INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

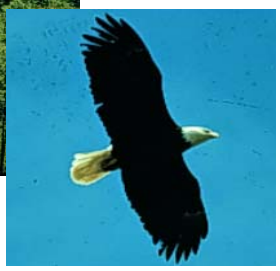
2001-2005

FORT STEWART AND HUNTER ARMY AIRFIELD, GEORGIA

ENVIRONMENTAL AND NATURAL RESOURCES DIVISION
DIRECTORATE OF PUBLIC WORKS

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN 2000-2005

FORT STEWART AND HUNTER ARMY AIRFIELD, GEORGIA



ENVIRONMENTAL AND NATURAL RESOURCES DIVISION
DIRECTORATE OF PUBLIC WORKS

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART/HUNTER ARMY AIRFIELD
964 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314-4328

REPLY TO ATTENTION OF

IMSH-ZA

SEP 1 4 2012

MEMORANDUM OF RECORD

SUBJECT: 2012 Review of Integrated Natural Resource Management Plan (INRMP) as to Operation and Effect

1. The INRMP for Fort Stewart and Hunter Army Airfield was approved by all parties (Installation, GA Department of Natural Resources (GA DNR), US Fish and Wildlife Service, National Marine Fisheries Service) in 2001. It was reviewed in 2007 and was found to be effective and not in need of major revision. A current review indicates that the INRMP continues to be effective in contributing to the conservation of natural resources on the Installation as intended by the Sikes Act. Furthermore, implementation of the INRMP is providing a conservation benefit to the following species listed as threatened or endangered under the Endangered Species Act:

a. Red-cockaded woodpecker (*Picoides borealis*)

b. Frosted flatwoods salamander (*Ambystoma cingulatum*)

c. Eastern indigo snake (*Drymarchon corais couperi*)

d. Wood stork (*Mycteria Americana*)

e. Shortnose sturgeon (*Acipenser brevirostrum*)

f. Atlantic sturgeon (*Acipenser oxyrinchus*)

2. Significant accomplishments from 2008-2012 include:

a. Increased the Installation's red-cockaded woodpecker (RCW) population from 279 potential breeding groups (PBGs) to 358 PBGs;

b. Provided 124 juvenile RCWs for translocation to critically small populations in cooperation with the US Fish and Wildlife Service and other partners;

c. Improved habitat conditions by conducting over 580,000 acres of prescribed burns, and over 25,000 acres of stand improvement thinnings;

d. Continued a long-term capture-recapture study of the eastern indigo snake. Since 2007, 85 eastern indigo snakes were captured, PIT-tagged and released (38 were new snakes and 47 were snakes that had been tagged previously). A total of 155 individual snakes have been PIT-tagged during the course of the study;

e. Reduced midstory using mechanical mowing and herbicide for the benefit of the gopher tortoise and eastern indigo snake on 860 acres;

f. Repatriated 159 juvenile gopher tortoises that had been collected as eggs from Fort Stewart and reared in the lab at Georgia Southern University;

g. Reduced midstory using mechanical mowing for the benefit of the RCW on 2,675 acres;

h. Conducted population surveys and supported research to expand knowledge of the ecology and management needs of the frosted flatwoods salamander;

i. Provided management and protection for a bald eagle nest that fledged five young in 2006-2012, contributing to the species' recovery and delisting. A new eagle nest discovered in 2010 fledged another five young in 2010-2012;

j. Ensured proper stewardship of over 90,000 acres of wetlands, which provide habitat for a variety of species, including wood storks, bald eagles, shortnose sturgeon, Atlantic sturgeon, and frosted flatwoods salamanders;

k. Coordinated with GA DNR regarding monitoring of Atlantic and shortnose sturgeon in the Ogeechee and Canoochee Rivers and provided assistance as needed;

l. Restored wiregrass on 826 acres and planted containerized longleaf pine on 475 acres;

m. Installation hunting and fishing opportunities are open to the public, supporting over 100,000 fishing attempts and 65,000 hunting attempts annually.

3. Mutual concurrence with the INRMP's operational effectiveness and benefit to listed species is affirmed by the signatures of the parties below. The parties will continue to review the INRMP on a regular basis, and will reconfirm their mutual concurrence at least once every five years.

Kevin F. Gregory
Colonel, US Army
Garrison Commander
Fort Stewart/Hunter Army Airfield, GA

14 SEP 12
(Date)

for Cynthia K. Dohner
Regional Director
Region 4
US Fish and Wildlife Service

Sandra Tucker, Field Supervisor
Georgia Ecological Services

4 Oct 12
(Date)

IMSH-ZA
SUBJECT: 2012 Review of Integrated Natural Resource Management Plan (INRMP) as to Operations and Effect

Dan Forster, Director
Wildlife Resources Division
Georgia Department of Natural Resources

03-13-13
(Date)

A.G. Woodward, Director
Coastal Resources Division
Georgia Department of Natural Resources

5/16/13
(Date)

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Marine Fisheries Services

(Date)

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-5048

REPLY TO
ATTENTION OF

Directorate of Public Works

U.S. Department of the Interior
Fish and Wildlife Service
ATTN: Sandra Tucker
4270 Norwich Street
Brunswick, Georgia 31520

Dear Ms. Tucker,

As you know, The Sikes Act requires military Installations, in coordination with the U.S. Fish and Wildlife Service and the appropriate state conservation agencies, to prepare an Integrated Natural Resource Management Plan (INRMP) to provide for sound stewardship of the natural resources on Department of Defense (DoD) lands. An INRMP for Fort Stewart and Hunter Army Airfield (FS/HAAF) was prepared and approved by all parties in 2001. In 2004, a comprehensive review and summary of accomplishments under the INRMP was also prepared. Both these documents were previously coordinated with your office, and are also provided on the attached CD attached for your reference.

Coordination between installation natural resource management staff and your office occurs on a regular basis, and this regular coordination has contributed greatly to the effective implementation of the INRMP. Section 607a(b)(2) of the Sikes Act stipulates that each INRMP "must be reviewed as to operation and effect by the parties thereto on a regular basis". In accordance with Army policy, revision of the INRMP is not required if this review indicates that the INRMP is providing conservation benefits as intended by the Sikes Act. Army policy does, however, direct installations to document the rational for such a determination in a memorandum reflecting the parties' mutual agreement.

The attached memorandum highlights some of the more significant conservation goals that have been accomplished under the current INRMP. These accomplishments lead us to conclude that the plan is operating effectively and is not in need of revision. Your review and concurrence/comment is requested. If additional information is needed, please contact Mr. Tim Beaty, DPW, Environmental Division, Wildlife Management Branch, at telephone (912) 767-7261. Your continued cooperation and assistance are appreciated.

Sincerely,

Michael W. Biering, P.E., CFM
Director, Public Works

2 Enclosures

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-5048

REPLY TO
ATTENTION OF

Directorate of Public Works

Dr. Roy Crabtree
Regional Administrator, SE Regional Office
National Marine Fisheries Service
263 13th Avenue, South
St. Petersburg, FL 33701

Dear Dr. Crabtree,

As you know, The Sikes Act requires military Installations, in coordination with the U.S. Fish and Wildlife Service and the appropriate state conservation agencies, to prepare an Integrated Natural Resource Management Plan (INRMP) to provide for sound stewardship of the natural resources on Department of Defense (DoD) lands. An INRMP for Fort Stewart and Hunter Army Airfield (FS/HAAF) was prepared and approved by all parties in 2001. In 2004, a comprehensive review and summary of accomplishments under the INRMP was also prepared. Both these documents were previously coordinated with your office, and are also provided on the attached CD attached for your reference.

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Sincerely,

Michael W. Biering, P.E., CFM
Director, Public Works

2 Enclosures

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-5048

REPLY TO
ATTENTION OF

Directorate of Public Works

Mr. Dan Forester
Director, Wildlife Resources Division
Georgia Department of Natural Resources
2070 U.S. Hwy. 278, S.E.
Social Circle, GA 30025

Dear Mr. Forester,

As you know, The Sikes Act requires military Installations, in coordination with the U.S. Fish and Wildlife Service and the appropriate state conservation agencies, to prepare an Integrated Natural Resource Management Plan (INRMP) to provide for sound stewardship of the natural resources on Department of Defense (DoD) lands. An INRMP for Fort Stewart and Hunter Army Airfield (FS/HAAF) was prepared and approved by all parties in 2001. In 2004, a comprehensive review and summary of accomplishments under the INRMP was also prepared. Both these documents were previously coordinated with your office, and are also provided on the attached CD attached for your reference.

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Sincerely,

Michael W. Biering, P.E., CFM
Director, Public Works

2 Enclosures

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-5048

REPLY TO
ATTENTION OF

Directorate of Public Works

Ms. Susan Shipman
Director, Coastal Resources Division
Georgia Department of Natural Resources
One Conservation Way
Brunswick, GA 31520

Dear Ms. Shipman,

As you know, The Sikes Act requires military Installations, in coordination with the U.S. Fish and Wildlife Service and the appropriate state conservation agencies, to prepare an Integrated Natural Resource Management Plan (INRMP) to provide for sound stewardship of the natural resources on Department of Defense (DoD) lands. An INRMP for Fort Stewart and Hunter Army Airfield (FS/HAAF) was prepared and approved by all parties in 2001. In 2004, a comprehensive review and summary of accomplishments under the INRMP was also prepared. Both these documents were previously coordinated with your office, and are also provided on the attached CD attached for your reference.

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Sincerely,

Michael W. Biering, P.E., CFM
Director, Public Works

2 Enclosures

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-5048

REPLY TO
ATTENTION OF

IMSE-STW-PWE 15 July 07

MEMORANDUM FOR RECORD

SUBJECT: Review of Integrated Natural Resource Management Plan (INRMP) as to Operation and Effect

1. The INRMP for Fort Stewart and Hunter Army Airfield was approved by all parties (Installation, GA Dept. of Natural Resources, US Fish and Wildlife Service, National Marine Fisheries Service) in 2001. It has been reviewed for operation and effect, and has been found to be contributing to the conservation of natural resources on the Installation as intended by the Sikes Act. Furthermore, implementation of the INRMP is providing a conservation benefit to the following species listed as threatened or endangered under the Endangered Species Act:

- Red-cockaded woodpecker (*Picoides borealis*)
- Flatwoods salamander (*Ambystoma cingulatum*)
- Eastern indigo snake (*Drymarchon corais couperi*)
- Wood stork (*Mycteria americana*)
- Shortnose sturgeon (*Acipenser brevirostrum*)

2. A comprehensive summary of accomplishments achieved under the INRMP was prepared in 2004 and is attached. Significant accomplishments from 2001-2006 include:

- Increased the Installation's red-cockaded woodpecker (RCW) population from 201 potential breeding groups (PBGs) to 279 PBGs;
- Provided 92 juvenile RCWs for translocation to other forests in cooperation with the U.S. Fish and Wildlife Service;
- Improved habitat conditions by conducting over 600,000 acres of prescribed burns, and approximately 25,000 acres of stand improvement thinnings;
- Completed habitat assessments for over 1300 potential flatwoods salamander breeding ponds in order to prioritize management efforts;
- Conducted population surveys and supported research to expand knowledge of the ecology and management needs of the flatwoods salamander and the indigo snake;
- Provided management and protection for a bald eagle nest that successfully fledged young every year, contributing to the species' recovery and delisting;
- Ensured proper stewardship of over 90,000 acres of wetlands, which provide habitat for a variety of species, including wood storks, bald eagles, shortnose sturgeon, and flatwoods salamanders;
- Tagged and monitored shortnose sturgeon (SNS) in cooperation with other state and federal agencies to learn more about their seasonal movements and management needs;
- Helped organize the Ogeechee River SNS Working Group to provide for effective inter-agency conservation efforts for the SNS.

3. Mutual concurrence with the INRMP's operational effectiveness and benefit to listed species is affirmed by the signatures of the parties below. The parties will continue to review the INRPM as to operation and effect on a regular basis, and will reconfirm their mutual concurrence at least once every 5 years.

Todd A. Buchs
Colonel, U.S.Army
Garrison Commander
Fort Stewart and Hunter Army Airfield, Georgia _____

Date

Sam D. Hamilton
Regional Director _____
Region 4
U.S. Fish and Wildlife Service _____
Date

Dan Forester
Director _____
Wildlife Resources Division
Georgia Department of Natural Resources _____
Date

Susan Shipman
Director _____
Coastal Resources Division
Georgia Department of Natural Resources _____
Date

Dr. Roy E. Crabtree
Regional Administrator _____
Southeast Regional Office
National Marine Fisheries Service _____
Date

IMSE-STW-ZA
SUBJECT: Review of INRMP as to Operation and Effect

3. Mutual concurrence with the INRMP's operational effectiveness and benefit to listed species is affirmed by the signatures of the parties below, and reflects agreement that the INRMP will continue to guide the Installation's natural resource conservation programs. The parties will review the INRMP as to operation and effect on a regular basis, and will reconfirm their mutual concurrence at least once every 5 years.

Todd A. Buchs
Colonel, US Army
Garrison Commander
Fort Stewart and Hunter Army Airfield, Georgia

Todd A. Buchs
7/15/07
Date

Sam D. Hamilton
Regional Director
Region 4
US Fish and Wildlife Service

Cynthia K. Dohner
9/11/07
Date

Dan Forester
Director
Wildlife Resources Division
Georgia Department of Natural Resources

Date

Susan Shipman
Director
Coastal Resources Division
Georgia Department of Natural Resources

Date

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Marine Fisheries Service

Date

IMSE-STW-ZA
SUBJECT: Review of INRMP as to Operation and Effect

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Todd A. Buchs
Colonel, US Army
Garrison Commander
Fort Stewart and Hunter Army Airfield, Georgia

Todd A. Buchs
7/15/07
Date

Sam D. Hamilton
Regional Director
Region 4
US Fish and Wildlife Service

Date

Dan Forester
Director
Wildlife Resources Division
Georgia Department of Natural Resources

Date

Susan Shipman
Director
Coastal Resources Division
Georgia Department of Natural Resources

Susan Shipman
9/13/07
Date

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Marine Fisheries Service

Date

— Already have —

GEORGIA
Coastal Resources Division

September 13, 2007

Mr. Michael W. Biering
Directorate of Public Works
Fort Stewart / Hunter Army Airfield
1587 Frank Cochran Drive
Fort Stewart, Georgia 31314-5048

RE: Consistency Determination of 2007 INRMP Review

Dear Mr. Biering:

Staff of the Coastal Management Program has reviewed your undated letter received July 30, 2007 and attached July 15, 2007 Memorandum for Record: Review of Integrated Natural Resource Management Plan (INRMP) as to Operation and Effect.

The Program concurs that the existing plan is operating effectively and is not in need of revision. The current plan is federally consistent to the maximum extent practicable with the applicable enforceable policies of the Georgia Coastal Management Program.

Please feel free to contact Kelie Moore or me if we can be of further assistance.

Sincerely,

Susan Shipman

Susan Shipman
Director

Enclosure

SS/km

cc: DNR/WRD

3. Mutual concurrence with the INRMP's operational effectiveness and benefit to listed species is affirmed by the signatures of the parties below. The parties will continue to review the INRPM as to operation and effect on a regular basis, and will reconfirm their mutual concurrence at least once every 5 years.

Todd A. Buchs
Colonel, U.S.Army
Garrison Commander
Fort Stewart and Hunter Army Airfield, Georgia

_____

_____

Date

Sam D. Hamilton
Regional Director
Region 4
U.S. Fish and Wildlife Service

_____

_____

Date

Dan Forster
Director
Wildlife Resources Division
Georgia Department of Natural Resources

Dan Forster

9-26-07

Date

Susan Shipman
Director
Coastal Resources Division
Georgia Department of Natural Resources

_____

_____

Date

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Marine Fisheries Service

_____

_____

Date

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Todd A. Buchs
Colonel, US Army
Garrison Commander
Fort Stewart and Hunter Army Airfield, Georgia

7/15/07
Date

for Sam D. Hamilton
Regional Director
Region 4
US Fish and Wildlife Service

9/11/07
Date

Dan Forster
Director
Wildlife Resources Division
Georgia Department of Natural Resources

9-26-07
Date

Susan Shipman
Director
Coastal Resources Division
Georgia Department of Natural Resources

9/13/07
Date

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Marine Fisheries Service

Date

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY FORCES COMMAND
1777 HARDEE AVENUE SW
FORT McPHERSON, GEORGIA 30330-1062

REPLY TO
ATTENTION OF

AFEN-EN

SEP 2 0 2001

MEMORANDUM FOR Commander, 3rd Infantry Division (Mechanized) and Fort Stewart (AFZP-DEV), 1557 Frank Cochran Drive, Fort Stewart, GA 31314-4928

SUBJECT: Approval of the Integrated Natural Resources Management Plan (INRMP)

1. Subject plan is approved for implementation.

2. For additional information, contact Mr. Stuart Cannon, DSN 367-5762, COMM 404-464-5762, or e-mail cannons@forscom.army.mil.

FOR THE COMMANDER:

JAMES E. DONALD
Major General, US Army
Deputy Chief of Staff for Personnel
and Installation Management

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT STEWART AND HUNTER ARMY AIRFIELD, GEORGIA

APPROVAL

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq.*) as amended.

Walter L. Sharp
Major General, U.S. Army
Commander, 3rd Infantry Division
(Mechanized) and Fort Stewart
Fort Stewart, Georgia

7/16/01
Date

for Sam D. Hamilton
Regional Director
Region 4
U.S. Fish and Wildlife Service

8/23/01
Date

for Dr. Joseph E. Powers
Acting Regional Administrator
Southeast Regional Office
National Marine Fisheries Service

08/07/01
Date

David Waller
Director
Wildlife Resources Division
Georgia Department of Natural Resources

9/5/01
Date

Duane Harris
Director
Coastal Resources Division
Georgia Department of Natural Resources

9/5/01
Date

James E. Donald
Major General, U.S. Army
Deputy, Chief of Staff for Personnel
and Installation Management
Fort McPherson, Georgia.

6 Sep 01
Date

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT STEWART AND HUNTER ARMY AIRFIELD, GEORGIA

PREPARED BY

Jones Technologies, Inc.
4425 Forbes Boulevard
Lanham, MD 20769

Gene Stout and Associates
4307 Crane Court
Loveland, CO 80537

FORT STEWART REVIEW

Tom Fry, Chief, ENRD
Tom Hilliard, Chief, Forestry Branch
Jerry Purcell, Supervisor, Timber Management
Jeff Mangun, Supervisor, Fire Management
Linton Swindell, Chief, Fish and Wildlife Branch
Emory Moore, Supervisor, Wildlife Management
Tom Bryce, Supervisor, Fisheries Management
Tim Beaty, Supervisor, Endangered Species
Dave McKivergan, Archeologist (Contractor)
George Harris, Environmental Specialist

Directorate of Public Works
Environmental and Natural Resources Division
Fort Stewart, Georgia 31314

Howard Bullard, Chief, Range Division
Jim Pearson, ITAM Coordinator (Contractor)
Drew Brown, ITAM Coordinator (Contractor)

Directorate of Training
Range Division
Fort Stewart, Georgia 31314

FORCES COMMAND REVIEW

Dr. Albert Bivings, Wildlife Biologist
Stuart M. Cannon, Forester

HQ, USAFORSCOM
ATTN: AFPI-ENE
Fort McPherson, GA 30330-6000

Ted Reid, Integrated Training Area Management Coordinator

HQ, FORSCOM
ATTN: AFOP-TE
Fort McPherson, GA 30330-6000

PREFACE

Fort Stewart Vision[1]

Fort Stewart and Hunter Army Airfield...
... World's premier heavy power projection platform;
... Home to trained and ready soldiers;
... In partnership with the community.

Fort Stewart, Georgia... heavy combat training second to none! Hunter Army Airfield... ready to project power, anywhere in the world!

Fort Stewart is the largest Army post east of the Mississippi. When the nation needs heavy forces, it calls on the nation's premier heavy rapid deployment force, the skilled professionals of the 3rd Infantry Division (Mechanized). Fort Stewart/Hunter Army Airfield provides the training to hone skills needed to win and survive on battlefields of the world.

The mission of Fort Stewart/Hunter Army Airfield has changed over the decades... from an anti-aircraft artillery training center in World War II and the Korean conflict... to adding tank training in the 1950s... to training Army aviators in the 1960s, ... to combined arms training in the early 1970s, ... to today's mission of training the equivalent of two heavy divisions from throughout the eastern United States. Training opportunities provided at Fort Stewart are first rate today, just as they have been over the decades.

This Integrated Natural Resources Management Plan is Fort Stewart/Hunter Army Airfield's plan of action for the care and wise use of the lands entrusted to the U.S. Army. The plan is for a five-year period, but the philosophy behind it is for a much longer period of time. Fort Stewart will conserve its biological diversity and make sound decisions regarding the use of renewable natural resources to support both the military mission and needs of the region.

Lands on Fort Stewart have been used to serve this nation's defense for well over half a century. This legacy is not taken lightly by those who use Fort Stewart today. This Integrated Natural Resources Management Plan is dedicated to the next generation of soldiers, their families, and other Americans who will use these lands and their natural resources.

[1] *Vision 2006*. Fort Stewart/Hunter Army Airfield (1996).

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT STEWART AND HUNTER ARMY AIRFIELD, GEORGIA

TABLE OF CONTENTS

EXECUTIVE REPORT

"We do not own this land; we are caretakers of the land and the plant and animal species that inhabit it. The American people entrust the land to our care, and we shall fulfill their trust. We shall conserve and protect these resources for the future."[2]

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on Fort Stewart/Hunter Army Airfield (AAF), Georgia from 2001 through 2005. The program conserves Fort Stewart/Hunter AAF land and natural resources and helps ensure compliance with related environmental laws and regulations. The Plan also helps ensure the maintenance of quality training lands to accomplish Fort Stewart/Hunter AAF's critical military mission.

Scope

This plan applies to organizations internal and external to Fort Stewart/Hunter AAF that are involved with, or interested in, the management or use of Fort Stewart/Hunter AAF lands and natural resources. Plan application includes active duty units, National Guard and Reserve components, directorates, private groups, and individuals. This INRMP is an integral part of the Fort Stewart/Hunter AAF Installation Master Plan.

Relationship to the Military Mission

Fort Stewart/Hunter AAF is responsible for the combat training of the equivalent of about two heavy divisions of U.S. Army soldiers stationed at Fort Stewart/Hunter AAF, across Georgia, and in other locations in of southeastern United States. The primary mission of Fort Stewart/Hunter AAF is to support and assist in training the 3d Infantry Division (Mechanized) to fight as required. It is also responsible for supporting non-divisional units training for their respective roles in combat. In addition, Fort Stewart/Hunter AAF has an area mission to provide support and services to other agencies, reserve forces, and installations within the prescribed area of responsibility (U.S. Army Corps of Engineers, 1990).

Fort Stewart is the largest Army installation east of the Mississippi River. Tanks, field artillery, helicopter gunnery, and small arms ranges can operate simultaneously on its vast acreage throughout the year. The long runway at Hunter AAF and world class facilities at the Port of Savannah help make Fort Stewart/Hunter AAF the Army's premier heavy, rapid deployment force (Fort Stewart/Hunter AAF, 1996).

This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The INRMP also describes natural resources recreational opportunities available to the Fort Stewart/Hunter AAF community, thus supporting the commitment to both Quality of Life and Communities of Excellence programs.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate Fort Stewart/Hunter AAF's military mission, nor does it replace any need or requirement for environmental documentation of the military mission at Fort Stewart/Hunter AAF.

[2] Robert M. Walker, Assistant Secretary of the Army, Testimony before Congress, July 11, 1995.

Environmental Compliance

This INRMP is required by the Sikes Act (16 U.S.C. 670a *et seq*.), Department of Defense Directive 4715.3 (*Environmental Conservation Program*), and Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*). This INRMP helps Fort Stewart/Hunter AAF comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, water quality, and wildlife management in general. This plan describes how Fort Stewart/Hunter AAF will implement provisions of AR 200-3 and local regulations, most notably Fort Stewart Regulation 385-14 (*Post Range Regulation)* and Fort Stewart Regulation 420-4 (*Hunting, Fishing, and Recreational Use*).

This INRMP has the signatory approval of the U.S. Fish and Wildlife Service. This signature approval includes agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP is considered informal consultation with regard to the Endangered Species Act. This INRMP assumes implementation of Endangered Species Management Plans (ESMP) (Fort Stewart Endangered Species Management Team, 1997; Georgia Cooperative Fish and Wildlife Research Unit, 1997), and any differences between provisions within the ESMPs and this INRMP will be resolved by the ESMP taking precedence.

The Sikes Act, as amended in November 1997, requires that INRMPs include:

- fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the plan;
- establishment of specific natural resource management goals and objectives and time frames for proposed action;
- sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- public access to the military installation that is necessary or appropriate for sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of applicable natural resource laws (including regulations);
- no net loss in the capability of military installation lands to support the military mission of the installation;
- regular review of this INRMP and its effects, not less often than every five years;
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement, and related activities in accordance with the INRMP;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish and wildlife.

Ecosystem Status

Fort Stewart contains about 158,678 acres of upland forest, 82,148 acres of forested wetlands, and 38,253 acres of clearings. Fort Stewart has a natural community of great interest, the longleaf pine-wiregrass community, and excellent examples are represented on the installation in significant acreage. Fort Stewart/Hunter AAF has a wide variety of flora and fauna, including five animal species federally-classified as threatened or endangered and another 37 plants and 26 animals in the "special concern" category.

Partnerships

This INRMP cannot be implemented by Fort Stewart/Hunter AAF alone. Fort Stewart/Hunter AAF is forging partnerships with various agencies to manage its natural resources. Major partners in the implementation of this Plan are the U.S. Fish and Wildlife Service, Georgia Department of Natural Resources, National Marine Fisheries Service, and the Natural Resources Conservation Service. Other partners in this effort include universities, other federal and state agencies, contractors, and private citizens.

Plan Components

This INRMP outlines goals and policies in five general areas: military readiness, stewardship, quality of life, compliance, and program integration. It describes Fort Stewart/Hunter AAF's military mission in general terms including the mission's impacts on natural resources. The Plan describes the installation's climate, land base, facilities, and natural resources, including a brief history of natural resources management on Fort Stewart/Hunter AAF. The Plan lists internal and external parties involved in implementation of this INRMP.

This INRMP emphasizes ecosystem management which is a departure from Fort Stewart/Hunter AAF's traditional multiple-use approach, consistent with recent changes in laws and Department of Army policies. Ecosystem management will continue to support the use of natural resources on Fort Stewart/Hunter AAF for both military and other human-related values and purposes. However, ecosystem management has an over-riding goal of protecting properties and functions of natural ecosystems.

This INRMP is organized to promote the management of lands and natural resources in an integrated manner. Ecosystem management chapters (12-18) deal with aspects of overall natural resources management: Inventory and Monitoring, Ecosystem Damage Prevention, Natural Resources Management, Research/Special Projects, Enforcement, Awareness, and Outdoor Recreation.

Within ecosystem management chapters are programs involving fish and wildlife management, integrated pest control, natural resources law enforcement, research programs, and conservation education. Additional chapters involve protection of cultural resources during natural resources management activities, the use of the National Environmental Policy Act (NEPA) to conserve natural resources, and unresolved/ biopolitical issues. A final chapter discusses specific measures to implement this plan.

Planned Major New Initiatives

This INRMP includes a description of ongoing natural resources programs and projects. Most of these will either be continued or completed. There are important new initiatives within this INRMP. These include the following:

- Continue implementing an ecosystem

management strategy.

- Continued implementation of the Integrated Training Area Management (ITAM) program.
- Manage forest lands to improve the capability to conduct military maneuver.
- Improve and more effectively use the geographic information system to allow better decisions regarding use and management of Fort Stewart/Hunter AAF natural resources.
- Continue manipulating the forest management program to meet requirements for red-cockaded woodpecker management, namely a growing season burn plan with a three-year rotation goal, increased timber stand improvement to favor longleaf pine, reliance on natural regeneration, and management to favor older-age longleaf pine.
- Rehabilitate damaged training lands and harden certain areas to better withstand training impacts.
- Develop and implement endangered species management plans.
- Enhance hunting and fishing opportunities by changing the access control system.
- Implement a system of Natural Resources Management Units that is used for all natural resources management programs.
- Complete the forest inventory and use its results for management decisions.
- Complete the wildlife habitat survey and use its results for management decisions.
- Restore the wiregrass component of the ecosystem in areas where it was once present.
- Develop a bobwhite quail management area to help reverse the declining trend in quail numbers.
- Enhance the management of the forest within the cantonment area for both productivity and aesthetic purposes.
- Comply with Department of Defense and Department of Army pest management initiatives via a management plan, pest controller certification, and reduction in the use of chemicals.
- Enhance fishing facilities.

There are some concerns about the following:

- training to standard while complying with more restrictive environmental statues and regulations;
- continue funding of the ITAM program by Headquarters, Department of the Army;
- not be able to comply with DOD pesticide reduction policy while controlling unwanted vegetation at training and recreational facilities;
- difficulty in obtaining harvest data from deer, feral hogs, and turkeys;
- declining level of natural resources law enforcement;
- effects of growing season burns on wildlife and vegetation;
- capability of sustaining hardwood mast production in upland forests; and
- the level of bureaucracy and cost associated with control of hunters and anglers.

Each of these issues is being addressed. None of these is in the “unresolvable” category. Dealing with tough issues is a sign of a progressive natural resources program.

Benefits and Costs

- **Military Mission Benefits:** Implementation of this Plan will improve the quality of training land. It will open more land to maneuver training. It will enhance mission realism through more options for training as well as more intensive planning of missions. It will improve the ability for

long range planning at Fort Stewart/Hunter AAF.

- **Environmental Benefits:** The Plan provides the basis for the conservation of natural resources. It will help reduce vegetation loss and soil erosion. It will reduce the potential for environmental pollution. It will provide for biodiversity conservation. Plan implementation will increase overall knowledge of the operation of Fort Stewart/Hunter AAF ecosystems through surveys and research.
- **Other Benefits:** Troop environmental awareness will be enhanced while training at Fort Stewart/Hunter AAF. Community relations and Fort Stewart/Hunter AAF's environmental image, internal and external to Defense, will be enhanced. Quality of life for the Fort Stewart/Hunter AAF community and its neighbors will be improved. Plan implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.
- **Costs:** This INRMP will cost about $35,904,000 dollars for the FY 01 - FY 05 period to implement. Funding will be primarily from revenues generated from the sale of hunting and fishing permits and timber products, and environmental funds.

Summary

This Integrated Natural Resources Management Plan will comply with environmental laws, conserve Fort Stewart/Hunter AAF's natural resources, improve the installation's relationship with the public, and enhance the military mission. This Plan will not resolve all existing and/or future environmental issues. It does, however, provide the guiding strategy, personnel, and means to minimize and work toward resolution of such issues.

1. GOALS AND POLICIES

Installation Mission[3]

Sustain a quality of life and installation support at the level necessary for division, non-divisional, tenant and reserve component units to accomplish their mission.

It is important to understand the relationship between the natural resources program and Fort Stewart/Hunter Army Airfield as a whole. A comparison of installation goals and goals of the natural resources program helps identify this relationship.

1-1 Fort Stewart Installation Goals

Fort Stewart/Hunter Army Airfield has six installation goals stated within *Vision 2006* (Fort Stewart/Hunter AAF, 1996):

Power Projection - Fort Stewart/Hunter Army Airfield is the world's premier heavy power projection platform. As part of the XVIII Airborne Corps, we provide a rapid armored force projection capability unmatched anywhere in the world. Continuous quality improvement to our ranges, facilities, and work force will maintain our position as the world-class benchmark for heavy force power projection well into the 21st Century.

Quality of Life - Our Quality of Life programs must be viewed as an investment toward attracting and retaining our soldiers, civilians and families: an essential component of our overall readiness. Quality of Life initiatives should grow from the best ideas from across the military and industry to improve the living and working environment for our soldiers, families and civilians.

Training Support - The installation role in this critical area is to provide effective, efficient and realistic training support to our units. Fort Stewart and Hunter Army Airfield must continue to optimize range operations, training aids, simulators, simulations, and devices. Our challenge is to find the right mix of training methods and resources.

Facilities/Infrastructure - The "health" of a city is often measured by the quality of its facilities and infrastructure. An overall sense of community and belonging is achieved when facilities are aesthetically designed and well maintained. Our challenge is to revitalize existing facilities, prioritize critical new construction and explore new ways of doing business.

Environmental Stewardship - The Fort Stewart and Hunter Army Airfield leadership recognizes our responsibility for protecting the environment. Our challenge is to fully integrate environmental considerations at every level on our installation. We will comply with all environmental laws, restore contaminated sites, take preventative measures, and conserve natural resources for future generations.

Optimize Resources - There is a need to break the mold of the self-sufficient "forts and outposts" of our past. In a period of significant resource constraints, we have looked towards re-engineering to prepare ourselves for the 21st Century. Our challenge is to optimize our resources to develop readiness-focused installations.

[3] *Vision 2006*. Fort Stewart/Hunter Army Airfield (1996).

1-2 Fort Stewart Natural Resources Goals

Army Environmental Vision Statement

The Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission.[4]

The Army's commitment to natural resources management is emphasized in Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), which requires that Integrated Natural Resources Management Plans (INRMP) be developed and maintained for all Army installations. Below are general Fort Stewart natural resources goals and policies used to attain them. These policies also serve as a checklist to monitor the success of the plan. Some policies fit more than one category. When this occurs, the most-fitting category was chosen. More specific objectives are included in chapters 12-20.

1-2a Military Readiness

Provide quality natural resources as a critical training asset upon which to accomplish the military mission of Fort Stewart.

- Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on Fort Stewart.
- Maintain quality training lands through range monitoring and damage minimization, mitigation, and rehabilitation.

1-2b Stewardship

Manage natural resources on Fort Stewart to assure good stewardship of public lands entrusted to the care of the Army.

- Use ecosystem management philosophies to protect, conserve, and enhance native fauna and flora with an emphasis on biodiversity enhancement.
- Monitor and manage soils, water, vegetation, and wildlife on Fort Stewart with a consideration for all biological communities and human values associated with these resources.
- Provide economic and other human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military training mission or other natural resources.
- Provide professional enforcement of natural resources related laws.
- Involve the surrounding community in the Fort Stewart natural resources program.
- Ensure the Fort Stewart natural resources program is coordinated with other agencies and conservation organizations with similar interests.

1-2c Quality of Life

Improve the quality of life of the Fort Stewart community and general public through high quality natural resources-based recreational opportunities.

- Provide high quality opportunities for hunting and fishing within biological and recreational carrying capacities of the resources.
- Provide high quality natural resources-based opportunities for other outdoor recreation, such as camping, picnicking, recreational shooting, and boating.
- Provide conservation education opportunities.

[4] Army Environmental Policy Institute. 1992. *U.S. Army Environmental Strategy into the 21st Century*. U.S. Government Printing Office 1993-747-677, 38 p.

1-2d Compliance

Comply with laws and regulations that pertain to management of Fort Stewart's natural resources.

- Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this Integrated Natural Resources Management Plan (INRMP) is predicated.
- Protect, restore, and manage sensitive species and wetlands.
- Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.
- Ensure Fort Stewart's natural resources program is consistent with the protection of cultural and historic resources.
- Implement this INRMP within the framework of Army policies and regulations.

1-2e Integration

Integrate elements of natural resources management into a single program which, in turn, is integrated into Fort Stewart's environmental and military training programs.

- Ensure the integration of, and consistency among, various activities identified within this INRMP.
- Integrate all land management activities to ensure compatibility of critical combat skills training and natural resources management.
- Ensure natural resources management is consistent with principles of Integrated Pest Management at Fort Stewart.
- Coordinate implementation of natural resources management with the overall Fort Stewart environmental program.
- Coordinate implementation of this INRMP with military training organizations.
- Provide command elements with information needed to make decisions which include natural resources related values.

1-3 Support of Installation Goals

Implementation of this INRMP will support the goals of Fort Stewart/Hunter Army Airfield. INRMP implementation will directly help accomplish the Environmental Stewardship goal. Implementation of this INRMP will help provide the military training lands needed to accomplish the Power Projection goal, and management of wildlife in particular and natural resources in general directly support the Quality of Life goal.

2. LOCATION AND BACKGROUND

2-1 Location

The Fort Stewart Military Reservation is located in the Atlantic Coastal Plain of southeastern Georgia, a region known as the "Coastal Empire." It comprises portions of Long, Liberty, Tattnall, Bryan, and Evans counties, and extends from the Ogeechee River (the Pamlico Marine Terrace) at elevations near sea level, westward to the edge of the Sunderland Marine Terrace at elevations of 120-180 feet. It is nearly rectangular, averaging 35 miles long by 18 miles wide, comprising 279,270 acres (MARCOA, 1995).

2-2 Satellite Installations

Hunter Army Airfield (AAF), approximately 35 miles northeast of Fort Stewart, is a 5,370-acre installation on the western edge of Savannah, Georgia. Hunter Army Airfield is approximately two miles wide by five miles long, with its long dimension running in a northeast-southwest direction. Most development is confined to the northeastern section (MARCOA, 1995).

2-3 Neighbors

Savannah, the "Cradle of Georgia" and the first planned city in North America, is Fort Stewart's largest neighbor. The post is 41 miles southwest of Savannah (MARCOA, 1995).

Savannah is a bustling, modern city with a population of 245,000. The City's Historic District is the largest in the nation and offers many unique retreats from the daily life at Fort Stewart. Recreational opportunities are numerous on Savannah's waterfront and beaches. As part of the 1996 Olympic Games at Atlanta, the entire yachting venue was held along Savannah's coastal waterway (Fort Stewart/Hunter AAF, 1996).

Industrial and shipping berths line the riverfront of Savannah, from Garden City to Causton Bluff. Savannah is the southeast's leading general cargo, foreign trade port between Baltimore and New Orleans, making it a vital link in the supply line for Fort Stewart/Hunter AAF (MARCOA, 1995).

Fort Stewart's nearest neighbor is Hinesville, a town of over 28,000, situated immediately outside the post's main gate. Fort Stewart is the town's largest industry. Between 1970 and 1990, Hinesville's population grew from 4,115 to 21,603 (Fort Stewart/Hunter AAF, 1996). Ties between Hinesville and Fort Stewart are close, with soldiers taking an active part in civic organizations and projects of Hinesville, while civic leaders are interested in post activities. There are two elementary schools on post, and Fort Stewart's high school students attend classes at one of the two high schools in Hinesville (MARCOA, 1995).

Glennville also adjoins Fort Stewart, but it is 19 miles from the main post. Glennville has a population of more than 4,000 and a diverse economy including agriculture and manufacturing. Other nearby towns include Midway, Claxton, Reidsville, Ludowici, Pembroke, and Richmond Hill (MARCOA, 1995).

2-4 Acreage and Acquisition

Fort Stewart comprises 279,270 acres. Virtually all of the land was obtained in 1941 and 1945 from many individual owners. Small adjustments to boundaries were common throughout the first 20 years of the installation's history.

2-5 Installation History

Originally known as Camp Stewart, the installation was activated in June 1940 as an Anti-aircraft Artillery Center and reached its peak strength of 55,000 men in August 1943. The installation served as a separation center for redeployed soldiers after World War II and became inactive shortly thereafter (MARCOA, 1995).

The Korean conflict necessitated the opening of Camp Stewart as the Third Army Anti-aircraft Artillery Training Center on August 10, 1950. Training of activated National Guard and Regular soldiers continued through 1953. Tank training was added in 1953, and the post was renamed Camp Stewart Anti-aircraft Artillery and Tank Training Center in 1954. Official ceremonies redesignating Camp Stewart as a permanent military installation were held on April 7, 1956, when it became Fort Stewart Anti-aircraft Artillery and Tank Training Center (MARCOA, 1995).

The next major buildup at Fort Stewart came in the fall 1961, during the Berlin Crisis. Army Reserve and National Guard units were activated and stayed on active duty at Fort Stewart until tensions eased in 1962. On October 22, 1962, when President Kennedy announced a blockade of all ships carrying offensive weapons to Cuba, an instant ready reserve of 19,000 men from the 1st Armored Division at Fort Hood was ordered to Stewart (MARCOA, 1995).

Prior to its acquisition by the U.S. Army, Hunter AAF was developed as a municipal airfield by the city of Savannah. Beginning in 1941, the Army used the airfield as an operational training and staging area for B-17 crews en route to Europe. The airfield was returned to municipal use in 1946, but was reclaimed by the U.S. Air Force in 1950 (Prentice Thomas and Associates, Inc., 1996).

America's growing involvement in Vietnam in 1966 created a demand for more aviators. An element of the U.S. Army Aviation School was relocated at Fort Stewart from Fort Rucker, Alabama. Helicopter gunnery courses and helicopter pilot training became the new mission of the post. To accommodate the increase in Army helicopter pilot training, the Army took control of the former Hunter Air Force Base in Savannah in April 1967 (Prentice Thomas and Associates, Inc., 1996). Fort Stewart, in conjunction with the new Hunter Army Airfield, became the U.S. Army Flight Training Center and began conducting the Accelerated Helicopter Training Program (MARCOA, 1995).

Advanced Helicopter Training for U.S. Army commissioned and warrant officer candidates was phased out as greater emphasis was placed on the Vietnamization program. Advanced Helicopter Training for Vietnamese Air Force students began in early March 1970, continuing until June 19, 1972. The Fixed Wing Initial Entry Course terminated at Fort Stewart in February 1971. With the de-emphasis of aviation training, the designation of Fort Stewart/Hunter AAF was changed from U.S. Army Flight Center and Fort Stewart to U.S. Army Garrison, Fort Stewart (MARCOA, 1995).

In 1972 Fort Stewart/Hunter AAF had a chance to demonstrate its capabilities as a combined arms training center. The U.S. Readiness Command at MacDill Air Force Base, Florida, conducted three joint training exercises (Brave Shield I, II, and III) at Stewart/Hunter that year. In 1972 and 1973 the 30th Infantry Division took part in experimental training tests at Fort Stewart to determine if units could come to combat readiness in six weeks instead of ten. In 1973, due to consolidation of the Army Flight Training Center at Fort Rucker, Alabama, Hunter AAF was placed in caretaker status (MARCOA, 1995).

Although not formally, the 1st Battalion (Ranger), 75th Infantry was activated at Fort Stewart on August 20, 1974. Hunter AAF reopened July 15 to accommodate the new units, and the 145th Aviation Battalion (Combat) from Fort Benning, Georgia arrived there August 28 to provide aviation support to the Rangers. The 609th Transportation Company and the 238th Aviation Company (Aviation Attack Helicopter) were also moved to Hunter AAF. They were soon joined by the Headquarters and Headquarters Company, the 110th Quartermaster Company of the 260th Quartermaster Battalion, and the 547th Medical Company (MARCOA, 1995).

The 1st Brigade, 24th Infantry Division (Mechanized) was formed at Fort Stewart on October 21, 1974 as part of the Army's 16-division concept. The 24th Infantry Division (Mechanized) was officially activated on September 21, 1975. The Division's 2nd Brigade was provisionally activated August 30, 1976, and was formally activated June 17, 1977 along with its battalions (MARCOA, 1995). In April 1996 the 24th Infantry Division (Mechanized) was reflagged as the 3d Infantry Division (Mechanized).

3. MILITARY MISSION

3-1 General

The primary mission of Fort Stewart is to support and assist in training the 3d Infantry Division (Mechanized) to fight as required. It is also responsible for supporting non-divisional units training for their respective roles in combat. In addition, Fort Stewart has an area mission to provide support and services to other agencies, reserve forces, and installations within the prescribed area of responsibility (U.S. Army Corps of Engineers, 1990).

Fort Stewart is the largest Army installation east of the Mississippi River, and is home of the 3d Infantry Division (Mechanized). The installation's great military value is due to its size, terrain, climate, and proximity to the East Coast and two deep water ports, Savannah, GA and Charleston, SC (MARCOA, 1995). Infantry, tanks, field artillery, helicopter gunnery, and small arms ranges can operate simultaneously on its vast acreage throughout the year. The long runway at Hunter AAF and world class facilities at the Port of Savannah help make Fort Stewart the Army's premier heavy, rapid deployment force (Fort Stewart/Hunter AAF, 1996).

Fort Stewart is the home of the 3d Infantry Division (Mechanized) with the following major units: 1st Brigade, 3ID(M); 2d Brigade, 3ID(M); 3ID Artillery; 3ID Support Command; 3ID Engineer Brigade; 3/7 Cavalry; 1/3 Air Defense Artillery, 103d MI BN; 123 Signal BN; 3d Military Police Battalion (Provisional); 24th Corps Support Groups; and the 3d Brigade, 3ID(M), which operates out of Fort Benning, but often trains at Fort Stewart.

The 48th Infantry Brigade (Mechanized) is the primary unit in the Georgia Army National Guard. It is headquartered at Macon, GA. Other National Guard units which train on Fort Stewart include the 218th Separate Infantry Brigade (Mechanized); 278th Armored Cavalry Regiment; and the 30th Separate Infantry Brigade (Mechanized).

Hunter Army Airfield has a primary mission to provide aviation support to the 3d Infantry Division (Mechanized) at Fort Stewart. Designated support functions include the testing, qualifying, and instruction of officers and enlisted personnel in aviation techniques and tactical operations. Hunter AAF additionally supports various non-divisional and military tenant activities to include the development and training of a portion of the Army's Rapid Deployment Force (U.S. Army Corps of Engineers, 1990).

Hunter AAF is home to units of the 3d Infantry Division (Mechanized) and non-divisional units. Major Division units at Hunter AAF are the 3d Infantry Division Aviation Brigade and the 924th Support Battalion (Aviation). Major non-Division units are the 260th Quartermaster Battalion and the 559th Quartermaster Battalion, which are part of the 24th Corps Support Group at Fort Stewart. Major tenant units include the 1st Battalion, 75th Ranger Regiment; 3d Battalion, 160th Special Operations Aviation Regiment (Airborne); 224th Military Intelligence Battalion; plus various aviation support elements (MARCOA, 1995).

As of December 1999, 15,110 soldiers were stationed at Fort Stewart (to include reserve components), supported by 2,989 civilian employees (to include non-appropriated-fund civilians and civilians associated with tenant activities). Hunter Army Airfield had a troop strength of 3,997 soldiers, with another 682 civilians. All together, there were 19,107 soldiers, 3,671 civilian employees, and 24,892

military family members for a total population of 47,670.

3-2 Effects of Military Mission on Natural Resources

The conservation of natural resources and the military mission will not be mutually exclusive.[5]

3d ID(M) units based at Fort Stewart have 3,392 wheeled and 2,056 tracked vehicles on-station. Installation forces include three mechanized infantry battalions, each with 54 Bradley Fighting Vehicles; three tank battalions, each with 58 M1A1 tanks; two field artillery battalions, each with 24 self-propelled 155mm howitzers; one air defense artillery with 30 Avenger Vehicles; one cavalry squadron, with 40 Bradleys, 22 tanks, and 8 OH-58D Kiowa Warrior helicopters, and one attack helicopter battalion with 18 AH-64 Apache attack helicopters (Elfner, 1996).

Fort Stewart is the only Army post east of the Mississippi River that is capable of training large mechanized forces. The installation is therefore used to train many other units not permanently stationed at Fort Stewart, particularly units of the National Guard and U.S. Army Reserve. These additional units effectively make the total training impact at Fort Stewart similar to two heavy divisions.

The nature of training so many heavy forces on one piece of land is that there are negative impacts to the land. It is a major challenge to conduct such massive military training while meeting the public (and Congressional) expectation of land stewardship. Important factors which must be considered with regard to stewardship include Fort Stewart's 30% wetlands, 51 cemeteries, 241 cultural resources sites, and the presence of threatened or endangered species.

Damaging effects of military missions come primarily from two sources, projectile impact and maneuver. Impact damage occurs within 19,985 acres of designated artillery, aerial gunnery, small arms, and explosive ordnance impact areas on Fort Stewart. Although this is the acreage currently being impacted, impact damage has occurred in other areas of the installation, particularly in the now inactive tank gunnery ranges. Munitions damage soil, vegetation, and wildlife upon impact. Wildfires are often caused by projectile impact, but these are seldom suppressed due to their location deep within the impact area. Wildfires are also caused by pyrotechnics, such as star clusters, smoke grenades, and tracers. These fires may be closer to borders, or outside, of impact areas and require suppression.

Vehicle maneuver damages soil and vegetation via equipment moving across the landscape. The extent of this damage is determined by many factors, including vehicle weight and the distribution of this weight, soil type, extent of soil wetness, vegetation, terrain, and the type of training mission involved.

3-2a Past and Current Military Mission Impacts on Natural Resources

Many suitable agricultural sites on the area had been cleared prior to the purchase by the Army. These sites were few and scattered in the southeast and northeast with numerous sites in the northwest. Woodlands were cut over one or more times, and recurrent fires kept the woodlands relatively open. During its early years, Fort Stewart was a woodland with open range for cattle. With decreases in people, hunting pressure, and other disturbance factors, game populations increased. Long range effects on wildlife were not so favorable. Openings seeded in, canopies of hardwood and pinelands closed, and important food plants were greatly reduced or eliminated, thereby reducing the

[5] AR 200-3, *Natural Resources - Land, Forest and Wildlife Management*, para 2-11.

wildlife carrying capacity of the land (DEH, 1992a).

The entire spectrum of training conducted by the 3d Infantry Division (Mechanized) is within wildlife habitat areas. Even the cantonment area and live fire impact areas encompass valuable wildlife habitat, to include songbird and protected species habitat. Old home sites scattered over the area are heavily utilized for bivouac sites (DEH, 1992a) and are also important sources of hard (live oak) mast.

Emphasis shifted to aviation training (fixed and rotary wing) in the 1960s, during the Vietnam conflict, to mechanized infantry training in 1970s. Initial effects of mechanization were beneficial, setting back plant succession. Wheeled and tracked vehicle traffic scarified the soil and provided seed beds for annual wildlife plants. However, the long term effect is not so favorable. Wildlife habitat is being damaged by soil disturbance, which inhibits water and nutrient transfer, affecting tree and other cover. Emphasis is being placed on renovation of areas damaged by military training (DEH, 1992a).

Soil damage is common on military reservations worldwide, especially where heavy mechanized training is a major activity. The area required for large-scale maneuvers by modern armies is considerable, and the few suitable facilities are subjected to intense training under rigorous time schedules. Training time and areas on which to train are in such demand that soils management has often been relegated to a low priority.

Soil condition on some installations has degenerated to the point where quality training is often not possible until reclamation is performed. Fort Stewart has not reached that point, but like numerous other installations, soils management needs to become a very high priority. At Fort Stewart, soils management is an important aspect of natural resource management. Hunter AAF is in much better condition, due to no maneuver training by armored units (DEH, 1993a).

A trend towards deforestation is apparent on the west side of the reservation. The loss seems to be due to two factors: (1) fielding of faster, heavier tracked vehicles (i.e., M1 tank and Bradley IFV) and (2) concentration of mechanized infantry training activities onto certain areas of the reservation as a result of competing land use (live fire danger zones, dedicated training areas, etc.) and poor trafficability in other areas. Rather than traveling on regularly maintained roads, tracked vehicles often parallel established roads in order to take advantage of concealment afforded by the forest canopy. Destruction of vegetation, including tree cover, eventually occurs as a result of continued use. The lack of tree cover makes the newly established trails less desirable, so traffic and associated damage continue to expand into adjacent areas. Recurrence of damage tends to outpace recovery, especially trees. Continued devegetation reduces the area's ability to support wildlife in general (DEH, 1992a). However, implementation of ITAM Environmental Awareness programs and Land Rehabilitation and Maintenance projects have halted de-vegetation in many areas.

Primary effects of a mechanized division on aquatic resources has been incidental silting and filling of several small streams adjacent to road crossings; draining of moist and wet sites for construction of range facilities, roads, etc.; accidental discharge of oil and other contaminants; and increased release of sewage treatment facility effluent into the Taylor's Creek/Canoochee Creek/Canoochee River system (DEH, 1992a).

Military use of fisheries resources (DEH, 1992a) include the following:

- Swim sites for Armored Personnel Carriers (APCs) and other vehicles in pond #28.
- Survival training fishing (all ponds and rivers).
- Operability tests and maintenance

checks of watercraft (ponds #10, #17, and #28 and Canoochee River).
- Deployment of pontoon bridges (Canoochee River, Pond #10, and Pond #21).
- Source of water for vehicles and water purification sites for soldiers (all ponds and rivers).
- Personnel swim/water safety training (all ponds and rivers).

None of these training activities have significant, long-term effects on aquatic resources on Fort Stewart.

Practically all roads on the installation cross wetlands at some point. Road construction and maintenance practices, especially on unimproved dirt roads, can have siltation and drainage impacts upon wetlands. Best Management Practices, as described in Section 14-2, Forest Management, are applicable to roads maintained by the DPW Roads and Grounds Section (DEH, 1993a) and ENRD Forestry Branch (DEH, 1992b).

Effluent from the water treatment facilities has a potential impact upon installation wetlands. Overflows from the Fort Stewart/Hinesville and DPW Industrial Wastewater Treatment Plants go into the Canoochee River. The potential exists to use wetlands to filter effluent and possibly sludge under certain conditions (DEH, 1993a).

Military maneuvers require large amounts of fuel which must be stored and often transported to field locations. The potential for large spills is present, and spilled fuels can cause large-scale, persistent damage to wetlands. Fort Stewart has a spill contingency plan and routinely handles fuel spills with minimum damage to the environment (DEH, 1993a).

The *Unit Leader's Handbook for Environmental Stewardship* (Department of Army, 1994) lists six primary consequences of intensive and continuous use of Army training lands:

- The loss of historical sites, vegetation, water resources, and wildlife.
- Diminished quality of available realistic training areas.
- Diminished operational security.
- Ineffective tactical operations.
- The creation of safety hazards to personnel and equipment.
- An increase in training, maintenance costs, and litigation.

On Fort Stewart, none of these have been significant in the long-term or on an installation-wide basis.

There are numerous positive effects of the military mission on natural resources. The most general, and most significant, is the Fort Stewart commitment to natural resources management, including minimizing and mitigation of military mission damage. This natural resources commitment is beneficial for both natural resources in general and people who use natural resources products.

Because of the virtual elimination of agricultural activities on Fort Stewart and the maintenance of massive tracts of land in forest cover as a result of the Army's land purchase, there has been a marked decrease in the volume of non-point source pollution of agri-chemicals and a net decrease in top soil loss (and overall stream siltation) compared to adjacent farm and developed land (DEH, 1992a).

The presence of Fort Stewart continues to preserve native ecosystems by preventing development and municipal expansion, and by ensuring that land uses are conducted in a manner that protects the environment. Natural resources considerations and safety demands associated with the training mission limit the extent of other potentially damaging land uses.

The success of Fort Stewart's conservation efforts is attested to by its diverse, self-sustaining natural resources. Providing effective military training and public land stewardship is a

significant challenge. Comparing natural resources on Fort Stewart with its neighbors and other public lands demonstrates that the Army at Fort Stewart is up to this challenge.

3-2b Future Mission Impacts on Natural Resources

It is difficult to quantify effects of future military missions on natural resources at Fort Stewart. If the mission remains essentially unchanged, mission impacts on natural resources will remain similar to those today.

The Fort Stewart/Hunter AAF "*Ten Year Range/Simulations Development Plan*" outlines planned changes in facilities (U.S. Army, 1996). Scheduled improvements to gunnery ranges are based on available funding and include: rebuilding firing berms and repairing firing positions; improving artillery firing points; and establishing a funded recurring maintenance program. Firing point improvements are designed to accommodate the M109A6 Paladin howitzer (Fort Stewart/Hunter AAF, 1996). Since these improvements are restricted to areas that are already intensively used, their impacts on natural resources should be minimal. Fielding the Paladin could result in greater impacts, however, due to differences in training doctrines and increased mobility compared to present artillery pieces.

Three Multi Purpose Training Ranges (MPTR) (FY 97-98, FY 99, and FY 01) are also included in the ten-year plan (Fort Stewart/Hunter AAF, 1996). Removal of trees and disturbance of soil associated with range construction will affect forest and wildlife resources in those few areas not overlaying existing facilities. These effects will be minimized using the NEPA planning process and the application of Best Management Practices.

By the end of the ten-year plan, a Precision Range Integrated Maneuver Exercise Course, offensive and defensive maneuver lanes for platoon and company maneuver training, a Combined Arms Live Fire Exercise maneuver area, and a Tank/Bradley Crew Proficiency Course will be operational (Fort Stewart/Hunter AAF, 1996). As mentioned above, construction will impact forest and wildlife resources, and there will be a vital need for adequate prior planning. However, properly designed and constructed maneuver lanes may minimize the impact of heavy tracked vehicles on wildlife habitats. Intensive disturbance of a localized area is more easily tolerated than less intensive damage over a more extensive landscape, provided facilities are properly sited.

The Army continues to face the challenges of reduced budgets, increasing environmental restrictions, and urban encroachment on its training areas. Future training will probably place more emphasis on simulators and simulations to augment live-fire training. An Improved Moving Target Simulator (IMTS) for training air defense units and an indirect fire system called GUARDFIST II are now open on Fort Stewart. Other planned simulation systems include the Close Combat Tactical Trainer, Platoon Gunnery Trainer, and Warfighter Simulation 2000 (Fort Stewart/Hunter AAF, 1996). These measures will not directly reduce the impacts on natural resources, but they will make it possible to achieve a higher level of training without increased natural resources impacts.

3-3 Effects of Natural Resources on the Military Mission

Military training is affected by limitations imposed by natural resources on Fort Stewart. Most of these limitations involve dense forests, wetlands, and endangered species, which are protected by Federal and State laws, Executive Order and Army policies.

There are concerns regarding the ability of the military to train effectively and meet the requirements for the recovery of the endangered

red-cockaded woodpecker (RCW). These concerns led to introduction of legislation to provide some leeway to military training with regard to this species in 1995. This legislation was later withdrawn.

This is not a significant issue at Fort Stewart. The installation sees the development of RCW habitat and training "habitat" as a very similar process. Both the RCW and trainers prefer open woodlands with little understory. Woodland thinning and regular prescribed burning are techniques which will benefit both the RCW and military training, a true "win-win" situation. There have been some negative effects on training with regard to avoiding RCW clusters. The 1996 revisions to the DA RCW Management Guidelines and Fort Stewart's draft Endangered Species Management Plan (Fort Stewart Endangered Species Management Planning Team, 1997) provide a significant level of relief from most of these effects. Section 13-4a describes these restrictions. Management efforts will continue to focus on reduction or elimination of training restrictions by emphasizing proactive conservation.

It is important that Fort Stewart do its part to keep the gopher tortoise from ever reaching the state where it is listed as threatened or endangered. This species is commensal with the threatened indigo snake. Much of the training on Fort Stewart is on sandy soils which are not good load-bearing soils as there are no other areas suitable for mechanized training. There could be environmental concerns regarding effects of heavy vehicular traffic on tortoise burrows.

A significant emphasis on training at Fort Stewart is for Middle-East deployment. This deployment theater has terrain that is basically unrestricted with regard to maneuver tactics. However, Fort Stewart terrain is very restricted ("no-go"), largely due to wetlands. Wetlands are distributed throughout Fort Stewart, and it is virtually impossible to plan maneuver training to avoid wetlands. Thus, wetlands are the most significant natural resources impediments to training on this installation. There are compliance reasons to protect wetlands, but wetlands are also a logistical obstacle to training in and of themselves. Wetlands are, very simply, tough environments in which to train mechanized units.

Military trainers make significant efforts to protect valuable forestry plantations and wildlife oak orchards throughout the reservation. Areas are plainly marked and are avoided except when training requirements make entry mandatory (as determined by DPTM) (U.S. Army, 1993). This conflict should be lessened as changes in forest management (Section 14-2) will eventually eliminate plantations with the change to a longleaf-wiregrass community.

No tank traps, foxholes, hull downs, tent drainages, or similar excavations are permitted on dams or emergency spillways (high water run-around) of water impoundments. Vehicle traffic on dams or spillways is confined to existing roads.

Many small (1-2 acre) wildlife clearings are scattered throughout the reservation, either as isolated clearings within the forest or as cultivated areas in larger (range) openings. While these areas are not off limits, they are protected from heavy vehicular traffic to the maximum extent possible, particularly when freshly plowed or in early development stages (U.S. Army, 1993).

Soldiers need to be aware of their environment, during both war and peace times. There are always rules of engagement, and planning and implementation of these plans must take these rules into account. Learning to plan around environmental restrictions helps develop a disciplined mindset that is a valuable asset to today's soldier. However, this must be balanced to avoid "negative training" from excessive constraints.

4. FACILITIES

4-1 Overview

Map 4-1a shows the general layout of Fort Stewart. The installation has over 3,000 buildings totaling over eight million square feet of space. Map 4-1b shows the general layout of Hunter AAF. Hunter AAF has over 800 buildings totaling over three million square feet (DEH, 1992d).

4-2 Training Ranges

Fort Stewart has 19,985 acres of impact areas. Firing ranges include 14 small arms ranges, eight dismounted live fire assault ranges, two tank/Bradley subcaliber ranges, five tank/Bradley gunnery ranges, one Mk-19 Qualification Range, three aerial gunnery ranges, one Demolition Range, one Close Quarter Battle Facility, one MOUT live fire facility, one AT/AP HE Range, three Ambush Lanes, 85 artillery firing points, four mortar points, four observation posts, and 10 Multiple Launch Rocket System launch points. Built-up training facilities are briefly described in Appendix 4-2.

4-3 Transportation System

Fort Stewart/Hunter AAF is adjacent to an excellent off-post transportation system of interstate and state highways. Interstate 95 is only 20 miles east of the Fort Stewart cantonment area and 15 miles northwest of Hunter AAF (Fort Stewart/Hunter AAF, 1996). Other nearby major thoroughfares include U.S. 17 and Interstate 16.

The Amtrak Rail System serves both Savannah and Jesup. A 6.5 mile rail spur provides a connection between Fort Stewart's cantonment area and a main rail line which runs along the east coast of the United States. This spur allows movement of assets via rail to Hunter AAF and to almost any embarkation point within the United States (Fort Stewart/Hunter AAF, 1996). Tracked vehicles and containers loaded at the Rail Marshaling Area on Fort Stewart can be rail-transported directly to dock side at the ports of Savannah, Brunswick, and Jacksonville.

There are 16 miles of track on Fort Stewart, linking the Marshaling Area, Container Handling Area, and the future Contingency Warehouse. Other rail assets on post include eight end-loading and one power (bi-level) ramps, four locomotive engines, as well as rail and box cars. The rail system at Hunter AAF has been upgraded to include ramps in the existing warehousing area adjacent to the Aviation Brigade Tactical Vehicle Maintenance Shop, as well as at the future Tactical Vehicle Maintenance Shop for the 559th Quartermaster Battalion and the 924th Support Battalion (Aviation). Hunter AAF rail lines extend to the Ammunition Supply Point and connect directly to the CSX main line along the western boundary of the installation (Fort Stewart/Hunter AAF, 1996).

The Port of Savannah is one of the major ports on the eastern seaboard and the tenth largest port in the country. Port facilities include container berths and container cranes capable of handling 45 containers per hour. The Port of Savannah also has gantry cranes with individual lift from 45 to 175 tons and tandem lifts to 275 tons. The Ocean Terminal features 10 berths totaling 5,988 linear feet and 83 acres of open storage space and about 37 acres of covered storage. Railcar switching services are provided by Norfolk Southern and CSX Transportation. Garden City and Ocean Terminals can accommodate lash mother ships and barge marshaling. Additional embarkation facilities including side, stern, and pivoting ramp roll-on/roll-off with crane and storage services are available at the Ports of

Brunswick, Georgia and Jacksonville, Florida. Both ports are linked to rail service by CSX Transportation and Norfolk Southern (Fort Stewart/Hunter AAF, 1996).

Hunter Army Airfield has the Army's longest runway at 11,000 feet, able to accommodate any aircraft in the Air Force fleet, including the C-5A Galaxy. This capability is critical to Hunter AAF's role as a "Power Projection Platform." Hunter AAF is able to deploy forces, such as the Rangers of the 1st Battalion, 75th Ranger Regiment, or armored forces of the 3d Infantry Division (Mechanized) anywhere in the world with minimal notice (MARCOA, 1995). The nearest commercial airport is located in Savannah.

4-4 Water Supply

Fort Stewart/Hunter AAF obtains its potable water from groundwater associated with the Floridan aquifer. This aquifer is beginning to exhibit salt water intrusion, indicating an overuse of water along the coast of Georgia and other states. It is likely that conservation plans will be required to reduce water use at Fort Stewart/Hunter AAF and other users along the coast. The U.S. Army Center for Public Works has been contracted to develop a Water Conservation Plan for Fort Stewart.

The Georgia DNR Environmental Protection Division (EPD) has identified Fort Stewart as one of the top ten water users in the southeastern region of Georgia. In April 1997, EPD developed an "Interim Strategy for Managing Saltwater Intrusion in the Upper Floridan Aquifer". This strategy requires that Fort Stewart develop a Water Management Plan. Currently, Fort Stewart and Liberty County are cooperating together in the development of a joint plan.

5. RESPONSIBLE AND/OR INTERESTED PARTIES

5-1 Fort Stewart / Hunter Army Airfield

5-1a Commanding General

The Commanding General, 3d Infantry Division (Mechanized) and Fort Stewart, is directly responsible for operation and maintenance of Fort Stewart, including implementation and enforcement of this INRMP.

5-1b Garrison Commander

The Garrison Commander is responsible for the training areas and facilities at Fort Stewart. In this capacity, he directs the Directorate of Public Works (DPW) that is the primary action agency with regards to construction and maintenance of facilities and protection and conservation of the installation's environmental and natural resources.

The Garrison Commander also oversees the Directorate of Training which supports the military training mission of the 3rd Infantry Division (Mechanized), the Directorate of Community Activities and Services (DCAS) which directs the recreational aspects of the installation, and the Directorate of Public Safety (DPS).

5-1b(1) Directorate of Public Works

Much of the responsibility for implementation of this INRMP is within DPW which acts as caretaker for the lands of Fort Stewart and Hunter Army Airfield (AAF).

5-1b(1)(a) Environmental and Natural Resources Division

The preparation and most of the implementation of this INRMP are the responsibilities of the Environmental and Natural Resources Division (ENRD), DPW at Fort Stewart. Within this Division are the following Branches: Environmental Branch, Fish and Wildlife Branch, and Forestry Branch. ENRD responsibilities include:

- Provide training for personnel involved in the management of Fort Stewart natural resources.
- Provide personnel and equipment support for repair, maintenance, and construction of natural resource facilities, if assessed for in-house accomplishment.
- Implement the Natural Resources Management Unit prescription process and coordinate prescriptions with Range Control and other affected organizations.
- Participate in the Training Support Quality Management Board (TSQMB).
- Ensure protection and wise management of wetlands.
- Ensure protection of the installation's cultural and historical resources.
- Implementation of the National Environmental Policy Act (NEPA).
- Plan and carry out fish and wildlife management tasks through biologically sound fish and wildlife management techniques.
- Provide expertise and support to the Installation Commander to ensure Fort Stewart compliance with restrictions set forth in the Endangered Species Act and other applicable laws.
- Set hunting season opening and closing dates, bag limits, and other regulations governing the harvest of fish and wildlife resources in cooperation with the Georgia Department of Natural Resources (DNR) and State Board of Natural Resources.
- Coordinate with State and Federal fish and wildlife management agencies in fulfillment of installation fish and wildlife management duties and responsibilities.
- Establish Fort Stewart policy on off-road vehicle use, as it relates to conservation of fish and wildlife resources.
- Coordinate with the Directorate of Public Safety to ensure Federal, State, and Installation laws and regulations pertaining to fish and wildlife are enforced.
- Develop information for hunters and anglers in coordination with the Public Affairs Office (PAO).
- Enforce Federal, State and Installation Laws and Regulations pertaining to fish and wildlife and boating safety.
- Record game kills and maintain other records to ensure compliance with season bag limits.
- Patrol woodlands and waters of the Installation to enforce laws and regulations pertaining to fish and wildlife, boating safety, endangered species, and illegal dumping.
- Execute warrants pertaining to the violation of laws and regulations regarding fish, wildlife, hunting, fishing, or boating.
- Seize and take possession of all wildlife or parts thereof taken, caught, killed, captured, possessed, or controlled in any manner or for any purpose contrary to the laws and regulations pertaining to fish and wildlife.
- Seize as evidence, without warrant, any device other than a boat, vehicle, or aircraft when there is cause to believe that its possession or use is in violation of any provisions of laws or regulations dealing with fish or wildlife.
- Arrest, if necessary, without arrest warrant any person found violating laws or regulations pertaining to fish, wildlife, hunting, fishing, or boating.
- Recommend and enforce suspension of

access privileges for specified infractions of laws and regulations pertaining to fish, wildlife, hunting, fishing, and boating.

- Coordinate with other State and Federal law enforcement agencies as necessary for the proper completion of wildlife law enforcement duties and responsibilities.
- Ensure Fort Stewart conservation law enforcement personnel are qualified and trained to carry out all assigned duties and responsibilities.
- Provide sufficient equipment to support the wildlife law enforcement program for proper completion of program responsibilities.
- Ensure the forest management supports the installation training mission
- Provide an even and sustained flow of products, as possible, through sound and scientific forest management
- Conduct an installation-wide forest stand inventory.
- Implement portions of the RCW Management and Recovery Plan pertaining to forest management.
- Implement and incorporate Recommended Best Management Practices for Forestry in Georgia.
- Implement prescribed burning guidelines to include longer ignition times and year-round burning.
- Plan and implement a prescribed burning program for integrated military and natural resources objectives.

5-1b(1)(b) Facilities Engineering Division

The Facilities Engineering Division, DPW is responsible for several programs which are integrated with activities within this INRMP. These include pest management, range road maintenance (not forest access roads), and grounds maintenance.

5-1b(2) Directorate of Training

The Directorate of Training's support of the implementation of the INRMP is vital to the success of this Plan. Below are the responsibilities of the Directorate of Training, relative to the implementation of this INRMP:

- Provide coordination and support for implementation of the ITAM program.
- Coordinate with and inform DPW of military training requirements and objectives as it relates to the implementation of short and long-term range development plans.
- Coordinate with DPW on upcoming training activities that may affect fish and wildlife resources.
- Provide a daily range and training area utilization schedule to Outdoor Recreation's Pass and Permit Office for control of hunters and anglers.
- Coordinate implementation of the *Ten Year Range Development Plan* with forest management by scheduling forestry activities.
- Participate in the area prescription process during reviews to ensure that prescriptions support training mission requirements.

5-1b(3) Directorate of Community Activities and Services

DCAS, via its Outdoor Recreation Division, manages the recreational aspects of this INRMP, especially the control of hunting and fishing activities. Below are specific responsibilities of Outdoor Recreation (DEH, 1992a):

- Print/issue Sikes Act Hunting and Fishing Permits.
- Issue recreational passes for hunting, fishing, and/or camping on the Reservation via the automated pass and permit system.
- Coordinate with Range Control to ensure that an up-to-date roster of closed areas and areas designated for hunting,

fishing and camping is available at all times.

- Assist DPW in the checking in of game.
- Plan and conduct group hunting and fishing activities.
- Plan and develop facilities relating to fish and wildlife resources, such as camping areas, game processing facilities, boat ramps, and fishing piers.
- Record daily the number of hunting and fishing passes issued and other use information obtained from the automated pass and permit system and provide DPW with an annual summary.
- Coordinate with the Safety Manager and DPW to establish a daily quota of hunters for each hunting area.
- Participate in national and state-sponsored hunting and fishing events such as National Fishing Week and National Hunting and Fishing Day.
- Establish, if necessary, a recreational hunting and fishing activity fee to defray costs associated with recreational activities not in support of issuing the Sikes Act Permit.
- Participate in the Training Support Quality Management Board (TSQMB).
- Oversee hunter safety training.

5-1b(4) Directorate of Public Safety

The Directorate of Public Safety (DPS) is responsible for enforcing laws and regulations on Fort Stewart/Hunter AAF, with the general exception of those laws regulations pertaining to hunting, fishing, and other natural resources recreation. Specific responsibilities of the DPS are listed below:

- Support the DPW by supplementing the conservation law enforcement function with Military Police on an as needed basis, as appropriate and available.
- Support in the prosecution of all hunting, fishing, and natural resources violations brought before the Federal Magistrate by DPW Conservation Law Enforcement officers.

5-1c Public Affairs Office

The Public Affairs Office is an important component of Fort Stewart's natural resources program, especially disseminating information critical to the success of the program. Below are specific responsibilities in this area (DEH, 1992a):

- Support Fort Stewart's natural resources program by providing news releases and public information notices of activities important to the Installation or community, to include designated National Hunting and Fishing Day and National Fishing Week.
- Assist DPW in promoting, publishing, and promulgating fish and wildlife information for public release in support of the Command, the resource, and the resource user.

5-1d Other Installation Organizations

Implementation of this Plan requires assistance of other directorates and organizations on the installation. Such organizations include the Directorate of Logistics (supply and transportation), Directorate of Resource Management (budget, personnel, and equipment authorizations), Directorate of Contracting (purchasing), and Staff Judge Advocate (legal assistance)

5-2 Other Defense Organizations

5-2a U.S. Army Forces Command

Forces Command (FORSCOM) will, per AR 200-3, assist Fort Stewart with development and implementation of conservation programs. FORSCOM has review/approval authority for this INRMP. FORSCOM provides funding to complete much of this Plan.

5-2b Army Environmental Center

The Army Environmental Center (AEC), located at Aberdeen Proving Ground, Maryland, provides oversight, centralized management, and execution of Army environmental programs and projects. It has support capabilities in the areas of NEPA, endangered species, cultural resources, ITAM, environmental compliance, and other related areas.

5-2c Corps of Engineers

The U.S. Army Corps of Engineers, Savannah District Office, assists Fort Stewart by administering contracts for outside or other agency support. It also is responsible for issuing wetland permits in accordance with Section 404 of the Clean Water Act. The Corps of Engineers has an office on Fort Stewart, partially due to the workload associated with administration of timber sales contracts for the installation.

5-2c(1) Waterways Experiment Station

Waterways Experiment Station (WES), a Corps of Engineers laboratory, has considerable expertise in wetlands and their management, as well as management of sturgeon. As such, WES is available to assist Fort Stewart with wetlands management, especially mitigation, as well as implementing the shortnose sturgeon Endangered Species Management Plan.

5-2c(2) Construction Engineering Research Laboratories

Construction Engineering Research Laboratories (CERL), a Corps of Engineers laboratory, assisted with early implementation of ITAM on Fort Stewart. CERL is now using Fort Stewart as a study for various research projects involving natural resources. Ongoing projects include effects of CS gas and other military training on endangered species and a sedimentation study.

5-2d U.S. Army Environmental Awareness Resources Center

The Environmental Awareness Resource Center specializes in providing material for the Environmental Awareness program within ITAM. Fort Stewart may use this support during 2001-2005 as it implements its ITAM program.

5-2e U.S. Army Biomedical Research and Development Laboratory

The Army Biomedical Research and Development Laboratory is evaluating the distribution and effects of Lyme disease, and Fort Stewart is a study site. This study includes the collection of ticks from the installation.

5-2f Topographic Engineering Center

The Topographic Engineering Center has assisted with implementation of the geographic information system at Fort Stewart. This assistance was provided through the Installation Conservation Assistance Program, which is operated by AEC.

5-3 Other Federal Agencies

5-3a U.S. Department of Interior

5-3a(1) U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS), U.S. Department of Interior, has a field office at Brunswick, Georgia which provides technical advice to Fort Stewart for the management of its natural resources, particularly endangered species. Department of Army Regulation 200-3, Chapter 11, dated 28 February 1995, provides cooperative guidance to be followed by Fort Stewart with the U.S. Fish and Wildlife Service regarding endangered species management on Army installations.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. This INRMP supersedes the *Cooperative Management Plan for Conservation*

and Development of Fish and Wildlife Resources on Fort Stewart/Hunter Army Airfield (DEH, 1992a). Appendix 5-3a contains specific items of agreement among the USFWS, DNR, and Fort Stewart, as required by the Sikes Act.

5-3a(2) U.S. Geological Survey

The U.S. Geological Survey (USGS), Biological Resources Division, operates a Cooperative Fisheries Unit at the University of Georgia. Fort Stewart has used this Cooperative Unit to assist in preparing its shortnose sturgeon endangered species management plan (1997). USGS also monitors water quality in Canoochee River and Canoochee Creek under contract with Georgia DNR, Environmental Protection Division.

5-3b U.S. Department of Agriculture

The U.S. Department of Agriculture (USDA) is interested in certain diseases that might affect livestock. Therefore, Fort Stewart cooperates with USDA with the collection of blood samples from harvested feral hogs to check for brucellosis and pseudorabies.

5-3b(1) U.S. Forest Service

The Forest Service, USDA is available to provide forestry insect and disease assistance under certain circumstances. The Forest Service has experimental plots on Fort Stewart as part of a study on the effects of growing season fires, to include a 2-3 year smoke study. The Forest Service also operates an annual southern pine beetle / gypsy moth program with Fort Stewart cooperation.

5-3b(2) Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS), USDA has conducted soil surveys of Fort Stewart and Hunter AAF. More recently, NRCS has assisted with various planning efforts, including plans for wetlands revegetation, erosion control mitigation on Pond 26, and the design of an emergency spillway. NRCS provides support to the Land Rehabilitation and Maintenance program along with the DPW Engineering Planning and Services Division (ESPD) and the DPW ENRD.

5-3c U.S. Department of Energy

The Department of Energy (DOE) is responsible for monitoring any effects of the operation of the Savannah River Plant. As part of this monitoring, DOE collects tissue samples from deer on Fort Stewart to test for radioactivity.

DOE also coordinates the Oak Ridge Institute of Science and Education (ORISE). ORISE involves 88 colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, post graduates, and associate degree graduates with opportunities to gain experience in their respective fields by working on military installations (and other areas). Fort Stewart uses ORISE assistance in many natural resources areas.

5-3d National Marine Fisheries Service

The National Marine Fisheries Service, a subdivision of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, is responsible for administering the Endangered Species Act regarding marine animals. Fort Stewart has consulted with the National Marine Fisheries Service regarding the shortnose sturgeon, and the Service has responded with a concurrence indicating that the military mission is not likely to adversely affect this animal. The Service has reviewed the shortnose sturgeon management plan.

5-4 State Agencies

5-4a Georgia Department of Natural Resources

The State of Georgia, functioning through the Director, Georgia Department of Natural Resources (DNR), provides limited technical advice and assistance if funds are available and priority warrants.

5-4a(1) Wildlife Resources/Coastal Resources Divisions

The Wildlife Resources Division is the primary support division within DNR for implementation of this INRMP. Much of this support has been in fisheries. DNR still supplies some fish for stocking lakes on Fort Stewart, and the Fisheries Management Section takes the investigative lead on fish kills occurring in installation streams and rivers, with assistance provided from Fort Stewart's Fish and Wildlife Branch. The State also conducts a Ogeechee River creel survey and an Ogeechee River fish population study.

Since 1990 Fort Stewart and Georgia DNR have entered into annual agreements to sponsor a Kid's Fishing Event (KFE) as part of National Fishing Week. The State provides catfish under the condition that Fort Stewart feeds the fish and opens the designated pond for the fishing event. This will be an annual event as long as both parties desire to hold the event.

DNR assistance is also provided in the trapping and relocating of nuisance alligators, through a specified State-licensed trapper. The Game Management Section provides limited deer herd management assistance and information on deer from coastal plain management areas for comparison purposes. The Georgia Natural Heritage Program is within the Wildlife Resources Division. Fort Stewart is a stocking site for RCWs that are translocated from private lands by the DNR.

In addition, DNR's Coastal Resources Division (CRD) provides limited support, primarily in the area of shortnose sturgeon technical assistance. The CRD is the principle investigative state agency for sturgeon conservation and management. This agency served as a reviewer for the Shortnose Sturgeon Endangered Species Management Plan (TAB B).

The Wildlife Resources Division, DNR is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. This INRMP supersedes the *Cooperative Management Plan for Conservation and Development of Fish and Wildlife Resources on Fort Stewart/Hunter Army Airfield* (DEH, 1992a). Appendix 5-3a contains specific items of agreement among the DNR, USFWS, and Fort Stewart, as required by the Sikes Act.

5-4a(2) Environmental Protection Division

The Environmental Protection Division, DNR is interested in water quality, including that of Fort Stewart and Hunter AAF. The Division has switched its limited statewide annual water quality investigations toward detailed, basin-by-basin studies. From 1997-1998, EPD established a watershed monitoring initiative for the Canoochee, Ogeechee, and Savannah River basin. Periodic monitoring will continue throughout the next decade. Fort Stewart may be asked to provide assistance as a watershed stakeholder, as appropriate, in this long-term initiative.

5-4b Georgia Forestry Commission

The Commission is responsible for suppression of forest fires on privately-owned lands located within counties surrounding Fort Stewart/Hunter AAF. The Commission also has the right to take any action necessary to suppress fires within one-quarter mile of installation boundaries which endanger any lands beyond the installation boundaries. The Commission shall render assistance to Fort Stewart/Hunter AAF,

when requested, in the suppression of fires which endanger any private land of the State of Georgia, when personnel and equipment are available (Anonymous, 1967).

5-5 Surrounding Municipalities

The proximity of Savannah precludes prescribed fire on Hunter AAF. This, in turn, is resulting in the establishment of climax forest on the installation. Fort Stewart worked with the City of Savannah to develop a flood control basin on Hunter AAF to standards where it may be usable for fishing. This project is ongoing. Communities that are either directly adjacent to or in proximity of Fort Stewart are positively affected by natural resources management on Fort Stewart. The installation provides excellent opportunities for general public hunting and fishing. There are no significant conflicts between natural resources management on Fort Stewart and its surrounding community.

5-6 Universities

Expertise from universities has provided specialized expertise to manage natural resources on Fort Stewart. The University of Georgia has used Fort Stewart as a study site for graduate studies on numerous species and habitats, and Georgia Southern University is conducting three Legacy Act projects for Fort Stewart, as described elsewhere in this INRMP. It is anticipated that some Fort Stewart ORISE personnel (Section 15-2b) may elect to get advanced degrees at nearby universities upon completion of their ORISE duties, and they are likely to use Fort Stewart as a study area.

Fort Stewart is a favorite field trip site. Georgia Southern University, the University of Georgia, Armstrong Atlantic State University, and Savannah State University use the post to teach first-hand knowledge of wetlands and longleaf pine-wiregrass ecosystem functionalities.

The Center for Ecological Management of Military Lands (CEMML) at Colorado State University is helping Fort Stewart implement its ITAM program. CEMML has provided personnel assistance for GIS and LCTA implementation.

5-7 Contractors

Fort Stewart uses contractors for many programs associated with natural resources, including INRMP preparation, forest inventory, helicopter and pilot for prescribed burning, NEPA documentation, boundary marking of RCW clusters, and pond dam repair. This source of expertise will continue during 2001-2005 as needed.

5-8 Other Interested Parties

The Savannah Science Museum uses Fort Stewart for collection of non-listed reptiles and amphibians. The Fernbank Science Center in Atlanta collects non-listed wildlife and plant species for museum displays. Both organizations must obtain annual permission for these collections.

The National Wild Turkey Federation has assisted with planting chufas on Fort Stewart, and this may continue during the next five years. The Nature Conservancy (TNC) completed a comprehensive floral and faunal survey of Fort Stewart in 1994. TNC is available to act as an objective third party to help resolve conflicts regarding management of Fort Stewart/Hunter AAF natural resources.

6. HISTORY OF NATURAL RESOURCE MANAGEMENT

The Installation Forestry Program was initiated in the early 1950s, and was soon followed by the Fish and Wildlife Program. Specialized programs for dealing with wetlands and endangered species were added later, and in 1990 the entire natural resources program was restructured to undertake ecosystem management (Fort Stewart/Hunter AAF, 1996).

6-1 Forest Management

Prior to the Army's purchase of land for Camp Stewart in 1941-42, lands were inhabited by a small rural population of farmers, turpentiners, and cattlemen. Small farms were scattered throughout and ranged in size from less than an acre to several thousand acres. Fields were cultivated for cotton, corn, and tobacco. Forest land was utilized for timber, naval stores, and livestock grazing. Frequent fire was a principal tool, and longleaf pine dominated forested uplands. Much of the timber was cut just before landowners were relocated outside the reservation (DEH, 1992b).

Logging and prescribed burning have been significant factors of woodland management since acquisition. Most timber harvesting has been selective cutting, emphasizing retention of high quality trees at about 70 square feet of basal area per acre (DEH, 1992b).

Since 1928 Hunter AAF has been under various civilian and military jurisdictions. Forest management has not been intensive at Hunter AAF, since the City of Savannah has grown up around the facility. Timber harvesting has been primarily clearcutting for construction projects. Prescribed burning has not been conducted due to smoke concerns (DEH, 1992b).

The 1992 forest management plan for Fort Stewart and Hunter AAF (DEH, 1992b) defined purposes of the plan as follows:

- to establish policies, objectives, guidelines, responsibility, resources, and time lines for the scientific management of forest resources.
- to plan, schedule, and implement management and to utilize the 285,000-acre Fort Stewart/Hunter AAF forest resources to accomplish the following objectives:
  - to enhance military training opportunities and ensure compatibility with wildlife conservation objectives.
  - to provide for a sustained yield of forest products.

The plan also established the general goal of providing an Army training environment that is compatible with endangered species protection and conservation, and utilization of standing timber, not to the maximum extent possible for any single interest, but to be compatible with both endeavors.

Fort Stewart supports one of the largest forest resources programs in the Department of Defense. The Biological Opinion issued on the *Effects of Military Training and Associated Activities at Fort Stewart and Hunter Army Airfield on Endangered and Threatened Species* (USFWS, 1992) provided requirements for the management of the red-cockaded woodpecker which significantly changed the forest management program on Fort Stewart. The primary ecological goal of the program is the maintenance and conversion of upland sites to a longleaf pine-wiregrass ecosystem. This is a significant departure from a program with monetary goals before 1992. Longleaf pine conversion uses year-round burning and thinning and essentially eliminates plantation-type

forestry, except its relatively short-term use for special cases of longleaf conversion. This change in emphasis is consistent with the forestry objective of supporting the military mission since burning and thinning improve maneuverability for soldiers training on Fort Stewart. The forest inventory, completed in 1998, is a major step for enhanced forest management during 2001-2005.

6-2 Fish and Wildlife Management

Wildlife management activities have occurred on Fort Stewart/Hunter AAF since the early 1950s. Early activities were conducted by the Fish and Wildlife Association with assistance from the Forestry Section. Work was financed by membership fees. The Association conducted predator control in the early 1950s. Other efforts consisted primarily of planting wildlife foods such as rye and lespedeza. Access was originally limited to assigned military personnel, civilians employed on post, and their guests. The post was opened to all licensed hunters and anglers in 1959.

Efforts to improve and stabilize the program resulted in employment of a Wildlife Director in October 1961. Beginning in 1963, the U.S. Fish and Wildlife Service initiated a cooperative program with Fort Stewart to provide fisheries management technical assistance under the Sikes Act.

In 1979 a permanent Fish and Wildlife Specialist position and a permanent technician position were created to support the wildlife management program. The development of a CALFEX range project in 1980 dictated the beginning of intensive red-cockaded woodpecker (RCW) management. In 1980 responsibilities for game management and non-game/endangered species management were separated, and a permanent technician was hired for strictly endangered species work. In January 1981 a permanent wildlife biologist position was established to oversee game management on the Installation.

In 1981, federal funding for support of the Sikes Act was not renewed by Congress, thereby eliminating assistance from USFWS wildlife biologists and reducing the level of fisheries assistance from the USFWS to supplying fish. Quarterly and annual technical visits by USFWS fisheries biologists were discontinued. Approval was given in 1983 for the establishment of a permanent fisheries biologist position at Fort Stewart, which was filled in February of 1984.

In 1984 the Fish and Wildlife Section was divided into three management areas: game, non-game/endangered species, and fisheries. In February 1985 the Fish and Wildlife Section was elevated to Branch status, coming out from under the Land Management Branch. In October 1985 DPW reorganized, creating the Natural Resources Management Division. The Fish and Wildlife Branch was moved into this new Division. By March 1986 the endangered species program had grown in scope and effect, warranting the establishment of a full-time biologist position.

In August 1991 a permanent biological technician position was authorized to support the endangered species program. That same month the installation submitted a Biological Assessment and entered into formal consultation with the U.S. Fish and Wildlife Service regarding the On-Going Mission at Fort Stewart and Hunter AAF. In September 1991 Fort Stewart entered into a cooperative agreement with The Nature Conservancy to survey for federal and state threatened/endangered species, which was completed in 1994. In July 1992 the U.S. Fish and Wildlife Service issued a Jeopardy Opinion regarding the RCW at Fort Stewart. Fort Stewart incorporated the reasonable and prudent alternatives provided by the USFWS into the RCW Recovery and Management Plan at that time. In late FY 92 the Natural Resources Management Division and Environmental/Energy Office were merged to create a single division, the Environmental and

Natural Resources Division, to more effectively integrate and coordinate related activities (DEH, 1992a).

6-3 Land Management

Fort Stewart did not have a land management program, in terms of a specific planned program, before 1992. Tasks normally within land management programs were accomplished by other Fort Stewart organizations, especially the Forestry Branch. The Fort Stewart Land Management Plan (DEH, 1993a) outlines the following objectives of the plan:

- Ensure that the terrain of Fort Stewart/Hunter AAF supports military training activities.
- Protect and, where possible, improve the quality of land and water resources.
- Protect land investments from depreciation by adopting land use practices based upon soil capabilities.
- Prevent installations from contributing to wetlands destruction through erosion; protect wetlands and flood plains, and their functions.
- Improve the appearance of installations and facilities through the preservation of natural terrain and vegetation by appropriate new plantings.
- Conserve populations of threatened and endangered plants and their habitats.
- Apply pest management practices through an environmentally safe and effective program.
- Preserve and protect archeological, historical, and architectural resources from damage or destruction.

The 1993 Land Management Plan (DEH, 1993a) for Fort Stewart/Hunter AAF included the following areas of responsibility:

- Protection, Management and Enhancement of:
  - grounds and landscaping - soils testing, planting fertilizing, mowing, dead tree and shrub removal, policing of trash, litter removal, mulching, pruning, ditch and canal maintenance.
  - wetlands and floodplains
  - soils and vegetation
  - archaeological, cultural, and architectural sites
  - rare, threatened, and endangered plants
- Pest Management
- Training Area Monitoring (Land Condition Trend Analysis)

The ITAM program was initiated at Fort Stewart in FY 91 (DEH, 1992a). The LCTA program was implemented in 1992, and the GIS was installed in 1993. Since then, proponency for the ITAM program has been transferred from DPW to G3/DPTM. Section 11-4 summarizes initial implementation of this program.

7. PHYSICAL NATURAL RESOURCES AND CLIMATE

7-1 Topography

Topographic features are very limited on Fort Stewart/Hunter AAF. Fort Stewart rises from near sea level in the eastern portion of the installation to 183 feet along its western border. Most of the land is less than 33 feet above sea level with slopes less than 3 percent (The Nature Conservancy, 1995). Relatively small changes in elevation have significant effects on vegetation, with wetlands and hardwood bottoms in lower

areas and upland pines and scattered hardwoods at higher elevations.

7-2 Geology

Known geology of coastal Georgia dates to the Paleozoic epoch and extends to 4000 meters below the ocean floor surface. The sedimentary section consists of 700 meters of Paleozoic rocks of Late Devonian age overlain by 2300 meters of Early and Late Cretaceous sediments from the Mesozoic era. Cretaceous rocks are overlain by 1000 meters of Cenozoic sediments, most of which are Eocene in age (Prentice Thomas and Associates, Inc., 1996).

The geomorphology of the Fort Stewart/Hunter AAF area includes marine terraces formed by fluctuations in sea level during the Pleistocene. These features are depositional and, in some cases, erosional surfaces comprised of marine sediments ranging in age from the Pliocene to the Holocene. These shore terraces were formed by wave action from the bluff at the shoreline to some distance offshore. As sea level fell and rose in response to glaciation, successive, parallel terraces were formed by the same process, each one shoreward of the earlier one. Of the nine Pleistocene terraces that occur in Georgia, the Sunderland, Wicomico, Penholoway, Talbot and Pamlico are present on Fort Stewart (Prentice Thomas and Associates, Inc., 1996).

7-3 Petroleum and Minerals

Fort Stewart/Hunter AAF contains no known petroleum or minerals of commercial value with exception of sand, clay, and gravel.

7-4 Soils

In coastal Georgia, drainage from three physiographic provinces, the Blue Ridge Mountains, Piedmont Plateau and Coastal Plain, affect the composition of alluvial deposits. Near Fort Stewart/Hunter AAF, the parent material for all soils is water-lain sediments deposited during and prior to the Pleistocene (Prentice Thomas and Associates, Inc., 1996).

As a result of the mild climate, freezing and thawing cycles have little effect on soil weathering. Much of the rainfall percolates through the soil and moves dissolved and suspended materials downward. As a result, most soils on uplands are highly weathered, leached, strongly acid, and low in natural fertility and organic matter (Prentice Thomas and Associates, Inc., 1996).

Soil surveys have been completed for both installations by the USDA Soil Conservation Service, now the Natural Resources Conservation Service. Although adequate for general use, the surveys are somewhat inaccurate. Site-specific soils testing may be required for grounds maintenance, turf management, facility construction, or other intense land use.

Most soils on the two installations are classified as sandy and infertile. The majority of soils at Hunter AAF are in the Cape Fear, Ellabelle loamy sand, Ocilla, and salty tidal marsh series. At Fort Stewart, Ellabelle loamy sand, Ogeechee, Pelham, Stilson, Rutlege, Leefield, and Mascotte are common soil series. Many of these series are well suited to the production of forest trees, and are unsuitable to cross-country movements of heavy equipment during wet periods (DEH, 1993a).

The Nature Conservancy (1995) lists Fort Stewart/Hunter AAF soils according to their drainage characteristics. Below is a summary of soils on Fort Stewart. Acreages were calculated using the geographic information system (Elfner, 1996).

Acreage and Proportionate Extent of Classified Soils on Fort Stewart, Georgia

Soil Classification	Acreage	Percent of Installation
Angelina and Bibb soils (AB)	8,063.27	2.98
Albany fine sand (As)	4,486.35	1.66
Cape Fear soils (Cc)	2,987.54	1.10
Chipley fine sand (Cm)	6,229.19	2.30
Craven loamy fine sand (Cx)	837.17	0.31
Dothan loamy fine sand (Da)	1,145.56	0.42
Ellabelle loamy sand (El)	42,860.37	15.83
Fuquay loamy sand (Fs)	6,986.80	2.58
Johnson loam (Je)	16,028.29	5.92
Kershaw coarse sand, 2-8% slopes (KkC)	3,063.74	1.13
Lucy loamy sand, 5-12% slopes (LMD)	872.76	0.32
Lakeland sand (Lp)	2,659.19	0.98
Lynn Haven sand (LQ)	254.32	0.09
Leon fine sand (Lr)	1,041.38	0.38
Mascotte sand (Mn)	29,979.46	11.07
Ocilla complex (Oj)	9,585.80	3.54
Ogeechee loamy fine sand (Ok)	14,159.92	5.23
Olustee fine sand (Ol)	4,542.69	1.68
Pelham loamy sand (Pl)	33,286.05	12.29
Pooler fine sandy loam (Pn)	7,938.73	2.93
Stilson loamy sand (Se)	17,055.93	6.30
Wahee Urban land complex (Wac)	6,277.03	2.32
Bayboro loam (Ba)	1,765.48	0.65
Bladen fine sandy loam (Bd)	813.16	0.30
Blanton sand, 0-3% slopes (Bn)	3,657.18	1.35
Echaw-Urban land complex (Ea)	4,497.42	1.66
Eulonia fine sandy loam (Eu)	15.91	0.01
Leefield loamy sand (Le)	14,733.39	5.44
Mandarin fine sand (Ma)	8,523.96	3.15
Osier and Bibb soils (Os)	8,015.73	2.96
Ponzer muck (Pn)	347.22	0.12
Riceboro loamy fine sand (Rb)	253.43	0.09
Foxworth fine sand, 0-3% slopes (Fo)	17.59	0.01
Udorthents, sandy and clayey (Ud)	121.57	0.04
Bonifay fine sand, 1-8% slopes (BoC)	935.72	0.35
Carnegie sandy loam, 5-8% slopes (CaC2)	80.85	0.03
Cowarts loamy sand, 2-5% (CoC)	32.02	0.01
Irvington loamy sand, 0-2% slopes (IgA)	313.22	0.12
Tifton loamy sand, 0-2% slopes (TfA)	3,895.68	1.44
Rutlege fine sand (Ru)	2,480.29	0.91

7-5 Water Resources

7-5a Surface Water

Fort Stewart's surface water resources are diverse and include numerous rivers, streams, ponds, and lakes. Map 7-5a(1) indicates surface drainage on Fort Stewart. Map 7-5a(2) indicates recreational fishing resources on Fort Stewart.

The majority of the surface waters of Fort Stewart are part of the Ogeechee River drainage system, which forms part of the eastern boundary of the installation. The Canoochee River is the main tributary of the Ogeechee and bisects Fort Stewart. It merges with the Ogeechee about 35 miles inland from Ossabaw Sound. Although most of the post is drained by the Canoochee, part of the northeast quadrant drains directly into the Ogeechee, and the southwestern quadrant is drained by the Altamaha River (Prentice Thomas and Associates, Inc., 1996).

While the Ogeechee generally carries a high silt load, the Canoochee does not. Consequently, the Canoochee has not developed large natural levees. The floodplain, however, is generally narrow, with little lateral migration of the stream channel. Organic matter content is generally high, derived from the Blackwater River and Swamp system (Prentice Thomas and Associates, Inc., 1996).

The Little Ogeechee River marks the western edge of Hunter AAF and drains most of the installation. Tides exert a great influence on the river, and salt water is carried upstream for some distance. Fresh to brackish tidal marshes have developed along much of the shore, and the river is not a significant source of drinking water. Because of the large amount of hard-surfaced land at Hunter AAF, fairly large amounts of run-off flow directly into the marsh/river system (Prentice Thomas and Associates, Inc., 1996).

Several old mill ponds were present at the time of the Army's purchase of Fort Stewart. Some of the most significant included Glisson's Mill Pond, Strickland's Mill Pond, Pineview Lake, and mill ponds where Pond #3, Pond #17, and Pond #28 now exist. Since establishment of the fish and wildlife management program, five old mill ponds have been renovated and improved; 14 excavated borrow pits have been converted to usable fish ponds and wetland sites; and 10 impoundments have been constructed (DEH, 1992a).

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes a subjective evaluation of water quality at the 68 sites sampled for fish. Impacts at each site were ranked as severe, moderate, minimal, or none. Most sites had minimal to moderate disturbance in terms of effects on water quality.

The following is a list of man-made ponds, significant streams and rivers on Fort Stewart/Hunter Army Airfield:

HABITAT TYPE	
Borrow Pits:	
Pond #5	1.5 acres
Pond #7	0.6 acres
Pond #10	1.5 acres
Pond #15	1.5 acres
Pond #19	9.6 acres
Pond #20	5.9 acres
Pond #21	14.6 acres

Pond #22	4.5 acres
Pond #23	7.5 acres
Pond #27	1.0 acre
Pond #30	7.6 acres
Pond #31	2.3 acres
Pond #32	6.0 acres
Landing 7.5 Borrow Pits	36.0 acres
Total Acres (Borrow Pit Ponds):	101.1 acres

Impoundments:

Pond #1	82.0 acres
Pond #2	67.0 acres
Pond #3	20.5 acres
Pond #4	1,070.0 acres
Pond #16	1.6 acres
Pond #17	14.5 acres
Pond #24	4.3 acres
Pond #26	52.0 acres
Pond #28	33.0 acres
Pond #29	9.7 acres
Total Acreage (Impoundments):	1,354.6 acres
Grand Total (Ponds and Lakes):	1,454.7 acres

Fresh Water Rivers and Streams:

Canoochee River	54.6 miles	(12.1 miles tidal)
Ogeechee River	14.9 miles	(14.9 miles tidal)
Green's Creek	2.4 miles	(2.4 miles tidal)
Mill Creek	4.2 miles	
*Clyde Creek	6.6 miles	(6.6 miles tidal)
*Canoochee Creek	20.0 miles	
*Taylor's Creek	15.6 miles	
*Savage Creek	12.9 miles	
**Maulden Branch	6.4 miles	
**Long Branch	5.1 miles	
**Horse Creek	2.6 miles	
**Taylor's Creek (above Pond 4)	7.3 miles	
**Beard's Creek	2.2 miles	
**Slade's Branch	3.7 miles	
**Otter Hole Branch	2.8 miles	
**Kirkland Creek	2.0 miles	
**Strum Bay Branch	5.9 miles	
**Caney Bay Branch	2.8 miles	
**Brier Bay Branch	3.4 miles	
**Bonnet Bay Branch	6.4 miles	

**Jones Bay Branch	6.9 miles
**Mount Hope Creek	3.0 miles
**Goshen Swamp Branch	3.2 miles
**Other Unnamed Streams	70.0 miles
Total Freshwater River/Stream Miles	264.9 miles (36.0 miles tidal)

Brackish Water Rivers:

Forest River (including tidal creek)	12.0 miles
Total Brackish Water River Miles	12.0 miles
Grand Total (Rivers and Streams)	276.9 miles

* Intermittent upper reaches
**Intermittent entire length

7-5b Ground Water Resources

There are three distinct aquifer systems in the Fort Stewart region. The principal artesian aquifer is a deep sequence of limestones of Eocene to Oligocene age, the primary source of large ground water withdrawals in the coastal area. This aquifer is generally 300 to 500 feet below the surface and is comprised of two distinct layers. The upper layer is derived from the Oligocene Series of sandy, phosphatic limestone and is not generally used as a water source. It is underlain by the Ocala Limestone of Eocene age (Prentice Thomas and Associates, Inc., 1996).

The principal artesian aquifer is overlain by two shallow aquifer systems. A 120 to 150 meters thick series of Miocene clays, sandy clays, and gravel lies directly above the principal artesian aquifer. Several industries in the coastal area have wells with yields greater than 200 gallons per minute from this aquifer. It is recharged largely by percolation from the surface aquifer, as well as some discharge from the principal artesian aquifer (Prentice Thomas and Associates, Inc., 1996).

The surface aquifer is composed of a relatively thin layer of sands, gravels, and clays, extending to a depth of approximately 25 meters near the coast. The surface aquifer is recharged directly from rainfall percolating through sediments. During dry months the base flow of streams and rivers of the coastal area is maintained by discharge from the surface aquifer. Water quality varies from very low total dissolved solids to slightly alkaline, moderately hard water. The two shallow aquifer systems are used almost exclusively for domestic water, but primarily as a secondary water supply rather than for drinking water (Prentice Thomas and Associates, Inc., 1996).

7-6 Climate

Fort Stewart/Hunter AAF lies in the coastal region of Georgia and has a mild, subtropical climate, typified by warm, humid summers and short, mild winters. The average annual temperature is 70ºF. Average summer temperatures are about 81ºF, though they may be somewhat higher at inland locations like Fort Stewart. Statewide, there is an average of 20 days per year of below-freezing temperatures, with an average daily low of about 39ºF. The first killing frost on Fort Stewart usually occurs about 1 December with the last about 1 March. Winter temperatures at Hunter AAF are

moderated by the Atlantic Ocean and average 52ºF (Prentice Thomas and Associates, Inc., 1996; Terrain Analysis Center, 1976).

Wind speeds rarely exceed five knots, except during hurricanes or tropical storms, generally in September through November, or during summer thunderstorms. Yearly rainfall at Fort Stewart is about 50 inches, half of which falls during the thunderstorm season of June through September. The wettest month is July (normal rainfall 7.6 inches), and the driest is November (1.7 inches) (Terrain Analysis Center, 1976). Local weather data for Fort Stewart is compiled at Wright Army Airfield.

8. FLORA AND FAUNA

8-1 General

The mixed forest biome that once existed in the Southeast has been broadly altered or replaced. The fire-dependent regional climax communities of longleaf pine/wiregrass and ancillary habitat types that depend on the longleaf community comprise the overall ecological unit managed by this Plan. The longleaf pine community is the keystone component of the ecological unit and serves as a focal point for management efforts. Optimal management of this ecological unit is highly compatible with military training. This compatibility stems from the ecological unit's tolerance to such environmental factors as fire, mechanical damage, and disease, as well as its characteristic open, park-like stands, which are essential for visibility during maneuver training. This type of management provides very good wildlife habitat (DEH, 1992a).

On a very broad scale, there are four types of ecosystems on Fort Stewart... sandhills, pine flatwoods, upland forests, and wetlands (Elfner, 1996). The installation contains about 158,678,000 acres of upland forest, 82,148 acres of forested wetlands, and 38,253 acres of clearings.

8-1a Habitat Classification

Floral and faunal diversity, habitat productivity, and environmental stability are greatly enhanced by the persistence of a well defined mosaic of natural habitat types. A standard method of describing natural environments of Georgia (*The Natural Environments of Georgia*, by Charles H. Wharton, 1978) is used to classify Fort Stewart/Hunter AAF habitats as follows (DEH, 1992a):

- ***Longleaf Pine Upland Forest (Longleaf Pine-Wiregrass)***. The Longleaf Pine Upland Forest habitat type is characterized by an overstory of longleaf pine (*Pinus palustris*) with an established ground cover of wiregrass *(Aristada stricta*). Wiregrass is crucial to this habitat type since it provides the main fuel for prescribed fire, a critical element if longleaf pine is to maintain its dominance.
- ***Mesic Lowland Pine Forest (Pine Flatwoods)***. Flatwoods typify much of the Lower Coastal Plain. These areas, being former sea floor, are very flat with sandy soils and an organic hardpan. They tend to be saturated during the wet season and very dry during the dry season. Dominant overstory is slash pine (*Pinus elliotii*), loblolly pine (*Pinus taeda*), and some longleaf pine. Saw palmetto (*Serenoa repens*) and gallberry (*Ilex glabra*) are typical understory plants.
- ***Evergreen Scrub Forest***. Evergreen Scrub Forest is a remarkable habitat on the lower slopes of the Dwarf Oak Forest, characterized by plants dwarfed by xeric conditions, such as dwarf scrub live oak, dwarfed laurel oak, and dwarfed red bay. On Fort Stewart,

Georgia plume (*Elliotia racemosa*) is sometimes found in this type. This unique shrub is listed as endangered by the State and is afforded protection under the Georgia Wildflower Protection Act of 1973.

- ***Lowland Broadleaf Evergreen Forest (Hammock)***. Hammock habitat type is found principally on Hunter Army Airfield. It is typified by lush vegetation and rich soil. Species found in this type include water oak (*Quercus nigra*), live oak (*Q. virginiana*), white oak (*Q. alba*), southern magnolia (*Magnolia grandiflora*), American holly (*Ilex opaca*), and saw palmetto.
- ***Dwarf Oak Forest (Longleaf Pine-Turkey Oak)***. Sandhills of Fort Stewart are covered by Longleaf Pine-Turkey Oak. Characterized by deep sandy soils, it is an extremely dry forest of small deciduous oaks with a longleaf pine overstory. These sand ridges occur along major streams and are remnants of Pleistocene barrier islands. The habitat is a fire-maintained climax type, and in the absence of fire it will succeed to an oak woodland. The eastern indigo snake, a threatened species, protected by the Endangered Species Act of 1973, is found in this habitat in conjunction with the gopher tortoise, whose burrows serve as over-wintering sites for the threatened reptile.
- ***Upland Broadleaf Deciduous-Needleleaf Evergreen Forest***. This habitat is found on heavier-textured soils on uplands. It has the appearance of a dry hardwood forest with pines. This habitat contains some of the richest soils on the Coastal Plain. Consequently, much of this habitat has been destroyed for agriculture.
- ***Beaver Dam Type***. Beavers impound flowing water to inundate portions of floodplain forests. Beaver ponds kill timber, and beavers are viewed by forest managers as pests. On the other hand, they create valuable wetlands, habitat diversity, dry weather water holes, quality waterfowl habitat, and help control erosion.
- ***Bay Swamp***. Bay Swamp habitat occurs along the edge of floodplains where seepage from adjacent slopes is heavy. It is characterized as a wet-floored evergreen forest dominated by bay trees, and differs from the blackwater river and swamp system in that it contains evergreen species and usually forms a layer of peat.
- ***Herb Bogs***. As the name implies, Herb Bog habitat is dominated by herbaceous plant growth with occasional, scattered, stunted pines. Soils in this habitat are low in nutrients and moistened by lateral seepage. Typified by the presence of pitcher plants (*Sarracenia* spp.), herb bogs are often referred to as pitcher plant bogs.
- ***Shrub Bogs***. Shrub Bog habitat is frequently found around the edge of cypress ponds or along the edge of bay swamps. It is characterized by pond pine (*Pinus serotina*), bay trees (*Magnolia* and *Persea* spp.), and red maple (*Acer rubrum*). These trees are often stunted or dwarfed. The water table fluctuates widely, causing the land to be rather wet during the rainy season and relatively dry at other times.
- ***Gum Ponds***. Gum Pond habitat is similar to cypress, in that both are underlaid by a layer of impervious clay. The main difference between cypress ponds and gum ponds is the dominant tree species. Gum ponds are important sites of diversity within surrounding pinelands. They support a number of amphibian and reptile species and also play a role in the recharge of the local water table.
- ***Cypress Pond***. Cypress Pond habitat often occupies former sites of Pleistocene marshy lagoons and river channels, characterized by an abundance

of cypress. Cypress ponds often vary in tree species abundance, based on persistent water depth. Three patterns of dominance are recognized: (1) deep water dominated by cypress, (2) shallower water co-dominated by cypress and swamp blackgum, and (3) the shallowest regions dominated by cypress, swamp blackgum, and slash pine.

- ***Blackwater Streams***. Blackwater Stream habitat is most frequently found in lower reaches of streams that cross Fort Stewart. They are the result of larger rivers damming smaller tributaries. Mostly aquatic, flora is dominated by cypress and tupelo gum, with cypress attaining a characteristic configuration of extremely large buttresses and small trunks.
- ***Blackwater River and Swamp System***. Blackwater River and Swamp System habitat is typical of Coastal Plain rivers, deriving its name from characteristic coloration of its waters. Varying from reddish in shallow areas to black in deeper areas, the coloration is caused by tannic acids leached from vegetation of swamps and flood plains. These systems typically lack an extensive bottomland hardwood floodplain but accommodate a gum-cypress community along the sloughs. Swamp blackgum dominates more slow-moving regions, while tupelo gum and cypress dominate open-water areas.

8-1b Community Classification

The Nature Conservancy (1995) classified Fort Stewart/Hunter AAF land cover types by communities. Community classification was adapted from the Nature Conservancy's Community Characterization Abstracts, which were based on the North Carolina Natural Heritage Program, the Sandhills Field Office (at Fort Bragg, NC), and the Florida Natural Areas Inventory. Below briefly-described communities for Fort Stewart/Hunter AAF have more-detailed descriptions in the *Fort Stewart Inventory*, and additional information is presented on rare plants and animals, characteristic plant species, variability of community element, range and distribution, examples of communities by training area, and management guidelines:

- ***Southern Mixed Hardwood Forest***. This community is characterized by a mostly closed canopy with straight trees, a well-developed subcanopy, and a sparse to dense shrub and herb layer.
- ***Upland Pine Forest***. This community is a rolling forest of widely spaced pines with few understory shrubs and a dense cover of grasses and herbs. Pristine areas are dominated by longleaf pine and wiregrass, while agriculturally-disturbed areas are dominated by shortleaf and loblolly pines and old field grasses and herbs.
- ***Southeastern Coastal Plain Xeric Sandhill***. This community contains longleaf pine with scattered turkey oak and small trees in the shrub layer, other low to tall scattered shrubs, and a sparse to high cover of herbs, dominated by grasses.
- ***Southeastern Coastal Plain Subxeric Pine-Scrub Sandhill***. This community is characterized by an open canopy of pines, low scrub oaks, and moderate cover in the herb layer.
- ***Atlantic Coastal Plain Mesic Longleaf Pine Forest***. This community has an open-canopied forest over scattered shrubs, an abundant and grassy herb layer, and a species-rich herbaceous flora dominated by wiregrass and little bluestem.
- ***Bay Forest***. This evergreen community is recognized by the presence of loblolly bay, swamp redbay, and sweetbay together in a peaty, acidic, wet area.
- ***Non-Riverine Swamp Forest***. This community type does not occur in floodplains which separates it from

swamp forest and bottomland hardwood community types associated with rivers. The community vegetation is very diverse, affected by hydroperiod and disturbance.

- ***Water Tupelo Swamp***. Found in the lowest, wettest portions of floodplains, this community type has a dense canopy dominated by bald cypress and water tupelo. Standing or flowing water is present for all or part of the year. Epipytes, such as Spanish moss, are characteristic.
- ***Coastal Plain Small Stream Swamp Forest***. This community type has a high species diversity in the canopy, with fine-scale microtopographic mosaics providing multiple habitats that support a variety of woody species. The shrub layer is often dense, and vines are abundant and diverse.
- ***Pond Cypress Dome and Swamp Forest***. This community type characteristically has pond cypress in a circular patch with a domed outline or a moderate to very dense canopy of pond cypress along a stream in organic soil. Larger trees are found in the interior with smaller ones to the outside, creating the "domed" appearance.
- ***Pond Cypress Pond Forest***. This community has a fairly open tree canopy with little understory, occurring on mineral soils.
- ***Swamp Tupelo Pond Forest***. This community has a canopy dominated by swamp tupelo, and it is found in a Carolina bay, sinkhole, or other Coastal Plain depressions, not in floodplains.
- ***Slash Pine Flatwoods***. Slash Pine Flatwoods are similar to Wet Longleaf Pine Flatwoods, but slash pine is the canopy dominant.
- ***Wet Longleaf Pine Flatwoods***. This community type has a moderately dense longleaf pine overstory over a dense to open shrub layer. The shrub layer density is directly related to the fire regime.
- ***Pine Savanna***. Savanna communities are saturated or inundated during the rainy season and extremely dry during the dry season. Herb species dominate over woody species on regularly burned sites.
- ***Pond Cypress Savanna***. This community type has an open canopy of pond cypress and a well developed, species-rich, ground layer.
- ***Streamhead Pocosin***. These communities occur at headwaters of streams and sometimes adjacent to them in floodplains. Pocosins are characterized by sparse to dense canopies of bay species and pines over very dense, almost impenetrable layers of evergreen shrubs and vines.
- ***Sandhill Seep***. This community is characterized by wetland vegetation on seepage slopes. Sandhill seeps, if burned regularly, can have the highest species richness in temperate North America.

8-1c Conservation Sites

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes descriptions (Section V) of 36 conservation sites for Fort Stewart/Hunter AAF. Conservation sites were defined as "*areas of significant biodiversity, harboring concentrations of rare species and containing highly intact natural communities*". Information included in the Inventory for each conservation site includes site name, size, rank (A, B, or C), training area, Natural Heritage resource summary, site description, threats to sites, monitoring and research recommendations, management recommendations, and management comments.

8-2 Flora

8-2a Floral Inventory

The Nature Conservancy (1995) found 1,066

taxa from 724 sites on Fort Stewart/Hunter AAF. Species found represent 465 genera and 139 families.

8-2b Threatened, Endangered, or Special Concern Plants

The Fort Stewart Inventory (The Nature Conservancy, 1995) provided a comprehensive list of plant species listed pursuant to federal law (Endangered Species Act) or Georgia state law (Endangered Wildlife Act of 1973 and Wildflower Preservation Act of 1973). Species identified by the inventory are as follows:

Species	Common Name	Federal Status*	State Status*	Global Rank*	State Rank*
Agromonia incisa	incised groovebur	SC		G3	S2S3
Balduina atropurpurea	purple honeycomb head	SC	R	G2G3	S2
Bumelia thornei	swamp buckthorn	SC	E	G1Q	S1?
Elliottia racemosa	Georgia plume		T	G2G3	S2S3
Fothergilla gardenii	dwarf witch-alder		T	G4	S2
Litsea aestivalis	pondspice	SC	T	G4G5	S2
Physotegia leptophylla	narrowleaf obedient plant		T	G4G5	SH
Sarracenia minor	hooded pitcher plant		U	G4G5	S4
Stewartia malacodendron	silky camellia		R	G4	S2

* E - Endangered (federal and state code)
T - Threatened (federal and state code)
SC - Species of Concern (federal)
R - Rare (state)
U - Unusual (state)
S1 or G1 - Critically imperiled because of extreme rarity
S2 or G2 - Imperiled because of rarity
S3 or G3 - Either very rare and local throughout its range or found locally, even abundantly, in a restricted range
S4 or G4 - Apparently secure, although it may be quite rare in parts of its range, especially at the periphery
S5 or G5 - Demonstrably secure, although it may be rare in parts of its range, especially at the

periphery

SH or GH - Of historical occurrence, perhaps having not been verified in the past 20 years and suspected to still be extant

8-2c Forest Inventory

The forest inventory was completed in 1998. This intensive inventory used 33,000 plots in stands selected from aerial photographs. There were at least 10 plots per stand with minimum stand size of 10 acres. Data collected are in a database that is GIS compatible. Inventory results will be summarized within this INRMP when available.

8-2d Wetlands

Fort Stewart contains approximately 82,148 acres of wetlands (Fort Stewart GIS database). Palustrine wetlands comprise 77.3% of the total, while forested wetlands comprise 68.8% of the Palustrine system. Hunter AAF contains approximately 1,400 acres of wetlands, of which 58.9% are classified as Palustrine, while forested wetlands comprise 56.4% of the Palustrine system (DEH, 1993a).

8-3 Fauna

The Fort Stewart/Hunter AAF area has a rich and diverse fauna. However, natural animal communities in the area, especially large mammals, have been affected by urbanization in the Southeast. Two prominent examples are panthers (*Felis concolor*) and black bears (*Ursus americanus*), which were extirpated from the area prior to Army occupation of the lands at Fort Stewart. White-tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*) are common, as are many smaller mammals, which are relatively undisturbed by urbanization (Prentice Thomas and Associates, Inc., 1996). A list of confirmed species from Fort Stewart/Hunter AAF is in Appendix 8-3.

8-3a Game Fish and Wildlife Species

The following fish and wildlife species are actively managed as game for sport hunting or fishing:

COMMON NAME	SCIENTIFIC NAME
Birds:	
Wood duck*	*Aix sponsa*
Eastern wild turkey	*Meleagris gallopavo*
Bobwhite quail	*Colinus virginianus*
Mourning dove	*Zenaida macroura*

*Numerous species of huntable waterfowl have been observed on Fort Stewart/Hunter AAF. Many benefit from wood duck management.

Mammals:	
Eastern gray squirrel	*Sciurus carolinensis*
Eastern fox squirrel	*Sciurus niger*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Feral hog	*Sus scrofa*
White-tailed deer	*Odocoileus virginianus*
Fish:	
Largemouth Bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Redear Sunfish	*Lepomis microlophus*
Channel Catfish	*Ictalurus punctatus*
Black Crappie	*Pomoxis nigromaculatus*
Hybrid Striped Bass	*Morone* sp.

8-3b Nongame Birds and Mammals

A list of confirmed bird and mammal species from Fort Stewart/Hunter AAF is in Appendix 8-3.

8-3c Fish

The Fort Stewart Inventory (The Nature Conservancy, 1995) included a detailed fish survey. A list of fish species from Fort Stewart/Hunter AAF is in Appendix 8-3. Installation biologists continue to build upon this list as additional species are verified as occurring on Fort Stewart or Hunter AAF.

8-3d Reptiles and Amphibians

The Fort Stewart Inventory (The Nature Conservancy, 1995) included a detailed reptile and amphibian survey. A list of reptile and amphibian species from Fort Stewart/Hunter AAF is in Appendix 8-3.

8-3e Threatened, Endangered, or Special Concern Animals

The Fort Stewart Inventory (The Nature Conservancy, 1995) provided a comprehensive list of plant species listed pursuant to federal law (Endangered Species Act) or Georgia state law (Endangered Wildlife Act of 1973 and Wildflower Preservation Act of 1973). Species identified by the inventory are as follows:

Species	Common Name	Federal Status*	State Status*	Global Rank*	State Rank*
Insect					
Cordulegaster sayi	Say's spiketail dragonfly	SC		G1G2	S1
Birds					
Aimophila aestivalis	Bachman's sparrow	SC	R	G3	S3
Alienates forficatus	swallow-tailed kite		R		
Falco peregrinus	Peregrin falcon		E		
Falco sparveniuspaulus	southeastern American kestrel	SC			
Haliaeetus leucocephalus l.	southern bald eagle	T	E	G	S
Mycteria americana	wood stork	E	E	G	S
Picoides borealis	red-cockaded woodpecker	E	E	G2	S2
Sterna antillarum	least tern		R		
Reptiles					
Drymarchon corais couperi	eastern indigo snake	T	T	G4T3	S3
Gopherus polyphemus	gopher tortoise	SC	T	G2	S3
Heterodon simus	southern hognose snake	SC		G4G5	S3
Pituophis melanoleucus mugitus	Florida pine snake	SC		G5	S3
Amphibians					
Ambystoma cingulatum	flatwoods salamander	T	R	G4	S3
Notophthalmus perstriatus	striped newt	SC	R	G3	S2
Rana capito capito	Carolina gopher frog	SC		G4	S3

Species	Common Name	Federal Status*	State Status*	Global Rank*	State Rank*
Fish					
Acipenser brevirostrum	shortnose sturgeon	E	E	G2	S2

* E - Endangered (federal and state code)
T - Threatened (federal and state code)
SC - Species of Concern (federal)
R - Rare (state)
S1 or G1 - Critically imperiled because of extreme rarity
S2 or G2 - Imperiled because of rarity
S3 or G3 - Either very rare and local throughout its range or found locally, even abundantly, in a restricted range
S4 or G4 - Apparently secure, although it may be quite rare in parts of its range, especially at the periphery
S5 or G5 - Demonstrably secure, although it may be rare in parts of its range, especially at the periphery

9. ECOSYSTEM STATUS SUMMARY

9-1 General

This chapter considers the current condition of natural resources on Fort Stewart/Hunter AAF, and compares conditions today to those in the past, emphasizing effects of military occupation on the land and, when possible, changes since pre-settlement times. The capability of natural resources to support the needs of the Fort Stewart military mission and community is also evaluated, compared with the past. Much of this chapter is subjective due to a lack of background data. However, recent and ongoing inventories and implementation of a geographic information system are significantly improving trend analysis capability.

9-2 Water Resources

Aquatic resources have always abounded on land now occupied by Fort Stewart/Hunter AAF; however there were few man-made facilities prior to military occupation. The preponderance of aquatic resources were natural cypress bogs, evergreen bays, streams and rivers, and their associated bottomland hardwood swamps. Several old mill ponds were present at the time of Army purchase, some of the most significant being Glisson's Mill Pond, Strickland's Mill Pond, Pineview Lake, and mill ponds where Pond #3, Pond #17, and Pond #28 now exist. In addition, numerous rice fields were present on Hunter AAF at the time of Army acquisition. Since the establishment of the fish and wildlife management program, five old mill ponds have been renovated and improved; 14 excavated borrow pits have been converted to usable fish ponds and wetland sites; and nine impoundments have been constructed (DEH, 1992a).

Primary effects of a mechanized division on aquatic resources has been the incidental silting and filling of several small streams adjacent to road crossings; draining moist and wet sites for construction of range facilities, roads, and other installation facilities; accidental discharge of oil and other contaminants from spills; and increased release of sewage treatment facility effluent into the Taylor's Creek/Canoochee Creek/Canoochee River system (DEH, 1992a).

Because of the virtual elimination of agricultural activities on Fort Stewart/Hunter AAF and the maintenance of massive tracts of land in forest cover as a result of military occupation, there has been a marked decrease in the volume of non-point source pollution of agri-chemicals and a net decrease in top soil loss (and overall stream siltation) compared to adjacent farm and developed land (DEH, 1992a).

Excessive withdrawal of water from the Floridan aquifer along the southeastern coast is causing some salt water intrusion into the aquifer. Fort Stewart/Hunter AAF is the tenth highest user of the aquifer (Section 4-4).

9-3 Soils

Many suitable agricultural sites on the area had been cleared prior to the purchase by the Army. These sites were few and scattered in the southeast and northeast with numerous sites in the northwest (DEH, 1992a). The land was heavily used on these sites, and soil erosion was probably significant. Army occupation has resulted in reforestation of most of these sites, reducing soil erosion. However, considering Fort Stewart as a whole, most of the installation has relatively little erosion compared to lands outside the installation.

9-4 Biodiversity

Pre-settlement Fort Stewart/Hunter AAF area consisted mostly of a longleaf-wiregrass ecosystem. This fire-driven ecosystem was maintained by natural fires, Native American fires, and later, fires set by cattlemen. Woodlands were cut over one or more times, and recurrent fires kept the woodlands relatively open.
During its early years, Fort Stewart was a woodland/open range for cattle. With decreases in people, hunting pressure, and other disturbance factors, game populations increased. Long range effects on wildlife were not so favorable. Openings seeded in, canopies of hardwood and pinelands closed, and important food plants were greatly reduced or eliminated, thereby reducing the carrying capacity of the land.

Emphasis shifted to aviation training (fixed and rotary wing) in the 1960s during the Vietnam conflict and then to mechanized infantry training in 1970s. Initial effects of mechanization were beneficial by setting back succession which had occurred during prior years. Wheeled and tracked vehicle traffic scarified the soil and provided seed beds for annual wildlife plants. However, long-term effects were not so favorable. Wildlife habitat was damaged by soil disturbance which effectively inhibits water and nutrient transfer and destroys tree and plant cover (DEH, 1992a).

Emphasis is now being placed on renovation of areas damaged by military training as well as hardening stream crossings and other heavily used sites to minimize future damage. This trend in land rehabilitation is continuing. Major efforts are underway to restore the longleaf-wiregrass ecosystem throughout Fort Stewart. This is perhaps the most significant step to return the area to conditions similar to those prior to settlement... a monumental accomplishment!

Perhaps the best way to evaluate overall effects of military occupation on Fort Stewart/Hunter AAF is to compare these land parcels with lands surrounding them. These areas were developed, farmed, or intensively managed for timber, and biological diversity was significantly decreased, a fate which would have occurred on many Fort

Stewart/Hunter AAF lands had not they been used for military purposes.

9-5 Support of the Military Mission

Fort Stewart/Hunter AAF is very capable of supporting its military mission. This mission is natural resources dependent, and the mission negatively affects some of these resources. The Land Rehabilitation and Management (LRAM) program mitigates some damage caused by this mission, and other ITAM programs within this INRMP will reduce future damage. The restoration of the longleaf-wiregrass ecosystem is increasing the capability of the installation to support military training.

9-6 Production of Renewable Products/Recreation

9-6a Forest Products

Fort Stewart's capability to support the production of forest products has steadily increased since Army occupation. The land has never been intensively timbered during the past half-century, and the installation is one of the largest producers of timber within the Department of Defense. The production of commercial forest products is no longer the primary objective of forest ecosystem management on Fort Stewart, but Fort Stewart will continue to produce quality forest products on a sustainable basis, as well as meet other obligations with regard to the forest.

9-6b Game and Hunting and Fishing

Fort Stewart has a local, regional, and even national reputation for quality hunting and fishing. It has perhaps the most intensively managed fisheries resources of any large tract of federal land in the nation. Four of the top 20 largemouth bass on record for Georgia have been caught from Fort Stewart ponds, and two of it's rivers, are among the best in the State for redbreast sunfish fishing. The game program is equally impressive, especially for deer, feral hog, and turkey. Hunting and fishing programs on Hunter AAF are more limited, but they remain very high quality. The shift to more longleaf-wiregrass ecosystem acreage on Fort Stewart will improve conditions for most game species.

9-6c Agriculture

Fort Stewart cannot support agriculture. The military mission and emphasis on forest ecosystem management have precluded this option. Hunter AAF could possibly support a small hay lease for lands adjacent to its runways, but significant agriculture is not an option.

9-6d Recreation

The addition of facilities has improved outdoor recreation options in recent years. Hunting and fishing are discussed above. The ability of the land to support natural resources-based recreation, other than hunting and fishing, is relatively unchanged in recent years. However, the intensity of use of these recreational options is expected to increase.

10. LAND MANAGEMENT UNITS

10-1 Impact Areas and Training Areas

10-1a Impact Areas

Fort Stewart has four impact areas, the Artillery Impact Area (12,287 acres), the Small Arms Impact Area (5,162 acres), aerial gunnery ranges (900 acres), and the Explosives Ordnance Demolition area (1,636 acres). These areas have limitations on their use, and many are off-limits to virtually all natural resources management options. Map 10-1 shows these areas.

10-1b Training Areas

Fort Stewart has 120 training areas, not including the Small Arms Impact Area, Artillery Impact Area, and Explosives Ordnance Demolition area. Map 10-1 shows these areas, and Appendix 10-1b has an acreage analysis of training areas.

10-2 Cantonment Area

Fort Stewart's cantonment area is defined (for purposes of this INRMP) as those lands that are built-up in terms of buildings and facilities along with their associated natural lands. This category includes those areas that are not part of training or impact areas. They comprise about 3,000 acres on Fort Stewart with 3,043 buildings, an airfield, and other developed areas (DEH, 1992d). Some grounds are intensively maintained, but many areas are unimproved and support excellent wildlife populations. Map 4-1a shows the cantonment area in relation to the rest of the post.

Hunter AAF has 943 acres of airstrip, aprons, and associated turf and 2,870 acres of improved grounds. The installation has 886 buildings (DEH, 1992d). Map 4-1b shows the installation.

10-3 Forest Compartments

During the mid-1960s 10 forest compartments were established, and these were subdivided into about 300 areas for management. These areas were too large to treat with single harvest applications, and they never became distinct management units. In 1992 the forest compartment system was replaced by using Training Areas to identify areas where volume marking of timber was used. However, to say that TAs were forest management units would be incorrect. In 1997 Natural Resources Management Units (Section 10-5), which will be used for forest management, were established. These Natural Resources Management Units are true management units in that all forest harvest management within a single unit are accomplished during one entry every cutting cycle (Section 14-2).

10-4 Game and Fisheries Management Units

Fort Stewart was divided into six wildlife management compartments, ranging in size from 32,172 acres to 52,028 acres with an average area of 46,545 acres. Each large compartment was further subdivided into smaller management units, of which there were 44, averaging 6,347 acres in size. Hunter Army Airfield is approximately 5,372 acres and was considered one management compartment (DEH, 1992a). These designations are being converted to Natural Resources Management Units, described in Section 10-5.

10-5 Natural Resources Management Units

Ideally, one common ecological management unit, based on ecosystem types or watersheds would be best for natural resources management.

However, often it is more critical that field personnel, troop units, recreationists, and others be able to easily identify area boundaries than it is to use more scientifically-based boundaries. Besides, due to the difficulty of determining at what level ecosystems should be identified and managed, it would be difficult to get agreement on a common ecosystem management unit designation that meets the needs of all users and managers.

However, Fort Stewart is making the transition to Natural Resources Management Units (NRMU) which, although not based on ecological boundaries, will be used for all natural resources management programs, including both Forestry and Fish and Wildlife. Natural Resources Management Units were developed as a joint Forestry, Fish and Wildlife, and Range Division project, with the initial goal of using them as burning units for ecological burns. Thus, their boundaries are largely existing roads, trails, waterways, and firebreaks, which makes unit boundaries easy to locate.

However, they have far wider applications, and they may be subdivided for timber sale or other forest management purposes, development of special wildlife areas (after completion of the Wildlife Habitat Survey), or management of hunting and fishing. Prescriptions for Natural Resources Management Units will be jointly developed within the Environmental and Natural Resources Division and coordinated with Range Control, described in Section 22-4.

There are 421 Natural Resource Management Units, averaging 629 acres. These are shown on Map 10-5.

11. ECOSYSTEM MANAGEMENT - GENERAL

Fort Stewart's natural resources program has traditionally been based on multiple-use management philosophies. However, military training has always been the primary land use.

This philosophy will continue in 2001-2005 with one important addition. Maintaining functional ecosystems will become an important goal of Fort Stewart land and natural resources management programs. "Realistic training lands" are essential needs by military trainers. This translates into functional ecosystems which can be sustained indefinitely.

Biodiversity conservation is an international commitment, and ecosystem management is a recognized means to achieve this commitment. This INRMP encompasses these broad concepts as stated in the below two sections.

This chapter has a variety of purposes:

- Describe biodiversity conservation and ecosystem management with regard to implementation by the Department of Army and some impacts on this INRMP.
- Describe how the formerly-emphasized program elements (Fish and Wildlife, Forestry, Land Management, etc.) fit within the new INRMP format and integrate with each other.
- Describe how the relatively new ITAM program fits within the new INRMP format and integrates with programs involving forest, land, and fish and wildlife management.

11-1 Biodiversity Conservation

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels including ecosystem diversity, species diversity, and genetic diversity.

The Department of Defense is developing a policy on biodiversity that will use the INRMP process as the implementation tool. A first step in this process was the development of *A Department of Defense (DoD) Biodiversity Management Strategy* (The Keystone Center, 1996). This Strategy identifies five reasons to conserve biodiversity on military lands:

(1) sustain natural landscapes required for the training and testing necessary to maintain military readiness;
(2) provide the greatest return on the Defense investment to preserve and protect the environment;
(3) expedite the compliance process and help avoid conflicts;
(4) engender public support for the military mission; and
(5) improve the quality of life for military personnel.

The Keystone Center report (1996) notes that the challenge is "*to manage for biodiversity in a way that supports the military mission"*. This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations.

This INRMP includes biodiversity considerations in a variety of ways, including monitoring and inventory, which are critical to adaptive management (sections 12-3, 12-4, and 12-5); protection for sensitive areas (Section 13-4); restoration of the longleaf-wiregrass forest ecosystem (Section 14-2); endangered species management (Section 14-5); wetlands management (Section 14-8); Water Quality Management (Section 14-9); LRAM (Section 11-4c); Pest Management (Section 14-13); and restrictions on activities which negatively affect biodiversity (sections 11-4b, 13-3, and 19-5). This INRMP may need to be adjusted when Army and FORSCOM policies on biodiversity are completed.

11-2 Ecosystem Management

Ecosystem management is not articulated formally in law, but its basic concepts have strong legal compliance aspects, especially within the Endangered Species Act, Sikes Act, and other laws such as the Clean Water Act and NEPA. Ecosystem management is a strategy that will help conserve biodiversity and maintain fully functional ecosystems.

The Department of Defense[6] goal with regard to ecosystem management is, *"To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations*."

Principles and guidelines to achieve this goal are:

- Maintain and improve the sustainability and native diversity of ecosystems.
- Administer with consideration of ecological units and time frames.
- Support sustainable human activities.
- Develop a vision of ecosystem health.
- Develop priorities and reconcile conflicts.
- Develop coordinated approaches to work toward ecosystem health.
- Rely on the best science and data available.
- Use benchmarks to monitor and evaluate outcomes.

[6] Department of Defense Instruction Number 4715.3, *Environmental Conservation Program*, May 3, 1996, specifically Enclosure 6.

- Use adaptive management.
- Implement through installation plans and programs.

Ecosystem management provides a means for Fort Stewart/Hunter AAF to conserve biodiversity and continue to provide high quality military readiness. Ecosystem management incorporates protection and use within a management program.

Fort Stewart is a user of land, primarily for military training. Conservation program activities such as harvesting timber, planting food plots, etc. may also be considered land use. Such conservation activities will be conducted as necessary to support the military mission and enhance the quality of life for soldiers and area civilians. The primary purpose of the installation's conservation programs, however, will be to enhance the quality of the natural environment and mitigate any adverse effects associated with military training.

Fort Stewart/Hunter AAF will use ecosystem management to guide its program in the next five years and beyond. This management strategy enables the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Concurrently, ecosystem management helps ensure compliance with environmental laws and production of renewable natural resources products.

11-3 Integrated Natural Resources Management

This INRMP provides the framework for an ecosystem approach to natural resources management. Chapters 12 through 19 address protection, management, and conservation of natural resources. The former military natural resources planning philosophy of separating fish and wildlife, land management, forestry, Integrated Training Area Management, and other programs has evolved into integrated, ecosystem-based management of all natural resources.

Integrated natural resources management, as described in this INRMP, is continuing a process of change which began in the early 1990s to integrate natural resources programs and use these programs to support the military mission.

11-4 Integrated Training Area Management

Manage Fort Stewart's Training Land "Platform" to Sustain its Future Use for Training.

ITAM Mission

Integrate all land management activities to ensure compatibility of critical combat skills training and natural resource management.

ITAM Strategy

Provide optimum training area management by integrating training and other mission requirements for land use with sound natural resource management of land. Achieve sustained use of training lands by implementing a program which includes:

- Inventorying and monitoring land conditions
- Integrating training requirements with land capacity
- Educating land users
- Providing for land rehabilitation and maintenance

Integrated Training Area Management (ITAM) is an Army-wide program to provide quality training environments to support the Army's military mission. ITAM was initiated with the realization that Army training lands were being degraded to the point where their capabilities to sustain military missions were in jeopardy.

As part of the ITAM budgetary and planning process, Fort Stewart has been designated a Category I installation. Category I installations are the largest installations, with critical training land missions, and with greatest environmental sensitivity to missions (U.S. Army FORSCOM, 1995).

Goals and objectives specific to ITAM are found in the ITAM Program Strategy, Section 2.1 (ODCSOPS, 1995) and FORSCOM ITAM Policy Memo, sections 1-3 and 1-4 (U.S. Army FORSCOM, 1995). These are incorporated into objectives within this INRMP. ITAM implementation at Fort Stewart/ is specified in the Installation ITAM Guide (DPTM, 1996).

ITAM implementation began in 1991 at Fort Stewart. Land Condition Trend Analysis (LCTA) was implemented and operational by 1992, and the Geographical Information System (GIS) was initiated in 1993. Since then, the Land Rehabilitation and Maintenance (LRAM), Environmental Awareness (EA), and Training Requirement Integration (TRI) components of ITAM have been implemented. Responsibility for overall ITAM implementation at Fort Stewart was transferred from DPW to DPTM in 1995. An ITAM Coordinator was hired in 1996. Range Division implements all components of ITAM.

11-4a Land Condition Trend Analysis

LCTA uses a wide array of natural resources data such as soils, ground cover, above ground vegetation/stem density, disturbance types, etc. to determine condition of land and trends in condition of those resources. Tazik et al. (1992) describe procedures for the standard LCTA plot inventory. Elfner (1996) describes LCTA implementation specific to Fort Stewart and results of the first two years of data collection.

LCTA was initiated on Fort Stewart in 1992 with 201 allocated core plots for long-term comparisons. Core plots were allocated using a GIS software package (Geographic Resources Analysis Support System, GRASS) which integrated soil series data and satellite imagery to produce a stratified random allocation.

LCTA core plots are designed to be intensively monitored on a long-term basis. Frequency of intensive monitoring is dependent upon management objectives and amount of change occurring annually on the installation. The 201 core plots were monitored using the long-term, intensive technique in 1992, the short-term, less intensive technique in 1993 and 1994, and a repeat of the long-term technique in 1995.

Elfner (1996) describes LCTA monitoring and results during 1992 through 1994. Military use is evident on 20-25% of plots; the most extensive nonmilitary use is forestry (60-90% of plots); and there is little water erosion. Most military use was noted on flatwood and pinehill LCTA sites.

Fort Stewart is changing its LCTA program to emphasize monitoring areas most used for military training. About 1,200 plots were established between 1995-1997 to establish baseline data on community types.

A small mammal survey associated with LCTA was conducted in 1993 and 1994, using a wildlife subset of 60 LCTA plots. Results are included in the species list in Appendix 8-3 and analyzed by Elfner (1996). No additional small mammal surveys are anticipated using LCTA plots.

A songbird survey was also done in 1993 and 1994 on the 60-wildlife plots LCTA subset. Results are included in Appendix 8-3 and analyzed by Elfner (1996).

11-4b Training Requirements Integration

Training Requirements Integration (TRI) is the direct interface between training requirements for land use and the capability of the land and its natural resources to support that training. TRI

relies on LCTA and other monitoring programs to determine land capabilities.

11-4b(1) Identification of Training Needs

It is important to identify means in which training can be sustained or improved via land management activities on Fort Stewart/Hunter AAF. The TRI program uses the Training Support Quality Management Board and the 10-Year Range/Simulation Plan (U.S. Army, 1996) to develop LRAM projects and to determine means to improve the Environmental Awareness program. The Board offers direct contact with trainers, and the Plan is updated regularly.

11-4b(2) Mission Siting

It is important to site missions where natural resources can support them on a sustained basis. This saves rehabilitation money and provides higher quality training for soldiers.

New mission siting is effectively implemented on Fort Stewart via the NEPA process. The coordination aspect of NEPA is conducive to obtaining necessary input to site missions on lands best suited for supporting them. See Chapter 20 for more information. The GIS is a valuable tool for selecting sites for virtually any combination of desired conditions. The Training Support Quality Management Board is used to facilitate the mission siting process and assure trainer input into the process.

11-4b(3) Training Restrictions

Restrictions on training are sometimes necessary for long-term sustainment of training and ecosystem protection. Fort Stewart has incorporated environmental restrictions into *Safety - Post Range Regulation* (3d IN DIV (Mech) and FS Reg 385-14). The following sections of this regulation are particularly important with regard to protection of installation natural resources:

- 1-5, General Instructions
- 5-7, Reporting POL Spills and Contamination Hazards
- 5-8, Endangered Species, Incidental Take Reporting, and Response Procedures
- 7-1, Use of Fort Stewart Roads By Track Wheeled Vehicles
- 13-5, Range Fires
- 13-6, Chemical Agents
- 13-7, Smoke Operations
- 14-1, Endangered Species
- 14-2, Excavation/Digging Training
- 14-3, Field Sanitation

These requirements are also disseminated to soldiers via the Environmental Awareness program, specifically using a training video, environmental handbooks, and environmental field cards.

11-4c Land Rehabilitation and Maintenance

LRAM is Preventive Maintenance of Our Training Land

Land Rehabilitation and Maintenance (LRAM), a component of ITAM, is intended to involve repair of damaged lands and use of land construction technology to avoid future damage to training lands. LRAM uses technologies such as revegetation and erosion control techniques to prevent site degradation, soil erosion, and water/wetlands pollution. These efforts are specifically designed to maintain quality military training lands, minimize long-term costs associated with land rehabilitation or additional land purchase, ensure compliance with environmental laws and regulations, and reduce erosion.

11-4c(1) LRAM Planning Units

LRAM will use Training Areas for planning units. TAs may not have boundaries based on

ecosystems, but boundaries are well-known by soldiers, which reduces conflicts between LRAM projects and military training activities.

11-4c(2) Training Area Rehabilitation

The number of significantly damaged acres of training lands on Fort Stewart is undetermined. The backlog of damaged lands is considerable, but it does not appear to be noticeably expanding. However, damaged areas tend to be among the best locations for military training. Thus, it is critical that they be repaired and maintained in a condition that can support training.

LRAM projects will be largely planned in-house, but Fort Stewart may also use NRCS expertise. NRCS standards will be used to help develop projects, and this agency's information on land rehabilitation technology may be used to design projects. Projects will be designed on a site-specific basis. There is no need to close entire TAs for LRAM work at Fort Stewart. Each site-specific project will be coordinated through Range Division, via the ITAM Coordinator.

The training area rehabilitation process will begin with identification of potential LRAM projects by the Fort Stewart/Hunter AAF ITAM team. LCTA data (Section 12-2a) and GIS technology (Section 12-6) will be used to help identify projects as will coordination with the Training Support Quality Management Board (Section 11-4b(1)). The ITAM Coordinator and the LRAM Coordinator will ensure that projects can be accomplished with minimal interference with the military mission. In some cases, specific sites might need to be off-limits to training for the duration of the project. The LRAM Coordinator will submit an Internal Job Order (IJO) to address program needs and this IJO is routed through ENRD for review. Within the ENRD, the Environmental Branch, Fish and Wildlife Branch and the Cultural Resources Management Specialist review the IJO to ensure that endangered species and other wildlife considerations, as well as cultural resources considerations, are taken into account.

ITAM and other Natural Resources personnel will visit project sites to ensure that all concerns are included in project planning. Appropriate NEPA documentation will be provided. Projects will then be accomplished either in-house, through NRCS, or via private contracts.

Revegetation is the critical stage of training area rehabilitation. Commonly used techniques for erosion control and establishment of vegetation include seedbed preparation, seeding, mulching, fertilizer application, watering, and protection from runoff until vegetation is established. Techniques will be specific to each project. The use of native species will be emphasized in accordance with the Presidential memo on the subject (Office of the President, 1994).

11-4c(3) Stabilized Access Routes and Ranges

Access to training areas is an obvious LRAM priority. Most LRAM projects involve improvement to access routes between the cantonment area and training areas. Perhaps the most noticed damage to Fort Stewart vegetative communities is the effects of sedimentation from roads and trails into wetlands. Thus, stabilized access routes can reduce the risk of future noncompliance.

Another important LRAM category is the stabilizing of berms on firing ranges. These

berms provide safety for soldiers and other personnel, and they protect down-range vegetation, including RCW habitat.

11-4c(4) Maneuver Islands

Maneuver islands are areas where mechanized forces can move through the terrain with minimal damage to the environment. The creation of a maneuver island on Fort Stewart often involves thinning or otherwise opening forests to allow maneuver and creating hardened turning pads and stream crossings. Hardened sites are areas which have been resurfaced with good base material and gravel.

Forest management and management for the RCW often support increased troop maneuver through thinning, harvest, and/or prescribed burning (Section 14-2). However, maneuver islands may need additional treatments to provide training conditions required.

11-4c(5) LRAM Projects

Fort Stewart has repaired military damaged lands in the past, but LRAM provide a more carefully managed, intensive program to accomplish this mission. The nature of military damage is such that potential LRAM projects may be created during a very short period, and priorities often change.

To date, LRAM projects have been identified mostly by intuition (i.e. their high priority is obvious). Historically, most LRAM work was accomplished by NRCS, consisting of repair of access roads from the cantonment area to training areas and the establishment of maneuver islands. In the future, projects will be less obvious with regard to priority, and LCTA and GIS will be used to assist with project identification and prioritization. LRAM projects will be forecast no less than one full year in advance of the anticipated start date. The initial LCTA analysis (Elfner, 1996) identified training "hot spots", and these are good starting points for LRAM project identification.

Subsequent fiscal years have seen more varied projects. Projects have included rehabilitation of maneuver lanes, hardening of significant traffic turning areas, improvements to roads and major intersections and culvert sites, upgrading firing point entrances, controlling vegetation for improved visibility, hardening stream crossings, and stabilizing soil on sloped areas.

The future of the military mission on Fort Stewart depends upon achieving the capability to rehabilitate damaged lands and return them to training status in a manner that also meets the needs of ecosystem management. The Fort Stewart LRAM program will achieve this in 2001-2005.

11-4d Environmental Awareness

Environmental Awareness is a component of ITAM to foster a conservation ethic in those who use Fort Stewart/Hunter AAF lands. Fort Stewart/Hunter AAF's Environmental Awareness program was initiated with support from CERL. The program include a Soldier's Handbook, Leader's Handbook, field cards, training video, and a series of posters.

Each soldier who inprocesses at Fort Stewart/Hunter AAF receives an Environmental Awareness briefing, using a video which is being updated. Soldiers receive the Soldier's Handbook, and leaders receive the Leader's Handbook, as well as associated field cards for reference. These materials will be updated when new RCW guidelines are received. Environmental officers and NCOs receive

additional training via classes taught by the Environmental Protection Division, which include the Environmental Compliance Officer Training Course and the Hazardous Waste Handlers Training Course.

The Army Environmental Resource Center, Huntsville, AL is providing posters appropriate to use on Fort Stewart/Hunter AAF. Fort Stewart will use the "Burma Shave" type signs on range roads to further inform soldiers of their stewardship requirements while teaching proper vehicle distance discipline. Seibert stakes will be used to mark areas soldiers should avoid.

The National Guard has the potential to put more vehicle use onto Fort Stewart/Hunter AAF than organizations stationed on the post. However, considering that Guard and Army Reserve units generally only train for a maximum of two weeks, it is difficult to individually provide Environmental Awareness briefings to each soldier. Therefore, Range Division distributes Leaders' Handbooks to units prior to their arrival at Fort Stewart/Hunter AAF. Considering the similar amount of damage from these units compared to resident units, this advance awareness training tactic appears to be working well.

There is a need to disseminate range-related information on stewardship requirements to civilian employees, contractors, hunters, anglers, and others who use Fort Stewart/Hunter AAF training areas. The Environmental Awareness program will be enhanced to accomplish this during 2001-2005.

11-5 Fish and Wildlife Management

Fish and wildlife management at Fort Stewart, as with virtually everywhere in this nation, is built upon a tradition of game management to support hunting and fishing. In the past 15 years or so, this base has broadened, driven by endangered species legal requirements and a growing recognition of the importance of nongame species. Even more recently has come an emphasis on general fauna and flora baseline inventory.

Much data needed to build a "nongame" program as part of managing ecosystems has been, or is being, collected. Data collection will continue as part of program expansion. However, the real challenge will be developing and implementing management programs for nongame (including endangered) species and their habitats during a period of declining budgets and personnel while maintaining high quality game and sport fish management aspects of the Fort Stewart/Hunter AAF fish and wildlife program.

Fort Stewart has a Hunting and Fishing Advisory Council to advise and assist with the game management and recreational aspects of fish and wildlife programs, commonly called the "21X program" after its funding code. The Hunting and Fishing Advisory Council's chair is appointed by the Commanding General. This Council will continue to play an important role in natural resources management in 2001-2005.

11-6 Forest Management

The 1990s are seeing the greatest change in forest management on Fort Stewart since the program began over 50 years ago. Most changes are occurring as a result of the Biological Opinion for the RCW (USFWS, 1992), which requires a conversion of upland forests to a longleaf-wiregrass ecosystem. Fort Stewart uplands had about one-third longleaf, one-third slash, and one-third loblolly pine prior to the start of this conversion. This conversion process could take decades to complete.

Section 14-2 describes most of the forest

management program on Fort Stewart/Hunter AAF. Major changes are occurring in the timing and amount of prescribed burning and the degree of thinning, all favoring longleaf pine with a basal area of 50-80 and old age trees. Fort Stewart has a history of being one of the Department of Defense's largest producers of commercial timber, and this will not change appreciably with this change to an ecosystem management system.

12. INVENTORY AND MONITORING

12-1 Objectives

- Inventory Fort Stewart/Hunter AAF's natural resources and regularly monitor resources that are important indicators of overall ecosystem integrity, capability of lands to support military missions, renewable product surpluses, status of imperiled species or communities, and other special interests.
- Provide inventory and monitoring data analyses to implement an adaptive management strategy, a critical component of ecosystem management.

12-2 Definitions

Current, quantitative data form the bedrock of resource management programs. Inventory, as used here, can be thought of as the "what's there" aspect of managing ecosystems. Some idea of "how many of what's there" is also useful for comparison purposes. Wildlife inventory has emphasized game and endangered species resources at Fort Stewart/Hunter AAF. Other natural resources inventory in recent years has included a floristic survey, exotic aquatic plants, National Wetlands Inventory, and a forest inventory. Chapter 8 summarizes inventory results.

Monitoring, a periodic "re-inventory," is the "what's happening to what's there" aspect of ecosystem management. Monitoring tracks population trends (and absolute numbers if needed) of individual species or higher associations of species such as plant communities. Monitoring is generally done on a regular basis. Monitoring often targets species with high economic or human use values and indicator species of overall ecosystem health. Monitoring on Fort Stewart/Hunter AAF has emphasized game species, forest pests and diseases, endangered species, aquatic weeds, and land condition.

12-3 Flora Inventory and Monitoring

12-3a Forest Inventory

The forest inventory was a major objective of the 1992 *Forest Management Plan* (DEH, 1992b). This inventory was completed in 1998. Maps provided will be in GIS format, and databases will be GIS-compatible. There are no needs for additional overall inventory during 2001-2005, but localized inventory will be done as Natural Resources Management Unit prescriptions are prepared during this five-year period.

12-3b Flora Surveys

The existing floral survey, conducted by The Nature Conservancy (TNC) (The Nature Conservancy, 1995), is adequate for Fort Stewart/Hunter AAF needs during the next five years. The list of plants discovered during this survey will be updated as new species are found as part of other projects.

12-3c Wetlands

Fort Stewart/Hunter AAF uses the National Wetlands Inventory. This inventory is reasonably accurate, but it does need updating as additional areas are evaluated. However, there are no needs for a major wetlands delineation during 2001-2005.

12-3d Wildlife Habitat Survey

It is important to evaluate quality and quantity of habitat to optimize the management of specific game and nongame species. A comprehensive, installation-wide habitat survey is being conducted. The database generated from this survey will be used to make management decisions, monitor management actions over time, and evaluate the results of such management actions. Also, the database (and associated maps) will be used to improve integration of forestry and wildlife programs.

The wildlife habitat survey consists of delineation of management units to identify key wildlife areas, such as old homesites, fence rows, oak groves, plum thickets, etc., using aerial photography. All key areas and habitat types that are identified are mapped and catalogued. Each management unit is surveyed on the ground to verify photo assessments, more accurately describe key wildlife areas, and obtain additional data on habitat conditions. From these data, habitat conditions can be assessed, management objectives clarified, limiting factors identified, and management prescriptions written during the Natural Resources Management Unit prescription process (Section 22-4).

12-3e Aerial Photography

Aerial photographs, by themselves, are not inventory items. However, they are a very useful survey tool to persons interested in managing relatively large pieces of land or analyzing long term vegetation changes.

The oldest known aerial photographs of Fort Stewart were taken in 1947. They have been taken at 5-10 year intervals since then. The latest aerial photographs were color infrared taken in October, 1996.

During 2001-2005 Fort Stewart will use satellite imagery to enhance its ecosystem monitoring capabilities. Considering the size of the installation, this will be a very economical way to regularly monitor changes in the landscape. Emphasis on the use of imagery will be in areas of heavy military training, especially Training Areas E and F.

12-3f Vegetative Mapping

A project to compile a Fort Stewart vegetative map is ongoing. A basic map was completed in 1999. This combined LCTA/CERL/The Nature Conservancy (TNC) project uses the community classification in the *Fort Stewart Inventory* (TNC, 1995) (see Section 8-1b). Preliminary delineation of community types was done on 1:20,000 infrared aerial photographs.

About 800 survey plots were ground-evaluated to determine composition of preliminary community type delineations. Results were hierarchically ranked using a computer to determine how closely they were related. The GIS is being used to provide a supervised classification of all community types on Fort Stewart, based on these survey plots and computer classifications.

Predicted community types will be ground-truthed to determine overall accuracy of the interpolation. From these results, a vegetative map of Fort Stewart will be developed.

12-3g Aquatic Plant Infestation Monitoring

Native and exotic aquatic plant infestations are important to monitor since their presence affects ecosystem functionality, water quality, sportsman access, and the sport fishery. Exotic

species pose particularly significant threats to the riverine ecosystem. Within the last decade, alligatorweed has spread throughout the Canoochee and Ogeechee river systems, and localized weed growth have the potential to block river channels and completely clog back water bays and sloughs. In addition, hydrilla is now present in southeastern Georgia (documented in the Canoochee River watershed, Evans County Public Fishing Area), and it is just a matter of time before it infests Fort Stewart/Hunter AAF. Such macrophytes require monitoring and possible control. Aquatic weed management is described in sections 14-3c and 14-3c(2).

12-3h Phytoplankton Sampling

Fort Stewart is part of an Environmental Protection Agency (University of Georgia office) study on phytoplankton. The objective of the study is to better understand effects of fertilization on plankton growth. Samples are taken monthly during the growing season from five ponds on Fort Stewart. This study began in 1996, and it will continue as long as EPA requires Fort Stewart's assistance in collecting data.

12-4 Fauna Inventory and Monitoring

Fauna surveys on Fort Stewart have involved game and nongame species. For purposes of this plan, nongame is defined as species not hunted or fished on Fort Stewart. Both inventory and monitoring (or census) are important to the Fort Stewart fish and wildlife management program.

12-4a Wildlife Game Species

Census of game species is required for the establishment of harvest regulations. Following biological data collection and analysis, administrative/legal procedures for establishing hunting seasons and harvest quotas are as follows (DEH, 1992a):

- Recommended seasons and bag limits are forwarded to the Georgia Department of Natural Resources, Wildlife Resources Division for review.
- The Georgia Department of Natural Resources schedules several public hearings, providing an opportunity for public comment on proposed regulations/seasons.
- After public opinion issues are resolved, the Georgia Department of Natural Resources forwards requested seasons and bag limits to the State Board of Natural Resources for legal review and final approval.
- Fort Stewart's seasons and bag limits are then published annually in State Hunting Regulations, issued by the Wildlife Resources Division. Fort Stewart generally follows State seasons and bag limits with the exception of either-sex deer season, which must be scheduled during periods of minimal military training to improve hunter access.

12-4a(1) White-tailed Deer

Historically, track counts and night light censuses were used with check station data to assist biologists in assessing the deer population and setting harvest quotas. With the buildup of soldiers, mechanized equipment, and increases in training, track counts and night light censuses were dropped due to training conflicts.

Currently, harvest data collected at deer check stations are the primary source of information to evaluate deer herd condition and establish either-sex deer seasons. Biologists collect jawbones for aging and determine antler length, antler diameter, number of points, and weights for bucks. Data collected from does during the either-sex season include age, weight, and reproductive status. Data are stored in a computer and summarized in a check station report. Age-specific antler measurements, body weights, and reproductive data are compared

with data from previous years to obtain the condition trend of the herd.

This information is provided to the Georgia Department of Natural Resources, for inclusion in a computer population model program used to evaluate deer herds statewide. Check station data are supplemented with habitat data, training area access records, and hunting pressure data to determine harvest quotas.

Operation of deer check stations is critical to the management of white-tailed deer. Either under- or overharvest would adversely affect future deer hunting. The major problem with sole dependence on check station data is that many deer are not checked, as required by post regulations. During 2001-2005 Fort Stewart will evaluate ways to reduce the number of unchecked deer by reducing the "hassle" involved with deer checking and increasing effectiveness of enforcement of deer checking regulations.

12-4a(2) Feral Hogs

The feral hog population is large and beginning to compete with deer during low mast production years. Maximum hunting pressure is placed on hogs by having no bag limit and extending the season. Hunter harvest is monitored annually via the Game Harvest Card.

Fort Stewart has cooperated with the U.S. Department of Agriculture with regard to feral hog diseases. Post wildlife managers periodically take blood samples from harvested hogs for USDA analyses. Results indicate that while pseudorabies is common in feral hogs, brucellosis is almost never found. Fort Stewart will again cooperate with USDA if requested during 2001-2005.

12-4a(3) Turkeys

Turkey hunters are required to tag all turkeys harvested on Fort Stewart as well as record all their turkey kills on their Game Harvest Card that must be turned in within 30 days of the close of turkey season.

Turkey hunter success should improve with changes in the forest management program, as a result of the increased prescribed burning and timber harvest.

12-4a(4) Quail

There are significant concerns regarding declining bobwhite quail abundance in the South, in general. Fort Stewart started monitoring quail population trends in 1996 as part of an ORISE project (Section 15-2b).

This research project started with nine routes with 12 stops on eight of them and eight stops on the other route. Stops were 0.5 miles apart, and listening times were eight minutes. This process was repeated in 1997, and results of the first two years were used to establish a standard technique to provide meaningful population trend information for management purposes.

Monitoring of the quail population will consist of three annual quail censuses of the upland game management area. The first census, a cock call survey, will occur in June. The second census, using trained bird dogs, will occur prior to hunting season. Finally, capture and banding will be conducted at the close of hunting season to provide survivorship and movement data (Directorate of Public Works, 1997).

12-4b Fish Surveys

12-4b(1) Pond and Lake Surveys

Fish population sampling has traditionally emphasized ponds and lakes under management. Sampling equipment includes a 50' bagged seine, 15' minnow seine, and several 100' experimental gill nets. The addition of an electrosampling boat has significantly enhanced the in-house capability for surveys.

Traditional pond seining, as developed by Dr.

H.S. Swingle at Auburn University, is utilized in all managed ponds to determine pond balance. Sampling is conducted from June through August and evaluates the presence and relative abundance of largemouth bass and bream reproduction, the presence and relative abundance of intermediate-sized bream and bass, the condition of all species, and the presence and relative abundance of competitive nongame species. Scales are taken to obtain age and growth data when appropriate.

Gill nets are used to sample catfish ponds and any other pond where additional data about the fish population is desired. Such information might include species composition, length-frequency distribution, relative abundance, reproduction verification, condition factors, age and growth data, and catch rate.

Electrosampling is conducted from March through November using 500-1,000 volt, pulsed DC current, adjusted for conductivity and other water conditions. Data obtained includes species composition, relative weight , Proportional Stock Density (PSD) and Relative Stock Density (RSD), length-frequency distributions, reproduction verification, length-weight relationships, condition factors, age and growth information, and catch rate.

12-4b(2) River and Stream Surveys

The DNR has a standardized sampling program for rivers and reservoirs using creel surveys and electrosampling. Fort Stewart is using electrosampling on the Canoochee River to provide data for the DNR database. The project involves surveying six, 1.5 kilometer sections of the river annually during September-November and weighing and measuring each fish caught. Data are provided to DNR on a diskette for entry into its database, upon which it forecasts angling quality.

In 1996 Fort Stewart began an intensive, long term fish population study of the Canoochee River using an ORISE biologist. The study initially focused on evaluating the effect of aquatic vegetation on the distribution and abundance of riverine fish. In 1997 the study expanded to incorporate a more comprehensive fish population assessment in an effort to monitor changes in fish communities over time. The current approach involves identifying and classifying fish assemblages using an Index of Biological Integrity. Numerous attributes or *metrics* will be assessed to include: number of total species; number of darter, sunfish, sucker, and catfish species; percent of intolerant and tolerant species; percent of omnivores, insectivores, piscivores, and herbivores; and fish health assessment. Mainstream sample sites will be compared with selected tributary reference sites within each sampling season to evaluate impacts, and annual results will be compared between years to assess trends over time. Fish are considered excellent indicators of acute and chronic impacts on stream health. This study will dovetail into the installation's efforts to monitor and protect the endangered shortnose sturgeon. Sampling will involve electrosampling from May through September. Examination of water quality will run concurrent with the fish sampling.

Freshwater mussels are excellent indicators of water quality because of their constant filtering of water through their systems. Fort Stewart plans to survey for freshwater mussels in the Canoochee River, which would both provide baseline inventory of these species and act as an indirect means to monitor water quality.

12-4b(3) Creel Surveys

Creel surveys are an integral component of managing recreational fisheries. Creel surveys can assess:

- quality of sport fishing, expressed as species caught and numbers and weight of fish caught per unit of fishing effort;
- fishing pressure, expressed as angler-hours of fishing effort for all species or separate species;
- total yield of fish in terms of species,

numbers, and weights for specified segments of time;
- composition of the catch, as a percentage of total numbers, and weights for various species and classes of fish;
- characteristics of the fishery, such as socioeconomic information about the angling population and value of the fishery to surrounding communities;
- statistics about the fish population, such as annual exploitation rate of various year classes of selected species, appraisal of new year classes recruited into the fishery, and population estimates and mortality rates for selected species; and
- other miscellaneous data decided upon prior to design and implementation of surveys.

Creel surveys must be repeated periodically to observe trends and record changes that may impact the fishery. Changes in fisheries management may be required to keep abreast of changes in fishing pressure, catch rates, etc. as determined from survey results. Creel surveys can also measure effects of management techniques, such as drawdowns, fish population control actions, or fishing regulations. Finally, creel surveys furnish information of interest to anglers that may aid them in their own fishing efforts.

The creel survey must be statistically valid and cost effective. Survey design should be based on random sampling. The survey should incorporate a stratified sampling scheme to increase the homogeneity of each sampling unit. Because of time, cost, and logistical constraints, it may be necessary to divide the fishery into smaller units with different sampling probabilities. Such a design can minimize cost and labor and increase survey precision. Survey types include aerial surveys, roving creel or access point surveys, telephone surveys, or combinations thereof.

Fort Stewart is planning a major creel survey of its recreational fisheries in the next few years. A project based on implementing Executive Order 12962, *Recreational Fisheries*, has been submitted. The project includes creel survey design to evaluate fish populations, angler catch, fishing effort, and socioeconomic data.

12-4c Threatened or Endangered Species

Endangered or threatened species monitoring will follow procedures outlined in the Biological Opinion (USFWS, 1992), unless consultation with the USFWS is used to improve monitoring. Section 14-5 includes additional information pertinent to this monitoring.

Red-cockaded woodpecker populations will be monitored according to procedures outlined in the RCW management plan (Fort Stewart Endangered Species Management Planning Team, 1997).

Gopher tortoises and their burrows will be surveyed on a 5-year cycle, with most sites surveyed every three years or less, to document numbers and distribution of active burrows and habitat quality for indigo snakes. This information will be sent to the USFWS annually.

Fort Stewart will continue to record bald eagle sightings and conduct aerial reconnaissance to locate nests in areas where frequent sightings suggest they may be present. This may be accomplished by flying with Forestry Branch during beetle surveillance in suspect areas. Fish and Wildlife personnel will continue to monitor the bald eagle nest.

Wood storks are not known to nest on Fort Stewart/Hunter AAF. If any nesting rookeries are found, a monitoring program will be established for this species.

The initial threatened and endangered species inventory by The Nature Conservancy (1995) provided the first installation survey for the

shortnose sturgeon. The first year's effort included trammel net capture and tagging, while the second year's effort focused on a biotelemetry study. Despite a good first effort, additional information on the population and its use of specific habitat throughout the year is sill needed. Consequently, the shortnose sturgeon Endangered Species Management Plan (Georgia Cooperative Fish and Wildlife Research Unit, 1997) proposes a three to five year population survey to more thoroughly assess and characterize the population, evaluate population trends, and monitor annual movements within the Ogeechee River system. Results of this survey will dictate additional investigations as necessary.

12-4d Neotropical Birds

There is considerable continental-wide concern over declining numbers of many neotropical bird species. Fort Stewart is collecting information to determine the status of these birds. Surveys will be done about every three years. Thus, in 2000 a songbird survey will be accomplished to compare with results of 1993, 1994, and 1997 surveys.

Fort Stewart used the services of Georgia Southern University to conduct two neotropical bird studies with an objective of determining effects of forest management practices on these birds. This work resulted in two Masters thesis publishings that provided insights into the influences of prescribed burning on neotropical birds.

In 1999, a Monitoring Avian Productivity and Survivorship (MAPS) survey was conducted. This survey is conducted on 10 days during the breeding season (May through August). Of the 107 individual birds trapped, 27 species were identified as neotropical migrants. This survey will be continued indefinitely.

In training area E-17 a Breeding Bird Census and a Winter Bird Population Study were conducted in 1996 and 1997. These surveys provide valuable data on wintering and breeding bird species in longleaf/wiregrass communities and their response to management.

12-4e Forest Insect Pest Monitoring

As described in Section 14-2n, some insects cause, or have the potential to cause, considerable damage to forest ecosystems on Fort Stewart/Hunter AAF. The Forestry Branch cooperates with the U.S. Forest Service to monitor the southern pine beetle and the gypsy moth, using trapping surveys. These surveys will continue during 2001-2005.

12-5 Water Quality Monitoring

Water quality monitoring is important to measuring ecosystem health at Fort Stewart/Hunter AAF. Land-based environmental degradation eventually affects water quality and aquatic ecosystems dependent upon good water quality.

12-5a Surface Water

12-5a(1) Ponds

Pond water quality checks have traditionally been done using a HACH® Ecology Test Kit #AL-36B and a secchi disk. Parameters measured included dissolved oxygen, pH, alkalinity, hardness, and carbon dioxide. This water quality testing was significantly improved in 1992 with the purchase of sophisticated Hydrolab® equipment (Water Quality Multiprobe Logger, Data Sonde 3, and H20). This equipment is enabling pond profiling with readings every foot of depth to obtain a water quality profile of each pond.

Additionally, parameters checked monthly during warm months include dissolved oxygen, pH, water temperature, conductivity, redox, and turbidity. Of particular interest are temperature and dissolved oxygen data. Both can limit fish

productivity and survival.

Fish kills are sometimes indicators of water quality problems, often pollution. Section 14-9 describes processes used when fish kills are discovered.

12-5a(2) Rivers

Hydrolab® equipment is used to monitor water quality at Bridge #15 (uppermost bridge on the Canoochee River), Bridge #41 (lowermost bridge on the Canoochee River), and Bridge #5 (uppermost bridge on Mill Creek) to determine the quality of water as it enters and leaves Fort Stewart. Thus, it would be possible to determine effects of Fort Stewart activities on water quality if that were required.

There are some nitrate, nitrite, and phosphorus level concerns in waters below the water treatment plant. However, surface water quality is generally good on Fort Stewart with exception of immediately below the water treatment plants and isolated sites where sedimentation is an issue.

The Georgia DNR Environmental Protection Division initiated a watershed/river basin monitoring program in the mid-1990's. In 1997 and 1998, the agency examined the Savannah/Ogeechee/Canoochee River basin. The final evaluation of the data from that study is still pending.

In-house monitoring will be conducted as determined for specific projects and activities as per the Clean Water Act and its amendments. Fort Stewart Fish and Wildlife Branch will assist Georgia DNR in the collection of fish specimens for contaminant analysis as requested by Georgia EPD.

12-5b Groundwater

Groundwater is one of Fort Stewart/Hunter AAF's most valuable natural resources. Fort Stewart and Hunter AAF use groundwater for drinking. Fort Stewart has five cantonment wells, eight additional noncommunity system wells, and one nonpotable well. Hunter AAF has two main wells and six noncommunity system wells. Cantonment and main wells are tested monthly, and noncommunity system wells are tested quarterly. Water fully meets Georgia Environmental Protection Division, DNR, standards.

Fort Stewart currently has 7 underground storage tanks (USTs) in service, while Hunter AAF has 8 active USTs. Remedial action is ongoing at both installations at several sites. To date, Fort Stewart has closed 173 USTs, while Hunter AAF has removed or closed in-place 93 USTs. All remaining USTs are equipped with sophisticated monitoring systems. The installation is conducting long-term monitoring at active and former UST sites. Fort Stewart currently maintains 233 monitoring wells, while Hunter AAF maintains 147 wells. Fort Stewart is proposing over 80 additional wells in FY00 while Hunter AAF is proposing over 60 new wells. The installation locates its wells at active and abandoned landfills, active and former burn pits, active and inactive explosives ordinance sites, fire training areas, paint booth sites, wash racks, bulk fuel facilities, and oil/water separator sites.

12-6 Data Storage, Retrieval, and Analysis

Collection of natural resources data is a virtually useless venture without the capability to store, retrieve, and analyze these data. In all too many cases, biological data are collected and stored without being used. Often this is due to inefficient data storage, retrieval, and analysis systems.

12-6a Microcomputer System

Microcomputers are essential to the routine operation of efficient natural resources management organizations. The volume of

incoming data is too substantial to handle without computers, and routine administrative tasks are accomplished considerably more efficiently with computers.

12-6b Geographic Information System

A geographic information system (GIS) allows users to store and manipulate spatial data (e.g. maps, aerial photos, satellite images). GIS deals with data in vector (lines and points) and raster (areas) formats. Data can be displayed and used to create maps.

Fort Stewart obtained its first GIS in 1992. This system operated on GRASS software. Initial hardware was an Intergraph Interpro 2000®, which was converted to a SUN SPARCstation 10® workstation in 1993. There is an ongoing process of converting from GRASS to ArcInfo® software. A global positioning system (GPS) is used to collect field data which can directly be downloaded into the GIS. Appendix 12-6b(1) lists GIS and GPS hardware and software at Fort Stewart.

The Fish and Wildlife Branch contracted through the Center for Ecological Management of Military Lands for the services of a GIS operator in 1997 and began procurement of additional hardware and software to access the GIS database. The Fish and Wildlife Branch will continue to share a common database with the ITAM/Forestry system, ensuring that all users have access to the most current information through the ITAM GIS system. The Fish and Wildlife system will also have the ability to run ArcInfo/ArcView independently when the ITAM GIS system is down for maintenance, data backup, or other reasons. Any information added or edited during this time will be transferred into the ITAM GIS system as soon as it comes back on line.

Database development for the Fort Stewart GIS is in progress. This will be one of the most significant steps for the Fort Stewart/Hunter AAF natural resources program during 2001-2005. Appendix 12-6b(2) lists current and projected databases. Priority database development projects include the forest inventory (Section 12-3b) and the vegetation map (Section 12-3g).

Spatial data analysis and map presentation are primary tasks of the GIS. GIS is becoming an integral part of many Fort Stewart natural resources programs. Facility siting, especially facilities associated with training land, is a major use of the GIS, and this use will continue to become more sophisticated. GIS is being used to plan LRAM projects, and this will become more important as project priorities become less intuitive in the future. Another use that is expected to grow is the synchronization of natural resources management and troop training in training areas.
Examples of recent use of GIS and GPS include:

- production of an environmental considerations map to plan the five-acre expansion of Firing Point 16;
- assistance to Range Control for Red Cloud Hotel range expansion;
- identification of southern pine beetle spots and potential longleaf pine restoration sites;
- assistance with the CERL project regarding *Balduina atropurpurea* on Fort Stewart;
- assistance for mitigation planning for endangered species;
- corrections of photograph registration points for the forest inventory;
- planning assistance for the Maneuver to Live Fire lanes project;
- analysis for expansion of borrow pit #6 and Metz borrow pit; and
- analysis for B-1 Demo project.

One potential application will be the development of a training map which would show areas with natural and cultural resources considerations as well as training facilities. Soldiers are trained to use maps, and an up-to-date training map that visually shows

environmental features would be an important contribution to both military training and environmental protection.

GIS could be used to plan military missions. Operations personnel could use the GIS to identify sites for training that require specific landscape features, and its line-of-sight feature is useful in planning laser-oriented military operations.

Another application is support of NEPA documentation. The GIS can provide alternatives for siting a variety of projects. Considering research and survey projects involving natural resources on Fort Stewart, the GIS is an invaluable tool for supporting these projects and storing and analyzing data collected.

As databases are compiled and the GIS fulfills the requirements of the Fort Stewart natural resources program, use of the GIS will expand. Programs such as hazardous materials management, environmental remediation/restoration, spill response, and ground water quality monitoring are obvious applications for GIS support. The GIS can support other civilian and military programs on the installation, such as grounds maintenance, range road maintenance, utility corridor planning, antenna siting, etc.

12-7 2001-2005 Inventory and Monitoring Summary

- By 2000 complete baseline data on community types.
- Monitor effects of hardened stream crossings.
- Collect forest data needed for management prescriptions.
- Annually update the floristic survey using data from other projects.
- Annually update the wildlife habitat survey.
- Regularly obtain and use satellite imagery for monitoring vegetative trends.
- By 1998 complete vegetative map.
- Monitor aquatic plants as needed.
- Monitor phytoplankton in cooperation with EPA.
- Annually monitor deer, hogs, and turkeys using check station data.
- Continue to cooperate with USDA on feral hog disease monitoring.
- Complete quail monitoring study and develop/implement standard monitoring technique.
- Conduct pond and lake surveys.
- Conduct Canoochee River survey through 2000 and evaluate future surveys.
- Conduct freshwater mussel inventory in Canoochee River.
- Conduct creel survey of installation fisheries.
- Conduct endangered and threatened species monitoring and inventory as required for each listed species.
- Continue neotropical bird monitoring.
- Monitor southern pine beetle and gypsy moth through trapping surveys, in conjunction with USFS.
- Continue surface water monitoring.
- Continue and upgrade groundwater monitoring.
- Update computer hardware and software and provide operator training.
- Continue to develop and maintain GIS databases.
- Use GIS data analyses to support training, natural resources, outdoor recreation, and other environmental programs.
- Additional inventory and monitoring will be conducted if the need arises.
- Develop and implement monitoring protocols for State-protected species and federal species of concern.
- Conduct Breeding Bird Survey and Winter Bird Population Study in E-17.

13. ECOSYSTEM DAMAGE PREVENTION

Preventing environmental damage is easier and less costly than trying to restore degraded ecosystems. However, the most effective prevention measure--prohibition of any destructive use of the land--is generally not an option on military installations. Thus, a compromise between total protection and unrestricted military training must be reached.

Natural resources management on Fort Stewart is predicated on the primacy of the military mission and the belief that effective training can be accomplished with minimal long-term environmental damage. The military community increasingly realizes that effective training and environmental stewardship are mutually compatible, and, indeed, necessary for the maintenance of a quality military training environment.

13-1 Objectives

- Integrate Fort Stewart/Hunter AAF's training requirements for land use with the natural resource conditions of the land.
- Provide protection for lands from wildfires.
- Provide protection for areas of special ecological concern.

13-2 Wildfire Protection

The Forestry Branch has primary responsibility for virtually all wildfires. On rare occasion the Fire Department responds first, such as a road shoulder fire near the cantonment area during weekends. Forestry and Fish and Wildlife cooperatively develop burn plans for ecological or military purposes. These plans are coordinated with Fish and Wildlife and Range Division, as well as Cultural Resources. Most burning is done by Forestry Branch.

13-2a Fire Prevention and Suppression

Fort Stewart uses three means to limit the extent of wildfires: firebreaks, early detection, and fuel reduction via prescribed burning. The installation was once checker-boarded with a massive firebreak system, each about 10 chains (660 feet) from the next. This was used to facilitate prescribed burning as well as control wildfires. Most of these are no longer maintained.

The firebreak system now emphasizes paralleling public roads and encompassing ranges where fires often start. Most firebreaks are 6-8 feet wide, but in some cases they are double wide, particularly along installation boundaries. Firebreaks are maintained with a harrow or fire plow, and most firebreak maintenance is in fall. Firebreaks paralleling public roads are generally about 100 yards from roads and act to keep smoke from obscuring driver vision during prescribed burning operations. In many cases tank trails along highways act as firebreaks. Firebreak maintenance is accomplished by Forestry Branch and is funded from Operations and Maintenance funds on ranges and from forestry funds in areas where commercial forestry is the primary objective of forest management.

Many roads, wetlands, tank trails, and streams act as firebreaks. The implementation of Natural Resources Management Units (Section 10-5) will require some changes to the firebreak system since these units are primarily based on burning units. This conversion will be completed by the end of the 2001-2005 time period, with most done by 2000. Some firebreaks may be converted to rye strips, which would be maintained by Fish and Wildlife Branch.

Early detection of wildfires is primarily done

using fire towers. Fort Stewart has five towers, two of which are generally manned during high fire danger times. When fire danger rises, other towers are manned by Forestry personnel. About 80% of wildfires are reported from these towers.

When fires are reported, several factors enter into the decision-making process regarding appropriate response. Some fires within impact areas are "let burn", so the first check is whether a reported fire is in a commonly used firing range, such as the Red Clouds. Fires not within impact areas or firing ranges are physically checked. Another early check is for red-cockaded woodpecker clusters which are protected from wildfires, since trees used for nesting are highly prone to fire damage due to leaking resins. Other factors which are weighed regarding suppression decisions include weather, presence of soldiers, proximity to highways, smoke drift, risk of spread, and whether or not the area is scheduled for ecological burning.

Reported fires are responded to in various ways from immediate suppression, to cutting temporary fire lanes and allowing fires to burn out, to "let-burn", and sometimes enhancing the burn with more ignition to either connect the fire with a burned out area or creating an ecological burn if one is scheduled for the area. Soldiers often put out small fires without Forestry assistance.

Fort Stewart/Hunter AAF can call upon the Georgia Forestry Commission for additional fire suppression support. Both agencies (Anonymous, 1967) have agreed that each may take appropriate actions to stop fires from entering or leaving Fort Stewart/Hunter AAF lands. The major wildfire prevention technique is reduction of fuel using prescribed burns.

13-2b Wildfire Impacts on Natural Resources

The longleaf-wiregrass ecosystem is totally dependent upon periodic fire. It would be naive to assume that the conversion of thousands of acres on Fort Stewart to a longleaf-wiregrass ecosystem using fire will have no effects on wildlife since plant communities and habitats are being changed. However, the end result will be a more naturally functioning ecosystem that is most favorable to those species native to the area, and these are important national, Department of Defense, Department of Army, and Fort Stewart goals.

There will be more fire on Fort Stewart than in the recent past, but it will be fire that is a natural part of the ecosystem, even if much of it is set by man and is burned in a more controlled manner than originally done.

13-3 Special Area Protection

Designation of special protection status for important or fragile areas is an important management tool. It is often easier and more cost effective to put use restrictions on some areas to minimize damage or disturbance than to mitigate damage or disturbance.

As part of the NEPA process, the Environmental and Natural Resources Division reviews proposed projects at Fort Stewart. Natural resources managers can identify concerns and recommend measures to minimize damage. Examples include avoiding cultural resources and wetlands, filling excavations after exercises, and siting missions in areas suited to the mission needs and environmental considerations. See Chapter 20 for more information.

Fort Stewart has several areas with special natural features. They harbor sensitive or unique wildlife species or represent unique plant communities. Following are special area categories and accompanying restrictions. Most areas either have been or soon will be digitized in the GIS, and maps detailing restricted areas will be available to project planners.

13-3a Red-cockaded Woodpecker Buffer Zones

Fort Stewart is one of many Army installations providing habitat for the red-cockaded woodpecker (RCW). The RCW is a federally listed endangered species managed by the installation in accordance with the Endangered Species Act (ESA). Once common throughout Southeastern United States, RCWs are now found almost exclusively on federal and state lands where they thrive in longleaf pine habitat.

Fort Stewart has established 200-foot buffer zones around trees with marked active clusters and primary recruitment clusters, per Army RCW Management Guidelines, Appendix 1 (Department of Army, 1996).

Training restrictions for the RCW and other endangered species are included in Fort Stewart Regulations 385-14. Restrictions on hunting, fishing, and recreational activities are included in Fort Stewart Regulation 420-4.

13-3b Cultural Resource Areas

Fort Stewart takes special measures to protect its cultural resources. Section 19-3 discusses means that Fort Stewart/Hunter AAF will use to protect cultural resources while implementing this INRMP.

13-3c Conservation Sites

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes descriptions (Section V) of 36 conservation sites for Fort Stewart/Hunter AAF. Conservation sites were defined as "*areas of significant biodiversity, harboring concentrations of rare species and containing highly intact natural communities*". Information included in the Inventory for each conservation site includes site name, size, rank (A, B, or C), training area, Natural Heritage resource summary, site description, threats to sites, monitoring and research recommendations, management recommendations, and management comments. Fort Stewart will consider these recommendations when decisions regarding these conservation sites are made. Programs within this INRMP will help implement these management recommendations.

13-3d Wetlands

Section 8-2d described wetlands on Fort Stewart/Hunter AAF. Wetland protection is driven by the Federal Clean Water Act, Section 404, 40 CFR. The Individual Job Order system within DPW is the primary means through which the NEPA process is activated and possible impacts are evaluated. If necessary, the Corps of Engineers will be consulted to determine whether jurisdictional wetlands are involved. Wetlands management practices are discussed in Section 14-8.

13-3e. Bald Eagle Nesting Sites.

In late 1992 bald eagles were observed building a nest on the east side of Pineview Lake. A site management plan was developed and approved following consultation with the USFWS. Later, a second nest site was established by the same pair in Training Area E-13. Initially, a 750 foot radius "off limits' area was established around both nest sites. With the downlisting of the eagle from endangered to threatened status, the "off limits" area within the lake will be reduced to 500 feet from the nest site. This is being done to accommodate the anglers who fish this lake. The perimeter road around the lake is blocked by cables at causeways lying east and north of the nest tree. The second site is posted by signs. Military training and low altitude overflights (500 feet for rotor wing and 100 feet for fixed wing) have been prohibited in these off-limits areas as well as in a larger secondary zones. These areas are also off-limits to recreational activities, but DPW has the authority to allow recreation during the non-nesting season.

14. NATURAL RESOURCES MANAGEMENT

This chapter includes management practices which directly affect soil, water, vegetation, and fauna. It includes forest management, habitat management, training land management, and direct manipulations of wildlife. Other programs include wetlands protection, water quality programs included in this chapter, game harvest, pest management, urban natural resources management, endangered species management, and erosion control.

14-1 Objectives

- Conduct natural resources management in a manner consistent with the needs of the military training mission.
- Manage the forest ecosystem at Fort Stewart to support military training, enhance ecosystem integrity, and produce forest products on a sustainable basis.
- Restore upland forests to a longleaf pine-wiregrass ecosystem.
- Rehabilitate damaged training areas and provide improved troop training environments which can sustain training indefinitely.
- Protect water quality and its associated values on Fort Stewart watersheds and on watersheds which drain from the installation.
- Protect soil integrity and enhance soil productivity.
- Manage wetlands to ensure “no net loss”.
- Improve the quality of habitat for game and nongame species.
- Produce game on a sustainable basis to support hunting and fishing programs.
- Manage all species in a manner to ensure sustainability and native diversity of ecosystems.
- Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible.
- Control noxious plants and pest animals in a manner that supports the military mission, promotes sustained ecosystem functionality, favors native species, and adds to the quality of life of the Fort Stewart and surrounding communities.
- Ensure installation compliance with the Endangered Species Act and other applicable conservation laws and provide mitigation for unavoidable adverse impacts associated with the military mission.

14-2 Forest Management

Professional forest management has occurred on Fort Stewart for almost one-half century. The resource has grown from a cut-over, poor quality forest to one that supports one of the largest forestry programs within the Department of Defense... a forest resource worth an estimated $500,000,000. More importantly, it has produced forest products for the local economy while maintaining lands to train our nation's military soldiers to survive and win on battlefields around the globe.

Fort Stewart’s forestry program has emphasized support of the military mission, enhancement of the forest ecosystem, production of commercial forest products, protection of forest watersheds, management of wildlife habitat, including that of the endangered RCW, and provision of outdoor recreational opportunities. The forest management program has changed dramatically over the decades on Fort Stewart/Hunter AAF. The *Fort Stewart/Hunter AAF Forest Management Plan* (DEH, 1992b) described the forest management program in 1992.

No change, however, has been as great as that occurring since 1992, as the Biological Opinion for the RCW (USFWS, 1992) is being

implemented. Management for the RCW requires the conversion of upland forest to a longleaf pine-wiregrass ecosystem where this ecosystem can be maintained. This requires regular burning during the March-September growing season, maintenance of a basal area (BA) in the 50-80 range, and control of hardwood understory. These are significant changes to the traditional forest management program on Fort Stewart, and most of them will be completed within this 2001-2005 period.

14-2a Forest Summary

Fort Stewart contains about 158,678 acres of upland forest, 82,148 acres of forested wetlands, and 38,253 acres of clearings. Fort Stewart upland pine forests are about evenly divided among longleaf, slash, and loblolly pine in terms of acreage, more often with species mixing rather than as homogeneous stands. The installation has about 4,000 different timber stands and 18,500 acres of plantations. The forest inventory results are maintained on the installation's GIS database.

14-2b Management Strategies

The management objective is clear at Fort Stewart with regard to upland forests. Forests will be either maintained as longleaf pine-dominated ecosystems or converted to a longleaf pine-wiregrass ecosystem if the land will support it. Coincidentally, and very advantageous to Fort Stewart, land maintained in this condition is good for military maneuver and good for the RCW. Thus, objectives with regard to supporting military training and complying with the Endangered Species Act can be reasonably accomplished simultaneously.

Wetlands and other non-longleaf areas occur as inclusions within the longleaf-wiregrass landscape. As such, they are an important part of the longleaf-wiregrass ecosystem. Where past management practices have eliminated longleaf pine and/or wiregrass (old fields in particular), planting may be needed to restore the area to its natural, historic community. In wetlands and mature hardwoods stands, the nature of the ground cover is such that prescribed fires will burn relatively cool or not at all, so they will retain their integrity as distinct communities. Such natural areas will not be converted to longleaf pine. A few areas, such as Training Areas C-17 and C-18, may not be appropriate for longleaf-wiregrass management due to their proximity to I-95 and associated smoke management concerns.

14-2c Management Units

Forest compartments were replaced by Training Areas as forest management units on Fort Stewart. Natural Resources Management Units (Section 10-5; Map 10-5) will become the forest management unit system during 2001-2005. These units were developed in late 1996 to implement prescribed burning.

New management units have been laid out on maps, but timber was harvested and trees planted in the past based on a different management scheme. Therefore, it will not always be possible to treat an entire Natural Resources Management Unit in a uniform manner. For example, a unit might require hardwood understory treatment, stand conversion, or BA reduction on only part of the area due to a timber sale on the other part five years ago. Thus, Natural Resources Management Units may be partially treated, or even combined in some cases, for forest management (or wildlife management) purposes with the understanding that the burn regime will be based on treating these units in a similar fashion.

14-2d Commercial Forest Products

Fort Stewart/Hunter AAF produces a number of commercial forest products:

- sawtimber, comprising dbh greater than 12 inches;
- pine pulpwood;
- hardwood pulpwood, which is most

hardwood sales;

- chip and saw, a mixture of sawtimber and pulpwood, generally in the 8-12 inch dbh class;
- utility poles and pilings, generally the highest value products;
- fence posts, generally a form of commercial timber stand improvement;
- pine straw, hand raked;
- resinous pine stumps, byproducts of the old naval stores program, being eliminated as products except for construction removal, due to sensitive wildlife species; and
- firewood, on an individual basis, done as an inexpensive form of timber stand improvement and providing personal use products.

14-2e Cutting Cycle

Cutting cycle has less definitive meaning under the Fort Stewart forest management program than in many commercial forest management programs. Areas are treated (thinned, harvest cut, or otherwise) based on ecological needs (often tied to the RCW) and military training needs. Basically, areas are cut when they get too thick. This generally will occur about once every 15 years, but this time frame is very site-specific. It is important to use the term "cutting cycle" to describe management tactics, but it must be understood this is "about 15 years", even though it is used "as 15 years" in this INRMP.

14-2f Cutting Units

Areas that comprise enough timber to support a sale are used as cutting units, and this is somewhat tied to market conditions. Normally, this amounts to 1,000-2,000 cords, which at 5-7 cords per acre is 150-400 acres per sale. Future sales (cutting units) will not cross Natural Resources Management Unit boundaries, which will eventually make these units more uniform in term of timber conditions within each unit.

Burning removes paint used to mark trees. Since prescribed burning will occur every three years, using Natural Resources Management Units as burn units, it is important to conduct timber management activities within any given NRMU once during each cutting cycle. Thus, in general, all cutting units, which can be thinned or harvested within a Natural Resources Management Unit, will be treated when the Unit is entered, about every 15 years.

14-2g Rotation Length

Rotation length is relatively meaningless under the Fort Stewart forest management strategy. The strategy is likened to a forever timber stand improvement (TSI) program. In terms of age of mature timber, some longleaf will certainly reach the 200+ age class under this system, but most will be removed at younger ages.

14-2h Harvest/Timber Stand Improvement

Unlike even-aged management of timber, the Fort Stewart system is one of perpetual timber stand improvement (TSI), and harvest is simply one means of accomplishing TSI. Thus, both are discussed together.

14-2h(1) Thinning

Thinning is the primary harvest and TSI tool used on Fort Stewart. Almost all thinning is commercial harvest. Decisions on which trees to be marked for removal (harvest) are based on several factors, including tree spacing, species, amount of regeneration, hardwood types and ages, and presence of wetlands.

Since the goal is longleaf-dominated uplands, harvest objectives are to favor longleaf by removing competing pine species in areas where fire exclusion has caused longleaf to diminish below its historical levels. The challenge is to convert slash and loblolly stands to longleaf pine. Much slash and loblolly is over 50 years old, so these species will be heavily harvested

during the next five years. About 4,200 acres have been annually harvested in recent years. Based on average growth rates and the requirement for military support and ecosystem restoration, the annual goal is to thin approximately 15,000 acres. Achievement of this goal will be directly impacted by a variety of factors, including market conditions, weather, and military activity. During periods of peak training activity, such as was experienced during DESERT SHIELD / DESERT STORM and the subsequent redeployment of Fort Stewart units in 1998 timber marking may be put on hold to support uninterrupted access to the training areas by the deploying units. Likewise, periods of prolonged rains will preclude full opportunity for marking. During the prolonged drought of 1998-2000, the local markets essentially stopped taking timber. This dramatically reduced sales, which in turn reduced the amount of acres to be marked, thinned, and prescribed burned.

Timber harvests will be based upon data provided by the forest inventory (Section 12-3a), as well as requirements for military (maneuver area) thinning, and threatened and endangered species habitat improvement thinnings. The priority for thinning will be in upland sites during the next five years. This will help provide habitat needed for RCW recovery as well as be most beneficial to military training that avoids wetland areas.

14-2h(2) Longleaf Restoration

During each 15 year entry cycle for a Natural Resource Management Unit, Fort Stewart has an objective of regenerating approximately 10% of each slash or loblolly plantation, and approximately 20% of each old field that has seeded in naturally in slash or loblolly pine. Deviations to this objective will be agreed upon by both Forestry and Fish and Wildlife. The attainment of this objective might require clearcutting and planting, particularly when non-longleaf sites are more than two chains from a longleaf seed source, as sometimes occurs at plantations, bug sites, and old fields.

The 18,500 acres of slash plantations will be converted to longleaf. This process will involve clearcutting. In some cases entire plantations will be clearcut while in others, outer edges will be clearcut, allowing longleaf to more gradually move into the site using natural regeneration. Decisions on individual sites as to the extent of timber removal will be dependent upon size of the plantation, availability of a natural longleaf seed source, and economics of seeding or planting.

14-2h(3) Chemical Treatments

Chemical treatments are sometimes economical means to remove undesirable tree and brush species that compete with preferred species. At Fort Stewart sweet gum, black gum, red maple, and some scrub oaks are examples of hardwood species that are undesirable from either timber or wildlife perspectives. Fort Stewart may use injection or spot treatment as a means to very selectively remove these species during 2001-2005. The Biological Opinion (USFWS, 1992) requires that such use within indigo snake habitat be consulted with the Service, and Fort Stewart will comply with this requirement.

14-2h(4) Prescribed Burning

Prescribed burning is critical to management of the forest ecosystem on Fort Stewart. Longleaf pine is a “fire climax” species which requires burning. Burning also reduces fuel loads which prevents severe fires. Fire creates more ideal conditions for military training by opening understory. Finally, fire is very important to the maintenance of quality wildlife habitat, especially habitat used by the RCW and other wildlife species.

Burning specifically for military training purposes is termed “military burning” while burning for forestry and/or wildlife purposes is termed “ecological burning”. Fire Management Section, Forestry Branch conducts military burning, and both Forestry and Fish and Wildlife

branches conduct ecological burning, with the Fire Management Section implementing most of them. Military burns of the impact area and firing ranges are described in Section 13-3a.

The Biological Opinion (USFWS, 1992) for the RCW requires an upland burn plan, for actual and potential longleaf pine sites, that establishes a goal of conducting growing season burns on a 2-4 year cycle. The growing season has been defined as March through August, but efforts will be made to distribute burning throughout this six-month period. For simplicity purposes, Fort Stewart is using a three-year growing season burn cycle, as in newly revised Army Guidelines (Department of Army, 1996).

To make the process simpler to implement, Natural Resources Management Units will be used as burning units. Fort Stewart's goal is to burn approximately one third of these NRMUs annually. Details are provided in the ESMP, paragraph 4-7b.

Appendix 14-2h(4) is a schedule of ecological burning during 2001-2005. This includes all but the cantonment area and impact/firing range burn areas. It is based on Natural Resources Management Units.

There are also needs for winter burns. These are particularly evident in areas that have not been burned and have a large buildup of fuel. Growing season burns would significantly damage quality timber and threaten RCW management in these cases. Such areas are winter burned until fuels have been reduced to a level where growing season burns will not excessively damage resources.

Over time, the need for these winter pre-burns will lessen as the system matures, and every three year burns become a fixture. These burns will also reduce the danger from wildfires since there will be no fuel buildup over more than three years.

Burning on Fort Stewart is primarily accomplished using a helicopter, either with a helitorch (flying drip torch) or aerial ignition devices (ping-pong balls with chemical mixtures). Some hand ignition is often required, and the process is one of close air-ground coordination. The process is especially sensitive during the June-August burns. Care must be exercised to prevent too much fire from being set too fast, to enable control and conditions which do not unduly harm young or mature longleaf or other desirable overstory. The next five-year period will be one of learning to best use and control late, growing season burns.

Prescribed burning will be planned and administratively accomplished using the annual Fish and Wildlife and Forestry planning within the DPW IFS system. This is an established system to track manpower, equipment, and budgets.

Burning is critical to the maintenance of longleaf pine since young longleaf can much better withstand burning than slash or loblolly which cannot survive a regular burning regime. Burning is critical to the maintenance of RCW habitat since the woodpecker requires a relatively open understory, which is exactly what occurs within a longleaf-wiregrass ecosystem. Burning, along with thinning and hardwood understory removal, is also ideal for military maneuver. Thus, ecological burning is also, in reality, military burning.

14-2i Regeneration

In keeping with the Army's forest management success, natural regeneration is the preferred method of perpetuating military forestland. Since acquisition, Fort Stewart forest management strategy has featured natural regeneration, and most of the current forest developed from natural seeding. There are several obvious advantages such as: cost-effectiveness; irregularity and therefore more natural; minimal mechanical or chemical site preparation; minimal labor resources; and utilization of the most ecologically compatible

seed source in the world.

Natural forest regeneration is continuous and will work beautifully if not over-managed. Numerous factors create openings in the forest canopy. Included are tornadoes, wildfire mortality, insect infestations, military training, and timber harvesting to name a few. When holes develop in the canopy, natural regeneration fills those openings with the most ecologically adapted species at no cost to the installation. Those processes occur with very little input from natural resources managers. Any attempt to plan or regulate natural regeneration will result in simplifying bio-diversity and managing forestland toward an artificial state.

Artificial regeneration efforts have produced mixed results. Problems with site preparation and planting are numerous but the most important disadvantages are as follows: military training damage to newly established plantations; abundant natural seeding causing over-stocking of the planted site; unnatural and destructive mechanical site preparation required to establish the site; timing and funding difficulties; high investment of land, labor and capital; and unfavorable weather.

Regeneration may be accelerated in areas where large openings occur. Abandoned ranges or firing points, storm damaged areas, large bug kills, low-utility hardwood stands and similar land classes may call for a planting prescription to speed up the regeneration process. Planting, however, should be the exception rather than a normal management technique.

Re-establishment of wiregrass may be undertaken simultaneously where appropriate. Recently developed harvest and planting techniques hold promise for making broad-scale wiregrass restoration feasible (see Section 14-3a(3)(1).

14-2j Timber Sales

14-2j(1) Markets

There are forest product markets on virtually all sides of Fort Stewart, accepting the Fort Stewart forest products described in Section 14-2d. However, markets are highly variable, and often competition is high, and markets are relatively poor. Examples of recent market prices are: pulpwood - $40 per cord, chip and saw - $90 per cord, and sawtimber - $105 per cord.

Markets are often poor for hardwoods (mostly pulp). However, markets are much better for quality hardwoods from wetlands, where harvest is difficult. When wetlands are dry enough to enter, woodcutters go to other areas off-post and cut low areas, flooding markets with high quality hardwoods. Thus, uplands are the most manageable from a market viewpoint.

There are limited markets for metal-contaminated timber. It can be sold for poles, but this requires high-grading forests which makes it difficult to achieve the forest management strategy.

14-2j(2) Planning

Natural resources management prescriptions (Section 22-4) for Natural Resource Management Units (NRMUs), which include timber harvest availabilities, will be coordinated with other natural and cultural resource functions to ensure integration. Additional coordination will be conducted with the Range Division to ensure minimal disruption of military activities. Natural resources prescriptions will be prepared at least one year in advance when possible so that the treatment can be incorporated into the military training schedule and thus provide adequate and timely coordination with other land use activities.

14-2j(3) Contracting

The Corps of Engineers (COE), Savannah District administers timber sales for Fort Stewart/Hunter AAF. This District charges

about $300,000 per year for services provided. After timber has been marked and volumes tabulated, Reports of Timber Availability are prepared and forwarded to the Corps of Engineers, which has an office on Fort Stewart. The COE incorporates this information into timber sales prospectus which are then distributed to potential bidders. The COE inspects sales in progress. The COE Forester takes official action to correct violations. Joint forestry and COE personnel inspect sale areas during the contract and after completion notify the COE that contracts are complete. Violations are noted (Contract Clearance Reports), and the COE District Resident Forester has them corrected by the contractor. The Fort Stewart ENRD Chief then signs contract releases, and the COE closes out contracts.

Forces Command is informed of specific availability of timber on Fort Stewart/Hunter AAF for the following year, and following FORSCOM approval, these are sent to the COE. Thus, individual sales do not have to go through FORSCOM, which reduces administrative costs.

14-2k Special Considerations

14-2k(1) Military Thinning or Clearing

Large areas on the western side of Fort Stewart have been designated for military maneuver emphasis. The area needs to be thinned or cleared, and this process (including burning) will likely result in RCW colonization as conditions for military maneuver tend to favor this endangered species.

Revised Army Guidelines (Department of Army, 1996) encourage this opening of the forest with the understanding that new RCW trees will not have to be marked or declared off-limits in this area. However, such birds will be counted toward recovery goals. This is a significant improvement in the management of RCWs and the conduct of military training on Fort Stewart. It rewards Fort Stewart for actions taken to support military training that also benefit RCWs, a vast improvement over former policies which tended to restrict the military mission if it inadvertently attracted RCW recruitment. Fort Stewart is consulting with the USFWS on this action.

14-2k(2) Troop Use of Timber Products

Soldiers are permitted on-post cutting of timber for posts, simulated land mines, parking lot borders, range repair materials, etc. Forestry Branch marks or designates areas (or specific trees) for these purposes in accordance with Fort Stewart regulations.

14-2k(3) Support for Mobilization

As demonstrated during operations Desert Shield and Desert Storm, mobilization requires drastic shifts in the normal way of conducting business on military reservations, particularly on a place such as Fort Stewart/Hunter AAF where mobilization must occur at a tremendously rapid pace. During Desert Shield and Desert Storm, the Forestry Branch conducted one small burn at the request of a training unit; otherwise, the assets of the Forestry Branch were unused.

If future events call for rapid deployment of soldiers and equipment from Fort Stewart, Forestry Branch is prepared to offer its equipment engineering operators (12 plus a supervisor) to help transport equipment from Fort Stewart to ports or wherever required. In addition, the Branch continues to be prepared to adjust its forest management operations to meet emergency needs by military units for training. Such support will be coordinated with Range Control and DPW organizations.

14-2k(4) Hardwoods for Wildlife

Section 14-3a(3)(a) discusses special provisions for the maintenance of hardwoods and their mast on Fort Stewart. There are tradeoffs with these provisions. In some ways it would be best to remove most hardwoods from uplands, which would maximize values of these sites for RCW

management and some other species, as well as increase the production of commercial timber products. However, Fort Stewart, within the principles of ecosystem management, is trying to strike balances in its management decisions, and it is recognized that the hardwood component of uplands is too valuable to remove in its entirety.

14-2k(5) Best Management Practices

Best Management Practices (BMPs) are included within Corps of Engineers contracts for forest harvest on Fort Stewart. *Georgia's Best Management Practices for Forestry* (Georgia Forestry Commission, 1999) is often cited. BMPs include recommendations for streamside management zones, stream crossings, access roads, timber harvest, site preparation, reforestation, prescribed burning, wildfire suppression, chemical treatments, and forested wetland management. Appendix 14-2k(5) details the application of BMPs on Fort Stewart/Hunter AAF.

14-2k(6) Cat-faced Trees and Resinous Pine Stumps

Protection of occupied and potential RCW habitat requires leaving all cat-faced trees in timber sales. This requirement is due to their preference for use as RCW cavity or nesting trees. Exceptions to this policy will be coordinated with the Fish and Wildlife Branch.

Resinous pine stumps are protected from extraction/uprooting on Fort Stewart. These stumps provide unique habitats for wildlife. Exceptions to this protection include clearing for construction of military facilities. Exceptions to this policy will be coordinated with Fish and Wildlife Branch.

14-2k(7) Hurricane Damage

Fort Stewart/Hunter AAF is in an area susceptible to mass destruction from hurricanes. Such an event could lead to a need for major changes in the forest management program, as well as short-term responses to the immediate damage. This will include coordination with the Fish and Wildlife Branch, whose programs could also be significantly affected by hurricane damage.

14-2l Firewood

Permits to cut firewood on Fort Stewart are sold directly by the Corps of Engineers office on the installation. The cost of permits is $5.00 per pickup load of dead and down timber and $10.00 per load of green wood in designated areas. Forestry provides areas where standing firewood may be cut for firewood. Generally these are areas where TSI is needed. Dead and down wood can be removed from any areas of the installation not closed for training.

14-2m Pinestraw

Pinestraw is not currently a major forest product on Fort Stewart, but it has significant potential. Fort Stewart pinestraw is very high quality, but harvesting techniques are quite different than for pinestraw associated with even-aged management and plantation management. Pinestraw brings less than $5,000 annually.

Pinestraw harvest is not allowed in active cluster sites during 1 March-31 July, the RCW nesting/fledgling season. Pinestraw raking is not allowed in cluster sites where prescribed burning is required for hardwood control. Harvest is only by hand raking the upper layer of pinestraw, and raking is not allowed more than once every five years in any given area.

14-2n Forest Diseases and Pests

Fort Stewart/Hunter AAF forests are plagued by insects and diseases common to forests of the southeastern U.S. Annual losses to forest resources from insects and disease exceed those from wildfires. Pest losses are insidious and direct control is usually not feasible (DEH, 1992b).

The greatest economic damage is caused by bark beetles, primarily Ips (*Ips avulsus*, *I. grandicollis*, and *I. calligraphus*), black turpentine beetle (*Dendroctonus terebrans*), and the southern pine beetle (*Dendroctonus frontalis* Zimm.). Ambrosia beetles (*Platypus* spp.) carry a fungus which penetrates from tunnels into heartwood and sapwood of dying trees. Nantucket pine tip moths (*Rhyacionia frustrana*) attack terminal growth on loblolly pines and may stunt or deform young trees on poor sites. Pales weevils (*Hylobius pales*) and pitch-eating weevils (*Pachylobius picivorus*) deposit eggs in stumps and dying trees. Larva feed upon and destroy seedlings in the vicinity. The red oak borer (*Enaphalodes rufulus*) and carpenter worm (*Prionoxystus robiniae*) are notable oak pests (DEH, 1992b).

The southern pine beetle is a serious forest pest at Fort Stewart/Hunter AAF. Unusually wet weather in 1993-94 prevented the cutting of buffer strips around bug spots. Southern pine beetles proliferated, and a significant outbreak began during late summer-early fall 1994 on Fort Stewart and continued throughout 1995 and into 1996. In 1995 the U.S. Forest Service (Barry, 1995; Spears and Barry, 1995) found 208 active southern pine beetle spots. Fort Stewart uses the following alternatives:

- no action, which would result in the infestation continuing for one to several years, greatly reducing the overall pine component;
- removal of infested trees and buffer strip by commercial sale; and/or
- cut-and-leave.

The Forest Service recommended a combined treatment using removal, cut-and-leave, and some chemical control for 1995 and 1996. In 1995 1,624 acres were treated on Fort Stewart/Hunter AAF; 635 infestation spots were located; six spots were treated with pile-and-burn method; 103 spots were treated by the cut-and-leave method; and 474 spots were treated by the removal method with 40,599 cords made available for sale and salvage harvesting. These actions required 50 new access roads. The outbreak was contained in 1996.

Disease losses are subtle, but significant, and result in substantial annual damage to Fort Stewart/Hunter AAF forests. Brown spot needle blight (*Scirrhia acicola*) particularly affects longleaf pine seedlings, and fusiform rust (*Cronartium fusiforme*) affects slash and loblolly pines. Brown spot needle blight infects longleaf seedlings, with all or partial denuding of needles, which can kill seedlings or keep them in the grass stage for years. Fusiform rust causes stem swellings in which a canker forms with a sunken area of rotten wood surrounded by a callus. This increases the chances of damage due to winds. This latter disease is especially prevalent in pine plantations (DEH, 1992b).

Longleaf pine, in general, is less susceptible to diseases and pests than are loblolly or slash pine. Loblolly pine is more susceptible to southern pine beetle than are slash or longleaf. As Fort Stewart approaches its objectives with regard to conversion of its upland forest to longleaf pine at 50-80 BA, there should be few southern pine beetle problems (Belanger *et al.*, 1993). Also fusiform rust disease should decrease as thinning occurs in the forest.

Increased ages of mature longleaf pines on Fort Stewart could result in increased susceptibility to forest pests and diseases, including the southern pine beetle (Belanger *et al*., 1993). However, this older-age susceptibility may be offset by thinning and regular harvest activities.

There are some uncertainties regarding forest pests and diseases on Fort Stewart as the installation implements its relatively new forestry strategy. This is especially true since geography is important, and there is no place with a similar condition to Fort Stewart for comparison. The next five years will be a time of learning with regard to effects of changes to the forest ecosystem at Fort Stewart. Considering the length of time involved with

changes, this learning period is likely to extend into decades.

14-2o Mitigation

Forest management includes the practice of managing the natural resources that occur on or in association with forest lands. Timber management and harvest, as summarized above (*i.e.*, longleaf restoration, thinning, prescribed burning, etc.), will be used as effective tools for ecological enhancement and restoration. However, sometimes these forestry activities may result in adverse impacts to associated natural resources as follows:

- loss of some old growth,
- siltation of streams and adjacent wetlands,
- limitations of recreational access during timber marking and harvesting,
- wildlife disturbance,
- loss of hardwoods for game species,
- loss of escape cover, and
- loss of nesting habitat.

Consequently, forest management must include mitigation when impacts occur. Mitigation may include avoiding the impact altogether; minimizing the impact by limiting the magnitude of the action; rectifying the impact by repairing, rehabilitating or restoring the impacted environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

The INRMP provides for retention of old growth and incorporates management practices to minimize siltation of streams. The INRMP also includes proactive management practices (*i.e.*, wildlife plantings, retention of mast trees, enhancement of recreational fishing opportunities, fish and wildlife habitat enhancement, fish and wildlife monitoring, etc.). Implementation of these and other activities in the INRMP which provide mitigation for adverse impacts associated with timber harvest will be funded with proceeds from timber sales. These expenses are directly related to management of the forest ecosystem. Title 10, United States Code, Section 2665 also authorizes the use of revenues from timber and forest product sales for natural resources management from the DoD forestry reserve account.

14-2p Summary

The Fort Stewart forest management program is continuing to change to meet the needs of managing the forest ecosystem to provide quality military training lands, protect ecosystem functionality, provide quality wildlife habitat, and produce products from the forest. Products include commercial forest products, recreational opportunities, and other less tangible items. The next five years will be important to restoration of the longleaf pine-wiregrass ecosystem which once dominated this part of the United States. Success means better protection for natural resources and better quality of training lands. Success also means products of the forest for human use... products such as wildlife and timber resources.

14-3 Habitat Management

"*The central thesis of game management is this: game can be restored by the creative use of the same tools which have heretoforth destroyed it- axe, plow, cow, fire, and gun*."
Aldo Leopold, 1933, *Game Management*

It is difficult to address habitat management from forest management and training land rehabilitation, as all three complement each other. However, the following sections describe vegetation management programs specifically to benefit wildlife.

14-3a Terrestrial Habitat Management

14-3a(1) Wildlife Habitat Prescriptions

Section 12-3e describes the ongoing wildlife habitat survey. The important factor is not the survey itself, but how it will be used. After each unit is surveyed by aerial photography interpretation and ground truthed for data on key wildlife areas and general habitat types, a decision will be made on which species can best be managed or "featured". Two or more species may be featured for particular areas when management strategies are similar or compatible. Factors considered in selecting target species are habitat capability, compatibility with other resources and military training, and cooperator and public involvement.

Soils are an important factor in the management of habitats and their wildlife. A soil type mosaic of the installation has been constructed, and soil types in each unit have been categorized as good, fair, poor, and very poor as wildlife habitat, provided by the Natural Resources Conservation Service. The soil base of a management unit is examined early to assess its habitat quality potential.

This initial evaluation can highlight a given unit for specific habitat improvements based on limiting soil factors, favor specific management schemes and featured species, or preclude specific management activities due to poor soil quality, such as not planting a specific food at a given site. Based on soil surveys, each wildlife/military clearing can be quality rated with regard to management options. This information is used when planning habitat improvements. These wildlife habitat classifications are preliminary and generalized, providing a starting place for site evaluation. Site specific management objective, habitat type, and species to be managed will be evaluated before a final management strategy is established for a given area. Section 22-4 describes the prescription process which will be used to manage Natural Resources Management Units on Fort Stewart/Hunter AAF.

14-3a(2) Game Species Habitat Summary

Below descriptions of game species habitat conditions are taken from the Fort Stewart/Hunter AAF Fish and Wildlife Management Plan (DEH, 1992a).

14-3a(2)(a) Deer Habitat

Fort Stewart's coastal flatwoods are rather poor in terms of deer habitat. Upland forests are deficient in protein and minerals. The interspersion of pine and hardwood types is fair, but soils and vegetative cover on uplands are poor deer forage producers. Prime mast areas, such as old homesites, are being lost to fires, soil compaction, and live oak decline. Forage production elsewhere is declining due to a closing forest canopy, which reduces sunlight penetration to the forest floor and thus, forage production. Diversity of deer habitat is fair due to clearings for artillery firing points, ranges, and wildlife clearings.

Deer habitat at Hunter AAF is mostly Lowland Broadleaf Evergreen Forest (Hammock). Canopy closure of the forest has reduced deer forage species production. Grasses and forbs on grassy areas along the runway are utilized in early spring, causing occasional deer/aircraft collisions. Habitat management to enhance the deer population for recreational hunting is not feasible due to the size of Hunter AAF and its aircraft-oriented mission.

14-3a(2)(b) Turkey Habitat

Good wild turkey habitat contains mature hardwood stands for mast production, scattered conifers for roosting sites, open understories to take full advantage of the turkey’s keen sight, scattered clearings for feeding, nesting and strutting, well distributed water supplies, sufficient prescribed fire to stimulate plant production and improve palatability and

nutrition, and reasonable freedom from disturbance.

Much of Fort Stewart has poor distribution of mixed hardwood species. Better diversity of hardwoods would help compensate for the high annual variability of mast production. Numerous old fence rows and homesites, containing live oak and water oak with uplands of runner oak compensate somewhat for this shortcoming. Artillery firing points and wildlife clearings, both fallow or planted with bahia grass, subterranean clover, or chufas, provide good breeding, nesting, and brooding areas. Brooding areas are further enhanced by planting some forestry access trails with bahia grass. Relatively open understories, preferred by the wild turkey, are lacking in many woodlands. Some areas of Fort Stewart have inadequate permanent water sources during the dry season.

14-3a(2)(c) Feral Hog Habitat

Feral hogs are omnivorous, using many food sources. Studies have shown that overall food habits and diet quality of deer and hogs is different seasonally, but diet similarity and overlap is high in fall and winter, especially for acorns. Fort Stewart has a significant acreage of swamps, bays, and river bottoms that are used by the hogs for cover and feeding, especially during dry weather. Natural food is supplemented by various plantings for white-tailed deer and wild turkey.

The feral hog is a game animal on Fort Stewart and is pursued by many hunters. Little habitat management is done specifically for the feral hog, but hardwood mast management and supplemental plantings in wildlife clearings for the white-tailed deer and wild turkey are beneficial to the feral hog. Prescribed fire for other species is also beneficial to the feral hog since this technique improves the palatability and nutrition of returning grasses and forbs.

14-3a(2)(d) Bobwhite Quail Habitat

Optimum quail habitat is characterized by good interspersion of woodlands, brush, grass, and cultivated lands. This best describes the once-abundant, small farms that made up Fort Stewart before acquisition by the Army. Since then, many cultivated fields have seeded in, and woodland canopies have closed significantly. Observations of people who have worked and hunted on Fort Stewart for more than a decade suggest that quail and other upland species have declined.

In order to reverse this decline, Fort Stewart has designated an upland game management area consisting of approximately 20,000 acres on the western portion of the installation. A quail management plan (Directorate of Public Works, 1997) has been developed for this area that provides for habitat enhancement by promoting early successional growth. Habitat management initiatives include:

- prescribed burning,
- timber management,
- strip disking, and
- feed patches.

Frequent burning favors the growth of annuals and results in a more open condition which quail prefer. To provide optimum habitat, Fort Stewart's upland game management area will be burned on a two year rotation with half of the area burned in one year, and the other half burned the following year (Directorate of Public Works, 1997). Since effects of fire during the nesting season are poorly understood, burns will alternate between March (prior to the nesting season) and the peak lightning season (April through August). Lightning season fire will destroy some nests and chicks, but will achieve superior vegetation control and comply with endangered species and ecosystem management guidelines. Half of each year's burns in upland game management area will be March burns and half lightning season burns. For the purpose of prescribed burning by helicopter, training areas within the upland game management area will be divided into management units averaging 500 acres. A prescribed burning schedule for the

management area is provided in Appendix 14-3a(2)(d).

Timber management within the upland game management area will promote open woodlands beneficial not only to bobwhite quail but also to vehicle maneuver. Bobwhite quail prefer open woodlands of about 25 to 30 square feet of basal area per acre. However, since red-cockaded woodpecker management guidelines require that upland woodlands be maintained between 50 and 80 basal area, optimum basal area for quail will be achieved only in areas where training requires such a low basal area (Directorate of Public Works, 1997).

Strip disking, discussed in Section 14-3a(3)(h), will be used to set back biological succession and provide quail with access to dense fields during the brood-rearing season. In addition, disking will be used to create firebreaks prior to prescribed burns in the upland game management area (Directorate of Public Works, 1997). Feed patches, discussed in Section 14-31(3)(d), will be used to ensure an ample food supply for quail. There are approximately 30 feed patches planted with *Lespedeza thunburgii* and *Lespedeza bicolor* in the upland game management area. In addition, four fields are planted annually with browntop millet and Egyptian wheat. To increase quail use of these fields, the surrounding forest will be thinned to 50 square feet of basal area per acre, and escape cover will be increased (Directorate of Public Works, 1997).

Habitat management should significantly benefit bobwhite quail. In many ways Fort Stewart is implementing classic Southern quail management... well-spaced older-age timber with an open understory.

14-3a(2)(e) Mourning Dove Habitat

The mourning dove is a highly mobile species, and local habitat conditions do not limit the total population, nor does manipulation of habitat increase populations. Dove management depends primarily on concentrating their numbers during hunting season and adjusting annual hunting regulations. Dove fields are established annually using browntop millet and dove proso, but success is limited since numerous agricultural operations are located adjacent to the boundary.

14-3a(2)(f) Cottontail and Marsh Rabbit Habitat

Cottontails thrive in openings where shrubs, grasses, and forbs dominate and in woodlands with fairly open canopies (40 to 50 percent crown closure), allowing sufficient sunlight to reach the forest floor to produce desirable grasses and forbs. A major limiting factor for rabbit populations on Fort Stewart is the high basal area of pine where crown closures greater than 75% are common. Prescribed fire, which improves nutrition and palatability of food plants, is of little benefit where crown closure prevents the growth of food. The marsh rabbit is found in wet areas, such as old rice fields, bays, and marshes. It is more closely identified with grass and sedge bogs than the cottontail.

Habitat management techniques, such as mowing, harrowing, planting, and prescribed burning benefit cottontails and marsh rabbits. Drop zones, range clearings, and artillery firing points that are dominated by shrubs, grasses, and forbs provide good habitat. Pine woodlands of fully stocked pole and sawtimber stands shade the forest floor, inhibiting the growth of adequate succulent forage. Consequently, areas most suitable for rabbits shift throughout the installation as pine stands are altered.

No specific management strategy is adopted for the marsh rabbit since its habitat is coastal plain swamps and marshes and principal food items include roots and succulent shoots in moist areas. As wetlands are protected, marsh rabbit habitat will be maintained. Plantings in wildlife clearings are utilized little, if any, by marsh rabbits.

14-3a(2)(g) Eastern Gray Squirrel Habitat

Productive gray squirrel habitat contains a wide variety of mast-bearing hardwood trees, fruit producing trees, and shrubs, flowers, buds, cones, and samaras in season in addition to adequate den cavities for escape, shelter, and raising young. Diversity of heavy seeded mast producers is limited with the majority being red oaks, with some white oak and hickory. Many of these trees are too young for optimum mast production, since this is achieved at 50 to 125 years of age (14-30-inch dbh).

Management needs of the eastern gray squirrel are largely fulfilled under the hardwood mast management program. This program achieves a minimum of 20% of each square mile for hardwood production, with at least 50% of this acreage in upland hardwoods. Diversity of hardwood species should be maximized with oaks, hickory, dogwood, maple, yellow poplar, magnolia, black gum, etc. being protected for mast production. In addition to mast, a sufficient number of hardwood snags greater than 40 years old must be preserved throughout the habitat for denning sites, since litters raised in den cavities experience a much higher survival rate than those raised in leaf nests. Prescribed fire has little application in gray squirrel habitat management.

14-3a(2)(h) Fox Squirrel

In contrast to the gray squirrel, fox squirrels prefer open, park-like woods with sparse vegetation. Since the fox squirrel is adapted to ground movement, it uses widely scattered hardwoods in pine uplands. Mast trees of optimum age (50 to 125 years) and optimum dbh (14" to 30") for maximum mast production are limited in many areas on Fort Stewart.

Where fox squirrel is targeted, management strategy favors stands of mature pine, preferably longleaf, with scattered pockets of hardwoods which are essential for dens and food diversity throughout the year. At least one-quarter acre of hardwood coverts should be maintained for every five acres of fox squirrel habitat. Scattered oaks throughout upland pines should also be protected. Snags are left for denning sites, except in the cantonment area. Prescribed fire can be utilized every three to five years to maintain ground foraging habitat.

14-3a(2)(i) Waterfowl Habitat

Nearly all bottomland hardwood stands on Fort Stewart contain some oaks for mast production, which is an important food for some duck species, especially wood ducks. Additionally, many isolated wooded ponds could serve as roosting areas. However, there are few nonforested wetlands, which are preferred habitats for most waterfowl species. Thus, Fort Stewart does not support a good huntable, waterfowl population, except during good mast years with high water tables and full water courses. Even then ducks tend to be scattered and difficult to hunt. Future plans are to construct additional waterfowl impoundments and establish areas that can be planted with rice, Japanese millet, and smartweed or utilized as moist soil management sites that can be flooded at appropriate times.

14-3a(3) Terrestrial Habitat Management Practices

Below management practices for wildlife species on Fort Stewart are categorized as a means to discuss them. However, there is overlap within these practices as well as with other sections of this INRMP, especially regarding forest management practices.

14-3a(3)(a) Hardwood Mast Management

Hardwood mast is an important food source for deer, turkey, feral hogs, quail, squirrels, some ducks, and many nongame species. A habitat survey (Section 12-3e) is being conducted in each Natural Resources Management Unit to locate key wildlife areas such as upland hardwoods, fence rows, old homesites, etc.

Selected areas will be improved by releasing quality mast trees from competition. Hardwood timber sales will be evaluated to ensure sufficient mast trees are left for wildlife.

For optimum mast production, most oaks must be greater than 50 years old and have a dbh of 14" to 30". A wide distribution of age classes should be available to ensure future mast production. Existing tree sites will be maintained by pruning and fertilizing when necessary to increase tree vigor and mast yield.

The objective for hardwood mast management is to retain approximately 20% of each training area for hardwood mast production, with approximately 50% of this acreage in upland hardwood. This goal can be reached while meeting requirements of the red-cockaded woodpecker. These sites are also heavily utilized by the military as command posts, bivouac sites, and assembly points.

Numerous old home sites, characterized by large live oaks, are being lost due to long-term heavy military training and live oak decline. Efforts are being made to replace these trees with young oaks by selecting young trees with good mast potential, releasing them from competition, and increasing the intensity of maintenance, possibly by liming and fertilizing.

Mast orchards have been established in areas that lack sufficient natural mast trees (Section 14-3a(3)(b)). Oak trees adjacent to established wildlife clearings, along fence rows, and in the transition zone between wetlands and forests will be released from the surrounding competition and then fertilized to increase tree vigor and mast production. Additionally, timber harvest availabilities will be reviewed, and an effort will be made to release well formed, high mast potential hardwoods from pine competition during the marking phase of the timber sale process.

In management units that lack 10% upland mast producers, areas will be selected as future hardwood mast areas and managed through the prescription process to favor oaks for mast production. Management will vary from site to site, but standard management actions will include:

- harrowing strip around the perimeter to protect from fire and leave fallow for wild forb production or possibly plant with rye is soil type and conditions are suitable for planting;
- removing all merchantable pine from hardwood areas to reduce fire hazard and release oaks from competition; and
- mowing fuels flat within the area boundary to reduce fire intensity from accidental ignition.

Additionally, widely scattered, well formed hardwoods will not be marked for harvesting since a portion of the 10% upland hardwoods may include old live oak homesites which are heavily utilized as bivouac sites and are declining in condition and mast production.

Fort Stewart is using Georgia Southern University to study live oak groves, important to both wildlife and military training. The objective of the study is to determine the cause(s) of the decline in live oak groves.

14-3a(3)(b) Mast Orchards

Due to the scarcity of good mast producers and the high cost of planting and maintaining annual wildlife plantings, a mast orchard program was instituted in the early 1970s. These orchards, averaging 2.0 to 2.5 acres in size, were established in existing wildlife clearings.

The Fish and Wildlife Management Plan (DEH, 1992a) emphasized mast orchard management, including establishment of these orchards. Annual maintenance consists of mowing or harrowing, pruning when necessary, fertilizing at 500-700 pounds per acre of 10-10-10, and insecticide spraying when necessary. Signs, identifying orchards as wildlife habitat

restoration areas, are placed around each site to minimize maneuver damage. During 2001-2005 Fort Stewart will stop establishing mast orchards, but continue to manage areas with oaks as described in Section 14-3a(3)(a).

14-3a(3)(c) Browse Management

Deer and other browsers, such as cottontails, mice, squirrels, etc., usually prosper following any event that produces new growth vegetation within their reach. This can be accomplished by utilizing rotary mowers, harrows, and prescribed fire in wildlife clearings and surrounding wildlife habitat. Mowing stimulates the sprouting of choice hardwood browse and grasses. Numerous wildlife clearings and RCW cluster sites are maintained by mowing, thereby improving browse quality for the deer. Timber thinning also sets back succession, generally stimulating browse production.

14-3a(3)(d) Supplemental Wildlife Food Plantings

Supplementary plantings are not a panacea to producing trophy bucks, but they are important in the Coastal Plain region of Georgia with its infertile, sandy, acidic soils and sporadic mast production. To maintain a healthy, dynamic herd of reasonable quality, deer need at least 16% protein. This is impossible to obtain on native vegetation and browse alone in the lower Coastal Plain, where protein levels average 7-11%. Historically, deer food plots on Fort Stewart have been primarily winter rye. Supplemental plantings have expanded to include subterranean clover that is high in protein and reseeds the following year, reducing annual planting costs. Critical periods for deer occur in late summer and late winter. Plantings of subterranean clover, winter rye, winter wheat, iron and clay peas, and other appropriate varieties will be made in 2001-2005 to supplement deer diets. Mineral supplementation will also be investigated. Food plots are important in managing deer by increasing nutritional levels of the herd, and improving hunter success during either sex season..

Subterranean Clover.

Subterranean clover (*Trifolium subterranean*) has been historically planted on Fort Stewart for habitat improvement. Subclover is a winter reseeding, annual forage legume with prostrate, non-rooting stems. It is appropriately called subclover because after fertilization, the peduncle bends toward the ground as a burr forms around the seeds. These seeds then mature at or below the soil surface. This habit allows good seed production despite rather intensive grazing.

The Mt. Barker variety of subclover has been very successful on Fort Stewart, dependent on good seedbed preparation and moist soil conditions at planting time. Subclover is planted in late October to mid-November at 25 pounds of inoculated seed per acre. Subclover is planted with a grain drill with a small seed box attachment.

Subclover maintenance consists of mowing and disking each plot in late August to mid-September. This reduces weed competition until subclover becomes established. After establishment, each plot is fertilized with 300 pounds per acre of 8-21-21-5S fertilizer. An additional fertilization in early spring with 150 pounds per acre of 8-21-21-5S improves seed production for more successful plant reestablishment the following year.

Other Wildlife Plantings.

In addition to subterranean clover planting, other annual and perennial plant species are established to improve wildlife habitat. A map of wildlife clearings which are used for plantings is provided in Map 14-3a(3)(d). These plots can produce two to four tons of high quality forage per acre during a period when availability of natural foods is at a low point. Annual plantings have played an important role in habitat management on Fort Stewart. Plant species that

have been used include winter rye, Egyptian wheat, browntop millet, grain sorghum, dove proso, partridge pea, and subterranean clover. Some annuals, such as subterranean and arrowleaf clover, partridge pea, and browntop millet, are classified as reseeding annuals and will be continued, when and where appropriate. Additional cultural practices are used to encourage native species. Sites are reviewed for stands of native species prior to scheduling annual plantings.

The conversion to perennial species in areas previously used for annual plantings is being done each year to reduce planting costs. Trial plots of alfalfa will be established in 2001-2005. Chufa is a warm season perennial sometimes utilized on Fort Stewart. Ryegrass, bahia grass, lespedeza Thunbergii, and bicolor lespedeza are being incorporated into the planting program. Bicolor lespedeza, one such perennial, will be planted in 1/8-1/4 acre plots to improve quail habitat.

Seeding and Maintenance Practices. The following chart describes seeding and maintenance practices for perennial and annual wildlife foods:

Wildlife Planting	Planting Technique	Seeding Rate	Fertilizer Rate	Planting Times
Winter rye (Wrens Abruzzi)	Drill	3 bu/ac	20-12-12-9S (400 lbs/ac) 20-12-12-9S (350 lbs/ac)	Sep-Nov
Egyptian wheat	Drill, rowcrop	10-12 lbs/ac	9-20-30 (300 lbs/ac) 34-0-0 (250 lbs/ac)	Apr-Jul
Subterranean Clover (Mt. Barker)	Hand seed, drill	25 lbs/ac	8-21-21-5S (300 lbs/ac) 8-21-21-5S (250 lbs/ac)	Oct-midNov
Arrowleaf clover	Drill	5-8 lbs/ac	8-21-21-5S (300 lbs/ac) 8-21-21-5S (150 lbs/ac)	Oct-midNov
Browntop millet	Rowcrop	12-15 lbs/ac	9-20-30 (300 lbs/ac) 34-0-0 (250 lbs/ac)	Apr-midAug
Dove proso	Rowcrop	12-15 lbs/ac	9-20-30 (300 lbs/ac) 34-0-0 (250 lbs/ac)	May-midJul
Grain sorghum	Rowcrop	10-12 lbs/ac	9-20-30 (300 lbs/ac) 34-0-0 (250 lbs/ac)	Jun-Jul
Chufa	Broadcast, rowcrop	40-50 lbs/ac	9-20-30 (250 lbs/ac) 34-0-0 (250 lbs/ac)	May-Jun
Iron clay peas	Drill	60 lbs/ac	23-6-13-95 (150 lbs/ac) 23-6-13-95 (100 lbs/ac)	Aug-Sep
Bahia grass	Broadcast	12-18 lbs/ac	10-10-10 (200 lbs/ac)	Apr-May
Lespedeza (Thunbergii)	Rowcrop, drill	10,000 plants/ac	8-24-24 (300 lbs/ac)	Apr-May
Bicolor lespedeza	Rowcrop	2-3 ft apart in 4-ft rows	8-24-24 (300 lbs/ac)	Jan-Feb
Perennial ryegrass	Broadcast, drill	10-15 lbs/ac	per soil test	Spring or fall

2001-2005 Trends in Plantings. Fort Stewart plans some general changes in its supplemental food program during the next five years. Additional fire lanes will be required to support the increased prescribed burning program and marking of Natural Resources Management Units. Opportunities to plant winter rye in these areas will be evaluated as will late summer planting of peas. These would have dual benefits of providing supplemental wildlife feed and reducing erosion. There are also plans to replace some winter rye plantings in fields with late summer plantings of iron and clay peas.

Although annual plantings will be reduced as habitat improves from increases in prescribed burning and timber harvesting, numerous wildlife clearings will be maintained since they serve dual purposes. These clearings are constantly utilized by the military as landing zones, artillery firing points, communication sites, etc. Maintenance of these sites should reduce the military's need to clear additional sites since they are critical in military training scenarios.

14-3a(3)(e) Wildlife Clearings

Sites for feeding, strutting, and nesting are numerous due to the many range clearings, artillery firing points, drop zones, timber harvest sites, timber access roads, and wildlife clearings found across the installation. Some wildlife clearings with bahia grass, native legumes, or dewberries are left unplanted, while others may be planted in winter rye, Egyptian wheat, subterranean clover, grain sorghum, chufa, and/or other appropriate varieties. Timber access trails are seeded with bahia grass and provide approximately 265 acres of excellent "bugging" habitat.

14-3a(3)(f) Prescribed Burning

Prescribed fire is the most cost effective method to set back succession over large acreages. Featured game species with regard to prescribed burning are quail, turkey, and deer. The RCW is the primary featured species with regard to growing season burns. Prescribed fire is the most important tool utilized in quail management. Care must be taken to protect prime nesting areas, plum thickets, etc. by harrowing protective rings around these valuable sites. In pine habitat, prescribed fire benefits deer by improving the palatability and nutritional level of understory plants; reducing large, woody understory stems; encouraging production of new sprouts; reducing roughs that suppress forbs and grasses; keeping browse within reach of deer; and encouraging understory fruit and mast production.

Section 13-4a discusses the use of prescribed burning for the prevention of large wildfires within impact areas and firing ranges as well as the use of ecological burns for reduction of wildfires. Section 14-2h(4) discusses the use of ecological burning for forest and wildlife management, including winter and growing season burns.

The previous fish and wildlife plan (DEH, 1992a) was species-specific with regard to prescribed burning with burning for quail on a three-year cycle and deer, turkey, and gopher tortoises on a 3-5-year cycle. Also, some species, such as turkey, were managed using smaller burns than for other species. In order to meet the needs of the RCW, other wildlife, and Forestry, Fort Stewart's goal is to have all prescribed ecological burns conducted on a three-year rotation during 2001-2005, unless special circumstances exist. See Section 14-2h(4).

Fort Stewart is studying the effects of growing season burns on insect production, especially considering management for quail and turkey. This ORISE project was begun in 1995 and the field work was completed in1998. The data currently being analyzed and the results will be available in 2000.

14-3a(3)(g) Liming

Because of the dominance of strongly acid soils on Fort Stewart, liming of wildlife clearings and mast orchards is periodically necessary if quality forage, seed, fruit, and mast are to be consistently produced in established game food areas. Before liming is undertaken, soil samples are taken, and pH is determined. If the soil pH is below the desired range of 6.0 to 6.5, the site is scheduled for liming. Bulk agricultural limestone of a specified fineness and neutralizing value is applied using a PTO-mounted fertilizer spreader or a limestone spreader truck. For mildly acidic soils, limestone is applied at a rate of one ton per acre; however in more strongly acidic soils, two tons per acre are preferred. Liming is generally accomplished during fall and winter.

14-3a(3)(h) Disking

Disking is utilized to change the composition of plants in quail habitat. Disking breaks up areas with mat-forming grasses, enabling better seed producing plants to grow between parcels of thicker vegetation.

Disking is used to encourage the development of native food plants such as lespedezas and partridge pea. Small plots, approximately 1/8 to 1/4 acre, are disked in pinelands near acceptable cover. These areas are either seeded or left fallow for native plant development. This technique not only aids in food production but increases "edge" which is very important in game habitat management. Additionally, annual wildlife plantings in established clearings are planted on a rotation basis. This enables ground that was harrowed the previous year to produce native game food plants the following year. Many preferred annual quail food plants seed in after disking.

Disking will continue in 2001-2005. Sites will be monitored for desired results. Disking will be intensive in the upland game management managed for optimum quail habitat (Section 14-3a(2)(d)).

14-3a(3)(i) Mowing

Mowing is useful in reducing brush and, simultaneously, stimulates the growth of grasses that attract insects. Insects are a very important diet component of many bird species. Mowing is used in some wildlife plantings and around RCW cluster sites.

14-3a(3)(j) Forest Crown Closure Management

Forest crown closure has reduced the abundance of many wildlife species on Fort Stewart/Hunter AAF. Reducing the basal area to 50-80 square feet per acre is being accomplished in accordance with the Biological Opinion (USFWS, 1992). In recent years this has averaged a BA of 60. This is good for the RCW, and lower BAs in the 50-60 range are especially beneficial to quail and turkey poults.

14-3a(3)(k) Brush Control

Brush control is primarily used to reduce competition for native mast-producing trees. Areas most benefited by this practice are strips around wildlife clearings that contain native mast trees, such as live oak, water oak, and dogwood. Brush is controlled by mowing and/or disking. After brush control, trees are pruned and fertilized. Other areas which may receive the same treatment are old homeplace sites or sites where good mast producers are concentrated in a small area. Emphasis has been placed on old home site restoration. These sites contain many preferred plant species, such as grapes, pears, and live oaks, and are gradually being destroyed by soil compaction caused by heavy bivouac usage. This compaction inhibits water and nutrient transfer, causing reduced mast production and eventual death. Selected sites may be restored by reducing brush competition, aerating compacted soil, and planting crops with deep root systems to break up the hard pan. In addition, efforts will be made

to replace or recreate oak groves and establish alternate sites where brush control will be undertaken. Selected trees will be mowed around, pruned, and fertilized.

14-3a(3)(l) Wiregrass Restoration

Wiregrass provides the pyrotechnic fuel required to maintain longleaf pine ecosystems. In some cases, simply opening the canopy and burning will not lead to wiregrass, probably due to a lack of seed sources. The Fish and Wildlife Branch harvests wiregrass seed each fall and spreads the seed at restoration sites in the spring. Transplanting of nursery-grown containerized wiregrass seedlings is also pursued. The Fish and Wildlife Branch will continue to seek to restore 100-500 acres annually, experimenting with various planting techniques to improve results.

14-3a(3)(m) Wildlife Water Facilities

In addition to river and creek systems, natural lakes, man-made impoundments, and borrow pits benefit wildlife. During the late 1970s and early 1980s, numerous permanent waterholes were established to provide water during drought. The following is the military grid location and description of water facilities.

Grid Coordinates	Description
180350	P-l (Managed Pond)
473308	P-3 (Managed Pond)
310327	P-7 (Managed Borrow Pit)
485316	P-15 (Managed Borrow Pit)
262521	P-17 (Managed Borrow Pit)
512343	P-19 (Managed Borrow Pit)
684363	P-21 (Managed Borrow Pit)
670365	P-23 (Managed Borrow Pit)
210420	P-26 (Managed Pond)
416355	P-28 (Managed Pond)
397295	P-30 (Managed Borrow Pit)
390296	P-32 (Managed Borrow Pit)
231405	Waterhole
274416	Waterhole
289286	Waterhole
210327	Waterhole
235314	Waterhole
273324	Waterhole
315349	Waterhole
301428	Natural Lake
321399	Borrow Pit
254360	Natural Lake
296352	Borrow Pit
342319	Borrow Pit
361366	Natural Lake
368268	Natural Lake
495452	Natural Lake
554436	Natural Lake

Grid Coordinates	Description
221489	P-2 (Managed Pond)
328324	P-5 (Managed Borrow Pit)
398275	P-10 (Managed Borrow Pit)
212418	P-16 (Managed Pond)
408277	P-18 (Managed Borrow Pit)
511342	P-20 (Managed Borrow Pit)
685368	P-22 (Managed Borrow Pit)
HAAF	P-24 (Managed Pond)
404274	P-27 (Managed Borrow Pit)
HAAF	P-29 (Managed Pond)
393296	P-31 (Managed Borrow Pit)
248446	Waterhole
241397	Waterhole
278396	Waterhole
295450	Waterhole
218319	Waterhole
254303	Waterhole
284350	Waterhole
262401	Natural Lake
333432	Natural Lake
424456	Natural Lake
293370	Natural Lake
310333	Borrow Pit
341382	Natural Lake
363365	Natural Lake
452503	Natural Lake
494408	Natural Lake
570426	Natural Lake

14-3a(3)(n) Chemical Pest Control

Pesticides to control weeds, woody vegetation and insects will be used to maintain wildlife clearings/military openings, and mast sites/bivouac areas. Pesticides used will be non-persistent, and will be used in strict adherence with EPA approved label.

14-3b Waterfowl Habitat Management

14-3b(1) Waterfowl Impoundments

Numerous man-made ponds and impoundments offer quality resting and feeding sites for waterfowl. Ponds 1, 2, 3, 17, 24, 26, 28, and 29 (see Section 14-3a(3)(m)) possess water control structures which enable water levels to be lowered and raised for waterfowl management.

The upper end of Pond #17 is partitioned off from the main body of the lake by a causeway. A small water control structure was inserted in the causeway allowing the water level in the upper pond (Pond #17A) to be raised above the height of the lower pond to improve wood duck nesting habitat.

Some improvements such as vegetative clearing, pot hole blasting, and dike renovation may be made within numerous abandoned rice fields on Fort Stewart/Hunter AAF (such as in Training Area A1) during the next five years. Some of these may be suitable for management as green-tree reservoirs.

14-3b(2) Waterfowl Nesting Structures

On seven managed impoundments, lack of natural wood duck cavities has been alleviated by installing wood duck nesting boxes with predator guards. Most sites, supporting a total of about 100 boxes, receive from 88% to 100% utilization. Yearly maintenance visits prior to nesting season are made, in addition to egg counts after the season.

Additional nest boxes are planned for 2001-2005. New boxes will be placed in the 54 acre borrow pit being converted into a lake near Pond 4. Glisson and Pineview ponds are good candidates for additional boxes. Old boxes will continue to be replaced as needed during the next five years.

14-3c Fish Habitat Management

Aquatic habitat can undergo physical or chemical change via natural succession or via land use practices by man. Type and manner of change can vary, and each process may impact the other. Physical changes may involve silting, filling, dredging, draining, fluctuations in rainfall, ground water levels, etc. Physical changes may also be in the form of structure placed in or removed from a body of water as a means of enhancing fish habitat or improving angler access, respectively. Chemical changes may involve variations or shifts in acidity, alkalinity, hardness, dissolved oxygen, salinity, phosphorus, nitrogen, sulfur, and other elements such as iron, zinc, copper, in addition to pesticides and other man-made effluent. Cumulative effects of these changes may alter the biota in terms of species composition, species diversity, population densities, etc. Within the context of fisheries management, the most obvious changes in Fort Stewart fisheries habitat involve aquatic vegetation infestations and system productivity.

Aquatic Vegetation. Ponds on Fort Stewart experience aquatic weed problems and require monitoring and weed control when the weeds either become a nuisance to anglers and interfere with fishing or create excessive "safe havens" for bream and other forage fish, resulting in overcrowding of these species and ultimately, pond unbalance from a quality fisheries perspective. Benefits of aquatic vegetation for wildlife, especially waterfowl, are considered before vegetation management actions are implemented. Possible effects on endangered species are carefully considered. The following list of aquatic plants have potential for impacting the fishery on Fort Stewart/Hunter AAF:

CATEGORY/COMMON NAME	SCIENTIFIC NAME
Algae:	
Pithophora	*Pithophora* spp.
Oedogonium	*Oedogoniumm* spp.
Nitella	*Nitella* spp.
Hydrodictyon	*Hydrodictyon* spp.
Floating Plants:	
Common Duckweed	*Lemna minor*
Watermeal	*Wolffia* spp.
Water-fern	*Azolla caroliniana*
Floating Water Hyacinth	*Eichhornia crassipes*
Emersed plants:	
Alligator Weed	*Alternanthera philoxeroides*
Slender Spikerush	*Eleocharis baldwin*
Parrot's Feather	*Myriophyllum brasiliense*
Frog's-Bit	*Limnobium spongia*
Water Lily	*Nymphaea* spp.
Cattail	*Typha* spp.
Water Pennywort	*Hydrocotyle umbellata*
Creeping Water Primrose	*Jussiaea repens*
Coastal Arrowhead	*Sagittaria graminea*
Common Arrowhead	*Sagittaria latifolia*
Water-shield	*Brasenia schreberi*
American Lotus	*Nelumbo lutea*
Spatterdock	*Nuphar* spp.
Red Ludwigia	*Ludwigia repens*
Smartweed	*Polygonum* spp.
Pickerelweed	*Pontederia lanceolata*
Lizard's Tail	*Saururus cernuus*
Baby Tears	*Micranthemum* spp.
Submersed Plants:	
Variable-Leaf Milfoil	*Myriophyllum heterophyllum*
Southern Naiad	*Najas guadalupensis*
Horned Pondweed	*Fannechellia patustris*
Variable-leaf Pondweed	*Potamogeton diversifolius*
Bladderwort	*Utricularia* spp.
Coontail	*Ceratophyllum demersum*
Fanwort	*Cabomba* spp.

Shore and Ditchbank Plants:

Water Paspalum	*Paspalum* spp.
Southern Water Grass	*Hydrochloa carolinensis*
Bulrush	*Scirpus* spp.
Bur-marigold	*Bidens* spp.
Flat Sedge	*Cyperus odoratus*
Maidencane	*Panicum hemitomon*
Torpedo Grass	*Panicum repens*
Widgeon-grass	*Ruppia maritima*
Willow	*Salix* spp.
Buttonbush	*Cephalanthus occidentalis*
Water Primrose	*Ludwigia octovalis*
Wax Myrtle	*Myrica cerifera*
Rush	*Juncus* spp.

Ponds with any of the above aquatic plant species are closely monitored and, if needed, treated to minimize their infestation.

System Productivity. All managed ponds are fertilized to promote a phytoplankton bloom for increasing fish pond productivity and shading out bottom muds to control aquatic vegetation. Catfish pond productivity may be increased through a feeding program, using demand or automatic feeders or hand-feeding. In ponds where catfish food does not produce the phytoplankton bloom necessary to shade out bottom muds, fertilizers may be applied. Habitat is likewise altered through application of lime to increase the pH of bottom muds and the water. When water alkalinity drops below 15 ppm, a standard application of one ton of agricultural limestone is applied, which increases the pH, allowing phosphorus in the fertilizer to become more available to phytoplankton, thus enhancing plankton blooms. When the opportunity arises, shallow pond margins are deepened to 24" or greater to reduce marginal weed infestations. Fish attractors are placed in selected ponds to enhance spawning and feeding habitat, as well as increasing protective cover. In the past spawning drums have been placed in selected catfish ponds to promote natural reproduction.

Wetlands Impact. No intentional filling or draining of wetlands occurs as part of fisheries management, unless permitted through Section 404 of the Clean Water Act. Section 14-8 describes wetlands management on Fort Stewart/Hunter AAF.

Pond Habitat Summaries. The following summarizes the status of Fort Stewart/Hunter AAF ponds being managed for fisheries:

Fisheries Habitat	# Acres	Type*	Featured Species**	Attractors	Feeders
Pond #1	80.0	Imp	LMB, BG, RE, HYB	X	
Pond #2	67.0	Imp	LMB, BG, RE, CCF		
Pond #3	20.0	Imp	LMB, BG, RE, CCF	X	
Pond #10	1.5	BP	CCF, LMB, BG, RE		
Pond #16	1.5	BP	LMB, BG, RE		
Pond #17	13.0	Imp	CCF, LMB, BG, RE	X	
Pond #19	8.0	BP	CCF, LMB, BG, RE		X
Pond #20	5.4	BP	CCF, LMB, BG, RE		X
Pond #21	15.7	BP	LMB, BG, RE, CCF	X	
Pond #22	4.9	BP	CCF, LMB, BG, RE		X
Pond #23	8.6	BP	CCF, LMB, BG, RE		X
Pond #24	4.0	Imp	CCF, LMB, BG, RE	X	X
Pond #26	5.0	Imp	LMB, BG, RE, CCF		
Pond #28	33.0	Imp	LMB. BG, RE, CCF	X	
Pond #29	9.7	Imp	LMB, BG, RE, CCF	X	
Pond #30	7.6	BP	CCF, LMB		X
Pond #31	2.3	BP	CCF, LMB		X
Pond #32	32.0	BP	CCF		

* **IMP** - Impoundments
BP - Borrow Pit

****LMB** - Largemouth Bass **BG** – Bluegill **RE** - Redear Sunfish
CRAP - Black and White Crappie **CCF** - Channel Catfish **RB** - Redbreast Sunfish
HYB - Hybrid

14-3c(1) Pond Fertilization

Managed ponds are fertilized with a liquid inorganic fertilizer (10-34-0 green formulation), beginning in late February-early March when water temperatures reach 60-65º F at a depth of 6 to 12 inches. Fertilization extend through late September or until water temperatures drop below 60-65º F. The following general schedule will be used as a guide:

Fertilize every two weeks for the first three applications; then
Fertilize every three weeks for the next three applications; then
Fertilize every month thereafter through September or until water temperatures fall below 60 to 65º F.

This schedule results in approximately 11 applications throughout the growing season. To prevent overfertilizing, fertilizer is not applied if secchi disk visibility is less than 12", and to prevent underfertilizing, fertilizer is applied if secchi disk visibility is greater than 18". Liquid fertilizer is applied at 20 pounds per surface acre, or about 1.8 gallons per surface acre. Fertilizer must be thoroughly mixed with the water to prevent settling to the bottom and being trapped in acidic muds. Fertilizer is pumped into a 1,200- gallon storage tank. Prior to each application, fertilizer is transferred into a 250-gallon pickup truck bed-tank. At the pond site, this fertilizer is transferred to a 30-gallon tank positioned in a 12-14 foot jon boat. Fertilizer is then drawn from the boat tank via an outboard motor-mounted eductor with attached suction hose, which creates a suction and siphons fertilizer as the boat is motored around the pond.

On occasion, a granular ammonium nitrate (34-0-0) is applied at 20 pounds to the acre, if nitrogen is determined to be the limiting factor in plankton bloom production. Granular triple superphosphate (0-54-0) may be applied at 20 pounds to the acre following a drop in dissolved oxygen stemming from a plankton die-off. This action is taken to restore the bloom as quickly as possible, thus elevating oxygen levels rapidly.

14-3c(2) Aquatic Weed Control

As aquatic plants become nuisance weeds, biological, mechanical, and/or chemical control is required. All aquatic weeds are identified; degree and severity of infestation determined; and control priority assigned. Chemical control involves herbicides, applied and used in accordance with label instructions and EPA and DOD requirements. Herbicides are applied during spring and summer when plants are most actively growing and flowering. The following herbicides are utilized in the Fort Stewart/Hunter AAF aquatic weed management program:

2,4-D (29.5% active ingredient (ac))
Diquat® (35.3% ac)
Dichlobenil (10.0% ac)
Copper Sulfate Crystals (99% ac)
K-tea® or A&V70 Plus®/copper (8% ac)
Rodeo®/glyphosate (53.5% ac)
Sonar A.S.®/fluridone (41.7% ac)

When required on the herbicide label, the treated pond is closed to fishing and non-consumptive use for the required time. Section 14-3c includes a list of aquatic weeds controlled at Fort Stewart/Hunter AAF.

Mechanical control of weeds includes cutting, raking, mowing, and dragging pond margins. Open water weeds are generally chemically treated. Winter drawdowns are periodically practiced on impoundments with water control

structures. As a general rule, ponds are lowered no more than 1/3 the original volume, allowing weed exposure to cold temperatures and drying conditions.

Biological control of weeds has been included as a vital element of the integrated pest management program. Three biological control agents are employed, triploid grass carp, alligatorweed flea beetle, and the water primrose flea beetle.

The grass carp (*Ctenopharyngodon idella*) is an herbivorous fish, primarily stocked to control submerged weeds. Triploid fish are stocked, ensuring 100% sterility, preventing natural reproduction of the species. Containment of grass carp to the pond is very important, and fish loss from pond discharges is considered before stocking. If necessary, control structures and spillways are equipped with fish barriers. Harvest or removal of grass carp from ponds is not allowed. Once stocked, grass carp can provide long-term control of noxious aquatic weeds. They are capable of eating two to three times their body weight per day in aquatic vegetation and can gain 5-10 pounds in a single year. Grass carp stocking in most circumstances is meant to augment other weed control actions. Rarely is carp stocking a sole solution. Use of grass carp should result in the decrease of aquatic herbicide usage. Grass carp may provide control for as long as 10-15 years.

Initial grass carp stocking began in fall 1984. Agreement for stocking was received from FORSCOM, USFWS, and Georgia DNR. Permits were provided by the State. Five borrow pits were stocked with 8-11 inch carp (P-19, 21, 21, 22, and 23). A subsequent stocking in 1987 was carried out in the five borrow pit ponds to compensate for some mortality following the first stocking. Stocking rates for grass carp are determined using a stocking model recommended by the Georgia DNR (GRAS-CARP, developed by the Colorado Fish and Wildlife Research Unit, Colorado State University).

State policy on grass carp stocking changed in 1988, allowing the stocking of triploid grass carp from certified dealers without permits. However, Fort Stewart will continue to maintain appropriate records of all grass carp stockings. These records will include proof of purchase and certificate of triploidy. The following list summarizes grass carp stocking to date:

	Initial Stocking			**Subsequent Stockings**					
Site	**Mo/Yr**	**# Stocked**	**#/ Acre**	**Mo/Yr**	**# Stocked**	**#/ Acre**	**Mo/Yr**	**# Stocked**	**#/ Acre**
P-19	11/84	79	9	12/87	28	3	6/96	135	15
P-20	11/84	65	12	12/87	65	12	7/92	120	22
P-21	11/84	234	15	12/87	37	3	7/95	230*	16
P-22	11/84	60	12	12/87	23	5			
P-23	11/84	132	15	12/87	72	8			

Site	Mo/Yr	# Stocked	#/ Acre	Mo/Yr	# Stocked	#/ Acre	Mo/Yr	# Stocked	#/ Acre
P-28	8/89	607	18						
P-2	10/89	1,600	24	6/96	1,600*	24			
P-27	10/89	12	12						
P-1	7/91	1,230	15						
P-17	4/93	210	15						
P-24	8/93	64	15						
P-26	3/93	780	15	6/96	225	4			
P-29	7/95	150	15	2/97	200	20			

* Following renovation.

The second form of biological control is the alligatorweed flea beetle (*Agasicles hydrophila*). This beetle is widespread over Fort Stewart, but the population fluctuates every year, depending on the severity of winter due to beetle intolerance of very low temperatures. The flea beetle feeds on foliage of alligatorweed, stressing plants and inhibiting growth. This beetle is presumed to have moved into this area naturally from Florida where it was introduced during the 1970s.

A third biological control agent is a native flea beetle found on Fort Stewart that is being referred to as water primrose flea beetle (*Lysathia ludoviciana*). This small beetle is found in moderate numbers on creeping water primrose (*Jussiaea repens*). Although not a major controller of the plant, it serves to feed on the foliage and assists in an integrated approach to managing this pond emergent. This beetle seems to over-winter well in south Georgia.

A project has been identified to identify exotic aquatic weed problem areas and using biological controls measures to reduce the emphasis on chemical control. This project is justified using Executive Order 12962, *Recreational Fisheries*. (Note: Hydrilla has been verified by the Georgia DNR in the Evans County Public Fishing Area lake, 2,000 meters north of Pond #17. This weed was documented on the State's property during summer 1989.)

The primary means of aquatic weed control is the implementation of a consistent and effective pond fertilization program as discussed in Section 14-3c(1). Pond fertilization stimulates phytoplankton growth, increasing plankton blooms, which, in turn, reduce sunlight penetration, shading out submerged vegetation.

14-3c(3) Liming

When a pond's alkalinity fall below 15-20 ppm, agricultural (dolomitic) limestone is applied at a standard rate of one ton per acre. No lime is required above an alkalinity of 25 ppm. Lime is

generally applied in fall and early winter, allowing the lime four to six months to neutralize bottom muds before the spring fertilization program. Ponds are tested every three years at a minimum to determine lime requirements. Bulk limestone is most easily applied from a platform on the end of a large boat or between two smaller boats to accommodate the limestone, or using a large, self- propelled, pontoon barge. Limestone is spread by shoveling or hosing the material off the platform as the boat is motored, distributing it as evenly as possible over the pond.

When agricultural limestone is not available or before it has reduced bottom mud acidity, hydrated lime is applied as a temporary remedy for low pH. If hydrated lime is used, it is applied at 50-100 pounds per acre several times during the year. When required, pond bottom mud samples are taken and sent to the University of Georgia, Extension Service Soil Test Lab to determine lime requirements. Limestone specifications should minimally meet the following criteria: chemical content not less than 90% calcium carbonate equivalent, elemental calcium not less than 20%, magnesium not less than 92%, and lime of a fineness that at least 85% passes through a 50-mesh screen, 80% passes through a 100-mesh screen, and 60% passes through a 200-mesh screen.

14-3c(4) Pond Construction

Additional lakes and ponds can:

- provide additional military training facilities,
- increase recreational fishing opportunities,
- reduce fishing pressure per acre and improve fishing success,
- improve waterfowl management,
- impound or flood low-lying areas where terrestrial vegetation control is imperative for maintaining open corridors for military target sighting,
- provide silt, sediment, and POL traps, preventing their deposition in streams and rivers, and
- provide excellent alternatives for completed borrow pits.

The following sites have potential for development as ponds or lakes:

Borrow Pits:

- landfill borrow pits, Area D-3, grid coordinates 385-278, 16-20 acres;
- Area E-l, grid coordinates 395-295, approximately 15 acres;
- Area A-14, grid coordinates 491-329, approximately 10-15 acres;
- Area E-4, grid coordinates 385-352, 5-8 acres; and
- Hunter AAF, Area H4, 4-6 acres.

Impoundments:

- Area E-18, grid coordinates 202-460, 80-100 acres;
- Area E-18, grid coordinates 213-457, 50-80 acres;
- Area E-19, grid coordinates 218-444, 50-90 acres;
- Area E-19, grid coordinates 224-438, 50-90 acres;
- Area E-21, grid coordinates 182-375, 30-50 acres; and

The borrow pits will be developed for fisheries use when abandoned as a source of fill material. Borrow pit management plans are being

prepared for these ponds. Impoundments are listed by priority. These will be developed as funds and approvals are obtained.

Two categories of ponds are constructed on Fort Stewart/Hunter AAF: borrow-pit ponds (excavated basins) and earthen dam impoundments (impounding of a stream).

Borrow Pits:

Fort Stewart/Hunter AAF has prepared *Guidelines for Development of Borrow Pit Ponds (*T. Bryce, unpublished*)*. When a construction project requires significant soil for building fills, foundations, and embankments, materials will be obtained from designated excavation sites. During site selection, consideration should be given to the site's ability to be converted to a usable recreational pond following completion of the project (i.e. hydrology, soil types, access, etc.).

Before excavation begins, a plan will be developed to include amount of fill dirt required, depth of excavation, access, and water control. The pit should be excavated to an average depth no less then six feet. Water table, rainfall, runoff, and soils will be used to determine the minimum excavation depth and average depth of the completed pit to ensure adequate water levels during drought. Consideration will be given to having one side of the pit adjacent to an identified upland. This establishes a downslope side with improved drainage capability to accommodate a water control structure for fisheries management and substitute for a rim ditch. When excavating a pit, consideration will be given to preservation and protection of wetlands. Once the pit is completed and released for pond development, the pit rim will be finished to provide a proper slope for grassing and future maintenance. If the pond is turbid upon filling and does not clear itself in a reasonable period of time, action will be taken to clear the pond using limestone, alum, or gypsum.

The Natural Resources Conservation Service is preparing a borrow pit management plan for the top 10 priority pits on Fort Stewart. This project is a cooperative Environmental-Fish and Wildlife project. The Environmental Branch is currently the POC for borrow pit utilization.

Impoundments:

Prior to construction of an impoundment, the project will be environmentally assessed in accordance with public law. The quality of impounded waters for fish and wildlife and recreational use is affected by project design. Waters must be economically manageable to avoid troublesome weeds and losses of fish and permit fertilization, water-level manipulation, mosquito control, acceptable water quality, drainage when needed, plantings for waterfowl, and other operations that produce good yields of fish and wildlife. Considerations when constructing impoundments include:

- Shoreline water depth must be a minimum of two feet. However, when a pond may fluctuate during dry spells or when a fertilization program is not planned, it is preferable to deepen the shoreline to 3-4 feet.
- Causeways can be built across shallow areas, such as upper reaches of ponds, creating small wetlands maintained in their natural state that may also serve as tannin traps and silt basins.
- Spillway and water control structure design must consider watershed runoff

for different storm intensities for economical construction of these facilities.

- Shallow areas around the shoreline can be excavated, with the spoil used to construct earthen piers of varying widths and lengths.
- If economically possible, the water control structure should have a double flashboard riser, with a sliding gate valve and deep-water draw trash rack to provide good water level control and improve water quality.
- If the watershed is excessive, a diversion or terrace should be constructed to channel excess water around the pond.
- Retaining fish habitat structure in the basin is important, so care must be taken not to completely clear the basin.
- Drop offs, islands, trenches, etc. should be maintained or constructed to enhance fish habitat.
- The dam should be constructed by cutting, backfilling, and compacting a core trench to give added structural strength and prevent water seepage.
- Front and back slopes of the dam should be no less than 2:1, with 3:1 preferable for mowing and maintenance.

Hunter AAF Pond:

A four-acre storm drainage retention pond was constructed by the City of Savannah on Hunter AAF to reduce flood damage. The Fort Stewart fisheries biologist provided input on the design of this pond with the objective of adding a fishery to the area. However, since runoff water comes from potentially polluted streets and other surfaced areas, there are concerns over water quality and its effects on fish. A three phase process is ongoing:

- Initial water quality evaluations were completed in late 1996. Following 16 months of water quality monitoring at the retention pond, overall water quality was assessed to be good and to sustain a sport fishery, in accordance with Georgia EPD. The table below summarizes the mean values for each parameter monitored:

Dissolved Oxygen:	9.017 mg/l
pH:	8.13
Total Alkalinity:	20.18 mg/l
Total Hardness:	34.80 mg/l
Sp. Conductance:	106.36 uS/cm
Total Phosphorus:	0.226 mg/l
Nitrate-N:	0.008 mg/l
Nitrite-N:	0.0325 mg/l
Total Ammonia-N:	0.808 mg/l
Unionized Ammonia Gas:	0.1704 mg/l
Chlorine:	0.11 mg/l
Phenol:	<0.01 mg/l
Fecal Coliform:	52.87 col/ 100 ml
Secchi:	69.76 cm
Turbidity:	34.5 NTU

- Largemouth bass and bluegill sunfish were stocked in 1998. Fish will be collected for bioassays before the pond is opened to fishing to determine the suitability of fish for human consumption.
- By 2000 a decision will be made whether to open the pond and allow anglers to keep fish for consumption or to make the pond “catch and release”.

14-3c(5) Pond Maintenance and Dam Safety

After an impoundment or borrow pit-type pond is completed, filled with water, and stocked, maintenance and repair of the facility is required for its long-term preservation. Pond maintenance constitutes a wide array of activities with emphasis on mechanical actions.

Dam maintenance is foremost to maintaining the integrity of the facility. This includes mowing, tree and brush cutting, beaver/muskrat control, erosion control, and soil stabilization. In addition, maintenance and repair of water control structures and spillways must be addressed. Earthen spillways will be mowed and kept clear of brush and tree growth. Spillway erosion will be checked and corrected. Slopes and grades will be maintained. Most water control structures are constructed of concrete, metal pipe, and lumber, therefore subject to cracking, corroding, and rotting. Valves and associated metal fixtures will require periodic replacement as necessary.

Pond #26 is a 52-acre lake with one of the best largemouth bass fisheries on post. The water control structure is corroded and leaking. The dam serves as a major tank trail crossing. A project to replace this water control structure has been submitted under Executive Order 12962, *Recreational Fisheries*, and the National Dam Safety Act.

Pond bank and shoreline maintenance will include mowing, soil stabilization, deepening shallows, and aquatic weed control. Causeways and perimeter roads will be graded, mowed, and stabilized. Culvert pipes require periodic repair and replacement. Perimeter roads will be posted off-limits to tracked vehicles, where appropriate, for operator safety, angler protection, and pond preservation. Pond maintenance also includes liming, fertilizing, fish kill cleanup, water quality monitoring, and clearing pond turbidity.

Some pond littoral zones have silted-in, increasing aquatic weed infestations. During 2001-2005 Fort Stewart will remove this excess silt and either land-apply it or use it for earthen piers. These earthen piers increase shoreline length and fish habitat as well as improve angler access.

Dam safety is crucial and deserves high priority in facility maintenance as outlined in the National Dam Safety Act (Public Law 92-367), Presidential memoranda on dam safety (23 April 1977 and 4 October 1979), *Federal Guidelines for Dam Safety* (FEMA 93), and AR 420-72. Formal (periodic technical) inspections are required at least every five years, and informal (periodic maintenance) inspections are required annually.

The most recent formal inspection was completed August 1996 by the U.S. Army Corps of Engineers (Savannah District). Based on site inspections and review of previous dam inspections, earthfill dams at Fort Stewart and Hunter AAF were judged to be in a safe condition. Listed discrepancies were not considered threatening to dam integrity and safety, but are scheduled for correction. Most discrepancies were of a maintenance nature. Informal inspections are conducted by the installation's Fisheries Biologist. Annual dam safety training is conducted within DPW.

All pond dams on Fort Stewart/Hunter AAF are classified as "low hazard" dams, where failure would result in minimal or no property damage. Coordination for dam safety will be made with

the Program Manager, Dam Safety, Environmental Protection Division, 3420 Norman Berry Drive, Hapeville, Georgia 30354, phone: (404) 656-7404. A postwide inventory of dams is maintained for all impoundments.

In accordance with federal policy, Fort Stewart has developed an Emergency Action Plan for each pond dam that identifies the location of dams; documents design and construction specifications; establishes an inspection procedure; and outlines emergency procedures in case of dam failure. This plan will ensure that an updated inventory with dam status is maintained. Dams that are a minimum of six feet in height and impounding 50 acre-feet are included in the inventory.

14-3c(6) Fish Attractors

Fish attractors in ponds can benefit all species of fish. Benefits include the aggregation of bait fish, additional substrate for aquatic invertebrate production, increased spawning habitat, and shelter. The primary purpose of fish attractors is to concentrate fish for anglers. Numerous fish attractor designs have been utilized in Fort Stewart/Hunter AAF ponds, including sunken Christmas trees, car tires, and PVC structures; floating pallet-rafts; and staked trees in shallows. Each fabricated fish attractor is identified by a red and white buoy, marked “fish attractor”. Buoys are anchored adjacent each attractor site. Attractors using trees, pallets, and brush are refurbished periodically to replace those that decompose. Fish attractor site selection is based on the amount of naturally occurring structure, water depth, pond size, and angler use.

14-3c(7) River Management

The intensity of management of rivers and streams on Fort Stewart/Hunter AAF is minimal since the network is an open system. River management includes:

14-3c(7)(a) Shortnose Sturgeon Protection

See Shortnose Sturgeon ESMP.

14-3c(7)(b) Water Quality Monitoring

See Section 12-5a.

14-3c(7)(c) Riparian Zone Protection

Riparian zones contain stream and river corridors as well as wetland buffer strips. These zones are of vital importance in that they help preserve those qualities that make a stream, river, wetland, or lake suitable for wildlife, recreation, and a source of clean drinking water. Riparian corridors also allow for free movement of wildlife from area to area within the state, help control erosion and river sedimentation, and help absorb flood waters. To advance protection of these zones, the following federal and state legislation will be applied as well as local and regional guidelines, as appropriate:

- Section 404, Clean Water Act
- Section 10, Rivers and Harbors Act of 1899
- Federal Water Pollution Control Act of 1972
- Endangered Species Act
- National Environmental Policy Act (NEPA)
- Coastal Zone Management Act
- Georgia Erosion and Sedimentation Control Act of 1975
- Georgia Surface Mining Act of 1968
- Georgia River Corridors Protection Act of 1989

- Georgia Coastal Marshlands Protection Act of 1970
- Georgia Water Quality Control Act
- Georgia Forestry Association's *Georgia's Best Management Practices for Forestry* (January 1999)

The establishment of buffer zones (*i.e*. stream management zones - SMZ) is crucial to the protection of riparian areas. Such zones would define permissible activities within a prescribed distance from the stream, river, lake, or other classified wetland. Activities potentially affected include road and other facility construction, forestry operations, waste water treatment operations, recreation usage, agricultural activity, waterborne military training activities, surface mining activities, utility development, etc. The establishment of a sound riparian zone protection policy is especially important with regard to protecting the endangered shortnose sturgeon which inhabits the Ogeechee River system.

Road construction and maintenance, timber harvest activities, military training, and facility construction have potential to impact wetlands and riparian zones. Implementation of Georgia Forestry Association's Best Management Practices (BMP), as outlined in Section 14-2k(3), will reduce impacts to stream management zones.

14-3c(7)(d) Erosion Control Within Associated Watersheds

Erosion control within stream and river watersheds will benefit natural resources and military training by minimizing impacts on resources and preserving training lands. Good land management practices on upland sites as well as the implementation of Best Management Practices for riparian zones (Section 14-2k(3)) will protect aquatic resources, including game and non-game fish.

14-3c(7)(e) Aquatic Plant Infestation Monitoring

Native and exotic aquatic plant infestations will be monitored as their presence relates to river health, water quality, sportsman access, and the sport fishery (Section 12-3h). Exotic species are particularly threatening to the riverine ecosystem. Within the past 15 years, alligatorweed has spread throughout the Canoochee and Ogeechee river systems, and localized weed growth has the potential of blocking river channels and completely clogging backwater bays and sloughs. In addition, hydrilla is now present in Southeast Georgia (documented in the Canoochee River watershed, Evans County Public Fishing Area). It is just a matter of time before it spreads to Fort Stewart/Hunter AAF. Such macrophytes will require monitoring and possible control.

14-3c(7)(f) Fish Kill Investigations

See Section 14-9b. Should a fish kill occur in a stream or river on the installation, Georgia DNR will take the lead investigative role with assistance provided by the Fort Stewart Fish and Wildlife Branch. The cause of the kill will be determined and action taken, if appropriate, to prevent further kills and possibly mitigate the kill

14-3c(7)(g) Creel Survey/Fishery Assessment

See Section 12-4b(2). Creel surveys must be conducted periodically to evaluate the fishery of flowing waters on Fort Stewart. Such

information can be beneficial to managing and protecting the fishery. Fort Stewart has adopted the Georgia DNR's standardized streams monitoring program and cooperates with Georgia DNR in data/information transfer as it relates to management of the Canoochee River fishery.

14-3c(7)(h) Landing Stabilization/Sportsman Access Improvement

See Section 18-4e.

14-3c(7)(i) Military Training Use of Rivers

All military training exercises on the Canoochee and Ogeechee rivers are reviewed and monitored to prevent or minimize impacts on the resource. Use of "navigable" portions of these rivers is regulated by the U.S. Army Corps of Engineers (Savannah District Office). Efforts will be made to minimize erosion and restore sites following military use, including revegetation and other soil stabilization techniques.

14-4 Game and Fish Harvest Management

Game and sport fish management is considerably different from management of other fish and wildlife species in that production of harvestable surpluses on a sustained basis is the major objective with other objectives involving "fair chase" and quality recreational opportunities. Plans for management of game species assume that population status information (Section 12-4a) is available.

14-4a White-tailed Deer

White-tailed deer are present throughout Fort Stewart. Population density ranges from 16-18 deer per square mile in peripheral areas, where illegal hunting is greatest, to 30-35 deer per square mile in core areas adjacent to Red Cloud/AIA complex, where access is more closely controlled and sanctuary is provided by the Red Cloud/AIA complex. Average deer density on the installation is 20-22 deer per square mile.

Check station data and population models generated in coordination with the Georgia DNR show a slowly increasing population in average condition for Lower Coastal Plain deer. Field dressed weights and antler measurements of yearling bucks and the productivity of females showed consistent declines through 1992, but recent data show much improvement in herd condition.

The following deer harvest data provides a record of reported kills on Fort Stewart from 1976 through 1998. These data show long-term trends in harvest* during the past 23 years.

Year	Males	Females	Total Deer*
1976	437	188	625
1977	321	127	448
1978	295	54	349
1979	351	85	436

Year	Males	Females	Total Deer*
1980	357	92	449
1981	355	94	449
1982	313	57	370
1983	395	23	418
1984	475	114	589
1985	377	52	429
1986	460	94	554
1987	487	162	649
1988	365	225	590
1989	351	211	562
1990**	215	117	332
1991	248	198	446
1992	283	225	508
1993	328	220	548
1994	220	157	377
1995	280	161	441
1996	384	180	564
1997	314	183	497
1998	424	210	634

* Reported harvest only, representing approximately 30-50% of actual harvest.
** Harvest reduced due to decreased hunting pressure caused by deployment of soldiers for Operation Desert Shield/Desert Storm.

The Fort Stewart deer herd exceeded its carrying capacity during the mid-1970s, and it has gradually been reduced to the point where the herd is probably below carrying capacity.

Increased thinning and burning are likely to improve deer habitat even further during 2001-2005. Therefore, the herd management strategy during the next few years will be to gradually

reduce antlerless harvest, allowing the herd to grow slightly. The herd will continue to be closely monitored to evaluate this strategy.

Hunter Army Airfield in Savannah is 5,370 acres, with only 3,650 acres available as game habitat. Population density ranges from 20 to 25 deer per square mile. Historically, only military bow hunting was allowed, but due to deer hazard problems on the airfield, shotgun hunting is now allowed, and the herd will be reduced as much as possible. Managing the herd for a sustained yield is not practical due to the size of the area and safety concerns presented by the presence of deer.

During the past five years the following harvests were reported on Hunter AAF:

1992	19 males	12 females	31 total deer
1993	15 males	22 females	37 total deer
1994	12 males	18 females	30 total deer
1995	12 males	6 females	18 total deer
1996	12 males	11 females	23 total deer
1997	16 males	11 females	27 total deer
1998	6 males	6 females	12 total deer

14-4b Eastern Wild Turkey

Wild turkey flocks are widely distributed on Fort Stewart. The population is increasing, but it fluctuates greatly. Habitat appears to be improving, and growing season burns are not adversely affecting overall turkey population numbers. Many turkeys successfully re-nest if a growing season burn destroys their first nests. It is, however, important to keep adjacent areas from burning during the same year to provide nesting cover in all parts of the range.

Fort Stewart has a spring gobbler season for six weeks with a three-tom bag limit. Reported kills range from 30 to 50 birds, annually. Turn-in of the kill is extremely poor, with estimates as low as 35-40 percent. Fall hunting will not be allowed for the population's protection.

14-4c Feral Hog

Feral hogs are widely scattered on Fort Stewart. Population levels fluctuate greatly, depending on mast crops. In a poor mast year, a small percentage of sows breed, and the ratio of pigs surviving to weaning is very low. Due to habitat destruction and direct competition with deer for acorn mast, the population will be controlled by allowing hunters to harvest as many animals as possible. Elimination of the feral hog is impossible due to military training conflicts and the presence of numerous restricted access areas which function as a refuge for the feral hog. The following is a summary of feral hog harvest data for 28 years during 1964-1998:

Season	Harvest
1964-65	516
1965-66	659
1966-67	400
1967-68	205
1968-69	483
1969-70	no data
1970-71	670
1971-72	195
1972-78	no data
1978-79	262
1979-80	431
1980-81	460
1981-82	no data
1983-84	325
1985-86	167
1986-87	248
1987-88	242
1988-89	202
1989-90	155

1990-91	91*
1991-92	108
1992-93	189
1993-94	151
1994-95	102
1995-96	271
1996-97	531
1997-98	563
1998-99	228

* Deployment of soldiers to Operation Desert Shield/Desert Storm.

Above data show reported kills which are 40%-50% of actual harvest. Annual fluctuations in kill are attributed to many factors, such as quality of the mast crop and hunting pressure, which varies from year to year depending on training schedules and hunter access. A population decline over the past 17 years is indicated from the above data. Average reported kill in the mid-1960s was 488, dropping to 184 by the mid-1980s and 152 since 1990, excluding the 1996 season in which 531 were reported. This decline has been beneficial to wildlife habitat that suffered significant damage from the high hog population in the 1960s. Beginning in 1995, the feral hog bag limit was eliminated, allowing as many feral hogs in the bag as hunters can harvest. Feral hogs on Hunter AAF have practically been eliminated with only one harvested during the 1998-99 season.

14-4d Bobwhite Quail

Bobwhite quail are widely, but unevenly, distributed over the installation. Populations have been exceptionally low the last 5-6 years, following a region-wide trend. Historically, the highest numbers have been found on the more fertile Sunderland Terrace along the western boundary that includes a series of forest openings from old fields and old tank ranges. These ranges afford fairly open, low basal area, pine stands that are frequently burned to facilitate military training.

Bobwhite numbers appear to be slowly recovering. Changes in forest management to add longleaf pine-wiregrass habitat using more thinning and burning should be beneficial to this lower succession species. Implementation of a management plan for the upland game management area of Fort Stewart (Section 14-3a(2)(d)) will significantly improve quail populations.

Fort Stewart will use annual call counts to monitor quail distribution and abundance. The goal of population management for quail will be to maintain a population density of one quail per acre. Over harvest is not believed to be a concern since the best quail habitat is also good training land and often closed to hunting.

14-4e Mourning Dove

The mourning dove is primarily a farm game species, thriving under intensive agricultural conditions where grain crops are grown. Doves are very common, but little success has been achieved in localizing their movements during the hunting season because of intensive farming operations off-post.

14-4f Waterfowl

Large numbers of ducks winter along the coast of Georgia. Both wood ducks and mallard are present throughout winter. From nest box utilization records, many wood ducks are year-round breeding residents. Other species observed include blue-winged and green-winged teal, lesser scaup, canvasback, and bufflehead. However, their presence is very sporadic and limited to small gatherings. Fort Stewart's

wealth of wetlands provide excellent opportunities for waterfowl management. Taylor's Creek, Canoochee Creek, and tributaries of the Canoochee River provide some of the best natural habitat for waterfowl on the installation. The wood duck (*Aix sponsa*) is emphasized in waterfowl management.

14-4g Eastern Gray Squirrel

The gray squirrel is found in huntable numbers in all hardwood bottomlands and upland hardwood areas. The squirrel population fluctuates greatly with changing yields of heavy seeded mast, such as acorns and hickory nuts. Squirrel reproduction and survival decreases dramatically during poor mast years. There is little demand for gray squirrel hunting on Fort Stewart.

14-4h Fox Squirrel

The fox squirrel is found in relatively good numbers on Fort Stewart, but there is little demand for hunting them. Fox squirrels are most often encountered along highways, adjacent to pine stands, feeding on pine seed.

14-4i Eastern Cottontail/Marsh Rabbit

The eastern cottontail and the marsh rabbit are found throughout Fort Stewart, but not in sufficient numbers to afford good hunting.

14-4j Fish

A previous version of the Fish and Wildlife Management Plan (DEH, 1992a) included a "snapshot" of conditions in each pond at that time with regard to fish populations. Since each pond, lake, and river is a separate entity with multiple species and subject to seasonal and annual variations in fish population distribution and abundance, an itemized description of each one is a complex process and only temporary in nature. The status of each body of water's sport fish population is evaluated annually and summarized through data charts, graphs, and population indices. These data are maintained in the Fish and Wildlife Branch office by the fisheries biologist.

Fisheries management on Fort Stewart/Hunter AAF is predicated on five objectives for each population:

- increase production of total fish biomass,
- increase fish survival,
- increase fish growth rates,
- optimize fish reproduction, and
- effectively use the dynamic relationships among the first four factors, including fish removal.

14-4j(1) Fish Harvest Management

All designated ponds and rivers will be available for recreational fishing, provided they are not closed due to military training, fisheries management, renovation, or other activity. Fish harvest for each body of water will be designated by creel, possession, and length limits for each game fish species. Limits are identical to State limits except where further restricted in ponds and lakes by DPW for management purposes.

Assessed harvest limits are based on the following factors: fish population estimates, length-frequency distributions, age structure, proportional stock density, predator-prey balance, reproductive success, growth rates and condition factors, harvest data, and angler

fishing pressure and catch. Available data will be considered before establishing creel and length limits and before restricting use of any given pond. Limits will be reviewed annually. Pond closure and creel/length limits are subject to change at any time.

Changes to fish harvest restrictions will be posted at the appropriate pond in addition to being listed in a Memorandum (distributed to Outdoor Recreation/Pass and Permit Office and the Game Warden Office). Installation fish harvest restrictions will be promulgated in FS Reg. 420-4. No commercial fish harvest will be allowed on Fort Stewart/Hunter AAF.

14-4j(2) Fish Population Control

Measures are taken to remove fish with a fish toxicant from ponds that experience a fish population problem such as overcrowded bream or undesirable species, or when draining and renovating a pond. For overcrowded bluegill, removal of 100 pounds per surface acre is recommended. Fish toxicants used at Fort Stewart include rotenone (5% emulsified solution) and antimycin A (Fintrol®).

Rotenone is commonly used when marginally or partially poisoning a pond to eliminate overcrowded bream (at 1-2 pints of 5% rotenone per 300 linear feet of shoreline) or when renovating a pond (at 1 ppm 5% rotenone). Antimycin A is used primarily to remove unwanted scaled fish from a catfish pond. Pond margin treatment with Fintrol® is accomplished using a concentration of 1 ppb. Elimination of overcrowded bluegill pond-wide with Fintrol® can be accomplished using a concentration of 1 to 3 ppb. Elimination of all scaled fish in catfish ponds can be accomplished using Fintrol® at a concentration of 5-10 ppb, depending on water temperature and pH.

Application of rotenone is recommended just after noon on a sunny day from July to September, when water temperatures are above 80º F. Pond margin treatment is made along a shallow shoreline from the shore out to 15 feet. When treating the shoreline, caution should be taken not to treat over 35% of the pond volume. Detoxification is accomplished by application of two pounds of potassium permanganate per 300 linear feet of shoreline, distributed in a line 15 feet from the shore or at a concentration of 1 to 2 ppm above the natural organic demand. It may be necessary to repeat treatments if enough fish are not removed initially. Application of either toxicant is carried out in accordance with label instructions, and ponds are closed for recreational use the duration of treatment and fish pick-up. Fish will not be made available for human consumption.

Supplemental stocking is another means to control undesired fish. For example, too many bream may be controlled by increased numbers of largemouth bass, and excess crappie may be controlled by stocking hybrid striped bass. These biological controls use the natural predator-prey relationships to control pond balance. In some cases, it may be necessary to close a pond to predator fishing to allow the proper balance to be achieved. Section 14-4j(3)(b) describes supplemental stocking.

14-4j(3) Fish Stocking

Fort Stewart stocks 20,000-80,000 fingerlings of various species annually in impoundments. These fish are purchased from commercial sources or obtained from state or federal hatcheries. The following fish stocking regimes are used:

14-4j(3)(a) Newly Constructed or Renovated Ponds

Bass/Bream Fishery

Fertilized Pond:

800 bluegill fingerlings/acre	Fall, Year 1
200 redear sunfish fingerlings/acre	Fall, Year 1
100 largemouth bass fingerlings/acre	Spring, Year 2
Option: 100 channel catfish fingerlings/acre	Fall, Year 1

Unfertilized Pond:

400 bluegill fingerlings/acre	Fall, Year 1
100 redear sunfish fingerlings/acre	Fall, Year 1
50 largemouth bass fingerlings/acre	Spring, Year 2
Option: 50 channel catfish fingerlings/acre	Fall, Year 1

Channel Catfish Fishery

Fed Pond (2-3% body weight/day):

1000 channel catfish fingerlings/acre	Fall, Year 1
100 largemouth bass fingerlings/acre	Spring, Year 2

(Note: Bass are stocked primarily for control of unwanted bream and other trash fish.)

Fertilized Pond:

500 channel catfish fingerlings/acre	Fall, Year 1
50 largemouth bass fingerlings/acre	Spring, Year 2

Unfed and Unfertilized Pond:

200 channel catfish fingerlings/acre	Fall, Year 1
50 largemouth bass fingerling/acre	Spring, Year 2

14-4j(3)(b) Supplemental Stockings

Largemouth Bass

Supplemental bass stocking may be required to correct an unbalanced condition stemming from overcrowded, stunted bream or bass overharvest. Generally, a supplemental stocking of advanced fingerlings or yearling bass (6-10 inches or larger) is made in the late summer or early fall, following a marginal rotenone application (to reduce the bream population). A stocking of yearling bass may also be made in the fall, following a minor to moderate fish kill. Under above conditions, 6-10 inch bass are stocked at 30-60 fish/acre in a fertilized pond or 10-30

fish/acre in an unfertilized pond.

Channel Catfish

Supplemental catfish stockings are made in managed catfish ponds once every 1-2 years to replace fish removed through harvest and natural mortality.

Catfish Pond:

Fed Pond:
1,180 channel catfish fingerlings/acre; Fall

Fertilized Pond:
590 channel catfish fingerlings/acre; Fall

Unfed/Unfertilized Pond:
236 channel catfish fingerlings/acre; Fall

Bass/bream Pond:

In bass/bream ponds, a light stocking of catfish can be made every one or two years to diversify the fishery. Larger catfish (6-8 inches or larger) are preferred to minimize losses of catfish to bass predation. These advanced catfish fingerlings are stocked at 50-100 fish/acre.

14-4j(3)(c) Hybrid Striped Bass

Hybrid striped bass (white bass X striped bass) have been experimentally stocked in Pond #1 (Pineview Lake) primarily to manage the crappie population. Hybrid striped bass fingerlings are stocked at 30 fingerlings/acre in the spring, every other year, if available.

14-4j(3)(d) Triploid Grass Carp

Grass carp have been stocked in selected ponds to manage aquatic weed problems. See Section 14-3c(2) for more specific information.

14-3j(4) Canoochee River Baseline Study

The Canoochee River is a valuable and unique blackwater fishery. The fishery within this river is potentially threatened by introduced flathead catfish competition, declining striped bass numbers, exotic weed infestations, and other factors. A project has been submitted to identify and evaluate fish populations in the Canoochee River, as discussed in Section 12-4b(2).

14-5 Endangered Species

14-5a Compliance Process

Management and protection of listed species will be given priority in natural resource management. In cases where endangered species management in accordance with the appropriate guidance would conflict with other mission activities, consultation with the U.S. Fish and Wildlife Service (USFWS) will be initiated to avoid jeopardizing any listed species or its critical habitat. Formal consultation with the USFWS will be coordinated with the installation Staff Judge Advocate (SJA). Proposals to enter into formal consultation or seek an exemption will be coordinated through the installation SJA or seek an exemption will be coordinated through the installation SJA, referred to Department of the Army Headquarters (HQDA (DADA-EL)), and reported in accordance with paragraph 2-3g, AR 27-40.

AR 200-3 states (Section 11-2(a-e)) that the Army has five primary requirements under the Endangered Species Act:

- to conserve listed species,
- not to "jeopardize" listed species,

- to “consult” and “confer”,
- to conduct a biological assessment, and
- not to "take" listed fish and wildlife species or to remove or destroy listed plant species.

Fort Stewart is committed to these five primary requirements. Fort Stewart’s *Biological Assessment of the On-going Mission at Fort Stewart, Georgia* (U.S. Army, 1991) provided the initial biological assessment upon which the Biological Opinion (USFWS, 1992) was issued. AR 200-3 also requires that Endangered Species Management Plans be incorporated into INRMPs.

Fort Stewart/Hunter AAF has prepared draft Endangered Species Management Plans (ESMP) for the RCW, Eastern indigo snake, bald eagle, wood stork, and flatwoods salamander (Fort Stewart Endangered Species Management Planning Team, 1997) and the shortnose sturgeon (Georgia Cooperative Fish and Wildlife Research Unit, 1997). These plans will be implemented following review and approval, including consultation with the USFWS and the NMFS. Any inconsistencies between contents of final ESMPs and this INRMP will be resolved by ESMPs taking precedence over the INRMP.

See the Endangered Species Management Plan for the Red-cockaded Woodpecker, Eastern Indigo Snake, Bald Eagle, Wood Stork, and Flatwoods Salamander (TAB A) and the Shortnose Sturgeon Endangered Species Management Plan (TAB B) for details on the compliance process, habitat trends, status, takings, and species specific management for each federally listed species found on Fort Stewart/Hunter AAF.

14-5b Other Species of Concern

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes recommendations for the protection and management of the 37 plants and 26 animals not federally-listed as threatened or endangered (sections 8-2b and 8-3e). Fort Stewart/Hunter AAF will continue to evaluate these recommendations and implement them when appropriate and when funding can be obtained. Funding priorities for these species is less than for those federally-listed.

Fort Stewart is using Georgia Southern University to study the flatwoods salamander and striped newt, both of which are found in similar habitat. This general ecology study will determine effects of winter fires on these species and the degree to which firebreak construction and maintenance may bring predatory fish into salamander and newt habitat. This study is Legacy funded.

14-5c Endangered Species Act Consultation

Consultation with the USFWS must be reinitiated if any of the following occur:

- the amount or extent of taking specified in the incidental take statement is exceeded;
- new information reveals that the specified action may affect listed species in manner or extent not considered in Biological Opinions;
- the specified action is modified in a manner that affects listed species or critical habitat in a way that was not considered in Biological Opinions; or
- a new species is listed or critical habitat is designated that may be affected by the identified action.

Potential impacts of future proposed actions which are beyond the scope of the existing consultation will be considered in separate Biological Assessments or Evaluations. A decision as to whether or not an action is within the scope of the existing consultation will be made by DPW. If the conclusion is that the action is "*not likely to adversely affect*" any endangered species, the assessment/evaluation will be forwarded to the USFWS Office in Brunswick, GA for concurrence. Copies of all Biological Assessments / Evaluations and USFWS letters of concurrence will be maintained in the Fish and Wildlife office. If it is concluded that the action "*may affect*" a listed species or critical habitat and the USFWS has not concurred that the action is not likely to adversely affect the species, then formal consultation with the USFWS will be initiated by the installation Commander.

14-6 Predators

The following predators are common to the area of Fort Stewart and Hunter Army Airfield:

COMMON NAME	SCIENTIFIC NAME	POPULATION PROBLEMS
Game Species:		
Bobcat	*Lynx rufus*	None*
Gray Fox	*Urocyon cinereoargenteus*	None*
Red Fox	*Vulpes fulva*	None*
Coyote	*Canis latrans*	None*
Non-Game Species:		
Barred Owl	*Strix varia*	Some RCW predation
Great Horned Owl	*Bubo virginianus*	Some RCW predation
Screech Owl	*Otus asio*	None
Red-Tailed Hawk	*Buteo jamaicensis*	None
Red-Shouldered Hawk	*Buteo lineatus*	None
Cooper's Hawk	*Accipiter cooperii*	Some RCW predation
Sharp-Shinned Hawk	*Accipiter striatus*	None
Sparrow Hawk	*Falco sparverius*	None
Marsh Hawk	*Circus cyaneus*	None

*These animals can be rabies vectors, but they do not closely associate with humans.

At this time, as well as in the foreseeable future, Fort Stewart/Hunter AAF does not see a need for any control of above-listed species. Overall, there are no major problems beyond the natural checks these species provide for other wildlife.

14-7 Other Nongame Species

The taking of nongame wildlife, except for rats, mice, coyotes, armadillos, ground hogs, beaver, freshwater turtles, poisonous snakes, frogs, spring lizards, fiddler crabs, freshwater crayfish, freshwater mussels, and nutria is prohibited by State law. Enforcement of these protective measures for nongame is the primary management tool for most nongame species on Fort Stewart/Hunter AAF.

Nongame wildlife will be managed to ensure the continued existence of a diversity of species. Artificial nest structures and plantings designed to benefit wildlife may be established and maintained near campgrounds and outdoor recreation areas. Emphasis placed on management of nongame species (other than threatened/endangered species) will reflect public demand and availability of funding and personnel.

Ongoing neotropical bird surveys (Section 12-4d) should provide some feel for trends in populations of some species of neotropical birds, as well as the group of birds as a whole. Habitat protection measures in Section 13-4, forest management (Section 14-2), wildlife habitat programs (Section 14-3), endangered species management (Section 14-5), wetlands management (Section 14-8), Water Quality (Section 14-9), and cantonment area management (Section 14-11) will benefit nongame species in general, consistent with ecosystem management strategies.

14-8 Wetlands Management

The National Wetlands Inventory indicates about 91,960 acres of wetlands on Fort Stewart. Section 8-2d describes wetlands on Fort Stewart/Hunter AAF. Protection and maintenance of existing habitat are the primary concerns of the DPW ENRD as it relates to wetlands. The quality of wetland watersheds affects the quality of downstream wetland plant and animal communities.

Wetlands protection is required by Executive Order 11990, *Protection of Wetlands*. The greatest threat to wetlands on Fort Stewart is siltation associated with roads and trails. Cumulative effects of road-associated siltation on wetlands are probably not great; however, due to the presence of roads, such effects are generally highly visible. In light of the extensive road network on Fort Stewart, the intensity of military training with tracked vehicles, and the harvest of installation timber resources, specific land management practices must be implemented to minimize impact on these wetlands.

14-8a Wetlands Protection

Section 13-3d, *Special Area Protection*, includes provisions to protect quality of wetlands at Fort Stewart using project review during NEPA documentation. These include using NEPA and IJO review to identify wetland conflicts with regard to planned actions and review of projects and activities involving wetlands. If necessary, projects with potential impacts are referred to the Corps of Engineers to determine if jurisdictional wetlands are implicated and to establish mitigation procedures.

14-8b Best Management Practices

The Georgia Forestry Association's *Georgia's Best Management Practices for Forestry* (BMPs) are intended to protect, maintain, and improve various wetland functions and potential uses. These BMPs are being implemented as part of the forest management (Section 14-2(k)(4)).

There is a need to implement BMPs within the DPW maintenance program. DPW is responsible for maintenance of most range roads, and basic water quality protective devices (such as described in BMPs and Section 14-8c) would significantly reduce negative impacts on wetlands. Improved use of BMPs within DPW will occur in 2001-2005.

14-8c General Wetlands Protection/Restoration

Efforts will be made to mitigate or restore impacted wetlands. The most significant impact upon wetlands on Fort Stewart stems from watershed erosion and subsequent silting of low lying areas and streams. Erosion control techniques include establishment of filter strips adjacent to bodies of water, terracing, seeding and mulching, gully healing through filling and shaping, use of temporary and permanent structures to stabilize gullies, construction of runoff diversions, berms and sediment traps/basins, planting cover vegetation, using chemical binders to stabilize reclaimed sites, using natural or man-made fibrous mats or other stabilizing materials, restricting or limiting vehicular traffic in specific areas or for specified periods of time, etc. Coordination with the Corps of Engineers and the U.S. Fish and Wildlife Service may be required in wetland mitigation.

Other sections of this INRMP have provisions to protect water quality and, therefore, wetlands. Provisions are found within *Training Requirements Integration* (11-4b), *Water Quality Management* (14-9), and *Land Rehabilitation and Maintenance* (11-4c). LRAM is emphasizing hardening of stream crossings, and this will have a positive effect on downstream wetlands.

14-8d Wetlands Banking

Fort Stewart/Hunter AAF received funding to begin a wetlands banking program which should restore wetlands in exchange for credits which could be "spent" when future projects, such as range expansion or facilities construction, affect wetlands. Wetlands banking at Fort Stewart involves two stages:

- Survey potential sites for wetland restoration and assess credit potential.
- Evaluate selected sites in terms of restoration costs and amount of training affected by the creation/restoration of wetlands.

This latter phase is the most difficult to accomplish. Due to the intensity of training at Fort Stewart it is critical to minimize the loss of training lands to wetland banks. Restoration action was implemented in Training Area A-11 as mitigation for the Brigade Marshaling Area and Railroad Pass Tracks in 1997. The final evaluation of training and natural resource management options can still be allowed within this restored area.

In 1998, a Wetland Mitigation Bank Siting Analysis was developed to evaluate potential for restoring impacted sites on Fort Stewart. Restoring the 1,000 acre Pond #4 to its historical stream hydrologic regime has been determined to be the best and most cost effective option to maximize wetland banking credits for meeting future training needs. A Mitigation Banking Instrument has been prepared and is being implemented. All sites considered for banking will be addressed in accordance with NEPA guidelines.

14-9 Water Quality

Water quality reflects environmental pollution. Thus, maintenance of high water quality is an important goal of this INRMP. Fort Stewart owns and operates several potable and non-potable water supply systems (Section 7-6) throughout Fort Stewart and Hunter AAF utilizing groundwater withdrawn from the Floridan aquifer. This aquifer provides high quality drinking water. In addition, the surface waters throughout Fort Stewart and Hunter AAF have been found to also be of the highest quality. The Installation intends to preserve that quality. Monitoring is one way the Installation ensures the standards are maintained. Section 12-5 describes existing water quality monitoring and plans to improve this monitoring protocol in 2001-2005.

AR 200-1 establishes the following objectives for water resources on Army lands:

- Conserve all water resources.
- Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
- Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
- Provide drinking water that meets applicable standards.

- Cooperate with federal, state, and local regulatory authorities in forming and implementing water pollution control plans.
- Control or eliminate runoff and erosion through sound vegetative and land management practices.
- Consider nonpoint source pollution abatement in all construction, installation operations, and land management plans and activities.

While the Environmental and Natural Resources Division (ENRD) is responsible for water quality, most of the water quality programs at Fort Stewart/Hunter AAF are managed within the ENRD's Environmental Branch. Consequently, attainment of most of the objectives of AR 200-1 is the responsibility of Fort Stewart's ENRD Environmental Branch. However, the last two objectives noted above are clearly natural resources management concerns and, as such, are managed by the Installation's Natural Resources personnel . This section specifically deals with management practices, actions, and initiatives taken by Natural Resources personnel with regard to water quality.

14-9a Pollution Control

Use of Fort Stewart/Hunter AAF waters include human consumption, military training, and recreation. The Fishery Biologist assists in identifying water pollution and its source and cooperates with the Environmental Branch to resolve problems and assists with the mitigation process when it involves fishery resources. Types of pollution that may impact the aquatic environment and its users are as follows (DEH, 1992a):

a. Inert organic materials, i.e. erosion silt, sediment, etc.;
b. Putrescible wastes, i.e. all organic wastes;
c. Toxic wastes, i.e. metals, insecticides, etc.;
d. Radioactive wastes; and
e. Thermal pollution, i.e. heated effluent.

Pollution may be detected and measured by various combinations of chemical, physical, and biological means. Chemical tests include dissolved oxygen (DO), pH, biological oxygen demand (BOD), carbon dioxide (CO^2), and those used to identify the presence or absence of particular chemical compounds or elements. Physical assay methods are available to examine color, turbidity, specific conductance, and odor, among other aspects. Biological assessment methods include sampling and identification of organisms as indices of pollutants and habitat degradation, examination of dead or dying organisms, and bioassays.

Laws and regulations associated with pollution control and abatement in U.S. waters include:

a. Clean Water Act of 1972, 1977, and 1987
b. U.S. Fish and Wildlife Coordination Act
c. Rivers and Harbors Act of 1899
d. National Environmental Policy Act of 1969
e. Coastal Zone Management Act of 1972
f. Executive Order 11990, Protection of Wetlands
g. Executive Order 11752, Prevention, Control, and Abatement of Environmental Pollution
h. Executive Order 12088, Federal Compliance with Pollution
I. AR 200-1, U.S. Army Environmental Protection and Enhancement
j. TB 55-1900-206-14, Control and Abatement of Pollution by Army Watercraft
k. FS Reg. 200-2, Spill Prevention Control and Countermeasures Plan and Installation Spill

Contingency Plan

Fort Stewart's Fish and Wildlife Branch will be involved in investigating all known water pollution incidents if they relate to the protection of the fisheries resource. The installation's Fisheries Biologist is part of the Installation Response Team for spill prevention control and counter measures (IAW FS Reg 200-2). In support, thereof, the Fish and Wildlife Branch provides technical assistance to mitigate effects of the spill or discharge of pollutants in any waters on Fort Stewart/Hunter AAF, as necessary.

Erosion has not been identified as a significant threat to water quality on Fort Stewart and Hunter AAF, but it does produce locally significant impacts on wetlands (Section 14-8), particularly within the training areas of Fort Stewart. The implementation of the LRAM component of ITAM (Section 11-4c) will improve Fort Stewart's ability to protect water quality by addressing erosion associated with training activities.

Groundwater management includes restoration projects associated with individual sources of pollution. These projects are not considered as natural resources management and are not included within this INRMP.

There are provisions within this INRMP which will specifically reduce negative impacts to water quality or mitigate such damage. These are found in sections 11-4b(3) - *Training Restrictions*, 14-2k(4) - *Best Management Practices*, 14-8 - *Wetlands Management*, 11-4c - *Land Rehabilitation and Maintenance*, 14-13 - *Pest Management*, 11-4d - *Environmental Awareness*, and 19-0 - *NEPA*.

14-9b Fish Kills

a. If the fish kill occurs in a pond or lake, the installation's Fish and Wildlife Branch will take the lead investigative role and follow the establish protocol in the *Field Manual for the Investigation of Fish Kills* (USFWS Publication 177). In summary, on-site investigation is made, water samples (and occasionally mud samples) are taken; and live and dead fish are collected. Water samples are tested for dissolved oxygen, pH, carbon dioxide, alkalinity, and hardness (all within in-house capabilities). Should a pesticide, oil, or other toxic agent be suspected of causing the kill, water, mud, and fish samples will be forwarded to either a locally contracted water analysis toxicology laboratory or to the U.S. Army Environmental Hygiene Agency for toxicological assessment.

A portion of the live fish collected will be immediately preserved in a 10% formalin solution, while the remainder will be kept alive, if possible. Specimens will be saved for necropsy and microscopic identification of parasites and signs of disease. Should a parasite or disease identification be made and determined to be the cause of the fish kill in the pond or lake, available treatments will be considered. In most cases, treatment of a moderate size body of water is not economically feasible, the fish kill will be allowed to run its course. However, if a treatment is known and feasible, the pond or lake will be closed and treated appropriately. Examination of the air bladder in fresh specimens will be conducted to determine whether explosives were used to effect the kill. Assistance may be sought from Georgia DNR if additional parasite or pathogen identification is necessary. Best estimated of numbers of fish, species composition, and length groups affected will be determined. As estimate of monetary cost of the

fish kill will be assessed. Fish count methods and monetary values are based on the American Fisheries Society's Special Publication #13, *Monetary Values of Freshwater Fish and Fish-kill Counting Guidelines.*

In the case of a large scale fish kill in a pond or lake, the Fish and Wildlife Branch will notify the following individuals and offices:

- Chief, Environmental/Natural Resources Division, Bldg. 1137, DPW, ph. 767-2010/767-4727
- Deputy DPW, Bldg. 1101, DPW, ph. 767-8356
- DPW, Bldg. 1101, DPW, ph. 767-8356
- Chief Game Warden, DPS, Bldg. 8091, Game Warden Office, ph. 767-2353
- Pass & Permit Office, Outdoor Recreation Section, Bldg. 440, ph. 767-5032/767-2191
- PAO, Bldg. 290, ph. 767-7833/767-8073

Once the cause is determined, all appropriate groups will be informed. Corrective action will be taken if it is determined it is economically feasible. If mitigation is possible and required, appropriate measures will be implemented. The affected area will be closed to the public if deemed necessary from a public health or public relations standpoint.

b. If the fish kill occurs in a stream or river (any waters classified as State of Georgia waters), then the Georgia DNR and Georgia EPD will be notified immediately, and the Georgia DNR will take the lead investigative role, with assistance provided by the Fort Stewart Fish and Wildlife Branch. In the case of a stream or river fish kill, the above listed individuals will be notified, as well as those listed below:

- Georgia DNR, Fisheries Management Section, Demeries Creek Office, Richmond Hill, ph. 727-2112/727-2111
- Georgia EPD, Brunswick, ph. 912-264-7284 (Monday-Friday; normal business hours)
- Georgia State Operations Center (SOC), Atlanta, ph. 1-800-241-4113 (weekends, holidays, and Monday-Friday after normal business hours)

14-10 Roads and Trails

DPW Roads and Grounds has responsibility for maintenance of tank trails and main roads, and Forestry Branch is responsible for maintaining timber and wildlife access roads and trails. Both categories are important to natural resources management in that they are needed for natural resources management, wildfire suppression/prevention, and recreation access.

There are about 500 miles of roads and trails within the responsibility of the Fire Management Section, Forestry Branch. Timber sales often dictate needs for these roads, and many are closed after timber harvest is completed. The 10-person heavy equipment team maintains roads and trails by pulling ditches to the center and adding base if it is through a wet area. Maintenance work involves culvert repair, hole filling, ditch pulling, and similar activities. Best management practices (Section 14-2k(4)) are an important aspect of road work to protect wetlands and water quality. Work is year-round, but primarily in summer. Crews also conduct prescribed burning, wildfire suppression, erosion control, wetlands restoration, firebreak maintenance, and other similar activities.

Environmental Branch coordinates use of borrow sites on Fort Stewart/Hunter AAF. No new borrow pits are being established, and if existing pits are expanded, coordination involves

wetlands, cultural resources, and endangered species, utilizing the NEPA and/or IJO processes.

The following guidelines will be used in 2001-2005 for construction and maintenance of these access roads (DEH, 1992b):

- Whenever possible, existing roads will be used, minimizing new construction.
- Access needed for timber harvesting will be serviceable when timber is shown to potential buyers. No additional maintenance work will be performed once a timber tract is sold unless military damage to the road renders the road in worse shape than when the contractor bid on the sale.
- Best management practices (Georgia Forestry Association, reprinted in 1995; Georgia Forestry Commission, 1995) will be followed in all construction and maintenance projects.
- Culverts and fill needed to harvest timber will be removed within six months after logging is completed.
- Projects which disturb more than one acre will have a sediment and erosion plan.
- Whenever possible, roads will be constructed at natural ground level, which is less likely to restrict natural water flow.

14-11 Cantonment Area Management

This section includes management of the cantonment area which directly affects natural resources management. Routine grounds maintenance on Fort Stewart/Hunter AAF is accomplished primarily by Roads and Grounds, DPW. Most routine grounds maintenance is not included in this section. Both Fort Stewart and Hunter have Installation Design Guides (Harland Bartholomew and Associates, Inc., 1990a and 1990b).

14-11a Cantonment Area Forest Management

Most of the Fort Stewart cantonment area is built upon uplands which are ideal for supporting pine communities. Cantonment pine stands are overstocked and need thinning. Much of the periphery of the cantonment area could be managed for mature pines, which are ideal for community living due to their open, park-like nature when regularly thinned and burned.

The Fort Stewart community is beginning to support forest management of the cantonment area, even though the first year or so after thinning, lands are unsightly. In 1993 the first cantonment area burns were done, and most residents have observed that burning removes thinning slash and creates ideal conditions. During 2001-2005 lands that can be managed for pines will be more intensively managed. The rate of this management will be based on community acceptance of forest practices.

There is a significant need for hardwoods within the Fort Stewart cantonment area. Existing hardwoods are steadily dying or being removed as part of maturation processes and construction, and there is no planned program for replacement. The installation will review its options during the next five years, but funding is likely to be a significant problem. Forestry funds are not an option since hardwoods within the cantonment area would have no commercial value, and landscaping funding is difficult to justify during a period of declining Defense

budgets.

14-11b Urban Habitat Management

Emphasis on urban wildlife management has opened new avenues for resource management. An emerging awareness that urban areas can be managed for wildlife and still be attractive, combined with reduced funding for grounds maintenance, has created new opportunities for habitat management within the Fort Stewart cantonment area.

14-11b(1) Reduced Grounds Maintenance

Reduced grounds maintenance programs involve reduction of mowing and establishment of forest, grassland, or wildflower areas to reduce grounds maintenance costs on improved and semi-improved grounds. The manicured grass tradition on military installations often makes it difficult to generate acceptance of these programs.

14-11b(2) No-mow Areas

"No-mow" means exactly what it says... the dropping of an area from the grass mowing cycle. These areas are most accepted by the public when they are natural extensions of already wild lands, such as narrowing a mowed road shoulder or extension of a woody area into a field.

Fort Stewart/Hunter AAF has stopped mowing on about 40 acres in recent years. These areas were planted into pine. There are few remaining acres where grass mowing can be reduced or eliminated. During 2001-2005 other areas will be evaluated for conversion to more natural vegetative cover, especially trees.

14-11b(3) Wildflowers

The acceptance of reduced grounds maintenance and the planting of wildflowers have become associated with each other. Wildflowers grow naturally on Fort Stewart/Hunter AAF, especially after burning. Burning offers an economical way to naturally produce wildflowers and reduce grounds maintenance costs. One potential site that will be evaluated is along Highway 144, between the road and the paralleling tank trail. If this long strip were removed from the mowing cycle or only mowed once in the fall, it could be burned to produce a prolific strip of wildflowers that would be viewed by thousands of persons daily.

14-12 Agricultural Leasing

Fort Stewart has no agricultural leases. In general, both the land and the military mission preclude this option during 2001-2005. One area with potential for a small lease is the grassy area around the runway at Hunter AAF. However, the value of this small lease is unknown.

14-13 Pest Management

Responsibility for pest management on Fort Stewart/Hunter AAF is shared among the Pest Control (Entomology) Section, Forestry Branch, and Fish and Wildlife Branch within DPW and the Game Warden Section within PMO. The installation has a Pest Management Plan (DEH, 1992d), upon which most of the below discussion is based. Pest management is also discussed in Section 14-2n, *Forest Diseases and Pests*, as well as in sections 14-3c and 14-4j(2) which describe aquatic weed control and noxious fish removal respectively.

Forts Stewart/Hunter AAF has ten categories of pests and weeds which cause significant damage and require control or management:

1. disease vectors,
2. structural pests,
3. stored product pests,
4. general household pests,
5. pests of ornamentals and turf,
6. miscellaneous pests,
7. forest pests,
8. weeds,
9. aquatic pests, and
10. agricultural pests.

14-13a Pest Control Practices

14-13a(1) Disease Vectors

From March to October mosquitoes, gnats, biting flies, ticks, filth flies, and fleas constitute the most important general annoyance. Several times each summer, outdoor activities must be curtailed if adult chemical control is not available. Mosquitoes and gnats, which cause much of the problem, breed in outlying fresh water and temporary ponds or other poorly drained areas. The County Mosquito Abatement Program provides mosquito control services in these areas. The Army is responsible for providing services within its own boundaries. Control efforts include removing mosquito breeding areas (small pools, open containers, ditches, etc), use of larvicides, and use of chemicals for adult control. As mosquito and biting gnat populations begin to increase, Ultra Low Volume insecticide treatments are initiated within certain high use areas.

Filth flies are a significant problem during summer and early fall. The program for controlling filth flies emphasizes on-base production (breeding) and prevention of entry into buildings. Effects of this potential disease vector will be minimized using sanitation and timely disposal of wastes. At the stables, proper handling and disposal of horse manure and wet bedding are essential to reducing fly production.

14-13a(2) Structural Pests

Structural pests include subterranean termites, powder post beetles, beetles, and carpenter ants. Termites are the most important due to their ability to destroy wood in structures. Infestations are found in about 40 separate buildings each year on Fort Stewart/Hunter AAF. Uncontrolled subterranean termites can cause serious weakening or failure of load-bearing members in structures in four to seven years.

Pre-treatment of soil for subterranean termite control is performed on all new construction sites. Wood used to replace rot or termite-damaged material is pressure-treated in accordance with Federal Specification TT-W-571 series or the American Wood Preservers Bureau Specifications. Treatment of structures with duct work or vent/flue that connects to heating, ventilation, or air-conditioning (HVAC) in or under slabs on grade and in enclosed spaces that are exposed to the ground, will not be treated with soil-incorporated termiticides until HVAC systems have been modified. All modifications to HVAC systems will be in accordance with AR 420-10 and AR 415-35.

Damage done by other structural pests, such

as powder post beetles and carpenter ants, is not an annual occurrence. These outbreaks are treated as needed.

14-13a(3) Stored Products Pests

Stored products pests are an occasional, but significant, problem, contaminating products made with flour or rice or destroying certain fibers. Approximately 35% of the subsistence materials received by the Commissary Store is dry food that is susceptible to these pests. Susceptible subsistence items may be shipped by railcar and may be treated with a fumigant (aluminum phosphide) in transit. In-transit fumigated railcars must be opened and ventilated by certified pest controllers.

14-13a(4) General Household Pests

General household pests include ants, spiders, silverfish, wasps, bees, crickets, fleas, and other invaders. Their control is required to maintain the health welfare and morale of building occupants and residents. Effective controls reduce these pests to tolerable levels or temporarily eliminate them. The cockroach is the most important pest of this category due to its adverse effect on morale and frequently occurring in dining areas, lavatories, and other living areas. An integrated approach includes sanitation and chemical control to suppress the population.

Preventive control measures (inspections, sanitation, and exclusion) reduce the chances for pest survival by limiting food and shelter. Chemical control is performed on a scheduled basis. All food service and messing areas receive pest control services once per month. Other common use building with recurring problems (administrative, service, barracks, guest quarters, warehouses, etc) receive quarterly service. Family housing units receive services only when pests threaten government property or occupants' health or when occupants have been unable to control the pest after having made a concerted effort. Other household and miscellaneous pests, such as ants, spiders, crickets, wasps, and fleas, are controlled on an on-call basis only.

14-13a(5) Pests of Ornamentals and Turf

Scale insects, aphids, leaf beetles and other pests of ornamentals are significant only when damaging populations occur.

Turf diseases and insects, like armyworms, sod webworms, and mole crickets, are normally only a significant problem in high maintenance turf areas, such as golf course greens and tees. Daily inspection during periods when pest problems are likely to occur should detect problems before significant damage is done. Chemical control is based on need, maximizing natural controls and avoiding environmental and pest resistance problems caused by overuse of pesticides.

Nematodes are an occasional turf pest. Control operations are based solely on need.

Spider mites are occasionally damaging pests, emphasizing flowers. Control is provided on an as-needed basis only.

Bagworms defoliate cedar, arborvitae, and juniper. Heavy defoliation for two consecutive years will kill these plants or at

least destroy their ornamental value.

14-13a(6) Miscellaneous Pests

Miscellaneous pests include rodents, ants, spiders, crickets, birds, and general wildlife pests. Rodents (rats and mice) are important because they destroy or contaminate foods and stored products. Periodically, rodents serving as disease reservoirs elevate rodent control to the highest priority. Rodent control is a sustained preventive effort.

Gulls, starlings, and English sparrows are primary pest birds. Permanent exclusion of birds from roosting/nesting sites is the control method of choice. If baiting becomes necessary and if toxic baits are exposed, they are kept under line-of-sight surveillance to prevent non-target animals from intoxication.

Various other vertebrate pests which occasionally interfere with activity operation include squirrels, skunks, bats, and pigeons. No routine control programs are established for these pests.

Wasps are a problem in Family Housing and in ordnance magazines where they build nests in the entryways and occasionally sting passing personnel. No non-chemical alternatives are available in this type of situation.

Wildlife nuisance pests are as follows:

Common Name	Scientific Name	Population	Problems
Game Species:			
Feral Hog	*Sus scrofa*	Moderate-Increasing	Rooting on golf courses, housing areas, and air strip rights-of-way
Deer	*Odocoileus virginianus*	Moderate-Increasing	Collisions with aircraft and motor vehicles
Raccoon	*Procyon lotor*	High-Stable	Raiders of garbage; rabies vector
Non-Game Species:			
Alligator	*Alligator mississippiensis*	High- Increasing	Lack of fear of humans at fish ponds
Beaver	*Castor canadensis*	Moderate-Stable	Flooding of timber on and off post land
Feral Dog	*Canis familiaris*	Moderate-Increasing	Damage to wildlife; rabies vector
Feral Cat	*Felis domesticus*	Moderate-Increasing	Damage to small birds and mammals
Armadillo	*Dasypus novemcintus*	Moderate-Increasing	Damage to lawns and golf course

All animals listed in this section need some type of control. Each one will be discussed separately.

Deer and Feral Hogs: In areas where these animals are a problem, increased hunting pressure and live-trapping are used to reduce and/or eliminate their impact.

Alligators: Problem alligators are handled on a case-by-case basis. Current policy is to notify the Georgia Wildlife Resources Division who then contacts a licensed nuisance alligator trapper, under contract with the State. The contractor will then coordinate with the DPW Fish and Wildlife Branch and identify the site and specific alligator to be removed. The contractor is issued a numbered permit and accompanied tag for each alligator. Once the alligator is captured, the contractor must affix the numbered tag that will remain on the animal through processing. Should an alligator present a hazard requiring immediate removal and the trapper cannot arrive in a reasonable period of time, the Fish and Wildlife Branch will trap and relocate it to a remote area of the post.

Beavers: Beavers, like alligators, are handled on a case-by-case basis. Generally speaking, beavers improve areas for waterfowl and help conserve water resources. When valuable timber resources are threatened, an attempt is made to trap beavers. However, if an area is well-suited for beavers, another colony will soon be established, requiring site monitoring and possible beaver expulsion again.

Raccoon: Raccoon territory has been

encroached upon by the expansion of post housing. Problem raccoons are trapped either by the Fish and Wildlife technicians or conservation law enforcement officers.

Feral Dogs and Cats: Dog and cat control in the cantonment area is handled by the DPS Provost Marshall. Stray hunting dogs or wild dogs outside the cantonment area are handled by the DPW Fish and Wildlife Branch, Conservation Law Enforcement.

Armadillos: Armadillo problems within the cantonment area (housing and golf courses) are handled by DPW Pest Control Branch. No attempts have been made to control populations in the wild. Research is showing that impacts of armadillos on wildlife are minimal.

14-13a(7) Forest Pests

Section 14-2n describes forest pests and disease management on Fort Stewart/Hunter AAF. Treatment by direct application of pesticides has been limited to the use of lindane against bark beetles and 2,4-D, Picloram Spike®, Velpar®, Velpar-L®, Tordon G®, and other approved herbicides against a variety of hardwood weed species in recent years. The control of these and other forest pests is primarily accomplished through IPM measures, such as manipulation of stand age, composition and density, selective timer harvest, mechanical reduction of woody stemmed weeds (drum choppers, KG blades), and the strategic application of prescribed burning.

14-13a(8) Weeds

Control of weeds is a Pest Control function. Herbicides are used to control weeds in areas such as parking lots, around moving obstructions, along perimeter fence lines and fuel lines, and along drainage ditches.

14-13a(9) Aquatic Pests

Aquatic pest control is conducted by the Fish and Wildlife Branch, conducted under the supervision of the Fishery Biologist. Management of aquatic weeds is accomplished through an integrated control approach. Sections 14-3c and 14-4j(2) describe aquatic weed control and noxious fish removal respectively.

14-13a(10) Agricultural Pests

Agricultural pest control is conducted by the Fish and Wildlife Branch. Agricultural pest control is conducted in wildlife clearings to improve agricultural planting and wildlife habitat under the supervision of wildlife biologists. The control of agricultural pests (nuisance weeds and insects) is an integrated program to include application of registered herbicides and insecticides, use of no-till planting techniques, periodic disk harrowing, and control burning.

14-13b Trapping Policy

The trapping of wildlife for sport and recreation is prohibited on Fort Stewart/Hunter Army Airfield. The furbearer resource is underutilized. However, compliance with Article 2, Section 27-3-63 of the Game and Fish Laws of Georgia, requires inspection of the traps at least every 24 hours. This is not possible on a military installation where extensive personnel training occurs daily, and sportsman access to any given area changes daily.

14-13c Integrated Pest Management

In 1994 the Army approved three Measures of Merit that defined the course of Pest Management programs until the year 2000. These measures are to have a current pest management plan by the end of FY 97, reduce pesticide use by 50% over a seven year period (1994-2000), and have pesticide applicators certified within two years of employment.

Fort Stewart is progressing well in the accomplishments of the above objectives as reflected by the following established procedures:

- Maintain its approved Integrated Pest Management Plan.
- Verify at least a 50% reduction in pesticide use from the end of FY 93.
- Provide basic and refresher training for personnel certified for pesticide handling.

14-13c(1) Integrated Pest Management Plan (IPMP)

Fort Stewart has completed its IPMP (DEH, 1992d), and this inhouse-prepared document will be updated as needed to keep it current. One goal of this IPMP is to minimize the adverse environmental impact of pesticide use while achieving an acceptable level of control and cost-effectiveness.

14-13c(2) Chemical Use

All chemicals used on Fort Stewart are EPA-approved. Reduced chemical use is a goal of the pest management program, but there are problems achieving this goal. The installation understands both obvious and long term threats to both humans and ecosystem functions from chemical abuses.

The Forestry program has drastically cut its use of chemicals, but most reductions were previous to the 1993 base year. However, recent actions to restore longleaf pine and improve RCW habitat are adding pressures to treat hardwood understory with chemicals.

The Pest Control program has reduced chemical use by at least 50% since 1993. This reduction is attributed to the use of integrated pest management practices as well as personnel cutbacks.

The fisheries management program has historically embraced an integrated pest management program, utilizing physical, chemical, and biological means of controlling aquatic pests. Aquatic pesticides were targeted for reductions beginning in 1984, and by FY 93, significant reductions had already taken place. Since FY 93 aquatic pesticide use has been reduced by 21.94% (from 391.08 lbs of active ingredient in FY 93 to 305.35 lbs in FY 96). Further reductions continue to be pursued in an effort to meet the 50 percent reductions by year 2000 as desired by the DoD Pest Management Measure of Merit 2 initiative.

14-13c(3) Pesticide Certification

There are certified pest control applicators within the Pest Control Section, Forestry Branch, and Fish and Wildlife Branch. These personnel will obtain required refresher training, and any new personnel will receive training required for certification. Fort Stewart/Hunter AAF uses the Army school at Fort Sam Houston, Texas.

15. OUTSIDE ASSISTANCE PROJECTS

Natural resources professions are developing so rapidly that research or special projects using outside expertise are often the only way to identify, or choose from, management options to meet particular objectives. These projects may be used to determine baselines with regard to status of ecosystems (for future comparisons) or to directly evaluate management programs in terms of meeting management objectives. Surveys, ecosystem studies, and population evaluations are an important part of the adaptive management process which is essential to ecosystem management.

15-1 Objectives

- Provide research and other studies to support Fort Stewart/Hunter AAF natural resources management program.
- Provide special projects to support the Fort Stewart/Hunter AAF natural resources program.

15-2 Support Mechanisms

15-2a Inhouse Capabilities

ENRD has limited inhouse research or special project capabilities. Limitations on inhouse capabilities derive from manpower restrictions and a management-oriented mission. ENRD and ITAM personnel store extensive data on vegetation, wildlife populations, and range status. The GIS is a powerful inhouse research asset. As this system comes on line with relatively complete databases, it can be used to support numerous projects described in this INRMP during the next five years.

There are some needs that go beyond the training of ENRD's inhouse staff. Some studies and projects require specialized academic training while others require more trained staff than available on Fort Stewart/Hunter AAF.

15-2b Other Agency Personnel and Project Assistance

The Intergovernmental Personnel Act of 1972 (IPA) provides a means to conduct research or obtain other personnel assistance at Fort Stewart/Hunter AAF. Any state or federal agency is authorized to participate. IPA is basically a system where a federal (or state) agency borrows other federal or state agency personnel for a limited time period to do a specific job. The installation pays the borrowed employee's salary and administrative overhead. There are two advantages: personnel are directly supervised by Fort Stewart/Hunter AAF, and no manpower authorizations are required.

In 2001-2005 Fort Stewart/Hunter AAF will consider using IPA agreements as a source of assistance with special projects. Those agencies that are partners for implementation of this INRMP are the most likely sources of this assistance.

Another "borrowed personnel" option is through the Oak Ridge Institute of Science and Education (ORISE). ORISE involves colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, post graduates, and associate degree graduates with opportunities to gain experience in their respective fields by working on military

installations (and other areas). Stipends are equivalent to salaries for employees hired with similar educational backgrounds, and a 30% overhead is added. The normal limit on the use of ORISE personnel is 3 years. Installations may assist in the selection of ORISE personnel. ORISE is used extensively at Fort Stewart/Hunter AAF, and it will continue to be an important option for manpower assistance during 2001-2005.

Fort Stewart/Hunter AAF recognizes the importance of cooperating with Federal and State agencies in addition to private organizations. Sections 5-2, 5-3, 5-4, and 5-5 identify other agencies with whom Fort Stewart/Hunter AAF has cooperatively worked in recent years. Other agencies will assist with implementation of special projects and research within this INRMP. Most of this support is briefly described in Chapter 5.

15-2c University Assistance

Universities are an excellent source of research assistance. Fort Stewart/Hunter AAF has used several universities in recent years to help with specialized needs. The University of Georgia, Georgia Southern University, and the Center for Ecological Management of Military Lands at Colorado State University are the most likely sources of assistance with implementation of this INRMP (Section 5-6) during 2001-2005.

15-2d Contractor Support

Fort Stewart/Hunter AAF may also turn to outside contractors for studies and projects. Contractors give the installation access to a wide variety of specialties and fields. Contractors are often involved in projects such as plan preparation, NEPA documentation, prescribed burning, aerial census and photography/imagery, and similar activities.

15-3 Planned Outside Assistance Projects

The below table outlines projects accomplished all or in part by outside entities in order of priority. ORISE projects are not included. In 2001-2005 many of these projects will be determined by funding availability.

2001-2005 Natural Resources Special Project Needs

Project	Priority*	Agency	Completion	Comments
Wetlands evaluations	1	Corps of Engineers	Indefinite	As needed
Forest products sales	1	Corps of Engineers	Indefinite	Ongoing
Greentree Reservoir	1	GA DNR, Ducks Unlimited	2001	Ongoing
Aerial photographs	1	CEMML, Contractor	Indefinite	As needed
Live oak study	1	GA Southern University	2000	Ongoing

Project	Priority*	Agency	Completion	Comments
Wiregrass restoration study	1	GA Southern University	2000	Ongoing
Vegetation Map	1	CEMML	2002	Planned
Water Quality Monitoring (Public Waters)	1	GA DNR EPD	Indefinite	Planned by DNR EPD
Forest disease/insect damage control	1	U.S. Forest Service	Indefinite	As needed
Endangered species management	1	USFWS	Indefinite	Ongoing
GIS implementation	1	CEMML	Indefinite	Ongoing
Management of hunting and fishing	1	GA DNR	Indefinite	Ongoing
River basin monitoring	1	GA DNR	Indefinite	Planned by DNR
Enforcement support	1	GA DNR, USFWS	Indefinite	As needed
Shortnose sturgeon population study	1	USACOE (WES)	2002	Ongoing
Feral Hog Health	2	USDA	Indefinite	As needed
Fish kill investigation	2	GA DNR	Indefinite	As needed
Sludge land application study	2	City of Hinesville	2002	Ongoing
Flatwood salamander and striped newt study	3	GA Southern University	2000	Ongoing
Neotropical bird study	3	GA Southern University	Indefinite	Ongoing
Phytoplankton study	3	EPA	Indefinite	As needed
Feral hog disease study	3	U.S. Dept. Agriculture	Indefinite	If requested

* 1 Needed as soon as possible for immediate management application.
2 Useful for improving management to a significant degree over a long

period.

3 Has good potential to improve long-term management.

16. ENFORCEMENT

Many aspects of natural resources management require effective enforcement if they are to be successful. Programs such as harvest controls, protection of sensitive species, water pollution prevention, hunting and fishing recreation, nongame protection, and others are very dependent upon law enforcement.

16-1 Objectives

- Enforce laws and regulations pertaining to implementation of the natural resources program at Fort Stewart/Hunter AAF.
- Use natural resources law enforcement as an integral part of the overall natural resources program.

16-2 History, Authority, and Operations

Natural resources law enforcement is the responsibility of the DPW Conservation Law Enforcement Office. The program was originally under the PMO and operated by Military Police personnel. In 1980 Fort Stewart hired its first Chief Game Warden, a civilian position. This position provided the continuity and specialized experience needed to enforce unique laws associated with natural resources. In 1998 the title of Game Warden evolved into the title of Supervisory Special Agent for Conservation Law Enforcement. The Supervisory Special Agent for Conservation Law Enforcement, under authority of the Sikes Act, is charged with the patrol and surveillance of hunting and fishing areas on Fort Stewart and Hunter Army Airfield, to include the following: checking of licenses, permits, and passes; investigating fish and game law violations; enforcement of the Lacey Act, Migratory Bird Treaty Act, the Endangered Species Act, and the Archeological Resources Protection Act; and enforcing installation bag and creel limits.

The Conservation Law Enforcement Office is comprised of a Supervisory Special Agent, two Special Agents and five Conservation Agents. All agents assigned fill full-time civilian positions. All assigned agents perform full time law enforcement duties as described in OPM Job Series 1812 or similar series..

U.S. Fish and Wildlife Service special agents will provide support for the enforcement program, as requested by the DPW and as available. Federally deputized wildlife rangers of the Georgia Wildlife Resources Division will also provide support, if available, when requested by the DPW.

16-3 Jurisdiction

Exclusive Federal jurisdiction exists on all areas of Fort Stewart/Hunter AAF. Federal authorities will prosecute individuals who violate the laws of the State of Georgia within the confines of these military reservations (18 U.S.C. Section 13, *Assimilative Crimes Acts).*

Conservation Law Enforcement Officers will issue DD Form 1805 citations to civilian and military personnel who violate misdemeanor provisions of Georgia law while on Fort Stewart

or Hunter Army Airfield. The fines have been established on a collateral forfeiture schedule adopted by the federal judges of the Southern District of Georgia. Individuals who elect not to pay their fine, or whose offense does not allow for mere payment of a fine, will be prosecuted before a United States Magistrate Judge in the Federal District Court for the Southern District of Georgia.

16-4 Enforcement Problem Areas

On a nationwide basis, hunting and fishing laws and regulations require the most enforcement. Fort Stewart/Hunter AAF has both activities as well as other outdoor recreation which require enforcement activities. In addition, there are endangered species, cultural resources, and nongame species which require protection.

16-4a Trespass

Probably the most common infraction is trespass. Crossing the boundary without approval constitutes this action. About 60% of citations issued are for trespass-related violations. Since trespass is often the first step to other illegal range activity, the overall reduction of illegal activities depends on a reduction in trespassing. Hunting in off-limits areas is a significant problem. Installation boundaries are marked with warning signs, "Military Reservation Off Limits Without Written Permission."

16-4b Off-Road-Vehicle Activity

Much trespass is associated with off-road-vehicle (ORV) activity. Non-military ORV activity is illegal on Fort Stewart/Hunter AAF, unless users are 100% disabled, IAW Fort Stewart Regulation 420-4**.** ORV activity creates at least four significantly negative impacts from a Fort Stewart/Hunter AAF viewpoint:

- Those who trespass are exposed to dangers associated with unexploded ordnance and ongoing shelling and firing. Risk increases as people get closer to the impact area. The point can be made that ordnance is found outside the boundary, but this rationale does not reduce the significance of the increase in danger to trespassers within these boundaries. ORV trespassing is particularly dangerous due to the places these vehicles can go and their weight, making them particularly vulnerable to unexploded ordnance just beneath the surface.
- Illegal ORV use interferes with ongoing military activities. The sighting of an ORV can disrupt military training to varying degrees depending upon the location of the sighting. In some cases it affects hundreds of soldiers in the field.
- The most critical factor to natural resources management and protection is damage caused to soils and vegetation. This may seem insignificant compared to the more obvious damage done by military maneuvers, but effects are cumulative. ORVs use places that are relatively unaffected by military vehicles. Their impact on wet, boggy areas and waterway embankments can be significant.
- Illegal use of ORVs on Fort Stewart/Hunter AAF affords easy access for other illegal activities, including theft, fish and wildlife violations, etc. Thus, ORV use is often combined with more serious activities.

16-4c Cultural Resources Vandalism and Theft

Fort Stewart/Hunter AAF has cultural resources of historic value. Some of these are relatively open to irreparable damage or theft. Cultural artifacts have value, both for personal enjoyment and commercial sale. Protection of cultural resources is directly related to trespass control. There have been thefts from cemeteries, and digging has occurred in old burial mounds.

16-4d Game Violations

Poaching, especially deer, is a significant problem at Fort Stewart/Hunter AAF. Deer counts in the past showed significantly lower deer densities near boundaries, where poaching is thought to be highest, indicating the seriousness of the problem.

Another significant issue is the checking of game at check stations. Less than 50% of harvested deer, feral hogs, and turkeys are thought to be brought to check stations, which is a violation of Fort Stewart/Hunter AAF regulations. This directly affects the capability of the Fish and Wildlife Branch and GA DNR to make decisions regarding harvest regulations. There are some problems associated with baiting of deer, hogs, and turkeys on Fort Stewart/Hunter AAF. This activity is illegal in Georgia. The other common violation associated with game is a lack of state or post hunting or fishing licenses or permits. This type of violation is fairly common throughout the United States.

16-4e Endangered Species Considerations

Sec. 670e-1. (Section 106) grants authority to DOD Conservation Agents to enforce all federal laws relating to the management of natural resources on Federal lands with respect to violations of the laws that occur on military installations within the United States. This very specialized enforcement arena is a responsibility of the DPW Conservation Law Enforcement Office at Fort Stewart/Hunter AAF. During 2001-2005, emphasis will be placed on increasing awareness of Conservation Agents of the indigo snake and gopher tortoise and encouraging more frequent patrol of sand hill habitats.

16-5 Training

Basic natural resources enforcement officer training comes from a recognized law enforcement training center. The Federal Law Enforcement Training Center (FLETC) course is the best option for Fort Stewart/Hunter AAF civilian Conservation Law Enforcement Agents. This course is used by virtually every federal agency except the Federal Bureau of Investigation. This Center is located in nearby Brunswick, GA. The FLETC course is required for Fort Stewart civilian conservation law enforcement agents.

There is a generally recognized requirement for a 40-hour-minimum annual refresher training for enforcement officers. Less training exposes the employer to liability risks in the event of legally-debatable officer actions. All assigned agents attend the annual 40 hour USFWS refresher in-service training at Tallahassee, Florida. Assigned agents may also attend the 40 hour annual refresher training with the National Military Fish and Wildlife Association during 2001-2005.

Fort Stewart PMO has a Police Instructor on its staff who is a Georgia-certified instructor. Conservation law enforcement agents obtain training from this in house trainer in topics such as alcohol awareness, first aid, firearms, the Law Enforcement Command Certification Course, and similar topics.

16-6 2001-2005 Natural Resources Law Enforcement

There is a trend toward civilianization of natural resources enforcement on military installations, and there is also a trend toward establishing the natural resources enforcement function within fish and wildlife organizations, as done in 49 of the 50 states. Fort Stewart/Hunter AAF was one of the earlier installations to recognize the value of permanent civilian positions when it hired its first civilian warden in 1980.

DOD Directive 4715.3 (May 3, 1996) states, "*Professional natural and cultural resources staff shall oversee the enforcement of applicable laws as an integral part of an installation's conservation program*". Army Regulation 200-3 (28 February 1995), states, "*Whenever hunting, fishing, or trapping is allowed on Army installations, enforcement of natural resources laws and regulations will be in accordance with the installation Fish and Wildlife Cooperative Plan and will be performed by Natural Resources Law Enforcement professionals and/or Provost Marshal if practicable...*". Sec. 670e-1. (Section 106) FEDERAL ENFORCEMENT OF OTHER LAWS *of the Sikes Act states "All Federal laws relating to the management of natural resources on Federal land may be enforced by the Secretary of Defense with respect to violations of the laws that occur on military installations within the United States."*

On 1 June 1999, the natural resources law enforcement mission shifted from the Provost Marshal to the Director ate of Public Works. The DPW and The DPS will coordinate joint efforts. The DPW Conservation Law Enforcement function will be funded through the A106 Environmental Program Requirements (EPR) process. Salaries and all support equipment and supplies will be funded from this annual process.

17. AWARENESS

Conservation awareness is instrumental in creating conditions needed to conduct natural resources management. Fort Stewart/Hunter AAF's approach to awareness stresses education. It provides military personnel and the public with insights into Fort Stewart/Hunter AAF's natural environment and conservation challenges. The more people know about the installation's unique natural resources, the more responsibly they will act toward them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, erosion control, wildfire suppression, etc. can be accomplished with little conservation awareness effort since soldiers, recreationists, and the general public naturally support these easily understood efforts. However, issues such as protection of RCW clusters, restrictions on troop field operations, nongame management, noxious fish removal, growing season burning, etc. require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users.

17-1 Objectives

- Provide information to units, leaders, soldiers, civilian employees, and other installation users to improve their understanding of the impacts of their activities on the environment.
- Provide an understanding of the Fort Stewart/Hunter AAF natural resources program to installation and surrounding communities.
- Provide decision makers with information needed to make judgments which affect the Fort Stewart/Hunter AAF natural resources program.
- Provide information to the military community and general public on recreational opportunities on Fort Stewart/Hunter AAF, especially those related to hunting, fishing, and other natural resources-based activities.
- Instill positive attitudes and behaviors of hunters and anglers using Army land toward the environment, including game populations, game habitats, and other users.
- Provide general conservation education to the Fort Stewart/Hunter AAF community.
- Establish and maintain good relations with the local media.

17-2 Printed Media

Fort Stewart/Hunter AAF's weekly newspaper, the *Frontline*, is the most efficient way for natural resources personnel to access the Fort Stewart/Hunter AAF community. This newspaper is used to explain programs and gain support for their implementation. Articles target a wide range of readers, but may be designed to appeal to specific categories of readers.

Natural resources personnel write some stories for the *Frontline*, and staff writers also cover natural resources materials. One staff writer has a regular *Woods 'N Waters* column that deals with natural resources and outdoor recreation. These articles feature topics relating to major natural resources projects and other aspects of management that may have public appeal.

Recent topics have included fishing derbies, RCW management, hunting seasons, Bradley fighting vehicle training in installation ponds, research projects, trophy fish harvested, and a visit by the Secretary of Interior regarding RCW management. The *Frontline* uses its special section, *Diversions*, to cover outdoor recreation about once a quarter.

Other newspapers, such as the *Coastal Courier, Savannah Morning News,* and *Coastal Closeup*, use information about Fort Stewart/Hunter AAF's natural resources programs. News releases and interviews with outside media are coordinated with Public Affairs Office (PAO). The *Coastal Courier* usually runs special sections involving Fort Stewart/Hunter AAF hunting and fishing programs in the fall and early spring. The visit by the Secretary of Interior in 1996 drew national press coverage since the visit was tied to efforts to reauthorize the Endangered Species Act in Congress.

The Fort Stewart/Hunter AAF program has been featured in many regional newspapers and magazines, such as the *Georgia Sportsman* and the *Georgia Outdoor News.* Occasionally, it even receives national publicity in magazines such as *Outdoor Life*. Hunting and fishing programs are usually the topic of regional or national printed media coverage.

In 2001-2005, special efforts will be made to use newspapers to acquaint Fort Stewart/Hunter AAF and surrounding communities with ecosystem management concepts. This effort will focus on issues such as changes in forest management, endangered species, the ITAM program, and similar new concepts.

17-3 Television and Radio

Fort Stewart/Hunter AAF's natural resources program in general is seldom the subject of television or radio coverage. However, specific issues can, and do, attract considerable electronic media coverage. The 1996 visit of the Secretary of Interior to applaud Fort Stewart's RCW program attracted national television coverage.

The installation's dedicated television channel, VTN, regularly does announcement-type coverage of Fort Stewart/Hunter AAF natural resources activities, including hunting and fishing information, skeet range operations, fishing derbies, etc. This is a direct access to the military community.

Use of television and radio during the next five years will largely be driven by media events on the installation. It will be difficult to generate media enthusiasm over routine events, but new and innovative programs such as growing season burns, forest ecosystem regeneration, and similar programs have the potential to attract the electronic media.

17-4 Special Events

Special events with local, state, or national significance offer opportunities to educate the public on programs of high interest. Earth Day and Arbor Day (often celebrated on the same day) are good examples. The Forestry Branch takes advantage of Arbor Day to plant trees at local schools and have equipment displays. These opportunities will be taken advantage of during 2001-2005, as deemed appropriate within personnel constraints.

17-5 Hunting and Fishing Awareness

Fort Stewart/Hunter AAF puts a considerable effort into increasing the level of awareness of opportunities to hunt, fish, and otherwise enjoy the out-of-doors on the installations. These programs are often a joint effort by Fish and Wildlife Branch and Outdoor Recreation.

Examples of materials available at the Outdoor Recreation facilities at Fort Stewart and Hunter AAF include:

- the *Sportsmen's Guide*, a compilation of rules and regulations;
- GA DNR hunting and fishing regulations;
- Fort Stewart Regulation No. 420-4, *Hunting, Fishing, and Recreation Use*;
- *Getting to Know Game, A Quick Look at Hunting on Fort Stewart, GA*, a hunting opportunities and game management summary;
- *Getting to Know Fish, A Quick Look at Fishing on Fort Stewart, GA*, a fishing opportunities and fish management summary;
- *Sporting Paradise of the South, Welcome to Fort Stewart Outdoor Recreation*, a collection of individual information cards on outdoor recreation in general;
- Lake Info Sheets, information sheets on each managed pond with pond depths and structures and directions to get there;
- memoranda on the status of ponds in terms of those closed and the rationale for closings;
- season and bag limit summary sheets for hunting; and
- *Fort Stewart Hunting/Fishing Area Map*, a high quality glossy map especially created for hunters and anglers.
- Hunting and fishing web pages have been established on the Fort Stewart Internet site (fishing: www.stewart.army.mil/outdoorrec/; hunting: www.stewart.army.mil/outdoorrec/hunting/)

During 2001-2005 Fort Stewart/Hunter AAF will update and improve its ways to inform users of the out-of-doors of opportunities available on the installation.

17-6 Watchable Wildlife

The Watchable Wildlife program is very important to Fort Stewart/Hunter AAF. There are many naturally occurring opportunities to observe wildlife in and near Fort Stewart/Hunter AAF, and there are special projects planned to facilitate the observation of wildlife.

Non-game wildlife will be managed to ensure the continued existence of a diversity of species. Artificial nest structures and plantings designed to benefit wildlife may be established and maintained at appropriate areas near campgrounds and outdoor recreation areas. The emphasis placed on management of non-game species (other than threatened/endangered species) will reflect public demand and availability of funds and personnel.

An area behind the Army Travel Camp at Holbrook Pond has been developed as a Food and Nesting Area for song birds. Plantings in this area include autumn olive (*Elaeagnus umbellata*), persimmon (*Diospyros virginiana*),

crabapple (*Morus rubra*), dogwood (*Cornus florida*), hazelnut (*Corylus* spp.), Chinese chestnut (*Castenea mollissima*), sawtooth oak (*Quercus acutissima*), and fringetree (*Chionanthus virginicus*). This area is easily accessible to anyone wanting to observe bird life.

In general, any hunting and fishing area not closed due to military use is open for non-consumptive recreational use, with appropriate and applicable restrictions. At times, Fish and Wildlife Branch receives requests from university and conservation groups to observe RCWs on Fort Stewart. Generally, it is possible to oblige these requests and provide information on where to observe these birds or to guide groups to viewing sites. Interest in nature in general and bird watching as a form of recreation in particular is increasing throughout the nation, so an increase in the number of people desiring to observe RCWs on Fort Stewart seems likely in coming years.

In order to provide the maximum opportunity to observe these woodpeckers with the minimum disruption of other activities, one red-cockaded woodpecker cluster will be set up as an interpretive center in conjunction with the USFWS and the Directorate of Community Activities and Services/Outdoor Recreation Branch. Cluster #51 (military coordinates 456308), located on GA Highway #144, approximately two miles from Holbrook Pond has been tentatively selected as the site for this interpretive center. An information board relating the life history and status of the RCW will be placed in the cluster. Publicity for access to the cluster will be handled by DCAS Outdoor Recreation Branch. If visitor foot traffic becomes too heavy, natural-look fencing and/or designated pathways will be added to prevent damage to the site which might result from soil compaction

17-7 Youth Groups

Natural resources personnel are committed to cultivating a conservation ethic in local youth. Personnel work with school groups on a variety of programs. Section 17-4 describes Forestry's work with youth on Arbor Day. The Savannah School District sends students interested in forestry to Fort Stewart to observe the duties of post foresters as a means to help students select careers. Fort Stewart/Hunter AAF game wardens go into local schools and provide wildlife identification and outdoor safety classes.

Fish and Wildlife personnel have a partnership with a federally-funded school latch-key program. In late 1996 a new archery instruction program developed out of that effort. Fishing derbies are an important facet of the youth program. Fort Stewart/Hunter AAF is planning a Backyard School Program which would involve the establishment of outdoor classrooms near elementary schools.

Scouts, in particular, need support with projects, merit badges, and conservation talks. Scouts have assisted with natural resources management on Fort Stewart/Hunter AAF. Natural resources personnel have worked with scouts on boating and water safety.

In 2001-2005 Fort Stewart/Hunter AAF natural resources personnel will continue to work with youth groups whenever possible. This is a good investment in the future.

18. OUTDOOR RECREATION

Fort Stewart/Hunter AAF is a large, mostly undeveloped, open space. Indeed, this open space and the outdoor recreation opportunities associated with it are perhaps Fort Stewart/Hunter AAF's best attributes in terms of community quality of life. With ever increasing time to pursue recreational interests, the general public will undoubtedly place more demand on Fort Stewart/Hunter AAF's natural resources.

18-1 Objectives

- Manage outdoor recreation consistent with needs of the Fort Stewart/Hunter AAF military mission.
- Provide opportunities to both the Fort Stewart/Hunter AAF community and the general public for high quality hunting, fishing, and other outdoor recreation.
- Identify hunter and angler access needs and explore opportunities to improve their outdoor experiences.
- Develop facilities that improve use and enjoyment of fishing, hunting, and other natural resources-based recreation, and increase the use of underutilized areas as a means of meeting recreational users needs and conserving wildlife and fisheries resources.
- Manage outdoor recreation while maintaining ecosystem integrity and function.

18-2 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If hunting and fishing (or other outdoor recreational activities) are to continue to thrive on Fort Stewart/Hunter AAF, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

The Army has been training soldiers to win on battlefields around the world for over a century while providing quality recreational opportunities for soldiers, their families, employees, and the general public. Fort Stewart/Hunter AAF has shown that these two goals can be met even in the most rigorous and demanding of training environments.

18-3 Public Access

Public access is a tradition on Fort Stewart/Hunter AAF. There are many opportunities for the general public to participate in installation activities. In maintaining a policy of public access, Fort Stewart/Hunter AAF relies on a responsible public to adhere to restrictions placed on range access by Range Control.

Department of Defense Directive 4715.3, *Environmental Conservation Program*, May 3, 1996, states, "*The principal purpose of DoD lands and waters is to support mission-related activities. Those lands and waters shall be made available to the public for educational or recreational use of natural and cultural resources when such access is compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness. Opportunities for such access shall be equitably and impartially allocated*".

Paragraph 2-10 of Army Regulation 200-3, *Natural Resources -- Land, Forest, and Wildlife*

Management, states that access by recreational users, "*... will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use; and at such times as such access can be granted without bona fide impairment of the military mission, as determined by the installation commander*." This regulation further states that withholding public access must be substantiated by a statement in the Integrated Natural Resources Management Plan.

Fort Stewart and Hunter Army Airfield are available to the public for enjoyment and use of natural resources, except when a specific determination has been made that the military mission prevents such access for safety or security reasons, or that the natural resources will not support such usage. Fort Stewart has allowed the public to hunt and fish on the installation since 1959.

Since Hunter Army Airfield is located in a populated urban area (Savannah), hunting is more limited on this small installation. Safety restrictions associated with a heavily used airfield further restricts the installation's capability for public use. However, public access will be permitted at times when safety and security allow such entry.

On Fort Stewart, the B-4 Small Arms Complex and the Red Cloud Tank Training Complex are restricted from hunter and angler access due to intensive live fire training. However, during periods of non-use, these areas are opened for organized hunts. When military activity in any given area is not compatible with a particular recreational use, that area will be closed until the military activity is completed. DPW may close areas and impoundments to recreational access for management purposes such as population management, weed control, pond renovation, etc.

Any person may hunt or fish on Fort Stewart/Hunter Army Airfield provided he or she is authorized to do so by the Installation Commander and possesses the necessary Sikes Act Permit, access pass, and State licenses. Fort Stewart/Hunter AAF policies toward public access are within both the spirit and letter of Army and Defense policies. They will be continued in 2001-2005.

18-4 Hunting, Fishing, and Trapping Programs

18-4a Hunting and Fishing Activities

Hunting on Fort Stewart is authorized during State-approved small and big game hunting seasons. Fishing is authorized year-round with no closed seasons.

Fort Stewart/Hunter AAF has 1,500-2,000 hunting permit holders, who spend 40,000-50,000 trips to the field annually, and 3,000-4,000 fishing permit holders, who make 60,000-80,000 fishing trips annually. In recent years the number of hunting trips has declined somewhat due to increased training which ties up more land on more days. Hunters and anglers on Fort Stewart/Hunter AAF add about $4,000,000 annually to local community economies.

18-4b Trapping Policy

Trapping of wildlife for sport and recreation is prohibited on Fort Stewart and Hunter Army Airfield. The furbearer resource is under-utilized. However, compliance with Article 2, Section 27-3-63 of the Game and Fish Laws of

Georgia, which requires inspection of the traps at least every 24 hours, is not possible on a military installation where extensive personnel training occurs daily and sportsman access to any given area changes daily.

18-4c Hunter and Angler Administrative Processes

Military installations often have relatively complex hunter and angler control systems. These are needed to accommodate recreational activities without interference with the military mission and to ensure safe recreational experiences.

18-4c(1) Hunting and Fishing Regulations

The GA Department of Natural Resources (Wildlife Resources Division) issues *Fresh & Saltwater Sportfishing Regulations* and *Hunting Seasons & Regulations* for hunters and anglers in Georgia. Army Regulation 200-3, *Natural Resources - Land Forest and Wildlife Management,* and FS Regulation 420-4, *Hunting, Fishing, and Recreational Use,* are primary means of establishing controls on hunting and fishing as well as other natural resources-related activities on Fort Stewart/Hunter AAF. Outdoor Recreation provides a condensed booklet of hunting and fishing regulations, the *Sportsmen's Guide*, which includes most items pertinent to the use of Fort Stewart or Hunter AAF for hunting and fishing.

18-4c(2) Permit Fees

In order to hunt or fish on Fort Stewart/Hunter AAF, individuals must obtain yearly or daily post permits, which are termed Sikes Act permits based on the law authorizing them. The Directorate of Community Activities and Services, Outdoor Recreation Branch, Pass and Permit Section is the Sikes Act Hunting or Fishing Permit issuing activity. Permits will be issued annually and will be valid for one year from date of purchase. Special Permits for shorter periods may be sold, i.e. Daily Hunting or Fishing Permits.

Prior to purchasing the Sikes Act Permit, the Permittee is required to have a valid State license corresponding to the type of Sikes Act Permit being purchased. The purchase of the Sikes Act Permit entitles the Permittee to fish or hunt in areas open to such use for the period indicated on the Permit. The Permit does not constitute a guarantee of access on any and/or all days during the period for which issued. In accordance with DOD policy, all Permit holders stand at par with each other for use privileges. Access will be equitably distributed by impartial procedures, such as a first-come, first-serve basis or by drawing lots.

In accordance with Title 16, U.S. Code 670b, the possession of a special State Sikes Act Permit will not relieve the Permittee of requirements of other Federal laws (i.e. Endangered Species Act, Migratory Bird Treaty, Lacey Act), nor of requirements pertaining to State laws as set forth in Title 16, U.S. Code 670.

The following policies are considered in determining the Sikes Act Permit fee:

- In accordance with Department of the Army Regulation (AR) 200-3, the same fees shall be charged for a particular use to all users, except senior citizens, children under the age of 16, and the physically handicapped. Exceptions to

this policy may be granted by the Heads of Military Services. AR 215-2, *The Management and Operation of Army Morale, Welfare and Recreation Programs and Nonappropriated Fund Instrumentalities*, however, allows for a sliding scale fee for hunting and fishing permits to encourage participation by lower grade personnel (Para. 6-37 b(4)). AR 215-2 further specifies that officers, civilians, guest, and the general public should be charged a permit fee commensurate with those charged the civilian community. Fort Stewart/Hunter AAF will request an exception to AR 200-3 to authorize its current sliding scale fee system.

- AR 200-3 directs that the fees should be commensurate with program costs, State and local fees for similar activities and facilities, and resources available for use.
- AR 200-3 directs that participation in hunting and fishing "*will be within manageable quotas and within the capability of the natural resources to support such use*". Fort Stewart/Hunter AAF has no quotas on the number of persons who can purchase permits, but it does utilize quotas within given hunting areas for safety, proper utilization of game, and recreational quality purposes. For example, hunters at Hunter AAF are restricted to about one hunter per 50 acres.
- The only source of funding for Fort Stewart/Hunter AAF natural resources management to support hunting and fishing is from permit sales. Virtually all other Federal and State fish and wildlife agencies receive federal funding (federal tax funds, timber sale receipts, general tax revenues, etc.) for such programs.
- The Fort Stewart/Hunter AAF Command desires a quality, self-sustaining fish and wildlife management program, supported and funded by the users, as recommended by the Army Auditing Agency and endorsed by Defense and Army regulations and policies.
- Fort Stewart/Hunter AAF has extremely high hunter and angler use year-round, requiring an intensive fish and wildlife management program.

Fort Stewart/Hunter AAF sells individual permits for annual use and individual permits for daily use. User classes are better defined in FS Reg. 420-4. In 1998 the following Sikes Act Permit fee schedule was implemented at Fort Stewart/Hunter AAF:

USER CLASS	**ANNUAL FEES**			**DAILY FEES**	
	Fishing	**Hunting**	**Combination**	**Fishing**	**Hunting**
E1-E4	$ 5.00	$10.00	$15.00		
All Others	$10.00	$25.00	$35.00		
Everyone				$10.00	$15.00

Costs of permits will be regularly reviewed by Fort Stewart/Hunter AAF. Adjustments will be made, if needed, based on the above items and any additional policy or regulations promulgated by the Department of Army or Department of Defense.

18-4c(3) Check-in and Clearing Procedures

Fort Stewart Regulation 420-4 outlines specific requirements of hunters with regard to check-in/out policies. Pass and Permit offices are maintained at both Fort Stewart and Hunter AAF. Access passes are required of all hunters as well as for those anglers using certain ponds and landings. Fort Stewart/Hunter AAF has implemented an automated check-in and check-out system accessible by telephone. All hunters and anglers must call the Pass & Permit automated phone number to verify that their desired destination is open for access. For those areas requiring an access pass, hunters and anglers must check in telephonically, display their appropriate "vehicle access permit" on the dashboard of their vehicle, and check out telephonically upon clearing the area. Hunters are required to mail in a "kill card" listing their deer, hog, and turkey kills for the previous season. Failure to do so will result in barring of that hunter from the installation for the following season. On any given day, all hunters and anglers who have not cleared the area by a designated time are prevented from obtaining access for hunting or fishing on their next outing. Fort Stewart/Hunter AAF has historically utilized a manual check-in and check-out system through the operation of a manned Pass and Permit facility. Under the new automated system, a facility continues to be staffed for the sale and issue of hunting, fishing, and camping permits, however all daily requests for hunting and fishing access is accomplished using the automated telephone system. Area openings and closings, received from Range Control, are input daily into the system's computer by Outdoor Recreation Branch personnel. This Area Status Sheet is posted at the Pass and Permit Office, faxed on demand, and will be ultimately placed on the Fort Stewart Hunting and Fishing Web sites. The Conservation Law Enforcement officers verify each hunter and angler's permission to be in a given area via a cellular telephone call-up procedure. The automated system uses "TeleTrac" software by Vermont Systems, Inc. and integrates with the installation's "RecTrac" system used to administer all other recreational activities on the installation. The new automated system will (1) reduce the operating cost of Outdoor Recreation's Pass and Permit Office, (2) increase the Pass and Permit operation's efficiency, (3) improve hunter and angler accessibility to the installation, (4) improve game harvest reporting, (5) maintain control over access on the installation, and (6) encourage increased participation by military and civilian hunters and anglers.

18-4c(4) State License Sales

Persons are responsible for obtaining State hunting and fishing licenses before obtaining post Sikes Act Permits. Georgia regulations provide information of hunting and fishing license requirements. Pass and Permit offices sell State licenses.

18-4c(5) Hunting/Fishing Maps

The Fort Stewart Hunting/Fishing Area Map is important for hunter and angler use of range areas. This map is high quality color and printed on glossy paper, featuring closed areas, special

hunting areas, fishable ponds and waterways, and most installation roads. The installation is changing this map to a 1:50,000 scale map which has no color, but shows more detail.

As databases are added to the GIS, it will be used to create more accurate and more useful hunting and fishing maps. During 2001-2005 Fort Stewart will use its GIS to provide improved maps for hunters and anglers. One option is to have two maps: a free map that is relatively inexpensive and a map for sale which shows considerably more detail and special features, such as food plots, and is relatively permanent with regard to quality and type of paper.

18-4c(6) Safety Considerations

Effective 1 May, 1999, the Pass and Permit Office requires all hunters, regardless of age, to present a hunter safety certificate before purchasing a Fort Stewart hunting permit. This new requirement is prompted by AR 210-21 that requires all hunters to attend a National Rifle Association approved hunter safety class before hunting on Army property. The installation recognizes all other state's hunter safety certificates. DCAS Outdoor Recreation offers Hunter safety courses.

18-4d Organized Hunts and Fishing Tournaments

The Outdoor Recreation Office may organize and conduct managed hunts, funded from non-appropriated recreation funds. DPW is responsible for recommending areas in which hunts are to be conducted, setting bag limits and weapons restrictions, and coordinating approval by the Georgia Department of Natural Resources.

18-4d(1) Fishing Tournaments

Fishing tournaments may be organized and conducted by Outdoor Recreation, funded from non-appropriated recreation funds, in coordination with DPW. Largemouth bass tournaments can be scheduled during all months except June through September. This restriction during the hotter months is based on high mortality rates among bass brought on by stress through playing and handling the fish.

Creel and length limits are imposed on tournament participants. For tournaments on managed ponds, the minimum qualification length is currently 15 inches. All smaller bass must be returned upon catching and do not qualify for points. Additionally, bass release is encouraged after weigh-in by awarding extra points to those anglers releasing their bass. Catch data (numbers, length, weight, etc.) will be collected and given to the Fish and Wildlife Branch following each tournament/derby. These rules are subject to change based on the population status of the resource. Spring bass tournaments and crappie and redbreast tournaments are popular at Fort Stewart.

18-4d(2) Kid's Fishing Events

Kid's fishing events may be conducted throughout the entire year. These events are restricted to children less then 16 years of age. Creel and length limits are imposed on event participants.

As part of National Fishing Week observance, Fort Stewart/Hunter AAF and the Georgia DNR may agree to co-sponsor a Kid's Fishing Event (KFE) that is open to all youth in the region without cost to the parents or requirement for an

Installation fishing permit. National Fishing Week is annually held during or about the first full week in June. Fishing is limited to children under 16 years of age. This activity is sponsored to promote fishing among youth; teach conservation, sportsmanship, and outdoor ethics; and promote good community relations between Fort Stewart/Hunter AAF and surrounding communities. About 200 youngsters participate in these events.

The following responsibilities are delineated for all KFEs: Georgia DNR, Fisheries Management Section provides catfish for stocking; DPW, Fish & Wildlife Branch feeds and cares for the fish, ensuring the pond remains closed to fishing until the KFE; and DCAS, Outdoor Recreation Branch, organizes and conducts the event. Upon completion of the one-day KFE, the pond is opened to all Fort Stewart/Hunter AAF fishing-permit holders.

The approval of this INRMP will serve as the concurrent approval of a standing Cooperative Agreement between Fort Stewart and GA DNR for the establishment of annual Kid's Fishing Events, when it is deemed appropriate by both parties.

The following "Agreement" is made and entered into by and between the Georgia Department of Natural Resources, Wildlife Resources Division (hereinafter referred to as "WRD") whose address is 2070 U.S. Highway 278 S.E., Social Circle, Georgia 30279 and Fort Stewart Military Installation (hereinafter referred to as the "Pondowner") whose address is Fort Stewart, Georgia 31314-5000:

WHEREAS, WRD desires to provide an opportunity for children under the age of 16 to have a successful fishing trip and thereby recruit them as anglers and conservationists; and

WHEREAS, the Pondowner desires to sponsor kid's fishing events (KFE's) at the Fort Stewart Military Installation as a means of supporting youth activities; and

WHEREAS, the Pondowner is the owner of certain real property located on Fort Stewart, Georgia, upon which a previously selected pond will be utilized. The date, time, and pond for the fishing event will be mutually agreed upon by the Fort Stewart Fish and Wildlife Branch and Georgia Department of Natural Resources, Fisheries Management Section (Coastal Region) prior to fish stocking.

NOW, THEREFORE, the parties heretofore and in consideration of the premises and benefits flowing to each herefrom, do agree as follows:

1) WRD agrees to: (a) provide fish for stocking the pond; (b) transport the fish to the pond; (c) provide technical advice on how the pond should be stocked, and (d) provide instructions on how the fish should be fed and on the care they should receive.

2) The Pondowner agrees to: (a) cooperate with WRD to assess the condition of the pond and the fish population thereof; (b) feed and care for the fish every day from the time of stocking to the conclusion of the last fishing derby; (c) organize and conduct a fishing event or events limited to children under 16 years of age, free of charge; (d) limit each child to no more than 10 fish; (e) follow recommendations provided by WRD for the management of the pond and care of the fish; (f) allow the WRD to enter the property to assess the condition of the pond and the fish population thereof; (g) allow the WRD to stock the pond with fish; (h) drain the pond and poison the

existing fish population if a WRD biologist deems such action necessary; and (i) keep the pond closed to all fishing by adults until after the last scheduled or rescheduled youth fishing event to be held pursuant to this Agreement.

3) It is mutually agreed that after the last scheduled or rescheduled fishing event to be held pursuant to this Agreement, any fish remaining in the pond shall become the property of the Pondowner; provided, however, that in the event the KFE's are postponed because of inclement weather, this Agreement shall continue in full force and effect until the last rescheduled event is held.

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18-4e Fishing Facilities

Fishing facilities include piers, docks, and boat ramps. Responsibility for the funding of such facilities falls under the Directorate of Community Activities and Services, Outdoor Recreation Branch. The Fish and Wildlife Branch, DPW, will coordinate with Outdoor Recreation, DCAS, in the design and placement of such facilities as boat ramps, docks and piers. The following is a summary of facilities and needs:

Existing Boat Ramps:

Pond 1	2 concrete-hardened ramps
Pond 2	1 concrete-hardened ramp
Pond 4	2 concrete-hardened ramps
Pond 17	1 earthen-hardened ramp
Pond 21	1 earthen-hardened ramp
Pond 26	2 concrete-hardened ramps
Pond 28	2 concrete-hardened ramps
Landing 3B	1 concrete-hardened ramp
all other landings	1 earthen-hardened ramp each

Facility Improvement Needs:

Canoochee and Ogeechee Rivers	Improved boat ramps at landings #lB, #3, #7, #13, #14, #14B, #15, #16, #17 (minimum)
Pond #2	1 improved boat ramp
Pond #3	1 improved boat ramp
Pond #21	1 improved boat ramp
Pond #26	improvement of current boat ramps
Pond #29	1 improved boat ramp

Landing Stabilization/Sportsman Access Improvement

Angler access to the Canoochee and Ogeechee Rivers are provided. Boat ramps and access roads to the rivers will be maintained and upgraded as needed. In addition, the construction of new facilities should be given consideration. The DPW Fish and Wildlife Branch and DCAS Outdoor Recreation Branch will provide input on the need and location of such facilities; DPW Roads and Grounds Section will maintain such facilities; and DCAS Outdoor Recreation Section should provide

funding for the development of such facilities. In addition, many of these landings are denuded of vegetation and experiencing moderate to severe sheet and gully erosion. These sites will be identified and systematically stabilized to minimize further soil loss.

Recreational Fishing Access Project

Fort Stewart/Hunter AAF is planning a major fishing access improvement program over the next 10 years as funds are available. A project based on implementing Executive Order 12962, *Recreational Fisheries*, has been submitted by the Fish and Wildlife Branch. The project includes road repair, directional signage, and boat ramps on the rivers and 23 ponds. Project costs will include funds necessary for NEPA and Endangered Species Act compliance.

18-5 Other Natural Resources Oriented Outdoor Recreation

Fort Stewart/Hunter AAF has a plethora of natural resources-related recreational activities other than hunting and fishing. These range from more passive activities such as wildlife watching to very active recreational outlets such as hiking, boating, camping, and various shooting activities.

18-5a Holbrook Recreation Area

Holbrook Pond Recreation Area and its adjacent camping area is the most developed outdoor recreation facility in the area. The 20-acre area includes a convenience store, covered picnic pavilions, volleyball courts, horseshoe pits, on-site boat rental, a fishing pier, a boat dock, picnic tables, and playgrounds. It is ideal for family outings and large unit functions. The lake is heavily stocked with a variety of sport fish. The adjacent campground has 20 improved camp pads with electricity and water, a RV sewage dump station, 20 tent sites, a laundry, and restrooms/showers. This campground is being expanded.

The Holbrook Recreational Area had severe tree damage due to the southern pine beetle. It had to be clearcut in 1995, and the area is growing up in sweet gum, an undesirable species. Outdoor Recreation and Forestry are developing a plan to reforest the area, including the planting of more desirable hardwoods.

18-5b Shooting Sports

A range is dedicated to recreational shooting with eight rifle and pistol lanes and seven shooting stations for archers. The installation also has skeet and trap fields with a club house, reloading room, picnic area, sporting clay course, and ammunition and reloading component sales. Special skeet shoots are held quarterly with small competitive shoots once a month. Beginner lessons are offered free of charge.

18-5c Off-Road Vehicles

With exception of special permits for handicapped persons, off-road recreational vehicles are not permitted on Fort Stewart/Hunter AAF.

18-5d Hunter Army Airfield

The Hunter AAF outdoor recreation program is similar, but on a smaller scale, than found at Fort Stewart. Facilities and options there include outdoor rental, salt water access, a boat dock, a Pass and Permit Office, and fishing on two

ponds.

18-5e Other Recreational Activities

Fort Stewart/Hunter AAF has other outdoor recreational opportunities for members of the military and civilian communities. Picnic areas are available at Pineview Lake and Wright Army Airfield, as well as smaller unit picnic facilities within the cantonment area. Camping is permitted at boat landings. There is a lighted, fenced area for recreational vehicle storage associated with Holbrook Recreational Area.

There is a complete outdoor recreation equipment rental center, which includes rental of large ski and fishing boats and campers. Rentals also include jon boats, electric motors, outboard motors, tents, garden tillers, water ski equipment, etc. Boating certification classes are offered monthly.

19. CULTURAL RESOURCES PROTECTION

"It is not enough to learn from history or a movie, we must make sure that these precious pieces of our history are preserved."

John Lewis, U.S. Representative, D-GA

Cultural resources protection at Fort Stewart/Hunter AAF is provided in accordance with Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. Section 470, as amended), the Archeological Resources Protection Act (16 U.S.C. Section 470aa-47011), the American Indian Religious Freedom Act (42 U.S.C.), the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. Section 3001 *et seq.*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and AR 200-4 (*Cultural Resources Management* (draft)). Management of cultural resources on Fort Stewart/Hunter AAF is a mission of the Environmental Branch, ENRD.

The primary source of outside assistance is the State Historic Preservation Officer (SHPO), who is also the primary regulator with regard to cultural resources in Georgia. The SHPO will review this INRMP as well as provide Section 106 guidance as the INRMP is implemented.

A draft *Historic Preservation Plan* (Prentice Thomas and Associates, Inc., 1996) for Fort Stewart/Hunter AAF is under review and contains the most comprehensive information regarding cultural and historic resources on the installation. Unless stated otherwise, below information is from this document.

19-1 Objective

- Implement this INRMP consistent with protection of cultural and historic resources at Fort Stewart/Hunter AAF.

19-2 Cultural and Historic Resources

Scant finds on Fort Stewart/Hunter AAF suggest that the area was not used much by Paleoindians (10000 - 8000 B.C.). Few Early and Middle Archaic (8000 - 3000 B.C.) artifacts have been found on Fort Stewart/Hunter AAF, but there are likely more sites buried in deep, subsurface

contexts. As expected, there have been a greater number of finds from the Late Archaic (3000 - 1000 B.C.) on the installation, including water-related and interior sites.

The Woodland Period (1000 B.C. - A.D. 1150) was a time of cultural growth of the people in southeastern Georgia. It is represented on Fort Stewart/Hunter AAF by 25 sites. Distribution of these sites is probably more reflective of past survey biases rather than actual distribution of activity.

The Mississippian Period (A.D. 1150 - 1550) witnessed the most complex social/political organization of the peoples of the area. Mississippian people inhabited the area at the time of European arrival. During this period Fort Stewart/Hunter AAF was more occupied by Savannah populations (35 sites) than any occupation during earlier periods.

No traces of the first almost two centuries (Discovery through 1715) of colonial exploration of the southeastern seaboard have been found on Fort Stewart/Hunter AAF. One area in the vicinity of the extreme southeastern tip of Fort Stewart was likely used toward the end of the Pre-Colonial Influence (1715 - 1732), a Native American settlement called "*the Yamassee Camp*." In circa 1730 Savannah was founded producing a profound influence on the area today occupied by Hunter AAF, as the city developed.

The Colonial Presence (1732 - 1775) saw the beginning of European settlement, which would set land use patterns that continued until Camp Stewart was established in 1940. The following settlements have been documented on Fort Stewart: Fort Argyle, Sterling Creek settlements, Barbecue Creek settlements, Cross Swamp settlements, Fort Argyle settlements, and Taylor's Creek Camp. During this period agriculture and timber production were major industries, as is true in the area today. The earliest historic occupation site in the Hunter AAF area is the McNish Site, and six other sites are likely from this period.

The Revolutionary War had very little impact on the Fort Stewart/Hunter AAF area. No specific Revolutionary War sites have been found on the installation.

The Early American Period (1782 - 1820) was a time of increasing settlement within the Fort Stewart area. Specific Early American sites on Fort Stewart include roads and settlement areas around Fort Argyle and Taylor's Creek, and six archeological sites that may have been used in the late Eighteenth Century.

The Antebellum Period (1820 - 1860) brought substantial change to the area in a steady growth manner, rather than via dramatic events. No archeological sites on Fort Stewart can be linked specifically to the Antebellum Period. However there are four sites which can only be dated to the Nineteenth Century that may have been used during this pre-Civil War period. There are cemeteries on Fort Stewart with Antebellum Period burials. Few farms were found in the Hunter AAF area at the time of the Civil War.

The Civil War (1861 - 1865) greatly disrupted economic and social life in the area, but no major military actions occurred in the area occupied by HAAF. Union soldiers, however, came through the area, including sites on Fort Stewart.

The Reconstruction Period (1865 - 1880) marked economic recovery and socio-political

adjustment for the South as a whole, including the Fort Stewart/Hunter AAF area. Only churches and cemeteries on the installation have specifically been identified with the Reconstruction, but four sites may have been used during this period.

The New Growth Period (1880 - 1920) was a time of continued agricultural and forest product use in the area, as well as increased populations in general. The Fort Stewart archeological inventory includes 152 sites with both Nineteenth and Twentieth Century use. Another 19 sites are dated within the Twentieth Century. Seventeen of these 171 sites have been specifically dated to the New Growth period. Settlement in the Hunter AAF area slowly increased during the opening decades of the Twentieth Century.

The American Period (1920 - 1940) began with the "Roaring Twenties" which affected the area less than in many other parts of the country. Similarly, the Great Depression had a lessened effect on the area than in other parts of the nation, but its impacts were certainly felt by area residents. Many of these dampened economic effects may have been the result of a general dependence on agriculture and timber, which were locally produced. Small farms and unpretentious homes were the norm in the Fort Stewart area prior to Army acquisition. The communities of Willie, Taylor's Creek, and Clyde were the most important on the future Fort Stewart area. Many of the 171 sites on Fort Stewart dated to both the Nineteenth and Twentieth and only the Twentieth centuries may have been occupied during the American Period, but little information is available on these sites.

In 1928 the City of Savannah purchased land for what was later to become Hunter AAF. Like Fort Stewart, Hunter AAF has no formally recorded sites dating to the time of military proprietorship, but they undoubtedly exist.

Prentice Thomas and Associates, Inc. (1996) (pp. 148-155 and 168-169) and Section 2-5 of this INRMP summarize activities on Fort Stewart and Hunter AAF since Army occupation in 1940.

19-3 Cultural Resources Surveys

There have been 41 cultural resources investigations at Fort Stewart/Hunter AAF over the past 25 years. To date, 902 sites and 50 isolated finds have been identified on the installation.

Of the 280,000 acres on Fort Stewart, about 50,000 have been surveyed with finds plotted. Much of the 3,777-acre cantonment area will likely be eliminated from future survey as will the 28,736 acres within ordnance-dudded impact and explosive ordnance areas of the post. Thus a minimum of 197,487 acres remains to be surveyed at Fort Stewart.

At the 4,890-acre Hunter AAF, 929 acres have been adequately surveyed for cultural resources; 789 acres are highly developed with most likely to be excluded from survey needs; and 1,535 acres in hazardous areas with reconnaissance and consultation required to determine the feasibility for survey. The remaining 1,637 acres have had low intensity investigation, and may require some additional survey.

Subject to the availability of funds, at least 30,000 acres will be surveyed annually for cultural resources. Requested acreage will be submitted to the Cultural Resources

Management Specialist not less than one year in advance of the start date. By the year 2000, when the Historic Preservation Plan is updated, it may be possible to use predictive modeling to eliminate some areas from survey needs due to low or no site potential.

19-4 Natural Resources Management Implications

In the past, natural resources projects were overlooked as potential causes of adverse impacts to archeological sites. Some activities described in this INRMP are potentially damaging to cultural resources. The Historic Preservation Plan (Prentice Thomas & Associates, Inc., 1996) indicates the following activities that require cultural resources considerations and actions:

- ***Timbering*** - the installation will use a management prescription for cultural and natural resources for each scheduled forest products harvest or enhancement project (see Section 22-4).
- ***Prescribed burning*** - the installation will use existing firebreaks as much as possible and avoid known cultural resources sites with new firebreaks, which will require the cultural resources impact analysis review process.
- ***Borrow pits*** - a Record of Environmental Consideration (REC) will be done for each borrow pit expansion. Prior to the creation of new borrow pits, Fort Stewart/Hunter AAF will develop a systematic, detailed, site-specific plan that minimizes the impact on potential culture resources by maximizing the productivity of each site. A REC will also be prepared.
- ***Road maintenance*** - most routine road maintenance comes under a categorical exclusion, but when the project's original dimensions are increased, a cultural resources impact analysis must be undertaken.
- ***Emergency salvage projects*** - if timber salvage operations include previously recorded sites, non-intrusive timber harvest methods will be used. When salvage involves areas previously surveyed without sites, no special cultural resources measures are required. If salvage involves areas not previously surveyed, non-intrusive harvest methods will be employed. Fort Stewart and the Georgia SHPO have a memorandum of agreement for salvage timber operations.
- ***Fish and wildlife enhancement projects*** - proposed projects, to include dam relicensing, will employ a REC and undergo the cultural resources impact analysis process. Ongoing or existing projects, such as food plots, water impoundment reconstruction, etc., will not be reviewed for cultural resources impacts unless the project's original dimensions are increased.

LRAM was not considered within the Historic Preservation Plan, but LRAM activities have potential to affect cultural resources. LRAM projects in previously surveyed areas that do not impact known sites will require no cultural resources documentation. LRAM projects that may affect known sites will undergo complete cultural resources documentation and review. LRAM projects on unsurveyed areas will require a REC and undergo the cultural resources impact analysis process.

Determination of effect and consultation guidelines provided in implementing regulations

for the National Historic Preservation Act (36 CFR 800) will be followed during ENRD review of projects. Any project assessed as having an effect on a cultural resource site at Fort Stewart/Hunter AAF will be coordinated with the Georgia SHPO. If it becomes necessary to mitigate adverse effects, the proponent will include mitigation costs in project planning.

Training is another means to minimize impacts on cultural resources at Fort Stewart/Hunter AAF. The Historic Preservation Plan requires a once-yearly briefing of key personnel to advise them of compliance status, changes in requirements, funding issues, or other pertinent topics. The ITAM Environmental Awareness component (Section 11-4d) includes cultural resources considerations, especially within its Soldier/Leader cards and handbooks.

Fort Stewart/Hunter AAF will address cultural resources program requirements, as well as meet goals of natural resources programs. Natural and cultural resources managers at Fort Stewart/ Hunter AAF will work closely with one another during development of natural resources projects. Through this partnership, Fort Stewart/Hunter AAF will provide both natural and cultural resources for future generations.

20. NATIONAL ENVIRONMENTAL POLICY ACT IMPLEMENTATION

"When we try to pick out anything by itself, we find it is hitched to everything else in the universe."
John Muir, Naturalist

The National Environmental Policy Act (NEPA) was created to disclose environmental concerns with human activities and resolve them to the best degree possible. Implementing NEPA regulations (AR 200-2, *Environmental Effects of Army Actions*) requires mitigation of damage to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems and attempt to resolve them using planning at early stages of project development.

20-1 Objectives

- Identify projects and activities on Fort Stewart/Hunter AAF which might impact natural resources and work with project planners to resolve issues early in the planning process using NEPA.
- Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.
- Help Fort Stewart/Hunter AAF comply with NEPA.

20-2 Responsibilities and Implementation

20-2a Responsibility

The Environmental Branch, ENRD has primary responsibility for NEPA compliance at Fort Stewart/Hunter AAF. Natural resources personnel prepare NEPA documentation for projects within their programs and review NEPA documentation for projects which affect natural resources.

20-2b NEPA Documentation

Army Regulation 200-2 (*Environmental Effects of Army Actions)* requires the proponent to prepare and fund NEPA documentation. At Fort Stewart/Hunter AAF proponents of many projects prepare NEPA documentation, which is ideal since it involves project managers (including military unit planners) in decisions involved with NEPA planning. Major projects often include NEPA documentation that has been done using contractors.

The most common NEPA document prepared for projects which impact natural resources is a Categorical Exclusion (CX), often with an attached Record of Environmental Consideration (REC). This simple documentation generally works well for routine projects such as road maintenance, vehicle decontamination exercises, routine road maintenance, small digging projects, and similar projects where natural sites are not damaged. A new, expanded list of actions which allow the use of CXs will be published in the anticipated revision of AR 200-2.

Environmental Assessments (EAs) are required when conditions for a CX are not met. This often happens when new military equipment or projects are planned. An EA maybe required when the action involves either a wide geographic area, a potential affect on endangered species or other sensitive plant communities, or affects wetlands. Examples include major LRAM projects, new borrow sites, or range construction. EAs generally exceed 10 pages, and they require the Commander's approval, publishing a Finding of No Significant Impact (FONSI), and waiting 30 days for public comment.

20-2c Mitigation

Mitigation is required by NEPA and AR 200-2 when a proposed action causes adverse effects to the environment. Mitigation is an excellent way to either consider less damaging options or providing means to off-set damage to the environment. A FONSI is a legally binding document. Mitigation identified in a FONSI is a Class 1 "must fund" for environmental purposes. This provides a mechanism to fund mitigation included in NEPA documents. Fort Stewart/Hunter AAF will use this feature in 2001-2005.

20-3 NEPA and Natural Resources Management

Natural resources activities (as described in this INRMP) must be properly planned, coordinated, and documented using NEPA. The NEPA process is also used to identify problems associated with other organizations' projects which affect the installation's natural resources. Thus, natural resources personnel are both proponents and responsible agents for NEPA.

Siting range-related projects is perhaps the most basic decision which requires input from natural resources personnel. If this phase is done within the cooperative spirit of NEPA, most other environmental problems are generally resolved with relative ease. Decisions such as specific siting or mission planning should be cooperatively discussed prior to preparing actual NEPA draft documents. It is the proponent's role to fund the NEPA process; DPW ENRD prepares the NEPA documentation.

An important offshoot of proper NEPA implementation is that projects are often enhanced by the effort. Siting is one of the most

common examples of such project enhancement. When natural resources managers understand mission/project requirements in terms of land features and requirements, they often not only offer more potential site options to mission or project planners, but also offer alternatives to avoid future environmental conflicts.

In 2001-2005 the installation will take the following steps to use NEPA to protect and conserve Fort Stewart/Hunter AAF natural and cultural resources:

- Review proposed actions during the project concept phases whenever possible.
- Ensure mitigation measures are included in the NEPA document when there is a proposed action that will impact natural resources. If such mitigation is included, ensure that it is entered in the environmental funding process.
- Use natural resources capabilities to provide mitigation. These resources include LRAM, special area protection, wetland management, etc.
- Track projects to ensure that mitigation is accomplished and that restrictions included within the REC are followed.
- Use the lowest level of NEPA documentation that is appropriate to minimize paperwork.
- Proposed actions involving communications towers will incorporate USFWS guidance for the siting, construction, operation, and decommissioning of communications towers (Appendix 20-3).

20-4 NEPA and This INRMP

Fort Stewart/Hunter AAF has no NEPA documentation for the natural resources program as a whole. Effects of implementation of this INRMP are being documented through an EA. This INRMP can be referenced with regard to description of affected environment to reduce verbiage in other NEPA documents.

21. BIOPOLITICAL/UNRESOLVED ISSUES

Some issues involving Fort Stewart/Hunter AAF are not easily resolved. Management issues such as growing season prescribed burning, forest-RCW management, Sikes Act permit fees, military operations affecting endangered species, and others are very difficult to resolve, but the installation has made tough decisions and is implementing them.

There are almost always issues on a military installation involving which organizations should have responsibility for the myriad of programs within the natural resources realm, but none of these are impending at Fort Stewart/Hunter AAF. There are, however, concerns about the following:

- difficulty in obtaining harvest data from deer, feral hogs, and turkeys;
- declining level of natural resources law enforcement;
- effects of growing season burns on selected wildlife and vegetation;
- potential effects of the possible listing of

the gopher tortoise;
- capability of sustaining hardwood mast production in upland forests; and
- the level of bureaucracy and cost associated with control of hunters and anglers.

Each of these issues is being addressed. Recognition of the issues involved is the first step in this process. None of these is in the "unresolvable" category. Dealing with tough issues is a sign of a progressive natural resources program.

22. IMPLEMENTATION

This plan is only as good as Fort Stewart's capability to implement it. This INRMP was prepared with a goal of 100% implementation. Below is described the organization, manpower, assistance, priorities, management prescriptions, and funding needed to implement the management programs described in chapters 12-20.

22-1 Organization

The Environmental and Natural Resources Division, DPW; Range Division, G3/DPTM; Outdoor Recreation, DCAS; and the Game Warden Section, PMO at Fort Stewart/Hunter AAF can implement most of this INRMP and fulfill goals and policies established in Chapter 1. There are no organizational changes proposed within this INRMP, although the installation keeps the option to make changes as it deems necessary for the most efficient implementation of this INRMP.

22-2 Manpower

22-2a Staffing

The below chart indicates existing and required personnel at Fort Stewart/Hunter AAF to implement this INRMP. Game Wardens and Outdoor Recreation personnel are not included since they have significant duties other than within this INRMP and their budgets are external to the scope of this INRMP. Also not included are positions involving cultural resources, water quality, and NEPA since these positions are more of a support nature than directly involved with natural resources management.

Position	Grade	Type	Existing Positions	Required Positions
Environmental and Natural Resources Division, DPW				
Fish and Wildlife Branch				
Chief	GS-12	Permanent	1	1

Position	Grade	Type	Existing Positions	Required Positions
Office Automation Assistant	GS-5	Permanent	1	1
Wildlife Biologist	GS-11	Permanent	4	4
Wildlife Biologist	GS-9	Permanent	5	5
Biological Technician	GS-5/6/7/8/9	Permanent	11	11
Fisheries Biologist	GS-11	Permanent	1	1
Engineering Equipment Operator	WG-10	Permanent	1	3
Biologist	NA	Contract/ORISE	5	5
Conservation Law Enforcement Officer	GS-11	Permanent	1	1
Conservation Law Enforcement Officer	GS-5/7/8/9	Permanent	2	7
GIS Operator	NA	Permanent/ Contractor	1	1
Forestry Branch				
Chief	GS-12	Permanent	1	1
Secretary	GS-5/7	Permanent	1	2
Supervisor, Fire Management	GS-11	Permanent	1	1
Forester	GS-11	Permanent	0	2
Engineering Equipment Operator, Supervisor	WS-10	Permanent	1	1
Engineering Equipment Operator	WG-10	Permanent	6	12
Engineering Equipment Operator	WG-8	Permanent	6	8
Lead Forestry Technician	GS-7	Permanent	1	1
Forestry Technician	GS-6	Permanent	1	1
Computer Specialist	GS-9	Permanent	1	1

Position	Grade	Type	Existing Positions	Required Positions
Supervisor, Timber Management	GS-11	Permanent	1	1
Forester	GS-9	Permanent	0	4
Forestry Technician	GS-8	Permanent	4	4
Forestry Technician	GS-6	Permanent	3	3
Forestry Technician	GS-5	Permanent	1	1
Forestry Technician	GS-4	Permanent	3	3
Forestry Technician	GS-4	Temporary	3	4
Computer Technician	NA	Contractor	1	1
Environmental Branch				
Environmental Protection Specialist (Wetlands)	GS-11	Permanent	1	1
Cultural Resources Specialist	NA	Contractor	1	1

22-2b Personnel Training

The Wildlife Society, Society of American Foresters, National Military Fish and Wildlife Association (NMFWA), Georgia Lake Management Society, and the Forest Farmers Association are among the professional societies applicable to meeting the needs of Fort Stewart/Hunter AAF's natural resources managers. Membership in these societies is encouraged. They have some of the best scientific publications in their professions. Fort Stewart/Hunter AAF has been active in the Georgia Lake Management Society, and its quarterly newsletter has featured various aspects of the Fort Stewart/Hunter AAF fisheries program.

Natural resources personnel from Fort Stewart/Hunter AAF will attempt to send at least one person to each of the following annual workshops or professional conferences:

- NMFWA annual workshop
- Society of American Foresters annual conference
- ITAM workshop
- North American Natural Resources Conference
- The Wildlife Society state, regional, and national conferences
- Longleaf Alliance workshops/meetings

Other conferences/workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Projects which are especially useful include prescribed burning workshops, LCTA training, military installation RCW workshops, basic computer training, GIS basic and advanced training, Watchable Wildlife workshops, wetlands training, endangered species training, and Partners in Flight. In addition, personnel will make appropriate visits to other military installations to learn first-hand of implementation of various management strategies.

Personnel will be trained in related environmental fields. NEPA training will be required of all supervisory personnel as well as others who review or prepare NEPA documents. Personnel involved with pesticide and/or herbicide application will attend required certification and re-certification courses. All professional positions within Natural Resources will be expected to attend at least a basic GIS course to learn the capabilities of the system. Conservation law enforcement training is discussed in Section 16-5.

22-2c Outside Assistance

Outside assistance with implementation of this INRMP is discussed in several sections of this plan, especially chapters 5 and 15. One additional source of outside assistance has been inmate labor from the Federal Prison at Jessup. These prisoners have been used by Forestry Branch and Fish and Wildlife Branch for a variety of services, including office renovation, marking TA boundaries, marking installation boundary line, and general clerical assistance. The future of this assistance is uncertain, but it is very useful.

22-3 Program Priorities

Preparation and implementation of this INRMP is required by the Sikes Act and/or Department of Army policy, and therefore, has many programs which are high funding priorities according to DoD Instruction 4715.3 (enclosure 4), OMB Circular A-106 rules, and Department of Army policies. This INRMP is a Federal Facilities Compliance Agreement with action required in a published NEPA document, which also qualifies it for high priority funding. There are also programs within this INRMP which are required for compliance with other laws and executive orders, especially involving endangered species, pollution prevention, NEPA, wetlands, cultural resources, etc.

However, it is unlikely that all programs within this INRMP will be funded immediately. Therefore, below sections define relative importance of projects and programs specifically included within this INRMP. Each priority category's programs are listed in order they are first mentioned in this document. Estimated time schedules are provided. Projects will include necessary funding for environmental compliance.

Lower priority projects may be implemented ahead of higher ones. This may occur due to funding restrictions. Some High Priority projects are critical, but they may not be compliance driven which makes funding more difficult. Below lists are based upon need and effect on Fort Stewart/Hunter AAF natural resources, not funding likelihood.

22-3a High Priority Projects/Programs

- Implement a Natural Resources Management Unit system (10-5) 2001-2005
- Implement an Ecosystem Management philosophy (11) 2001-2005
- Support the Hunting and Fishing Advisory Council (11-5) 2001-2005
- Complete and use forest inventory data (12-3b) 2001-2005
- Complete and use wildlife habitat survey (12-3e) 2001-2005
- Use satellite imagery (12-3f) 2001-2005
- Complete vegetation mapping (12-3g) 2001-2005
- Monitor aquatic plants (12-3h) 2001-2005
- Collect harvest data from deer, hogs, and turkeys (12-4a(1)-(3)) 2001-2005
- Monitor fish populations in lakes and ponds (12-4b(1)) 2001-2005
- Monitor endangered species (12-4c) 2001-2005
- Monitor lake, pond, and river water quality (12-5a(1)) 2001-2005
- Monitor groundwater quality (12-5b) 2001-2005
- Use GIS for analyses (12-6b) 2001-2005
- Complete and update GIS databases (12-6b) 2001-2005
- Identify training needs in terms of natural resources (11-4b(2)) 2001-2005
- Site projects and military missions on lands best suited for them (11-4b(2)) 2001-2005
- Enforce environmental restrictions within training regulations (11-4b(3)) 2001-2005
- Prevent, minimize, and suppress wildfires (13-3a) 2001-2005
- Protect areas of special significance (13-4) 2001-2005
- Implement forest ecosystem management program (14-2a-i) 2001-2005
- Sell forest products (14-2j and m) 2001-2005
- Implement forest management special considerations (14-2k) 2001-2005
- Minimize damage from forest pests and diseases (14-2n) 2001-2005
- Manage for hardwood mast (14-3a(3)(a)) 2001-2005
- Conduct ecological burning (14-2h(4) and 14-3a(3)(f)) 2001-2005
- Manage forest crown closure (14-2h(1) and 14-3a(3)(j)) 2001-2005
- Restore wiregrass (14-3a(3)(l)) 2001-2005
- Fertilize ponds (14-3c(1)) 2001-2005
- Control aquatic weeds (14-3c(2)) 2001-2005
- Maintain pond dams (14-3c(5)) 2001-2005
- Manage river habitat (14-3c(7)) 2001-2005
- Manage fish and game harvest (14-4) 2001-2005
- Control noxious fish populations (14-4j(2)) 2001-2005
- Stock fish (14-4j(3)) 2001-2005
- Develop and implement endangered species management plans (TAB A) 2001-2005
- Consult with the USFWS on endangered species issues (TAB A) 2001-2005
- Implement Best Management Practices for wetlands protection (14-8b) 2001-2005
- Protect and restore wetlands (14-8c) 2001-2005
- Protect water quality (14-9) 2001-2005

- Maintain roads and trails (14-10) 2001-2005
- Implement pest management program (14-13a) 2001-2005
- Maintain Integrated Pest Management Plan (14-13c(1)) 2001-2005
- Reduce pesticide/herbicide use (14-13c(2)) 2001-2005
- Certify and maintain certification of pesticide applicators (14-13c(3)) 2001-2005
- Conduct priority 1 research/special projects (15-3) 2001-2005
- Conduct natural resources law enforcement (16-6) 2001-2005
- Provide training for enforcement officers (16-5) 2001-2005
- Manage hunters and anglers (18-4) 2001-2005
- Improve checkin-checkout system (18-4c(3)) 2001-2005
- Provide other outdoor recreation (18-5) 2001-2005
- Protect cultural resources while implementing INRMP (19-4) 2001-2005
- Prepare and review NEPA documents (20-2a and b) 2001-2005
- Use NEPA mitigation (20-2c) 2001-2005
- Work to resolve concerns regarding natural resources management (21-0) 2001-2005
- Provide personnel to implement this INRMP (22-2a) 2001-2005
- Provide personnel training (22-2b) 2001-2005
- Use external assistance to implement this INRMP (22-2c) 2001-2005
- Use Natural Resources Prescriptions (22-4) 2001-2005
- Obtain funding to implement this INRMP (24-5) 2001-2005
- Provide command support to implement this INRMP (24-7) 2001-2005

22-3b Important Projects/Programs

- Update floristic survey (12-3c) 2001-2005
- Obtain aerial photos (12-3f)
- Complete quail monitoring study (12-4a(4))
- Complete second phase of fish population study of Canoochee River (12-4a(2)) 2001-2005
- Conduct fresh water mussel survey (12-4a(2)) 2001-2005
- Conduct creel surveys (12-4b(3)) 2001-2005
- Monitor neotropical birds using LCTA (12-4) 2001-2005
- Complete neotropical bird inventory (12-4d) 2001-2005
- Support the GA DNR river study (12-5a(2)) 2001-2005
- Monitor riverine water quality (12-5a(2)) 2001-2005
- Routine computer upgrades (12-6a) 2001-2005
- Implement browse management (14-3a(3)(c)) 2001-2005
- Plant supplemental wildlife food (14-3a(3)(d)) 2001-2005
- Create wildlife clearings (14-3a(3)(e)) 2001-2005
- Lime wildlife habitat (14-3a(3)(g)) 2001-2005
- Improve waterfowl impoundments (14-3b(1)) 2001-2005
- Provide waterfowl nest boxes (14-3b(2)) 2001-2005
- Lime ponds and fertilize ponds (14-3c(3)) 2001-2005

- Construct ponds (14-3c(4)) 2001-2005
- Construct fish attractors (14-3c(6)) 2001-2005
- Complete growing season burn study (14-7) 1998
- Evaluate wetlands banking (14-8d) 2001-2005
- Monitor fish kills (14-9b) 2001-2005
- Manage borrow sites (14-3c(4)) 2001-2005
- Enhance cantonment area forest management (14-11a) 2001-2005
- Reduce grass mowing (14-11b(2)) 2001-2005
- Conduct priority 2 research/special projects (15-3) 2001-2005
- Implement Environmental Awareness program (11-4d) 2001-2005
- Effectively use newspapers (17-3) 2001-2005
- Publish hunting and fishing awareness materials (17-5) 2001-2005
- Update hunting and fishing map (18-4c(5)) 2001-2005
- Provide safety classes (18-4c(6)) 2001-2005
- Provide organized hunts and tournaments (18-4d) 2001-2005
- Improve fishing facilities (18-4e) 2001-2005

22-3c Less Important Projects/Programs

- Support phytoplankton study (12-3i) 2001-2004
- Maintain mast orchards (14-3a(3)(b)) 2001-2005
- Disk wildlife areas (14-3a(3)(h)) 2001-2005
- Mow wildlife habitat (14-3a(3)(I)) 2001-2005
- Manage for wildflowers (14-11b(3)) 2001-2005
- Evaluate hay lease options for Hunter AAF (14-12) 2001-2005
- Conduct priority 3 research/special projects (15-3) 2001-2005
- Effectively use television and radio(17-3) 2001-2005
- Celebrate Arbor Day (17-4) 2001-2005
- Implement Watchable Wildlife programs (17-6) 2001-2005
- Support youth activities (17-8) 2001-2005

22-4 Natural Resources Prescriptions

The planning methodology for much of this INRMP implementation is within the natural resources prescription process. Both Forestry Branch and Fish and Wildlife Branch will prepare Integrated Management Prescriptions (IMP) for each Natural Resources Management Unit. IMPs will be written by working committees comprised of personnel within the Forestry and Fish and Wildlife branches and coordinated with other natural resource professionals for integration within the overall natural resource management program. Each IMP will accurately show the "footprint" of projects.

Each IMP will be prepared by personnel who meet appropriate professional standards and examined by a review board chaired by the Chief, Environmental and Natural Resources

Division with the Chief, Fish and Wildlife Branch and Chief, Forestry Branch. Final say will rest with the review board chairperson. The review board will set priorities, assign natural resource professionals to carry out various tasks in the prescription, and allocate resources to complete the task. The assigned professional will conduct the prescribed action and review results of that action. All prescriptions will be available for USFWS and DNR review.

Prescriptions may use IJO and/or timber availability processes for implementation. These processes will ensure that persons external to the IMP preparation process are included, such as Environmental Branch, Range Division, Outdoor Recreation, etc. If the Endangered Species Act is involved, an IMP could lead to a biological assessment and NEPA. IMPs could require NEPA documentation.

Range Division may also initiate IMPs for the improvement of training areas. In addition, Section 11-4 describes quarterly ITAM synchronization meetings to ensure that program's projects are properly coordinated.

22-5 Funding Options

Unlike most functions within the Department of Defense, natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP.

22-5a Forestry Funds

Forestry funds are generated from sale of forest products. Forestry funds are centrally controlled, and Fort Stewart/Hunter AAF is limited to recovering its approved expenses for forest management. The remainder of the money generated by the Fort Stewart/Hunter AAF forestry program is split 60:40 between the U.S. Treasury and counties.

These funds are commonly called P7 funds. Only expenses that are directly related to the management of Forest Products Production Areas (AR 38-100) may be reimbursed from sale receipts and include: timber management, reforestation (to include enhancements), timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment and supplies, disease and insect control, planning (to include actions necessary to maintain forestry compliance with applicable laws and regulations, *i.e.*, mitigation), cultural resources inventory and mitigation, timber marking, inspections, sales preparation, training of personnel, and timber sales. DA Regulation AR 200-3 (Chapter 5) outlines collection and expenditures systems.
The below table outlines forestry funds needed to implement this INRMP.

Project	FY 01	FY 02	FY 03	FY 04	FY 05	Totals*
Forest Equipment	$453	$475	$220	$250	$250	$1,648
Forest Fire Protection	$181	$190	$198	$206	$206	$981
Forest Management	$1,780	$1,867	$1,954	$2,021	$2,021	$9,643

Project	FY 01	FY 02	FY 03	FY 04	FY 05	Totals*
Forest Access Roads	$204	$200	$200	$200	$200	$1004
Reforestation	$123	$125	$125	$125	$125	$623
Forestry Support	$200	$200	$200	$200	$200	$1,000
Forest Mitigation (Fish & Wildlife)	$120	$120	$120	$120	$120	$600
Total Requirements	$3,061	$3,177	$3,017	$3,122	$3,122	$15,499
REVENUE SOURCES						
Installation Proceeds	$0	$0	$0	$0	$0	$0
Proceeds through COE	$5,700	$6,000	$6,300	$6,500	$6,500	$31,000
Total Proceeds	$5,700	$6,000	$6,300	$6,500	$6,500	$31,000
NET	$2,639	$2,823	$3,283	$3,378	$3,378	$15,510

* thousands of dollars

22-5b Sikes Act Funds

Sikes Act funds (21X5095) are collected via sales of licenses to hunt or fish. They are authorized by the Sikes Act and regulated via AR 200-3, Chapter 6. Funds may be used only for fish and wildlife management on the installation where they are collected. They cannot be used for recreational aspects of fish and wildlife management. They are exempt from the Base Commercial Equipment (BCE) cap, and they have no year-end (unobligated funds carry over on 1 October). Fee collection and administration (i.e. printing and issuing the State Sikes Act Permit) costs (not to exceed 10% of the annual Sikes Act revenue) are authorized.

Monies accrued from the collection of Sikes Act Permit fees will be expended in support of the Fish and Wildlife Management Program on Fort Stewart/Hunter AAF and for no other purpose. Collections and disbursements will be accounted for in accordance with guidance provided for the appropriation titled "*Wildlife Conservation, Military Reservations*", Army Account 21X5095 (Army Regulation 37-100 and 37-108). Unobligated balances shall be accumulated with current fee collections, and the total amount accumulated at the Installation will be available for obligation as apportioned by the Office of Management and Budget.

(Note: The protection and management of threatened and endangered species will not be funded from Sikes Act funds collected from hunters and anglers. These activities are stewardship responsibilities of Fort Stewart/Hunter AAF.)

Collections from FY94-FY99 were $211,731;

$201,239; $219,739; $176,322; $126,250; and $150,166, respectively.

22-5c Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at both Department of Army and FORSCOM levels with no requirements for spending where they were generated. AR 200-3 (Chapter 2) outlines procedures for collection and spending these funds. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs. These are broadest use funds available exclusively to natural resources managers. They are exempt from BCE limits on the purchase of equipment.

AR 200-3, para 2-14a(5) lists the following uses of agricultural funds:

- Administrative and operational expenses of agricultural leases.
- Initiation, improvement, and perpetuation of agricultural leases.
- Preparation, revisions, and requirements of integrated natural resources management plans.
- Implementation of integrated natural resources management plans.

Services in lieu of payments must provide these same services.

Fort Stewart/Hunter AAF has no agricultural leases. Thus, the major use of these funds would be implementation of this INRMP. The installation does not regularly receive agricultural funds, but some projects have been funded by FORSCOM using these funds. This option will remain open during 2001-2005, but no agricultural funds will be programmed for INRMP implementation.

22-5d Environmental Funds

Environmental funds are a special subcategory of Operations & Maintenance (O&M) funds. They are controlled by the A-106 budget process. They are special in that they are restricted by the Department of Defense solely for environmental purposes. Compliance with laws is the key to getting environmental funding. The program heavily favors high priority funding projects to return to compliance with federal or state laws, especially if noncompliances are backed by Notices of Violation or other enforcement agency action.

"Must fund" classifications include mitigation identified within *Findings of No Significant Impact* and items required within Federal Facilities Compliance Agreements. This INRMP is a Federal Facilities Requirement Agreement, and some projects and programs within it are also used to mitigate various military activities.

A copy of the Environmental Program Requirement submissions for FY2001 through 2005 is provided in Appendix 22-5d. Projects specifically for NEPA and cultural resources management are not included in this appendix**.**

The total Environmental Fund budget for this INRMP is estimated at $15,510,000 for 2001-2005. These estimates will be adjusted as needed each year.

22-5e Training Funds

The Forces Command ITAM Regulation states that Fort Stewart/Hunter AAF is a Category I installation. Category I installations are

estimated to have ITAM costs of about $1 million annually with the understanding that special circumstances may dictate changes in these numbers (which must be justified). ITAM funding requests will not contain projects which fall within Conservation Compliance (ODCSOPS, 1995).

ITAM funding requests are not submitted via the A-106 process. Instead, the 5-year ITAM Work Plan is used to channel ITAM funding requests from G3/DPTM Fort Stewart/Hunter AAF, through GS FORSCOM, to ODCSOPS.

22-5f Other Funds

The only other source of funding for natural resources programs on Fort Stewart/Hunter AAF is O&M funds, generally from DPW. These funds are used for military burns since fire suppression/prevention is a DPW O&M responsibility. O&M funds were also used for the water control project on Pineview reservoir. For cost estimation purposes, annual costs of $15,000 are included from O&M funds for implementation of this INRMP. It is understood that O&M funds may also be used for other maintenance projects during the next five years.

Non-appropriated funds (NAF) may also be used to defray the outdoor recreation costs associated with this INRMP. However, these are not specifically included within this plan. NAF funds could be used to help implement an improved hunter/angler checkin system, as discussed in Section 18-4c(3).

22-6 INRMP Implementation Costs

Below is a summary of funding avenues and dollars required for implementation of this INRMP.

Type Funds*	FY 01	FY 02	FY 03	FY 04	FY 05	TOTAL
Sikes Act	$200	$205	$210	$210	$210	***$1,350***
Forestry	$3,061	$3,177	$3,017	$3,122	$3,122	***$15,499***
Agricultural **	$81	$80	$5	$5	$5	***$176***
Environmental/Natural Resources	$3,802	$3,682	$3,793	$3,911	$3,911	***$19,099***
Other	$15	$20	$20	$20	$20	***$95***
Totals	***$7,159***	***$7,164***	***$7,045***	***$7,268***	***$7,268***	***$35,904***

* Funds in thousands of dollars.
** This is a funding option that is sometimes used if other options are not available.

Thus, total five-year funding to implement this INRMP will be $35,904,000 (not including the ITAM program).

Above costs do not include related organizations such as PMO and Outdoor Recreation (except Sikes Act sales costs), nor do they include costs incurred by other agencies . NEPA, cultural resources management, non-Forestry road maintenance, and pest management costs are not included.

Under the provisions of the Anti-Deficiency Act, all requirements set forth in this Agreement requiring the expenditure of Army funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by Fort Stewart under the terms of the Agreement shall require or be interpreted to require a commitment to expend funds not appropriated for a particular purpose. If Fort Stewart cannot perform any obligations set forth in this Agreement due to the unavailability of funds, Fort Stewart and the other signatory agencies intend for the remainder of the Agreement to be executed. Any obligation under the Agreement which cannot be performed due to the unavailability of funds must be renegotiated between Fort Stewart and the signatory agencies.

22-7 Command Support

Command support is essential to implementation of this Plan. Many priority projects for natural resources management within the next five years require command support. This Plan has the support of the Fort Stewart/Hunter AAF Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to

implementation of this Plan as required by the Sikes Act and other Federal laws. Just as importantly, the Command is dedicated to maintaining and improving the military mission at Fort Stewart/Hunter AAF. Implementation of this Plan is a means to that end.

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FORT STEWART, GEORGIA

APPENDICES

APPENDIX 4-2: Fort Stewart/Hunter AAF Training Ranges

FCG	FCG Description	Cat Code	Cat Code Description	# of Ranges	Total # of Lanes
Individual Weapons Qualification					
F17801	Zero Range	17801	BSC 10M-25M RG	4	250
F17802	Field Fire RGS	17802	Field Fire RG	2	35
		17803	FD Fire RG RETS		
F17804	Record Fire RGS	17804	Record Fire RG	1	15
		17805	REC FIR RG RETS	1	16
		17806	MOD RCD RG RETS		
F17807	Night Fire RGS	17807	Night Fire RNG	1	15
		17808	Night Fire RETS	1	16
F17810	KD Ranges	17810	KD Range		
F17811	Sniper TNG RGS	17811	Sniper Range		
		17812	Sniper RNG RETS	1	10
F17821	Pistol Qual CSE	17821	CBT Pistol CRS		
		17822	Pistol RG RETS	1	15
		17823	Sub-MG Range	1	15
F17831	Machins Gun Qual	17831	MG Trans RG	1	10
		17832	MG FLD Fire RG	1	10
		17833	MPMG Range RETS		
F17834	40MM GR MG RNG	17834	40MM GR MG Qual	1	4
F17841	Law Ranges	17841	Law RNG SUBCAL	1	4
		17842	Law Range	1	4

FCG	FCG Description	Cat Code	Cat Code Description	# of Ranges	Total # of Lanes
		17843	Recoilless RNG	1	10
F17844	HVY AA WPNS RG	17844	ANTIARM TKG/LIV	1	10
		17845	ANTIARM RG RETS		
F17881	Grenade RGS NF	17881	Hand GR ACC NF	1	4
		17882	Hand GR Qual NF	1	4
F17883	Grenade RGS LIV	17883	LIV Hand GR RNG	1	4
F17884	Grenade LCHR RG	17884	Grenade LCHR RG	1	4
F17891	Infiltration CS	17891	Infiltrat CSE		
F17921	Demp/Flame RGS	17921	LT Demo RNG	1	
		17922	Flame OPNS RG	1	
		17970	HVY Demo	1	
F17977	ENG Qual RGS	17977	EN RNG NONSTND	1	
		17978	EN Qual RG STND		
F17800	Misc Ranges	17813	Auto Rifle RG	1	
		17814	NS SML Arms RNG		
		17816	Baynet ASLT CRS	1	
Major Weapon System Ranges					
F17851	Mortar Scale RG	17851	MORT Scaled RNG	1	
F17852	Mortar Ranges	17852	Mortar Range	5	
F17854	ARTY Scale RGS	17854	FA Scaled Range	1	
F17855	ARTY Direct RG	17855	FA Direct RNG	4	
F17856	ARTY Indirect	17856	FA Indirect RNG	88	
F17857	MLRS Ranges	17857	MLRS Range	28	

FCG	FCG Description	Cat Code	Cat Code Description	# of Ranges	Total # of Lanes
F17861	Tank Scale RGS	17861	TNK RNG 1:30/60		
		17862	TNK RNG 1:5/10	2	
F17863	Tank STA Gun RG	17863	STN Gunnery RNG	5	
F17864	Multipur TNG RG	17864	MPTR		
		17865	MPTR RETS	2	
F17866	MPRC	17866	TK PLT BTL RUN	1	
		17867	MPRC-L		
		17868	MPRC-H	1	
F17869	CBT ENG VEH RGS	17869	CEV Range	1	
F17871	Air Defense RGS	17871	ADA Gun Range	1	
		17872	ADA Missile RNG	1	
F17873	Aerial Harmon	17873	Aerial HARM RNG	1	
F17874	Aerial Gun GRS	17874	Aerial GUNY RG	6	
		17875	AWSS GUNY RG	1	
F17876	Air-ground RGS	17876	CLS Air SPT RNG	1	
		17877	Bombing Range	1	
F17892	Fire/Move RGS	17892	Fier/Move RNG	5	
F17893	SQD Defense RGS	17893	SQD DEF RNG	5	
F17894	INF Battle CSE	17894	INF SQ BTL CSE	2	
		17895	IN SQ BTL AUTO	1	
		17896	IN PLT BTL CSE	1	
		17897	IN PLT BTL AUTO	1	
MOUT Facilities					

FCG	FCG Description	Cat Code	Cat Code Description	# of Ranges	Total # of Lanes
F17898	MOUT Assault CS	17898	MOUT ASST CSE	2	
F17995	MOUT FACS NF	17995	CBT IN CITY FAC		
		17996	MOUT TNG (SM)(16)		
		17997	MOUT TNG (LG)(32)		
Miscellaneous Training Facilties					
F17900	MISC TNG FACS	17908	TGT DETEC RG NF	1	
		17948	HD-TO-HD PIT		
		17949	P.O.W. TNG Area		
		17950	Confidense CSE	1	
		17952	Mine WF Area	1	
		17954	WH VEH DV CSE	1	
		17955	TRK VEH DV CSE	1	
		17956	AMPHIB VEH TG A	1	
		17958	Ship Load MCKUP		
		17959	Air TRAN Mockup	2	
		17961	PLF Platform	2	
		17962	SUSP HARN MCKUP		
		17963	MCKP Jump Tower		
		17964	UNWTR Ford Site	1	
		17965	Combat Trail		
		17966	Rapell TRN Area	2	

FCG	FCG Description	Cat Code	Cat Code Description	# of Ranges	Total # of Lanes
		17968	RD/AF CONST TRN		
		17971	OBSER TWR/BUNK		
		17973	Timber BRDG Area	1	
		17974	Panel BRDG Area	1	
		17975	AVLB/RFT/FRD AR	2/23/02	
		17976	Float BRDG Site	22	
		17979	PIPLN CONST TR		
		17980	Parade/Drill FLD	4	
		17981	FIRFIGHT/RESCU		
		17982	Water SUP TG AR	26	
		17983	Army ARFLD TG A	7	
		17984	MED/HV EQUIP TR	2	
		17987	DECO TNG Site	4	
		17988	POL TRAIN Area		
		17989	Laundry TNG FAC		
		17991	PERS/EQUIP DZ	7	
		17993	Pole Orchard		
		17994	Obstacle Course	1	
		17999	MED FD TNG Area	1	

APPENDIX 5-3a: Specific Items of Cooperation Between the U.S. Fish and Wildlife Service, Georgia Wildlife Resources Division, Georgia Coastal Resources Division, and Fort Stewart/Hunter Army Airfield

PURPOSE: The purpose of this document is to specifically list items to be provided by the Georgia Wildlife Resources Division (GAWRD), Georgia Coastal Resources Division (GACRD), U.S. Fish and Wildlife Service (USFWS), and Fort Stewart/Hunter Army Airfield (AAF) for cooperative implementation of the Fort Stewart/Hunter AAF Integrated Natural Resources Management Plan. Items not specifically listed will generally be the responsibility of Fort Stewart/Hunter AAF unless the other agencies agree to assist with their implementation.

AUTHORITY: In accordance with the authority contained in Title 10, U.S. Code, Section 2671, and Title 16, U.S. Code, Section 670 the Department of Defense, the Department of Interior, and the State of Georgia, through their duly designated representatives whose signatures appear on the Fort Stewart/Hunter AAF Integrated Natural Resources Management Plan, specifically approve the Integrated Natural Resources Management Plan and the below specific items of cooperation between the three agencies.

MUTUAL AGREEMENT:

- Persons hunting or fishing the lands or waters of Fort Stewart/Hunter AAF shall be required to obtain special Fort Stewart/Hunter AAF hunting or fishing licenses unless exempt by Fort Stewart/Hunter AAF regulations. Funds derived from the sale of these licenses will be used exclusively for the implementation of the Fort Stewart/Hunter AAF Integrated Natural Resources Plan in accordance with Army regulations and the Sikes Act. Fees charged shall be established by the installation in accordance with Army regulations. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).

- Persons hunting or fishing the lands of Fort Stewart/Hunter AAF must purchase State licenses, tags, and stamps as required by GAWRD, unless exempt by GAWRD regulations. GAWRD agrees that military personnel on active duty and permanently stationed at Fort Stewart/Hunter AAF may purchase hunting and fishing licenses at resident prices.

- A Federal waterfowl stamp is required for hunting waterfowl as prescribed by Federal laws.

- All hunting and fishing on Fort Stewart/Hunter AAF will be in accordance with federal and state fish and game laws.

- Representatives of GAWRD, GACRD, and USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security. Such personnel may

use U.S. Army transportation on a nonreimbursable basis, to include aircraft, for wildlife related functions on Fort Stewart/Hunter AAF provided such transportation is available without detriment to the military mission.

- GAWRD, GACRD, and USFWS shall furnish technical assistance for development and implementation of professionally sound natural resources programs on Fort Stewart/Hunter AAF provided funding for such support is available.

- Fort Stewart/Hunter AAF shall furnish assistance and facilities to GAWRD, GACRD, and/or USFWS for mutually agreed upon natural resources research projects. Suitable land areas, animals, facilities, and personnel may be made available at Fort Stewart/Hunter AAF's discretion, when requested, providing the proposed studies are compatible with, and in no way limit, accomplishment of the military mission.

- No exotic species of fish or wildlife will be introduced on Fort Stewart/Hunter AAF lands without prior written approval of the Army, GAWRD, GACRD, and the USFWS.

- GAWRD shall establish season and bag limits for harvest of game species on Fort Stewart/Hunter AAF. The installation may make special requests for such regulations according to procedures established by GAWRD.

- Hunting and fishing on Fort Stewart/Hunter AAF will be authorized and controlled by the installation commander in accordance with locally published installation regulations, promulgated in compliance with applicable Federal and State laws, Army regulations, military requirements, and the Integrated Natural Resources Management Plan.

- Fort Stewart/Hunter AAF will operate biological check stations during hunting seasons and collect harvest data, which will be made available to GAWRD. GAWRD may collect additional data on fish or wildlife resources at Fort Stewart/Hunter AAF with approval of Fort Stewart/Hunter AAF for access to training lands

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- Public access for hunting and fishing is approved under a system of controls established by Fort Stewart/Hunter AAF in cooperation with GAWRD. Civilians will be considered on an equal basis with military and Army civilian employees for permits and access to hunting and fishing areas. Hunting, trapping, and fishing will be allowed only on those areas where there is no conflict with military training activities and no unreasonable safety hazard to participants, military personnel and dependents, or Army civilian employees. Certain areas will be closed to hunting and fishing, including, but not limited to impact areas containing unexploded ordnance and training areas with sensitive electronic equipment.

- Fort Stewart/Hunter AAF has exclusive jurisdiction with regard to law enforcement. In areas of exclusive jurisdiction, Georgia laws may only be enforced by federally-commissioned

enforcement personnel. Enforcement will be a joint responsibility of Fort Stewart/Hunter AAF, Georgia Department of Natural Resources, and the USFWS.

- Fort Stewart/Hunter AAF agrees to cooperate with USFWS, GAWRD, and GACRD for management of threatened or endangered species residing on the installation. Such efforts will be in compliance with Federal and State laws and applicable Army regulations.

- Fort Stewart/Hunter AAF has the option to directly transfer funds to the GAWRD, GACRD, or USFWS for implementation of this Integrated Natural Resources Management Plan.

- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, Fort Stewart/Hunter AAF agrees that any land use change which significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS:

The military mission of Fort Stewart/Hunter AAF supersedes natural resources management and associated recreational activities; and such activities must, in all instances, be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

REQUIRED REFERENCES:

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.

- The possession of a special permit for hunting migratory game birds will not relieve the permittees of the requirements of the Migratory Bird Stamp Act, as amended.

- This INRMP is a Federal Facilities Compliance Agreement.

- As required by the Sikes Act, the following agreements are made:

(1) This Fort Stewart/Hunter AAF Integrated Natural Resources Management Plan is the planning document required by the Sikes Act, as amended. This Plan contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with the new requirements within the Sikes Act if needed.

(2) This plan will be reviewed by GAWRD, GACRD, USFWS, and Fort Stewart/Hunter AAF on a regular basis, but not less often than every 5 years.

(3) No land or forest products from land on Fort Stewart/Hunter AAF will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on Fort Stewart/Hunter AAF under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the Integrated Natural Resources Management Plan.

(4) With regard to the implementation and enforcement of the Fort Stewart/Hunter AAF Integrated Natural Resources Management Plan, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with Federal and State agencies having responsibility for the conservation or management of fish or wildlife.

(5) The Fort Stewart/Hunter AAF Integrated Natural Resources Management Plan is not, nor will be treated as, a cooperative agreement to which chapter 63 of title 31, United States Code applies.

(6) This Integrated Natural Resources Management Plan will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

APPENDIX 8-3: Confirmed Fauna of Fort Stewart

The following list of species may be found on Fort Stewart and Hunter Army Airfield. Species are arranged phylogenetically. Species listed are taken from DEH (1992), The Nature Conservancy (1995), and Elfner (1996).

FAMILY/COMMON NAME	SCIENTIFIC NAME
FISH	
Acipenseridae - Sturgeons	
Shortnosed sturgeon	*Acipenser brevirostrum**
Atlantic sturgeons	*Acipenser oxyrhynchus**
Lepisosteidae - Gars	
Longnose gar	*Lepisosteus osseus**
Florida gar	*Lepisosteus platyrhineus**
Amiidae - Bowfins	
Bowfin	*Amia calva**
Anguillidae - Freshwater Eels	
American eel	*Anguilla rostrata**
Umbridae - Mudminnows	
Eastern mudminnow	*Umbra pygmaea**
Clupeidae - Herrings	
Hickory shad	*Alosa mediocris***
American shad	*Alosa sapidissima***
Gizzard shad	*Dorosoma cepedianum***
Esocidae - Pikes	
Redfin pickerel	*Esox americanus**
Chain pickerel	*Esox niger**
Cyprinidae - Minnows	
Grass carp	*Ctenopharyngodon idellus**
Ohoopee shiner (bannerfin shiner)	*Cyprinella leedsi**
Golden shiner	*Notemigonus crysoleucas**
Ironcolor shiner	*Notropis chalybaeus**

FAMILY/COMMON NAME	SCIENTIFIC NAME
Dusky shiner	*Notropis cummingsae**
Spottail shiner	*Notropis hudsonius**
Taillight shiner	*Notropis maculatus**
Coastal shiner	*Notropis petersoni**
Pugnose minnow	*Opsopoeodus emiliae**
Fathead minnow	*Pimephales promelas*
Catostomidae - Suckers	
Creek chubsucker	*Erimyzon oblongus**
Lake chubsucker	*Erimyzon sucetta**
Spotted sucker	*Minytrema melanops**
Silver redhorse	*Moxostoma anisurum***
Ameiuridea - Bullhead Catfishes	
Snail bullhead	*Ameiurus brunneus**
Yellow bullhead	*Ameiurus natalis**
Brown bullhead	*Ameiurus nebulosus**
Flat bullhead	*Ameiurus platycephalus**
Ictaluridae - Catfishes	
White catfish	*Ictalurus catus**
Channel catfish	*Ictalurus punctatus**
Tadpole madtom	*Noturus gyrinus**
Speckled madtom	*Noturus leptacanthus**
Amblyopsidae - Cavefishes	
Swampfish	*Chologaster cornuta**
Aphredoderidae - Pirate Perches	
Pirate perch	*Aphredoderus sayanus**
Fundulidae - Killifishes	
Golden topminnow	*Fundulus chrysotus**
Marsh killifish	*Fundulus confluentus**
Mummichog	*Fundulus heteroclitus**
Lined topminnow	*Fundulus lineolatus**
Pigmy killifish	*Leptolucania ommata**
Bluefin killifish	*Lucania goodei*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Poeciliidae - Livebearers	
Mosquitofish	*Gambusia holbrooki**
Least killifish	*Heterandria formosa**
Sailfin molly	*Poecilia latipinna**
Atherinidae - Silversides	
Brook silverside	*Labidesthes sicculus**
Rough silverside	*Menidia martinica**
Inland silverside	*Menidia beryllina**
Atlantic silverside	*Menidia menidia**
Centrarchidae - Sunfishes	
Mud sunfish	*Acantharchus pomotis**
Flier	*Centrarchus macropterus**
Everglades pigmy sunfish	*Elassoma evergladei**
Okefenokee pigmy sunfish	*Elassoma okefenokee*
Banded pigmy sunfish	*Elassoma zonatum**
Bluespotted sunfish	*Enneacanthus gloriousus**
Banded sunfish	*Enneacanthus obsesus**
Redbreast sunfish	*Lepomis auritus**
Green sunfish	*Lepomis cyanellus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth	*Lepomis gulosus**
Bluegill	*Lepomis macrochirus**
Dollar sunfish	*Lepomis marginatus**
Redear sunfish	*Lepomis microlophus**
Spotted sunfish	*Lepomis punctatus**
Largemouth bass	*Micropterus salmoides**
Black crappie	*Pomoxis nigromaculatus**
Moronidae - Temperate Basses	
Striped bass	*Morone saxatilis**
Hybrid striped bass	*Morone* sp.
Percidae - Perches	
Swamp darter	*Etheostoma fusiforme**
Christmas darter	*Etheostoma hopkinsi***
Turquoise darter	*Etheostoma inscriptum***
Sawcheek (tessellated) darter	*Etheostoma olmsteadi**
Blackbanded darter	*Percina nigrofasciata**

FAMILY/COMMON NAME	SCIENTIFIC NAME
Elopidae	
Ladyfish	*Elops saurus**
Clupidae	
Atlantic menhaden	*Brevoortia tyrannus**
Gerreidae	
Irish pompano	*Diapterus olisthostomus**
Sparidae	
Pinfish	*Lagodon rhomboides**
Sciaenidae	
Silver perch	*Bairdiella chrysoura**
Spot	*Leiostomus xanthurus***
Atlantic croaker	*Micropongonias undulatus***
Red drum	*Scianenops ocellatus***
Mugilidae - Mullets	
Striped mullet	*Mugil cephalus**
Gobiidae	
Naked goby	*Gobiosoma bosci**
Bothidae	
Southern flounder	*Paralichthys lethostigma***
Soleidae - Soles	
Hogchoker	*Trinectes maculatus**
Syngnathidae - Pipefishes	
Northern pipefish	*Syngnathus fuscus**
Chair pipefish	*Syngnathus louisianae**

* Verified by The Nature Conservancy (1995).
** Verified by GA DNR Ogeechee River fish survey.

FAMILY/COMMON NAME	SCIENTIFIC NAME
REPTILES AND AMPHIBIANS.	
Bufonidae - Toads	
Oak toad	*Bufo quercicus*
Southern toad	*Bufo terrestris*
Hylidae - Hylid Frogs	
Southern cricket frog	*Acris gryllus g.*
Grey treefrog	*Hyla chrysoscelis*
Green treefrog	*Hyla cinerea*
Pine woods treefrog	*Hyla femoralis*
Barking treefrog	*Hyla gratiosa*
Squirrel treefrog	*Hyla squirella*
Southern spring peeper	*Pseudacris crucifer bartramiana*
Little grass frog	*Pseudacris ocularis*
Southern chorus frog	*Pseudacris nigrita n.*
Ornate chorus frog	*Pseudacris ornata*
Microhylidae - Narrow-mouthed Toads	
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*
Pelobatidae - Spadefoot Toads	
Eastern spadefoot toad	*Scaphiopus holbrooki h.*
Ranidae - True Frogs	
Carolina gopher frog	*Rana capito c.*
Bullfrog	*Rana catesbeiana*
Bronze frog	*Rana clamitans c.*
Pig frog	*Rana grylio*
River frog	*Rana heckscheri*
Southern leopard frog	*Rana sphenocephala*
Carpenter frog	*Rana virgatipes*
Ambystomatidae - Mole Salamanders	
Flatwoods salamander	*Ambystoma cingulatum*
Marbled salamander	*Ambystoma opacum*
Mole salamander	*Ambystoma talpoideum*
Eastern tiger salamander	*Ambystoma tigrinum t.*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Amphiumidae - Amphiumas	
Two-toed amphiuma	*Amphiuma means*
Plethodontidae - Woodland Salamander	
Southern dusky salamander	*Desmognathus auriculatus*
Southern two-lined salamander	*Eurycea cirrigera*
Dwarf salamander	*Eurycea quadridigitata*
Ocmulgee slimy salamander	*Plethodon ocmulgee*
Gulf Coast mud salamander	*Pseudotriton montanus flavissimus*
Southern red salamander	*Pseudotriton ruber vioscai*
Many-lined salamander	*Stereochilus marginatus*
Salamandridae - Newts	
Striped newt	*Notophthalmus perstriatus*
Central newt	*Notophthalmus virdescens*
Sirenidae - Sirens	
Broad-striped dwarf siren	*Pseudobranchus striatus s.*
Eastern lesser siren	*Siren intermedia i.*
Greater siren	*Siren lacertina*
Alligatoridae - Alligators	
American alligator	*Alligator mississippiensis*
Anguidae - Lateral-Fold Lizards	
Eastern slender glass lizard	*Ophisaurus attenuatus longicaudus*
Island glass lizard	*Ophisaurus compressus*
Mimic glass lizard	*Ophisaurus mimicus*
Eastern glass lizard	*Ophisaurus ventralis*
Inguanidae - Inguanid Lizards	
Green anole	*Anolis carolinensis*
Southern fence lizard	*Sceloporus undulatus u.*
Scincidae - Skinks	
Northern mole skink	*Eumeces egregius similis*
Five-lined skink	*Eumeces fasciatus*
Southeastern five-lined skink	*Eumeces inexpectatus*
Broadhead skink	*Eumeces laticeps*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Ground skink	*Scincella lateralis*
Teidae - Teid Lizards	
Six-lined racerunner	*Cnemidophorus sexlineatus s.*
Colubridae - Colubrid Snakes	
Northern scarlet snake	*Cemophora coccinea copei*
Southern black racer	*Coluber constrictor priapus*
Southern ringneck snake	*Diadophis punctatus p.*
Eastern indigo snake	*Drymarchon corais couperi*
Corn snake	*Elaphe guttata g.*
Yellow rat snake	*Elaphe obsoleta quadrivittata*
Grey rat snake	*Elaphe obsoleta spiloides*
Eastern mud snake	*Farancia abacura a.*
Rainbow snake	*Farancia erytrogramma e.*
Eastern hognose snake	*Heterodon platirhinos*
Southern hognose snake	*Heterodon simus*
Eastern kingsnake	*Lampropeltis getula g.*
Scarlet kingsnake	*Lampropeltis triangulum elapsoides*
Eastern coachwip	*Masticophis flagellum f.*
Redbelly water snake	*Nerodia erythrogaster e.*
Banded water snake	*Nerodia fasciata f.*
Brown water snake	*Nerodia taxispilota*
Rough green snake	*Opheodrys aestivus*
Florida pine snake	*Pituophis melanoleucus mugitus*
Glossy crayfish snake	*Regina rigida r.*
Carolina black swamp snake	*Seminatris pygaea paludis*
Northern brown snake	*Storeria dekayi d.*
Florida brown snake	*Storeria dekayi victa*
Northern redbelly snake	*Storeria occiptomaculata o.*
Southeastern crowned snake	*Tantilla coronata*
Peninsula ribbon snake	*Thamnophis sauritus sackenii*
Eastern ribbon snake	*Thamnophis sauritus s.*
Eastern garter snake	*Thamnophis sirtalis s.*
Rough earth snake	*Virginia striatula*
Eastern smooth earth snake	*Virginia valeriae v.*
Elapidae - Coral Snakes	
Eastern coral snake	*Micrurus fulvius f.*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Viperidae - Pit Vipers	
Southern copperhead	*Agkistrodon contortrix c.*
Eastern cottonmouth	*Agkistrodon piscivorus p.*
Eastern diamondback rattlesnake	*Crotalus adamanteus*
Canebrake rattlesnake	*Crotalus horridus*
Dusky pygmy rattlesnake	*Sistrurus miliarius barbouri*
Chelydridae - Snapping Turtles	
Common snapping turtle	*Chelydra serpentina s.*
Emydidae - Emydid Turtles	
Eastern chicken turtle	*Deirochelys reticularia r.*
Eastern river cooter	*Pseudemys concinna c.*
Florida cooter	*Pseudemys floridana f.*
Yellowbelly slider	*Trachemys scripta s.*
Spotted turtle	*Clemmys guttata*
Eastern box turtle	*Terrapene carolina c.*
Kinosternidae - Mud and Musk Turtles	
Sriped mud turtle	*Kinosternon bauri*
Eastern mud turtle	*Kinosternon subrubrum s.*
Loggerhead musk turtle	*Sternotherus minor m.*
Common musk turtle	*Sternotherus odoratus*
Testudnidae - Tortoises	
Gopher tortoise	*Gopherus polyphemus*
Trionychidae - Soft-Shelled Turtles	
Florida softshell	*Apalone ferox*
Gulf coast spiny softshell	*Apalone spinifera aspera*

BIRDS.

Gaviidae - Loons	
Common loon	*Gavia immer*
Colymbidae - Grebes	
Pied-billed grebe	*Podilymbus podiceps*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Phalacrocoracidae - Cormorants	
Double-crested cormorant	*Phalacrocorax auritus*
Anhingidae - Darters	
Anhinga	*Anhinga anhinga*
Ardeidae - Herons and Bitterns	
Great blue heron	*Ardea wurdemanni*
Green heron	*Butorides striatus*
Green backed heron	*Butorides virescens*
Little blue heron	*Ergretta caerulea*
Cattle egret	*Bubulcus ibis*
Common egret	*Casmerodius albus*
Louisiana heron	*Hydranassa tricolor*
Yellow-crowned night heron	*Nyctanassa violacea*
Least bittern	*Ixobrychus exilis*
American bittern	*Botaurus lengtiginosus*
Ciconiidae - Wood Storks	
Wood stork	*Mycteria americana*
Threskiornithidae - Ibises	
White ibis	*Eudocimus albus*
Anserinae - Geese	
Canada goose	*Branta canadensis*
Anatinae - Marsh Ducks	
Mallard	*Anas platyrhynchos*
American black duck	*Anas rubripes*
Common pintail	*Anas acuta*
Green-winged teal	*Anas crecca*
Blue-winged teal	*Anas discors*
American wigeon	*Anas americana*
Wood duck	*Aix sponsa*
Aythyinae - Diving Ducks	
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Canvasback	*Aythya valisineria*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Lesser scaup	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common eider	*Somateria mollissima*
White-winged scoter	*Melanitta deglandi*
Oxyurinae - Stifftails	
Ruddy duck	*Oxyura jamaicensis*
Merginae - Mergansers	
Hooded merganser	*Lophodytes cucullatus*
Red-breasted merganser	*Mergus serrator*
Cathartidae - Vultures	
Turkey vulture	*Cathartes aura*
Black vulture	*Coragyps atratus*
Elaninae and Milvinae - Kites	
Swallow-tailed kite	*Elanoides forficatus*
Mississippi kite	*Ictinia mississippiensis*
Snail kite	*Rostrhamus sociabilis*
Accipitrinae - Accipiters	
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
Buteoninae - Buteos and Eagles	
Red-tailed hawk	*Buteo jamaicensis*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
Golden eagle	*Aquila chrysaetos*
Bald eagle	*Haliaeetus leucocephalus*
Circinae - Harriers	
Northern harrier	*Circus cyaneus*
Pandionidae - Ospreys	
Osprey	*Pandion haliaetus*
Falconinae - Falcons	
Merlin	*Falco columbarius*

FAMILY/COMMON NAME	SCIENTIFIC NAME
American kestrel	*Falco sparverius*
Phasianidae - Quail	
Common bobwhite	*Colinus virginianus*
Meleagrididae - Turkeys	
Wild turkey	*Meleagris gallopavo*
Gruidae - Cranes	
Sandhill crane	*Grus canadensis*
Rallidae - Rails	
Virginia rail	*Rallus limicola*
Sora	*Porzana carolina*
Purple gallinule	*Porphyrula martinica*
Common gallinule	*Gallinula chloropus*
American Coot	*Fulica americana*
Charadriidae - Plovers	
Killdeer	*Charadrius vociferus*
Scolopacidae - Sandpipers	
Greater yellowlegs	*Tringa melanoleuca*
Solitary sandpiper	*Tringa solitaria*
Spotted sandpiper	*Actitis macularia*
American woodcock	*Philohela minor*
Common snipe	*Capella gallinago*
Larinae - Gulls	
Herring gull	*Larus argentatus*
Ring-billed Gull	*Larus delawarensis*
Columbidae - Pigeons and Doves	
Rock dove	*Columba livia*
Mourning dove	*Zenaida macroura*
Common ground dove	*Columba livia*
Cuculidae - Cuckoos	
Yellow-billed cuckoo	*Coccyzus americanus*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Tytonidae - Barn Owls	
Screech owl	*Otus asio*
Great horned owl	*Bubo virginianus*
Strigidae - Typical Owls	
Barred owl	*Strix varia*
Caprimulgidae - Goatsuckers	
Chuck-will's widow	*Caprimulgus carolinensis*
Common nighthawk	*Chordeiles minor*
Apodidae - Swifts	
Chimney Swift	*Chaetura pelagica*
Trochilidae - Hummingbirds	
Ruby-throated hummingbird	*Archilochus colubris*
Alcedinidae - Kingfishers	
Belted Kingfisher	*Ceryle alcyon*
Picidae - Woodpeckers	
Common (yellow-shafted) flicker	*Colaptes auratus*
Pileated woodpecker	*Dryocopus pileatus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Hairy woodpecker	*Picoides villosus*
Downy woodpecker	*Picoides pubescens*
Red-cockaded woodpecker	*Picoides borealis*
Tyrannidae - Flycatchers	
Eastern kingbird	*Tyrannus tyrannus*
Great crested flycatcher	*Myiarchus crinitus*
Eastern phoebe	*Sayornis phoebe*
Acadian flycatcher	*Empidonax virescens*
Eastern wood pewee	*Contopus virens*
Hirundinidae - Swallows	
Tree swallow	*Tachyeineta bicolor*
Rough-winged swallow	*Stelgidopteryx ruficollis*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Barn swallow	*Hirundo rustica*
Purple martin	*Progne subis*
Corvidae - Jays and Crows	
Blue jay	*Cyanocita cristata*
American crow	*Corvus brachyrhynchosps*
Fish crow	*Corvus ossifragus*
Paridae - Titmice	
Black-capped chickadee	*Parus atricapillus*
Carolina chickadee	*Parus carolinensis*
Tufted titmouse	*Parus bicolo*r
Certhiidae - Creepers	
Brown creeper	*Certhia familiaris*
Sittidae - Nuthatches	
White-breasted nuthatch	*Sitta carolinensis*
Red-breasted nuthatch	*Sitta canadensis*
Brown-headed nuthatch	*Sitta pusilla*
Troglodytidae - Wrens	
House wren	*Troglodytes aedon*
Winter wren	*Troglodytes troglodytes*
Carolina Wren	*Thyothorus ludovicianus*
Mimidae - Mimic Thrushes	
Northern mockingbird	*Mimus polyglottos*
Grey catbird	*Dumetella carolinensis*
Brown thrasher	*Toxostoma rufum*
Turidae - Thrushes	
Hermit thrush	*Catharus guttatus*
Wood thrush	*Hylocichla mustelina*
Eastern bluebird	*Sialia sialis*
Robin	*Turdus migratorius*
Sylviidae - Kinglets	
Blue-gray gnatcatcher	*Polioptila caerulea*
Golden-crowned kinglet	*Regulus calendula*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Ruby-crowned kinglet	*Regulus satrapa*
Motacillidae - Pipits	
Water pipit	*Anthus spinoletta*
Bombycillidae - Waxwings	
Cedar waxwings	*Bombycilla cedrorum*
Laniidae - Shrikes	
Loggerhead shrike	*Lanius ludovicianus*
Sturnidae - Starlings	
European starling	*Sturnus vulgaris*
Vireonidae - Vireos	
White-eyed vireo	*Vireo griseus*
Yellow-throated vireo	*Vireo flavifrons*
Solitary vireo	*Vireo solitarius*
Red-eyed vireo	*Vireo olivaceus*
Parulidae - Wood Warblers	
Black-throated blue warbler	*Dendroica caerulescens*
Yellow-rumped warbler	*Dendroica coronata*
Yellow-throated warbler	*Dendroica dominica*
Blackpoll warbler	*Dendroica striata*
Pine warbler	*Dendroica pinus*
Prairie Warbler	*Dendrocia discolor*
Palm warbler	*Dendroica palmarum*
Common yellowthroat	*Geothlypis trichas*
Black-throated green warbler	*Guiraca caerulea*
Worm-eating warbler	*Helmitheros vermivorus*
Yellow-breasted chat	*Icteria virens*
Swainson's warbler	*Limnothlypis swainsonii*
Black-and-white warbler	*Mniotilta varia*
Kentucky warbler	*Opornis formosus*
Northern parula warbler	*Parula americana*
Prothonotary warbler	*Protonotaria citrea*
Ovenbird	*Seiurus aurocapillus*
American redstart	*Setophaga ruticilla*
Hooded warbler	*Wilsonia citrina*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Ploceidae - Weaver Finches	
House Sparrow	*Passer domesticus*
Icteridae - Blackbirds	
Bobolink	*Dolichonyx oryzivorus*
Eastern meadowlark	*Sturnella magna*
Red-winged blackbird	*Agelaius phoeniceus*
Orchard oriole	*Icterus spurius*
Boat-tailed grackle	*Quiscalus major*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
Thraupidae - Tanagers	
Summer tanager	*Piranga rubra*
Fringillidae - Finches	
Bachman's sparrow	*Aimophila aestivalus*
Northern cardinal	*Cardinalis cardinalis*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Blue grosbeak	*Guiraca caerulea*
Indigo bunting	*Passerina cyamea*
Painted bunting	*Passerina ciris*
Purple finch	*Carpodacus purpureus*
Pine siskin	*Carduelis pinus*
American goldfinch	*Carduelis tristis*
Rufous-sided towhee	*Pupilo erythrophthalmus*
Ipswich (Savannah) sparrow	*Passerculus sandwichensis*
Vesper sparrow	*Pooecetes gramineus*
Bachman's sparrow	*Aimophilla aestivalis*
Slate-colored junco	*Junco hyemalis*
Chipping sparrow	*Spizella passernia*
Field sparrow	*Spizella pusilla*
White-throated sparrow	*Zonotrichia albicollis*
Fox sparrow	*Passerella iliaca*
Swamp Sparrow	*Melospiza georgiana*
Song Sparrow	*Melospiza melodia*

MAMMALS

FAMILY/COMMON NAME	SCIENTIFIC NAME
Didelphiidae - Opossums	
Virginia opossum	*Didelphis virginiana*
Talpidae - Moles	
Starnose mole	*Condylura cristata*
Eastern mole	*Scalopus carolinensis*
Soricidae - Shrews	
Northern short-tailed shrew	*Blarina brevicauda*
Least shrew	*Cryptotis parva*
Shorttail shrew	*Blarina brevicauda*
Southeastern shrew	*Sorex longirostris*
Vespertilionidae - Plainnose Bats	
Little brown myotis	*Myotis lucifugus*
Indiana bat	*Myotis sodalis*
Eastern pipistrel	*Pipistrellus subflavus*
Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Seminole bat	*Lasiurus seminolus*
Hoary bat	*Lasiurus cinereous*
Eastern yellow bat	*Lasiurus intermedius*
Evening bat	*Nycticeius humeralis*
Molossidae - Free-Tailed Bats	
Mexican free-tailed bat	*Tadarida brasiliensis*
Ursidae - Bears	
Black bear	*Ursus americana*
Procyonidae - Raccoons	
Raccoon	*Procyon lotor*
Mustelidae - Weasels, Skunks, Otters	
Long-tailed weasel	*Mustela frenata*
Mink	*Mustela vison*
River otter	*Lutra canadensis*
Striped skunk	*Mephitis mephitis*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Canidae - Dogs, Wolves, Foxes	
Coyote	*Canis latrans*
Red fox	*Vulpes fulva*
Gray fox	*Urocyon cinereoargenteus*
Felidae - Cats	
Mountain Lion	*Felis concolor*
Bobcat	*Lynx rufus*
Sciuridae - Squirrels	
Eastern gray squirrel	*Sciurus carolinensis*
Eastern fox squirrel	*Sciurus niger*
Southern flying squirrel	*Glaucomys volans*
Geomyidae - Pocket Gophers	
Southeastern pocket gopher	*Geomys pinetis*
Sherman's Pocket gopher	*Geomys fontanelus*
Castoridae - Beaver	
Beaver	*Castor canadensis*
Cricetidae - Mice, Rats and Voles	
Eastern harvest mouse	*Reithrodontomys humulis*
Oldfield mouse	*Peromyscus polionotus*
Cotton mouse	*Peromyscus gossypinus*
Golden mouse	*Peromyscus nuttalli*
Eastern woodrat	*Neotoma floridana*
Rice rat	*Oryzomys palustris*
Hispid cotton rat	*Sigmodon hispidus*
Pine vole	*Pitymys pinetorum*
Muridae - Old World Rats	
Norway rat	*Rattus norvegicus*
Black rat	*Rattus rattus*
Leporidae - Hares and Rabbits	
Eastern cottontail	*Sylvilagus floridanus*
Marsh rabbit	*Sylvilagus palustris*

FAMILY/COMMON NAME	SCIENTIFIC NAME
Suidae - Swine	
Feral hog	*Sus scrofa*
Cervidae - Deer	
White-tailed deer	*Odocoileus virginianus*
Dasypodidae - Armadillos	
Armadillo	*Dasypus novemcinctus*
Trichechidae - Manatee	
West Indian Manatee	*Trichechus manatus*

APPENDIX 10-1b: Fort Stewart Training Areas

A AREAS:	ACREAGE
A-1	2,560.05
A-2	1,726.93
A-3	1,505.14
A-4	1,072.32
A-5	1,273.36
A-6	1,430.31
A-7	1,125.69
A-8	601.54
A-9	1,478.35
A-10	917.63
A-11	1,235.90
A-12	1,695.20
A-13	1,484.68
A-14	2,502.04
A-15	326.17
A-16	2,807.30
A-17	349.60
A-18	1,821.92
A-19	430.35
A-20	476.01
TOTAL	**26,344.48**

B AREAS:	ACREAGE
B-1	2,955.32
B-2	723.51
B-3	1,267.03
B-5	1,071.62
B-6	671.82
B-7	1,281.66
B-8	1,727.03
B-9	4,978.57
B-10	3,751.08
B-11	2,907.28
B-12	4,187.65
B-13	4,557.91
B-14	3,162.58
B-15	2,257.80
B-16	1,318.53
B-17	2,272.53
B-18	2,839.97
B-19	4,085.65
B-20	3,023.52
B-21	1,342.35
B-22	2,668.38
B-23	2,314.44
B-24	2,431.37
TOTAL	**57,797.60**

C AREAS:	ACREAGE
C-1	4,622.87
C-2	1,474.30
C-3	1,343.53
C-4	3,155.37
C-5	2,327.34
C-6	1,342.94
C-7	2,840.17
C-8	2,595.74
C-9	3,669.63
C-10	1,777.04
C-11	2,745.87
C-12	1,724.86
C-13	1,582.43
C-14	2,801.22
C-15	3,391.05
C-16	2,109.91
C-17	3,347.39
C-18	2,611.65
TOTAL	**45,463.31**

D AREAS:	ACREAGE
D-1	1,883.79
D-2	324.00
D-3	2,041.74
D-4	807.92
D-5	4,974.32
D-6	1,541.01
D-7	2,451.43
D-8	815.13
D-9	2,196.32
D-10	1,204.66
D-11	1,191.42
D-12	1,412.62
D-13	2,043.81
D-14	1,214.74
D-15	2,739.08
D-16	889.02
TOTAL	**27,731.01**

E AREAS:	ACREAGE
E-1	1,357.77
E-2	1,407.78
E-3	3,640.77
E-4	2,586.45
E-5	1,781.20
E-6	3,804.75
E-7	4,147.13
E-8	2,759.81
E-9	1,892.09
E-10	1,979.96
E-11	4,539.42
E-12	1,815.10
E-13	3,182.75
E-14	1,245.88
E-15	1,631.26
E-16	1,847.91
E-17	1,796.81
E-18	2,783.80
E-19	2,995.52
E-20	1,037.52
E-21	1,871.56
E-22	1,594.41
TOTAL:	**51,699.65**

F AREAS:	ACREAGE
F-1	2,305.15
F-2	1,558.90
F-3	2,313.35
F-4	1,693.52
F-5	2,118.24
F-6	4,829.03
F-7	3,177.71
F-8	2,127.93
F-9	3,947.27
F-10	1,558.76
F-11	1,204.32
F-12	2,424.84
F-13	790.25
F-14	1,756.88
F-15	2,995.74
F-16	2,473.17
F-17	1,433.67
F-18	1,185.29
F-19	2,350.22
F-20	2,990.82
TOTAL	**45,235.06**

	ACREAGE
AIA:	12,212.67
EOD:	896.58
SMALL ARMS (B-4):	6,140.83
VICTORY DZ (WRIGHT AAF):	734.18
CANTONMENT AREA:	3,381.54
TAYLOR CREEK MAINTENANCE AREA:	433.91
TOTAL:	**23,799.71**

APPENDIX 12-6b(2): Fort Stewart GIS Databases

1**. Soils**

General: Soils, Hydric Soils

2. Hydrography

General: Streams

3. Botany

General: Vegcover Plots

Forest Management: Forest Stands, Timber Types, Stand Basal Area, Stand Age, Stand Site Index, Stand Regeneration

Wetlands: National Wetlands Inventory

Special Status: Southern Pine Beetle, Rare and Endangered Plants

4. Wildlife

Special Status: Rare, Endangered, and Threatened Species, RCW Trees, RCW Inserts, Indigo Snake, Gopher Tortoise Habitat

5. Cultural

General: Archaeological Sites, NR Selected, NR Eligible, NR Potentially Eligible, NR Ineligible; Cemeteries

6. Boundaries

General: Fort Stewart Boundary, Training Areas, Present and Future Range Boundaries, Range Fans, County Boundaries

7. Geodetic/Cadastral

General: Gridlines, USGS Quad Lines

8. Land Status

Use/Management: Prescribed Burn Areas, Training Areas, Sub-training Areas, Present and Future Range Areas, Old Fields

9. Transportation

Vehicle: Roads

10. Military Operations

General: Airstrips and Landing Zones

Training: Training Areas, Sub Training Areas, Present and Future Ranges, Range Fans

11. Imagery

Satellite: Landsat TM 1988, Landsat MS 1973, Landsat MS 1979, Landsat MS 1986, Landsat 1992

Databases scheduled for completion in 2000-2004 include:

Imagery

Satellite: SPOT 1997-2001
Aerial: Digital Ortho Quarter Quads 1997

Botany:

General: Vegcover

Landform

Topology: DEM
Slope: Slope
Aspect: Aspect

APPENDIX 14-2h(4): Ecological Burning Schedule

PROPOSED BURN SCHEDULE -- A-AREAS

	1999	2000	2001	2002	2003	2004
A-1.1	W					W
A-1.2				W		
A-1.3					W	
A-1.4					W	
A-1.5			W			
A-1.6	W					W
A-1.7		W				
NOTE: A-1 is on a 5-year winter cycle due to close proximity to critical smoke-sensitive areas.						
A-2.1	GS			GS		
A-2.2		GS			GS	
A-2.3			GS			GS
A-3.1		GS			GS	
A-3.2	W		GS			GS
A-3.3	GS			GS		
A-4.1		GS			GS	
A-4.2	W		GS			GS
A-4.3	GS			GS		
A-5.1	GS			GS		
A-5.2		GS			GS	
A-5.3	GS		GS			GS
A-6.1	W	GS			GS	
A-6.2	W		GS			GS
A-6.3			W			W
NOTE: Burn A-6.3 only in winter due to hardwood values for wildlife.						
A-6.4	GS			GS		
A-7.1		GS			GS	
A-7.2			GS			GS
A-8.0		GS			GS	
A-9.1		GS			GS	
A-9.2			GS			GS
A-9.3	GS			GS		
A-9.4		GS			GS	

	1999	2000	2001	2002	2003	2004
A-10.1		GS			GS	
A-10.2			GS			GS
A-11.1		GS			GS	
A-11.2	W			GS		
A-11.3			GS			GS
A-12.1	GS		GS			GS
A-12.2		GS			GS	
A-12.3	W			GS		
A-13.1			GS			GS
A-13.2		GS			GS	
A-14.1	GS			GS		
A-14.2			GS			GS
A-15.0		GS			GS	
A-16.1		GS			GS	
A-16.2			GS			GS
A-16.3	W			GS		
A-16.4	W		GS			GS
A-17.0	W			GS		
A-18.1			GS			GS
A-18.2		GS			GS	
A-18.3	GS			GS		
A-18.4	W			GS		
A-18.5	Annual winter or growing season burns.					
A-19.1	Annual winter or growing season burns.					
A-19.2	W			W		
NOTE: A-19.2 is on a winter cycle due to proximity of urban areas (smoke sensitivity).						
A-20.1	W			GS		
A-20.2			GS			GS
A-20.3		GS			GS	

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
A-1	0	0	0
A-2	791	0	623
A-3	0	0	420
A-4	123	0	123
A-5	350	327	572
A-6	367	293	737
A-7	560	0	0
A-8	0	0	0
A-9	374	441	242
A-10	0	0	0
A-11	515	429	0
A-12	0	0	0
A-13	0	0	0
A-14	1,479	0	0
A-15	0	0	0
A-16	0	0	0
A-17	0	0	0
A-18	0	0	424
TOTAL	**4,560**	**1,491**	**3,142**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
A-1	972	921	403
A-2	624	280	0
A-3	0	1,109	412
A-4	0	533	424
A-5	572	0	0
A-6	784	0	0
A-7	0	687	0
A-8	590	0	0
A-9	656	0	0
A-10	502	412	0
A-11	0	0	0
A-12	659	484	550
A-13	1,038	458	0
A-14	0	1,094	0
A-15	289	0	0
A-16	1,451	596	825
A-17	0	0	318
A-18	1,662	1,461	1,226
A-19	---------- AS NEEDED AND AS AVAILABLE ----------		
A-20	94	203	173
TOTAL	**10,552**	**7,958**	**4,616**

PROPOSED BURN SCHEDULE -- B-AREAS

	1999	2000	2001	2002	2003	2004
B-1.1	W		GS			GS
B-1.2		GS			GS	
B-1.3	GS			GS		
B-1.DEMO.1	W			GS		
B-1.DEMO.2	W		GS			GS
B-2.0	W			GS		
B-3.1			GS			GS
B-3.2		GS			GS	
EOD	W		GS			GS
B-4.1	GS		GS		GS	
B-4.2		GS		GS		GS
B-4.3	GS		GS		..GS	
B-4.4		GS		GS		GS
B-4.5	W		GS		GS	
B-4.6		W		GS		GS
B-4.7		GS		GS		GS
B-4.8	W		GS		GS	
B-4.9		GS		GS		GS
B-4.10	W		GS		GS	
B-4.11	GS		GS		GS	
B-4.12		GS		GS		GS
B-4.13		GS		GS		GS
B-4.14	W		GS		GS	
B-4.15		GS		GS		GS
B-4.16		GS		GS		GS
B-5.1	GS			GS		
B-5.2			GS			GS
B-6.1		GS			GS	
B-6.2	GS			GS		
B-7.1			GS			GS
B-7.2	W	GS			GS	
B-7.3	GS			GS		

	1999	2000	2001	2002	2003	2004
B-8.1	GS		GS			GS
B-8.2		GS			GS	
B-8.3	GS			GS		
B-9.1	GS		GS		GS	
B-9.2		GS		GS		GS
B-9.3	GS		GS		GS	
B-9.4		GS		GS		GS
B-9.5	GS		GS		GS	
B-9.6		GS		GS		GS
B-10.1	GS		GS		GS	
B-10.2	GS		GS		GS	
B-10.3		GS		GS		GS
B-11.1 THRU B-11.6		GS		GS		GS
B-12.1	GS		GS		GS	
B-12.2	GS		GS		GS	
B-12.3		GS		GS		GS
B-13.1	W GS				GS	
B-13.2	GS			GS		
B-13.3			GS			GS
B-13.4		GS		GS		GS
B-14.1	GS			GS		
B-14.2	GS		GS			GS
B-14.3	GS			GS		
B-4.4		GS			GS	
B-14.5	GS		GS			GS
B-15.1		GS			GS	
B-15.2	GS		GS			GS
B-15.3	GS			GS		
B-16.1	GS		GS			GS
B-16.2	W			GS		
B-17.1	GS		GS			GS
B-17.2	GS			GS		
B-17.3		GS			GS	

	1999	2000	2001	2002	2003	2004
B-18.1	GS (west of Rd. 72 only)		GS			GS
B-18.2		GS			GS	
B-19.1			GS			GS
B-19.2		GS			GS	
B-19.3	GS			GS		
B-19.4			GS			GS
B-19.5		GS			GS	
B-20.1	Annual: GS if possible; catch up following winter if missed.					
B-20.2	Annual: GS if possible; catch up following winter if missed.					
B-20.3	GS		GS			GS
B-20.4		GS			GS	
B-21.1	W	GS			GS	
B-21.2			GS			GS
B-22.1		GS			GS	
B-22.2	GS			GS		
B-22.3	GS		GS			GS
B-23.1		GS			GS	
B-23.2			GS			GS
B-23.3	GS			GS		
B-24.1	GS			GS		
B-24.2		GS			GS	
B-24.3	GS			GS		
B-24.4			GS			GS

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
B-1	938	0	652
B-2	0	0	434
B-3	727	477	0
B-4	----------AS AVAILABLE----------		
B-5	445	0	580
B-6	0	426	229
B-7	0	541	369
B-8	472	752	620
B-9	771	641	565
B-10	----------AS AVAILABLE----------		
B-11	----------AS AVAILABLE----------		
B-12	----------AS AVAILABLE----------		
B-13	797	1,152	2,293
B-14	876	1,084	1,228
B-15	565	943	766
B-16	0	0	736
B-17	0	691	479
B-18	0	2,508	0
B-19	756	2,078	519
B-20	2,479	2,300	1,756
B-21	0	750	0
B-22	747	728	474
B-23	705	1,400	252
B-24	1,099	0	669
TOTAL	**12,588**	**17,053**	**12,622**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
B-1	932	0	932
B-1 DEMO	1,258	0	1,258
B-2	737	0	0
B-3	0	0	0
B-4	895	895	895
B-5	580	0	0
B-6	229	0	0
B-7	369	463	0
B-8	620	0	0
B-9	0	0	0
B-10	3,000	3,000	3,000
B-11	3,000	3,000	3,000
B-12	3,000	3,000	3,000
B-13	0	0	0
B-14	0	0	0
B-15	0	0	0
B-16	0	0	0
B-17	1,116	0	0
B-18	0	0	0
B-19	1,229	0	0
B-20	0	0	0
B-21	0	592	0
B-22	0	0	0
B-23	252	0	0
B-24	1,301	0	0
TOTAL	**18,518**	**10,950**	**12,085**

PROPOSED BURN SCHEDULE -- C-AREAS

	1999	2000	2001	2002	2003	2004
C-1.1		GS			GS	
C-1.2	GS			GS		
C-1.3			GS			GS
C-1.4		GS			GS	
C-2.1		GS			GS	
C-2.2			GS			GS
C-2.3	GS			GS		
C-3.1			GS			GS
C-3.2	GS	GS	GS	GS	GS	GS
C-3.3	GS			GS		
C-4.1			GS			GS
C-4.2		GS			GS	
C-4.3			GS			GS
C-4.4	GS			GS		
C-5.1	W		GS			GS
C-5.2	GS			GS		
C-5.3		GS			GS	
C-5.4	(AGR 1)	ANNUAL GS BURNS				
C-5.5	W		GS			GS
C-6.1		GS			GS	
C-6.2			GS			GS
C-6.3	GS			GS		
C-7.1			GS			GS
C-7.2	(AGR 1)	ANNUAL GS BURNS				
C-7.3	GS			GS		
C-7.4		GS			GS	
C-7.5			GS			GS
C-8.1	GS			GS		
C-8.2			GS			GS
C-8.3	GS			GS		
C-8.4		GS			GS	
C-8.5			GS			GS

	1999	2000	2001	2002	2003	2004
C-9.1	GS			GS		
C-9.2			GS			GS
C-9.3		GS			GS	
C-9.4	(AGR 2)	ANNUAL GS BURN				
C-10.1		GS			GS	
C-10.2	GS			GS		
C-10.3	W		GS			GS
C-11.1		GS			GS	
C-11.2	GS		GS			GS
C-11.3	GS			GS		
C-11.4		GS			GS	
C-12.0	GS			GS		
C-13.1	W		GS			GS
C-13.2		GS			GS	
C-14.1			GS			GS
C-14.2	GS			GS		
C-14.3	(AGR 3)	ANNUAL GS BURN				
C-15.1		GS			GS	
C-15.2			GS			GS
C-15.3		GS			GS	
C-15.4	W		GS			GS
C-15.5	(AGR 3)	ANNUAL GS BURN				
C-16.1		GS			GS	
C-16.2			GS			GS
C-16.3		GS			GS	
C-16.4			GS			GS
C-16.5	GS			GS		
C-17.1				W		
C-17.2	W				W	
C-17.3			W			
C-17.4	W					W

	1999	2000	2001	2002	2003	2004
C-18.1	W					W
C-18.2		W				
C-18.3			W			
C-18.4					W	
C-18.5				W		

NOTE: C-17 and C-18 are on 5-year winter burn cycles due to their close proximity to critical smoke-sensitive areas.

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
C-1	820	0	1,199
C-2	0	582	318
C-3	262	688	946
C-4	1,727	1,464	806
C-5	812	812	1,316
C-6	458	433	438
C-7	667	1,192	1,194
C-8	0	611	1,350
C-9	1,369	2,124	1,898
C-10	599	662	533
C-11	0	613	621
C-12	0	1,648	0
C-13	0	0	0
C-14	0	767	1,250
AGR 3	1,302	1,302	1,302
C-15	502	1,480	0
C-16	1,122	465	335
C-17	0	0	0
C-18	0	0	0
TOTAL	**9,640**	**14,843**	**13,506**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
C-1	1,199	2,530	0
C-2	0	545	0
C-3	0	0	0
C-4	618	0	0
C-5	504	419	275
C-6	0	0	0
C-7	0	963	0
C-8	1,351	0	0
C-9	1,284	1,016	0
C-10	533	0	0
C-11	2,071	654	0
C-12	1,648	0	0
C-13	0	438	1,160
C-14	1,250	0	0
C-15	0	839	0
C-16	335	0	0
C-17	732	1,007	433
C-18	520	273	751
TOTAL	**12,045**	**8,684**	**2,619**

Any burns missed are to be caught up ASAP.

PROPOSED BURN SCHEDULE -- D-AREAS

	1999	2000	2001	2002	2003	2004
D-1.1	GS			GS		
D-1.2		GS			GS	
D-1.3	W		GS			GS
D-2.1	W			GS		
D-2.2	W		GS			GS
D-3.1	W		GS			GS
D-3.2		GS			GS	
D-3.3	GS			GS		
D-3.4		GS			GS	
D-3.5			GS			GS
D-4.1	GS			GS		
D-4.2	W	GS			GS	
D-4.3	W		GS			GS
D-4.4	W		W	GS		
-						
D-5.1	W			GS		
D-5.2	GS	GS	GS	GS	GS	GS
D-5.3		GS			GS	
D-5.4	GS			GS		
D-5.5			GS			GS
D-5.6	GS			GS		
D-5.7	W	GS			GS	
D-5.8	W	GS			GS	
D-6.1		GS			GS	
D-6.2	GS			GS		
D-6.3	W		GS			GS
D-6.4	GS	GS	GS	GS	GS	GS
D-7.1	GS			GS		
D-7.2		GS			GS	
D-7.3	GS	GS	GS	GS	GS	GS
D-7.4			GS			GS
D-7.5	GS			GS		
D-8.0		GS			GS	

	1999	2000	2001	2002	2003	2004
D-9.1	GS			GS		
D-9.2		GS			GS	
D-10.1	GS			GS		
D-10.2	GS (West side)		GS			GS
D-11.1	GS			GS		
D-11.2	GS		GS			GS
D-12.1			GS			GS
D-12.2	GS	GS	GS	GS	GS	GS
D-12.3	GS			GS		
T.C MAINT.	W		GS			GS
D-13.1		GS			GS	
D-13.2			GS			GS
D-14.1	GS			GS		
D-14.2	GS		GS			GS
D-15.1		GS			GS	
D-15.2			GS			GS
D-15.3	GS			GS		
D-15.4	GS		GS			GS
D-16.1	GS			GS		
D-16.2			GS			GS
D-16.3		GS			GS	
D-16.4	GS			GS		

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
D-1	0	0	525
D-2	0	0	0
D-3	516	786	209
D-4	0	176	387
D-5	659	1,242	1,834
D-6	162	583	755
D-7	279	279	1,127
D-8	943	0	0
D-9	0	0	1,087
D-10	0	0	372
D-11	0	254	761
D-12	184	786	795
D-13	927	1,114	0
D-14	0	574	574
D-15	1,043	1,295	439
D-16	373	256	141
TOTAL	**5,936**	**7,449**	**9,005**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
D-1	1,346	610	0
D-2	159	92	159
D-3	205	0	0
D-4	183	0	0
D-5	2,441	1,561	683
D-6	1,014	410	0
D-7	848	1,376	0
D-8	0	0	0
D-9	1,087	11,08	0
D-10	0	0	0
D-11	761	0	0
T.C. MAINT	426	0	0
D-12	0	0	0
D-13	0	0	0
D-14	0	0	0
D-15	0	0	0
D-16	40	0	0
TOTAL	**8,510**	**5,157**	**842**

Any burns missed are to be caught up ASAP.

PROPOSED BURN SCHEDULE -- E-AREAS

	1999	2000	2001	2002	2003	2004
E-1.1		GS			GS	
E-1.2	GS			GS		
E-1.3	W		GS			GS
E-2.1	W		GS			
E-2.2	NO BURNS - (ASP)					
E-2.3	GS			GS		
E-3.1			GS			GS
E-3.2	W	GS			GS	
E-3.3	GS			GS		
E-3.4	W	GS			GS	
E-4.1	GS			GS		
E-4.2			GS			GS
E-4.3		GS			GS	
E-5.1	W		GS			GS
E-5.2	GS			GS		
E-6.1		W		GS		
E-6.2		GS			GS	
E-6.3	W		GS			GS
E-6.4		GS			GS	
E-6.5	GS			GS		
E-7.1	W		GS			GS
E-7.2	GS			GS		
E-7.3	W	GS			GS	
E-7.4			GS			GS
E-8.1			GS			GS
E-8.2		GS			GS	
E-8.3	GS			GS		
E-8.4	GS			GS		
E-9.1		GS			GS	
E-9.2	W		GS			GS
E-9.3	GS			GS		

	1999	2000	2001	2002	2003	2004
E-10.1			GS			GS
E-10.2	GS			GS		
E-10.3		GS			GS	
E-11.1	GS			GS		
E-11.2	W		GS			GS
E-11.3	W	GS			GS	
E-11.4	W		GS			GS
E-11.5	W			GS		
E-11.6	W		GS			GS
E-12.1		GS			GS	
E-12.2	W		GS			GS
E-12.3	GS			GS		
E-13.1	GS		GS			GS
E-13.2		GS		GS		
E-13.3		GS			GS	
E-13.4	W			GS		
E-13.5	W		GS			GS
E-14.0	W			GS		
E-15.1	W			GS		
E-15.2		GS			GS	
E-15.3	W		GS			GS
E-16.1	GS		GS			GS
E-16.2	W			GS		
E-16.3		GS			GS	
E-17.1	GS			GS		
E-17.2		GS			GS	
E-17.3	GS		GS			GS
E-18.1	GS			GS		
E-18.2			GS			GS
E-18.3	GS			GS		
E-18.4	W		GS			GS
E-18.5		GS			GS	

	1999	2000	2001	2002	2003	2004
E-19.1		GS			GS	
E-19.2	W			GS		
E-19.3	W		GS			GS
E-19.4	W	GS			GS	
E-19.5	GS			GS		
E-19.6		GS			GS	
E-19.7	GS			GS		
E-20.1	GS			GS		
E-20.2		GS			GS	
E-21.1	OUT OF CYCLE - LONGLEAF SEEDCATCH - NEXT BURN TBA.					
E-21.2	OUT OF CYCLE - LONGLEAF SEEDCATCH - NEXT BURN TBA.					
E-21.3	GS			GS		
E-21.4		GS			GS	
E-22.1	GS			GS		
E-22.2	OUT OF CYCLE - LONGLEAF SEEDCATCH - NEXT BURN TBA.					
E-22.3	OUT OF CYCLE - LONGLEAF SEEDCATCH - NEXT BURN TBA.					
E-22.4		GS			GS	

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
E-1	0	618	527
E-2	0	0	621
E-3	1,156	1,116	619
E-4	605	1,294	744
E-5	0	757	1,068
E-6	0	0	455
E-7	0	2,583	500
E-8	0	798	1,236
E-9	0	421	174
E-10	467	0	585
E-11	2,396	1,608	1,126
E-12	419	908	454
E-13	1,581	1,076	1,050
E-14	817	0	0
E-15	574	608	0
E-16	628	625	556
E-17	661	662	1,150
E-18	1,630	1,145	1,630
E-19	1,007	2,018	1,007
E-20	464	607	464
E-21	527	566	527
E-22	356	285	368
TOTAL	**13,289**	**17,694**	**14,859**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
E-1	527	238	0
E-2	621	1,202	0
E-3	619	0	0
E-4	0	0	0
E-5	0	0	0
E-6	1,728	2,260	0
E-7	1,072	0	0
E-8	1,522	0	0
E-9	1,193	0	0
E-10	585	898	0
E-11	0	0	0
E-12	0	0	0
E-13	537	0	0
E-14 - E-22	0	0	0
TOTAL	**8,404**	**4,598**	**0**

Any burns missed are to be caught up ASAP.

PROPOSED BURN SCHEDULE -- F-AREAS

	1999	2000	2001	2002	2003	2004
F-1.1	GS			GS		
F-1.2			GS			GS
F-1.3		GS			GS	
F-2.1			GS			GS
F-2.2		GS			GS	
F-2.3	GS			GS		
F-3.1		W		GS		
F-3.2			GS			GS
F-3.3		GS			GS	
F-4.1		GS			GS	
F-4.2	W		GS			GS
F-5.1	W		GS			GS
F-5.2	W			GS		
F-6.1		W		GS		
F-6.2		GS			GS	
F-6.3			GS			GS
F-6.4	GS			GS		
F-6.5	W		GS			GS
F-6.6	W		GS			GS
F-6.7	GS			GS		
F-7.1	W		GS			GS
F-7.2	W			GS		
F-7.3	W		GS			GS
F-7.4	GS			GS		
F-7.5	W		GS			GS
F-8.1			GS			GS
F-8.2	GS			GS		
F-8.3		GS			GS	

	1999	2000	2001	2002	2003	2004
F-9.1	GS			GS		
F-9.2	W		GS			GS
F-9.3	W				GS	
F-9.4		GS		GS		
F-9.5	GS		GS			GS
F-10.1	GS			GS		
F-10.2		GS			GS	
F-10.3	GS		GS			GS
F-11.1	W	GS			GS	
F-11.2	GS			GS		
F-11.3	W		GS			GS
F-12.1	W		GS			GS
F-12.2	GS			GS		
F-12.3		GS			GS	
F-12.4		GS			GS	
F-12.5	W	GS			GS	
F-13.1		GS			GS	
F-13.2	GS			GS		
F-14.1	W	GS			GS	
F-14.2	GS			GS		
F-14.3			GS			GS
F-15.1	GS			GS		
F-15.2		GS			GS	
F-15.3			GS			GS
F-15.4		W		GS		
F-15.5	W		GS			GS
F-16.1		GS			GS	
F-16.2	W		GS			GS
F-16.3	GS			GS		
F-17.1		GS			GS	
F-17.2			GS			GS
F-17.3	GS			GS		

	1999	2000	2001	2002	2003	2004
F-18.1		GS			GS	
F-18.2	GS			GS		
F-19.1		GS			GS	
F-19.2	GS			GS		
F-19.3	W		GS			GS
F-20.1			GS			GS
FNCOA	DEAN FIELD - ANNUAL WINTER BURN					
F-20.3	GS			GS		
F-20.4	W	GS			GS	

Any burns that are missed will be caught up ASAP.

GROWING SEASON BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
F-1	702	545	1,063
F-2	0	366	506
F-3	685	0	0
F-4	764	949	0
F-5	0	821	1,319
F-6	592	1,997	649
F-7	450	1,414	716
F-8	0	922	930
F-9	1,685	1,836	1,955
F-10	619	544	1,042
F-11	422	320	479
F-12	833	417	1,091
F-13	583	0	158
F-14	504	0	641
F-15	0	789	400
F-16	1,746	758	701
F-17	0	552	486
F-18	542	0	669
F-19	1,129	0	592
F-20	0	1,888	897
TOTAL	**11,255**	**14,118**	**15,279**

WINTER BURN ACREAGE BY TRAINING AREA

	FY 97	FY 98	FY 99
F-1	1,063	0	0
F-2	506	637	0
F-3	855	754	0
F-4	0	0	0
F-5	1,319	0	0
F-6	1,197	0	0
F-7	1,647	0	0
F-8	0	0	0
F-9	0	0	0
F-10	959	0	0
F-11	479	0	0
F-12	0	0	0
F-13	158	0	0
F-14	641	660	0
F-15	1,279	951	0
F-16	0	0	0
F-17	387	0	0
F-18	669	0	0
F-19	1,138	0	546
F-20	1,927	177	177
TOTAL	**14,224**	**3,179**	

APPENDIX 14-2k(5): Best Management Practices

Purpose: The purpose of this appendix is to provide guidelines for forest and fire management practices which are recommended in the State of Georgia.

Objective: The objective of Best Management Practices (BMPs) is to protect water quality from non-point source pollution as mandated in three federal laws, the 1972 Water Pollution Control Act (Public Law 92-500, Section 208), the 1977 Clean Water Act (Public Law 95-217), and the 1987 Clean Water Act (Public Law 100-4, Section 319).

References: The publication pertaining to BMPs in Georgia is *Georgia's Best Management Practices for Foresty* (Georgia's Forestry Commission, 1999*)*. Source for implementation of BMPs on Fort Stewart is the *Fort Stewart / Hunter Army Airfield Forest Management Plan* (Directorate of Engineering and Housing, 1992b).

Areas for BMP Consideration: Forest managers will consider and implement BMPs when planning, prescribing, or conducting forestry activities in the following categories:

- Streamside Management Zones (SMZs)
- Road locating, construction, maintenance, and retirement
- Stream crossings
- Timber harvesting
- Mechanical site preparation
- Chemical site preparation
- Site preparation burning
- Reforestation
- Prescribed burning
- Wildfire surppression
- Fertilization
- Revegetation and site stabilization

I. BMPs for Stream Management Zones

Streamside Management Zones are buffer strips adjacent to perennial or intermittent streams or other bodies of water that should be managed with special considerations to protect water quality. SMZs should be identified and clearly designated in the field with paint or flagging. Slope and type of stream determine SMZ widths. The following recommendations for minimum SMZ width (for non-trout waters) are as follows:

Slope Class	Perennial (feet)	Intermittent (feet)
Slight (<20%)	40	20
Moderate (21-40%)	70	35
Steep (>40%)	100	50

Since ephemeral areas can direct stormflow into intermittent stream channels, care should be taken to minimize disturbing the soil in these areas. Where ephemeral areas transition into well-defined intermittent or perennial streams, those areas should be treated as an intermittent stream.

A. Recommended BMPs

(1) Identify any local, State, or Federal regulations that may supersede or mandate the use of BMPs.
(2) Determine and designate the appropriate SMX width on site prior ro conducting any timber sale or forest practice.
(3) Along perennial stream, leave an average of 50 square feet of basal area per acre evenly distributed throughout the zone or at least 50% canopy cover after a harvest to provide shade.
(4) Along intermittent streams, leave an average of 25 square feet of basal area per acre evenly distributed throughout the zone or at least 25% canopy cover after a harvest to provide shade.
(5) Minimize stream crossings.
(6) Except at planned stream crossings, locate new access roads outside of the SMZ.
(7) Maintain existing roads within the SMZs with adequate water control structures and stabilization measures as needed.
(8) Locate log decks, staging areas, and skid trails outside the SMZ, preferably on well-drained, stable soils.
(9) Where used, firebreaks should be installed parallel to streams and outside SMZs.
(10) Minimize the intensity of a prescribed fire in the SMZ to maintain forest floor cover and protect the soil surface, where ecologically prudent.
(11) Periodically inspect the SMZ, evaluate the effectiveness of the BMPs, and adjust practices when necessary.

B. Practices to be Avoided Within SMZs

(1) Cutting stream bank trees.
(2) Unnecessary access roads and main skid trails.
(3) Log decks.
(4) Portable sawmills.
(5) Significant soil compaction and rutting by harvesting equipment.
(6) Removal of ground cover or understory vegetation.
(7) Felling trees into the streambed or leaving logging debris in the stream.
(8) Serving or refueling the equipment.
(9) Mechanical site preparation and site preparation burning.
(10) Mechanical tree planting.
(11) Broadcast application of fertilizers or pesticides.
(12) Handling, mixing, or storing toxic or hazardous materials.

II. BMPs for Road Location, Construction, Maintenance, and Retirement

A. Recommended BMPs

(1) Identify local, State, or Federal regulations that may supersede or mandate the use of BMPs.
(2) Use soil surveys and topographic maps to identify soils, stream location and other natural features on the property that might pose problems.

(3) Locate potential control points and stream crossings prior to designating access roads in the field.
(4) New permanent access roads should follow the contour of the land as much as possible with grades ideally kept below 10%.
(5) Temporary access roads should follow the contour of the land as much as possible. Grades can run up to 25% for short distances provide water control structures are properly installed.
(6) Except at planned stream crossings, locate new access roads outside of the SMZ.
(7) Minimize stream crossings.
(8) Minimize number, length, and width of access roads.
(9) Locate new access roads on high ground, preferably on the sides of ridges for proper surface drainage.
(10) Conduct site reconnaissance to verify road layout with potential soil problems, stream locations, sensitive areas and watershed conditions.
(11) Evaluate the condition of existing roads and potential water quality impacts. If necessary, plan for improvements or replace with new routes.
(12) Construct access roads only wide enough.
(13) Schedule construction during favorable weather.
(14) On crown and ditch roads, install water turnouts at proper intervals. Turnouts should never tie directly into streams or water bodies. If necessary, outfall of turnouts may need sediment barriers such as rock, hay bales, or silt fence installed.
(15) Keep roads free from obstructions and logging debris.
(16) Roadbeds on erosive soils should be stabilized with appropriate measures.
(17) Stabilize exposed soil on shoulders of permanent of temporary access roads located within SMZs, wetlands, or at stream crossings as soon as possible using appropriate methods (i.e., seeding, mulching, silt fencing, hay bales, geotextiles, etc.)
(18) Retire temporary roads, log decks, skid trails by reshaping and stabilizing, as appropriate.
(19) Keep outfall of water turnouts open at all times.

B. Practices to be Avoided When Constructing and Maintaining Roads

(1) Except at planned stream crossings, road construction inside the SMZ.
(2) Insloping of roads.
(3) Using ditches on steep roads.
(4) Turnouts tied directly into perennial and intermittent streams or ephemeral areas.
(5) Excessive traffic on wet roads.

III. BMPs for Stream Crossings

The Federal Clean Water Act, Section 404, exempts normal, established, ongoing silvacultural activities from the permitting process for discharges or dredged material in jurisdictional wetlands. However, 15 baseline provisions for forest road construction and maintenance in and across waters of the U.S. are mandated to qualify for forest road exemption as identified in the 1999 Georgia's Best Management Practices for Forestry.

A. *Recommended BMPs*

(1) Approaches to all permanent or temporary stream crossings should be made at gentle grades of slope (3% or less) wherever possible.
(2) Approaches should be made at right angles to stream flow where practical.

(3) Approaches should have water control structures on both sides of a crossing to prevent road runoff from entering the stream.
(4) Stabilize approaches, if necessary, with rock extending at least 50 feet from both sides of the stream bank during the operation.
(5) For temporary access roads, temporary bridges or spans are favored over culverts or fords.
(6) Build wetlands fill roads outside the SMZs, except when crossing the channel.
(7) Stabilize exposed soil around permanent or temporary stream and wetlands crossings with any one or combination of the following: seed and mulch, hay bales, rock, silt fence, geotextiles, and/or excelsior blankets.
(8) With watershed of 300 acres or more, use bridges to cross streams if other alternatives are not suitable for containing storm flows.
(9) Remove temporary bridges and stabilize approaches and stream banks when operations are completed.
(10) Use fords only for haul roads (not skid trails).
(11) Locate fords where stream banks are low and the bottoms are relatively hard and level.
(12) Where necessary, establish a smooth, hard-surface, low water crossing. For permanent fords use gravel or rock filled Geoweb or concrete pads. For temporary fords use dragline mats or logs to armor the stream bottom.
(13) Material should not significantly impound stream flow, impede fish passage or cause erosive currents. Remove temporary crossings from the channel when operations are completed.
(14) Where fords are not available or recommended, culverts can be used to cross small streams including braided streams in broad flats.
(15) When crossing streams with a watershed larger than 300 acres, consult a qualified professional.
(16) Size permanent culverts so that the cross-sectional area will accommodate expected 25-year, 24-hour storm flows.
(17) Size temporary culverts so that the cross sectional area will accommodate the 2-year, 24-hour storm flows.
(18) Culverts under 15 inches in diameter are not recommended.
(19) Multiple culverts should be spaced at a distance of at least one-half the culvert's diameter.
(20) Place the culvert in a straight section of the stream and free of obstructions.
(21) Place the bottom of the culvert at the same elevation as the bottom of the stream.
(22) Place fill dirt around the lower half of the culvert and pack during installation.
(23) Place at least 15 inches or at least one-third the culverts diameter, whichever is greater, of fill dirt over the top of the culvert so that the fill over the culvert is the high spot in the stream crossing.
(24) The culvert's end should be long enough to achieve no more than a 2:1 slope on the fill.
(25) Stabilize fill at the ends of a culvert with either rip-rap, Geoweb, excelsior blankets, gabions, headwalls, grass seed and mulch, hay bales, etc.
(26) Periodically inspect culverts and remove any debris inside.
(27) Remove all temporary culverts and fill material used in the stream or wetland crossing and stabilize streambanks when operations are completed.

B. Practices to be Avoided When Constructing Stream Crossings

(1) Using steep approaches into the streams.
(2) Crossing at bends in the stream.
(3) Using fords in streams for skid trails.
(4) Constructing hard surface crossings on streams with mucky, muddy or unstable bottoms.
(5) Using asphalt materials for low water crossings.

(6) Anything that impedes the free flow of expected flow of water.
(7) Temporary crossings of logs and brush "topped" with soil.
(8) Using undersized culverts.

IV. BMPs for Timber Harvesting

A. Recommended BMPs

(1) Locate log decks before planning the road system.
(2) Minimize the number of log decks necessary for the operation.
(3) Minimize the size of log decks.
(4) Locate log decks uphill and skid up hill to them.
(5) Locate log decks in a stable, well-drained area away from gullies when possible.
(6) Stabilize as needed when the harvest is completed.
(7) Have periodic breaks in grade of skid trails to help disperse surface flows.
(8) Use temporary closure techniques for skid trails if significant erosion may occur before permanent closure techniques are installed.
(9) Where needed, retire skid trails as soon as possible with properly installed water control structures. Use low ground equipment, logging mats, or other techniques on saturated soils where practical.
(10) Minimize the grad of skid trails.
(11) Wash and service equipment away from any area that may create a water quality hazard, especially within SMZs and along ephemeral areas.
(12) Dispose of oils, lubricants, their containers and other wastes according to local, State and Federal regulations.
(13) Clean up and/or contain fuel and oil spills immediately.
(14) Use techniques that minimize soil disturbance, such as backing trees out with machine, using low ground pressure equipment with booms or cable winch.
(15) Maintain the integrity of stream banks.
(16) Minimize the exposure of mineral soil by spreading logging slash and using it to drive over.
(17) Plan the timber harvest for the dry season when possible.
(18) Concentrate skid trails and use logging slash, mats or other techniques to minimize soil compaction and rutting.
(19) Use practices conducive to rapid regeneration.

B. Practices to be Avoided

(1) Locating log decks within the SMZ.
(2) Allowing log decks to concentrate storm runoff onto roads, trails, or direct paths leading to a watercourse.
(3) Using streams and drains with defined channels as skid trails.
(4) Main skid trails within SMZs.
(5) Facilitating the potential movement of sediment to a stream or body of water.
(6) Breaking down the integrity of a stream bank.
(7) Washing or servicing equipment where it could affect water quality.
(8) Using trees or de-limbing gates in the SMZs.
(9) Leaving tops in stream channels.
(10) Rutting.

V. BMPs for Site Preparation and Reforestation

A. Recommended BMPs

(1) Plan the site preparation job before starting to ensure that the best treatment is implemented.
(2) Use the minimum intensity of site preparation required.
(3) On slopes of 6-10%, intensive mechanical methods should follow the contour of the land.
(4) On slopes of 11-20%, mechanical methods, other than chopping, should follow the contours of the land.
(5) Where accelerated erosion is likely, use methods that leave logging debris and other litter scattered evenly over the site.
(6) When constructing beds on slopes greater than 5%, follow the contour of the land.
(7) Protect the forest floor and limit soil disturbance in stabilized gullies that are not eroding.
(8) When using chemicals to site prep, consider weather conditions, equipment capabilities and pesticide formulations to avoid pesticide drift into the SMZ.
(9) Conduct all on-site pesticide handling away from streams, ponds, wells, and roadside ditches.
(10) Dispose of pesticide containers and/or excess pesticides according to local, State, and Federal regulations and label requirements.
(11) Clean up and/or contain all pesticide spills immediately.
(12) Unless protected by natural barriers, the area to be burned should be protected by firebreaks installed following BMP recommendations, if ecologically appropriate.
(13) Moisture levels within the soil, forest fuels, and the air should be sufficient to prevent major exposure or damage to the mineral soil, especially on moderate to severely erosive soils.
(14) Exclude high intensity site preparation fires from the SMZ, unless ecologically appropriate.
(15) Where possible, use natural barriers such as roads, streams, and fields as firebreaks.
(16) Install firebreaks on the contour as much as possible.
(17) When firebreaks cannot be installed on the contour, use a gradual grade.
(18) Use bladed or harrowed firebreaks instead of plowed firebreaks whenever possible.
(19) On slopes exceeding 3%, install water bars with water turnouts in firebreaks according to BMP recommendations for skid trail retirement.
(20) Use hand tools or back blade firebreaks away from the edge of streams, roads, or gullies.
(21) Install water bars and water turnouts at approaches to streams, roads, and gullies to prevent channeling water from firebreaks into these areas.
(22) Treat active gullies the same as streams, using appropriate buffers and plowing practices.
(23) Hand plant on >21% slopes with severely erosive soils.
(24) Machine plant on the contour on slopes between 5% and 20%.

B. Practices to be Avoided

(1) Any mechanical methods except drum roller chopping or spot cultivation on slopes greater than 30%.
(2) Intensive mechanical methods on slopes greater than 20% with sever erosion potential.
(3) Windrow construction that could direct runoff into waterways.
(4) Mechanically preparing sites when soils are saturated.
(5) Mechanical methods in SMZs.
(6) Blocking any drainage with beds, windrows, or similar structures.
(7) Bedding that channels surface runoff into waterways and roadbeds.
(8) Moving soil into windrows and piles.

(9) Re-activating stabilized gullies.
(10) Applying a pesticide directly to water bodies, unless it is specifically prescribed and labeled for aquatic management.
(11) Broadcast applications of pesticides within SMZs.
(12) Firebreaks that channel surface runoff into streams, roads, or gullies.
(13) Plowing inside the SMZ.
(14) Machine planting up and down slopes greater than 5%.
(15) Machine planting within SMZs.

VI. BMPs for Prescribed Burning, Wildfire Suppression, Fertilization, and Revegetation

A. Recommended BMPs

(1) Follow the same BMPs for site preparation burning for prescribed burning.
(2) Locate camps and staging areas for wildfire suppression on upland sites.
(3) Stabilize areas designated for water supply points and dip sites for helicopters to prevent excessive rutting from support equipment.
(4) Mix and /or handle fire retardants, lubricants, etc. away from streams, ponds, wells, and roadside ditches.
(5) Repair wildfire suppression firebreaks as soon as practical after the fire is under control to meet BMPs for pre-suppression plowing.
(6) Consider weather conditions and equipment capabilities to avoid fertilizer drift in the SMZ.
(7) Conduct all on-site fertilizer handling away from streams, ponds, wells, and roadside ditches.
(8) Clean up and/or contain all fertilizer spills immediately.
(9) Dispose of fertilizer containers and/or excessive fertilizer according to local, State, and Federal regulations and label requirements.
(10) Follow the seeding mixture and liming guidelines for erosion control planting as outlined in the 1999 Georgia's Best Management Practices for Forestry.

B. Practices to be Avoided

(1) Applying fertilizer directly to water bodies unless specifically prescribed and approved for aquatic management.
(2) Applications of fertilizer within SMZs.

APPENDIX 14-3a(2)(d): Upland Game Management Plan and Burn Schedule for Upland Game Management Area.

Northern bobwhite have experienced a broad scale decline over most of their range. This trend is reflected in Fort Stewart's bobwhite population. Observations of people who have worked and hunted on Fort Stewart for more than a decade suggest that bobwhite and other upland species were once abundant on the installation, but are now scarce. In order to reverse the decline of Fort Stewart's upland game populations, Fort Stewart Fish and Wildlife and Forestry will take actions to improve the installation's upland game habitat and collect data on the bobwhite population to measure the effectiveness of these management actions. Management actions will be aimed primarily at quail, but are expected to benefit other species as well.

Management Area

Upland game management on Fort Stewart will be concentrated on approximately 20,000 acres, including the following management units (see attached map):

E13.1, E13.2

E15.1

E16.1, E16.2

E17.1, E17.2, E17.3

E18.1, E18.2, E18.3, E18.4, E18.5

E19.1, E19.2, E19.3, E19.4, E19.5, E19.6, E19.7

E20.1, E20.2

E21.1, E21.2, E21.3, E21.4

E22.1, E22.2, E22.3, E22.4

F7.1, F7.2

F8.1

F9.1, F9.2, F9.3

F10.1, F10.2, F10.3

F11.2

The management units listed above possess the greatest abundance of bobwhite, and the terrain best suited for upland game management on the installation. This area is also heavily used for mechanized training. The proper land management regime for mechanized training is similar to an upland game management regime in that both land uses require frequent prescribed burning and broad expanses of open, upland terrain. Additionally, the soil disturbance and resulting vegetation produced by mechanized training are beneficial to upland wildlife.

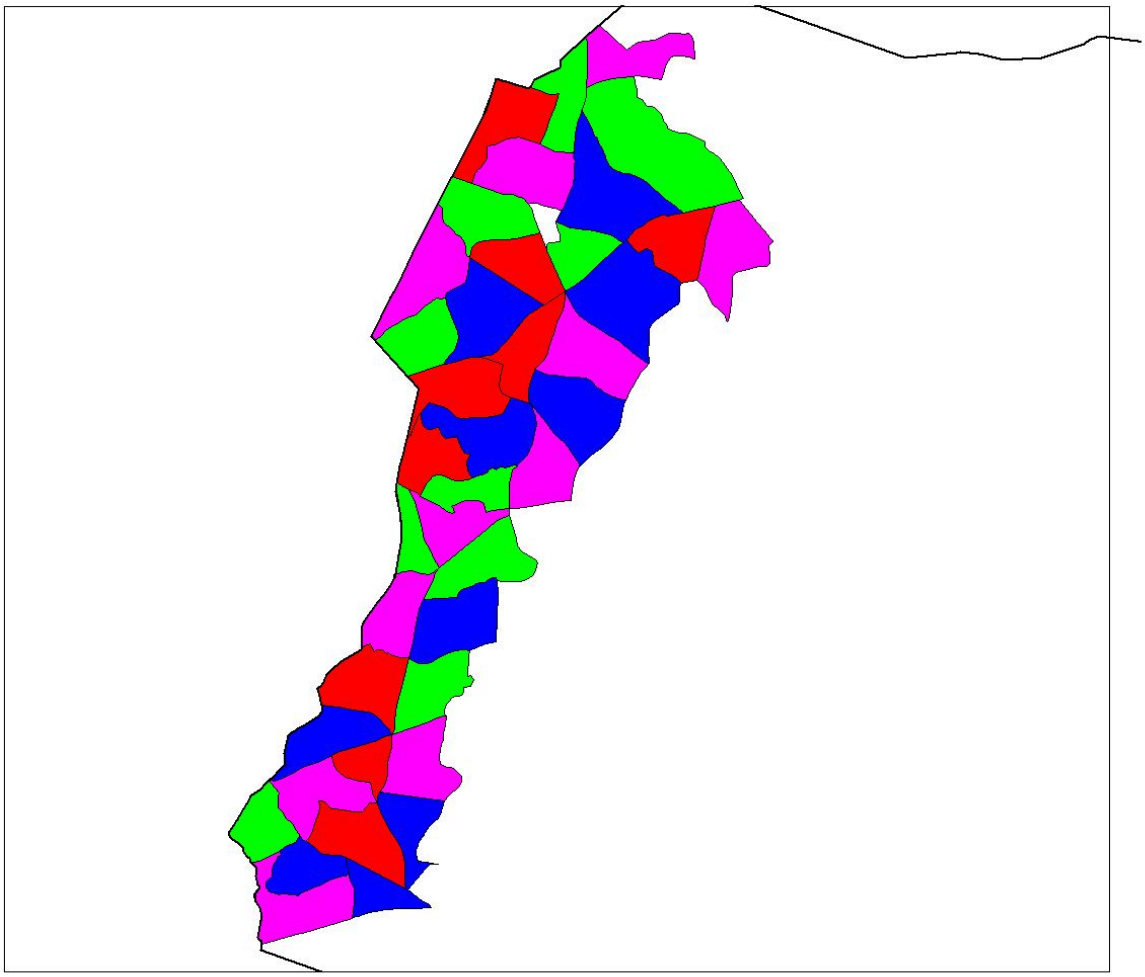
Habitat Management

Prescribed Burning

Frequent burning favors the growth of annuals, many of which are preferred food sources for bobwhite and other upland wildlife. Additionally, bobwhite prefer the more open condition created by frequent fire. In order to provide optimum habitat for upland game and tactical vehicle maneuver, Fort Stewart's upland game management area will be burned on a two year rotation with half of the area burned in one year, and the other half burned the following year. Such a rotation would achieve the necessary vegetation control and still provide sufficient cover.

Since the effects of fire during the nesting season are poorly understood, burn treatments in the quail management area will alternate between March burns (prior to the nesting season) and peak lightning season burns (April through August). Lightning season fire will destroy some nests and chicks, but will achieve superior vegetation control, and comply with endangered species and ecosystem management guidelines. Half of each years burns in the upland game management area will be March burns and half lightning season burns. To facilitate the described rotation and aid in planning other management actions around the burn rotation, each training area in the upland game management area has been divided into natural resource management units that average 500 ac. in size, since 500 ac. is the minimum average size block that may easily be burned by helicopter. To insure the availability of cover and nesting material, prescribed fire will be scheduled so that adjacent burn blocks will be on a different annual rotation (burned in different years) or different seasonal rotation (burned in the same year, but different seasons). See attached map and table.

TITLE: Annual Burn Rotation
LOCATION: FORT STEWART, GEORGIA



Scale: 1:322659

no data
Even Year Rotation A
Even Year Rotation B
Odd Year Rotation A
Odd Year Rotation B

Table 1. Proposed burn schedule for upland game management area.

	1997	1998	1999	2000	2001	2002	2003	2004
E13.1 DC94	WINTER		SUMMER		MARCH		SUMMER	
E13.2 JA 96		MARCH		SUMMER		MARCH		SUMMER
E15.1 DC94			SUMMER		MARCH		SUMMER	
E16.1 AP96			SUMMER		MARCH		SUMMER	
E16.2 MY96		MARCH		SUMMER		MARCH		SUMMER
E17.1 JA96	MARCH		SUMMER		MARCH		SUMMER	
E17.2 MY96		MARCH		SUMMER		MARCH		SUMMER
E17.3 MY96			SUMMER		MARCH		SUMMER	
E18.1 JA95	SUMMER		MARCH		SUMMER		MARCH	
E18.2 AP96		SUMMER		MARCH		SUMMER		MARCH
E18.3	SUMMER		MARCH		SUMMER		MARCH	

GS95								
E18.4 GS94	MARCH		SUMMER		MARCH		SUMMER	
E18.5 DC92		MARCH		SUMMER		MARCH		SUMMER
E19.1 JA95		SUMMER		MARCH		SUMMER		MARCH
E19.2 JA95		SUMMER		MARCH		SUMMER		MARCH
E19.3 JA95		MARCH		SUMMER		MARCH		SUMMER
E19.4 JA95		SUMMER		MARCH		SUMMER		MARCH
E19.5 JA95	SUMMER		MARCH		SUMMER		MARCH	
E19.6 MY96	MARCH		SUMMER		MARCH		SUMMER	
E19.7 DC93	SUMMER		MARCH		SUMMER		MARCH	
E20.1 JA95	MARCH		SUMMER		MARCH		SUMMER	
E20.2 GS96		SUMMER		MARCH		SUMMER		MARCH

E21.1 GS96		MARCH		SUMMER		MARCH		SUMMER
E21.2 GS95		SUMMER		MARCH		SUMMER		MARCH
E21.3 JA96	MARCH		SUMMER		MARCH		SUMMER	
E21.4 JA96		SUMMER		MARCH		SUMMER		MARCH
E22.1 JA95	SUMMER		MARCH		SUMMER		MARCH	
E22.2 GS95		MARCH		SUMMER		MARCH		SUMMER
E22.3 JA95			SUMMER		MARCH		SUMMER	
E22.4 GS95		MARCH		SUMMER		MARCH		SUMMER
F7.1 DC95		SUMMER		MARCH		SUMMER		MARCH
F7.2 GS95			SUMMER		MARCH		SUMMER	
F8.1 AP96		MARCH		SUMMER		MARCH		SUMMER
F9.1	SUMMER		MARCH		SUMMER		MARCH	

GS95								
F9.2 JA95		MARCH		SUMMER		MARCH		SUMMER
F9.3 AP96	SUMMER		MARCH		SUMMER		MARCH	
F10.1 JA95	MARCH		SUMMER		MARCH		SUMMER	
F10.2 DC90	WINTER	SUMMER		MARCH		SUMMER		MARCH
F10.3	WINTER		MARCH		SUMMER		MARCH	
F11.2 DC94	WINTER		SUMMER		MARCH		SUMMER	

Timber Management

Bobwhite prefer open woodlands of about 25 or 30 square feet of basal area/acre. Such woodlands provide conditions suited to tactical vehicle maneuver, and allow sunlight to reach the ground cover, which encourages growth and increases the production of many of the bobwhite's preferred foods. Since red-cockaded woodpecker management guidelines require that upland areas be maintained between 50 and 80 basal area, optimum basal area for quail are not feasible except in areas where training requires such a low basal area. Timber sales will be conducted frequently on uplands within the upland game management area in order to maintain 50 square feet of basal area per acre in the upland game management area. Shelterwood cuts will be

prescribed to maintain a balance of age classes in longleaf stands. In order to coordinate thinning operations with the burn schedule, timber will be marked as needed following March burns. This would allow as much as 29 months between burns to mark timber, conduct the sale and cut. Management units should be inspected with each March-burn to determine whether the unit contains sufficient timber in excess of 50 square feet of basal area per acre to conduct a timber sale.

Strip Disking

Soil disturbance, such as that achieved from disking sets biological succession back to its earliest seral stage on the disturbed site. Many of the annual forbes that volunteer on these disturbed sites are preferred food sources for bobwhite and other upland species. Disked strips will also function as fire breaks and will allow bobwhites better access to dense fields of broomsedge during the brood-rearing season. Disking is most effective in open, upland areas when annual forbes begin to be crowded out by less desirable grasses and woody vegetation. Strips should be disked on each management unit just prior to the burning of the management unit so that the disked strip will be an effective firebreak. Strips disked in December will produce heavy-seeded quail foods such as partridge pea, croton, and ragweed and will serve as fire breaks for March burns. Strips disked in April-June will produce beggarweed, panicgrass, and plants attractive to insects, and will serve as firebreaks for summer burns.

Feed Patches

The habitat management practices described previously should insure an ample food supply for a huntable populations of bobwhite and cotton-tails. The primary objective of planted feed

patches will be to increase quail hunter success by concentrating the birds for the hunter. There are approximately 30 feed patches planted with *Lespedeza thunburgii* and *Lespedeza bicolor* in the area proposed for upland game management. Many of these feed patches are located in overly dense forests. Others have been damaged by military training. Thinning the forest down to 50 square feet of basal area per acre will improve many feed patches. Clear cutting a chains width around feed patches will relieve competition from surrounding vegetation and will improve shooting by allowing the hunter to get between his quarry and the surrounding forest. Light disturbance by tracked vehicles will probably not damage Lespedeza while it is dormant, but may damage it during the growing season. For this reason, fish and wildlife personnel will inspect each Lespedeza patch early each Spring to insure that all of the patches have signs that are plainly visible to training soldiers so that no patch is destroyed unnecessarily. In the future, feed patches should be located on fingers or other upland terrain out of the way of tracked vehicles. Each Lespedeza patch should be scheduled for burning just prior to the March burning of the burn block in which the patch is located.

In addition to the areas Lespedeza patches there are 4 fields annually planted with browntop millet and Egyptian wheat. To increase bobwhite use of these fields the surrounding forest will be thinned down to 50 square feet of basal area per acre, and escape cover will be increased in the fields. Each year 2 strips should be disked (one in December, one in March) around each field in a decreasing concentric fashion starting at the tree line and working into the field until the first disked strip becomes dominated by woody vegetation, at which point the first strip is redisked and the rotation begins again. It will take several years before the first disked strips offer suitable escape cover for bobwhite. In the meantime supplemental cover will be provided

using discarded Christmas trees. Soil samples will be analyzed for all feed patches every 4 years in conjunction with Summer burning and feed patches should be limed and fertilized as needed.

Population Management

Quail Harvest

If we desire a given bobwhite population density, then we need to insure that the population is not diminished beneath a level that can produce the desired density. It has been demonstrated that the best quail lands can readily support a Fall population density of a bird per acre. It is not known whether Fort Stewart could ever support such a high population density, but the goal of a bird per acre is a good place to start. If several years of data demonstrate that, within the spectrum of feasible management actions, no amount of birds left unharvested will produce a Fall population density of a bird per acre, then the harvest may be increased and the population diminished nearer to, but no lower than, the level needed to produce the maximum Fall population density feasible.

A census using trained bird dogs will be conducted prior to each hunting season to estimate the number of birds that may be harvested from an area without diminishing the reproductive potential of the population. Until the Fall population of an area exceeds by 10%, the number of bobwhites needed to produce a population density of 1 bird per acre in the subsequent Fall population, no more than 10% of the areas population will be harvested.

At the close of hunting season a mark and recapture population estimate of harvested areas will be conducted to estimate the areas residual population, the Fall - Winter natural mortality, obtain additional sex ratio and production data, and calibrate the bird dog census. Bands recovered from harvested birds will also provide survivorship and movement data.

Each June a cock call survey of the quail management area will be conducted to determine the relative abundance of quail across the area and over time. These surveys will serve as an index of the quality of the breeding habitat.

Quail and Season of Fire

Within the last 3 years Fort Stewart Forestry and Fort Stewart Fish and Wildlife have begun to implement a prescribed growing-season fire program that calls for growing-season fire on a 2 to 4-year cycle in Fort Stewart's red-cockaded woodpecker habitat (See the attached Burn Schedule for the Upland Game Management Area). Since most quail lands are burned in late February or early March, the effects of growing season fire on bobwhite production are poorly understood and may have management implications. Data from the cock call survey will be compared against the burn records to determine whether season of fire has an effect on bobwhite habitat selection. A radio telemetry study should be conducted to determine the effects of growing season fire on bobwhite production.

Funding for Upland Game Management

The most effective management actions open to Fort Stewart Game Management are prescribed fire, strip disking, and thinning the forest. Fort Stewart Forestry and Fish and Wildlife are required to conduct prescribed burns for endangered species management and for fire control purposes. In many instances, strips will be disked for fire control purposes. Forests will need to be thinned to improve endangered species habitat and to improve conditions for tactical vehicle maneuvers. Army guidelines require Fort Stewart Forestry and Fort Stewart Fish and Wildlife to implement each of these management actions for reasons other than game

management, so the bulk of game management's actions may be accomplished with little added 21x expenditures.

Management actions that will be funded by 21x include planting and maintaining feed patches, and collecting and analyzing population data. Some effort should be made to estimate revenues from quail hunting so that game management will know how much should be reinvested in improving quail hunting on Fort Stewart. It is doubtful that quail hunting on Fort Stewart currently generates much income for the installations game management program. However, the lack of quail hunting on Fort Stewart can probably be attributed to the lack of quail on the installation. Quail hunting remains popular on lands with an abundance of birds. Quail hunting has proven lucrative on private lands that offer good hunting. While it is true that many private shooting preserves offer accommodations not available on Fort Stewart, it is also true that few private lands possess the resources that Fort Stewart does. With the resources Fort Stewart has and the management regime proposed in this plan, Fort Stewart should be able to offer good wild bird hunting at a lower price than private shooting preserves, and once established, the program should be self-supporting.

The proposed study of the effects of growing season fire on bobwhite production would be difficult for Fort Stewart Fish and Wildlife to fund entirely. A cooperative effort between Fort Stewart Fish and Wildlife, Quail Unlimited, Georgia Department of Natural Resources, or other organizations may make such a study feasible. Such organizations will be contacted and the possibility of a cooperative effort explored

Service Interim Guidelines For Recommendations On
Communications Tower Siting, Construction, Operation, and Decommissioning

1. Any company/applicant/licensee proposing to construct a new communications tower should be strongly encouraged to collocate the communications equipment on an existing communication tower or other structure (*e.g.,* billboard, water tower, or building mount). Depending on tower load factors, from 6 to 10 providers may collocate on an existing tower.

2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), using construction techniques which do not require guy wires (*e.g.,* use a lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration regulations permit.

3. If constructing multiple towers, providers should consider the cumulative impacts of all of those towers to migratory birds and threatened and endangered species as well as the impacts of each individual tower.

4. If at all possible, new towers should be sited within existing "antenna farms" (clusters of towers). Towers should not be sited in or near wetlands, other known bird concentration areas (*e.g.,* state or Federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.

5. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.

6. Tower designs using guy wires for support which are proposed to be located in known raptor or waterbird concentration areas or daily movement routes, or in major diurnal migratory bird movement routes or stopover sites, should have daytime visual markers on the wires to prevent collisions by these diurnally moving species. (For guidance on markers, see *Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute, Washington, D.C., 78 pp*, and *Avian Power Line Interaction Committee (APLIC). 1996. Suggested Practices for Raptor Protection on Power Lines. Edison Electric Institute/Raptor Research Foundation, Washington, D.C., 128 pp.* Copies can be obtained via the Internet at http://www.eei.org/resources/pubcat/enviro/, or by calling 1-800/334-5453).

7. Towers and appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint". However, a larger tower footprint is preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above ground obstacles to birds in flight.

8. If significant numbers of breeding, feeding, or roosting birds are known to habitually use the proposed tower construction area, relocation to an alternate site should be recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.

9. In order to reduce the number of towers needed in the future, providers should be encouraged to design new towers structurally and electrically to accommodate the applicant/licensee's antennas and comparable antennas for at least two additional users (minimum of three users for each tower structure), unless this

design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.

10. Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site.

11. If a tower is constructed or proposed for construction, Service personnel or researchers from the Communication Tower Working Group should be allowed access to the site to evaluate bird use, conduct dead-bird searches, to place net catchments below the towers but above the ground, and to place radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems.

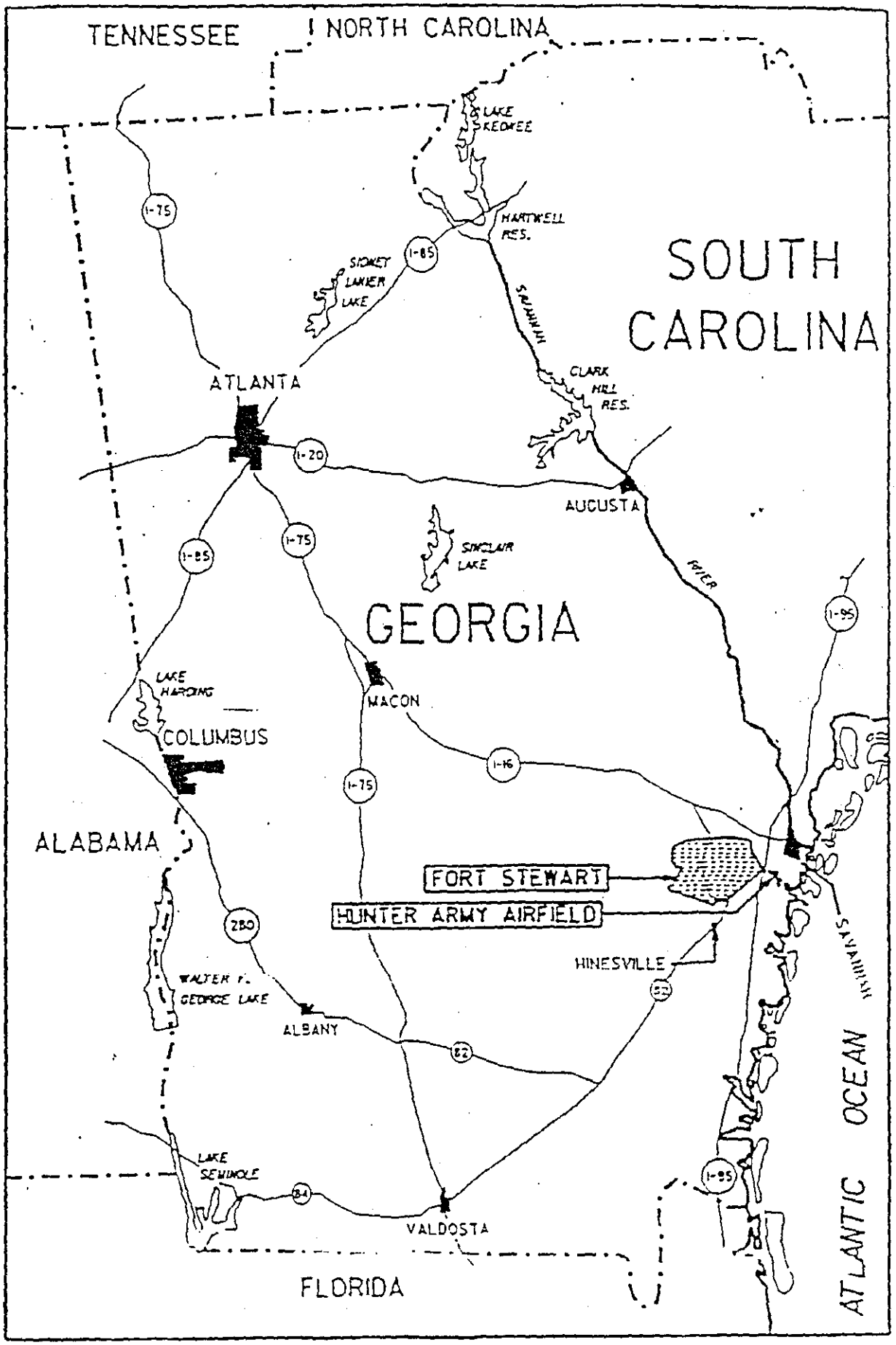
12. Towers no longer in use or determined to be obsolete should be removed within 12 months of cessation of use.

APPENDIX 22-5d: Environmental Program Requirements

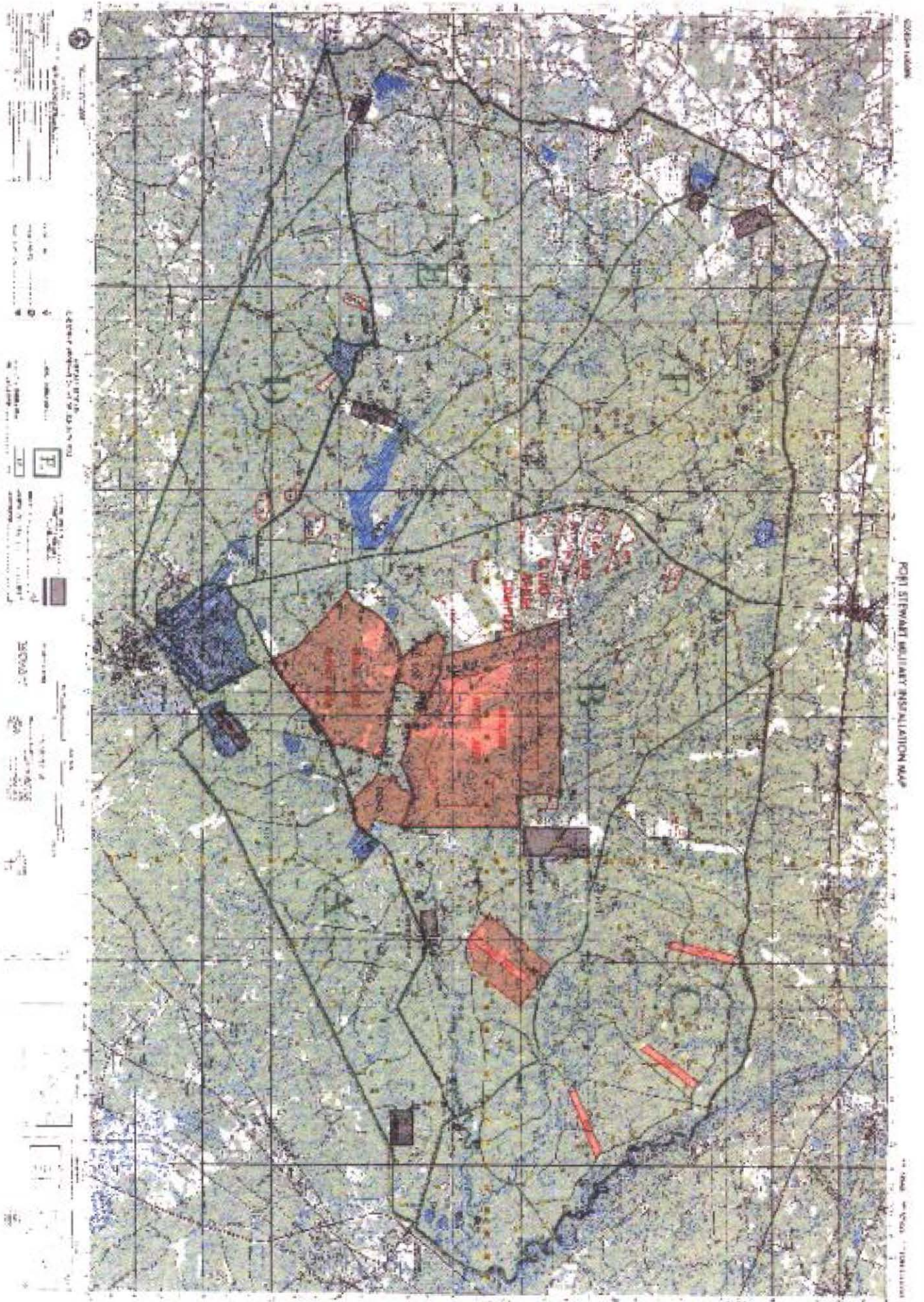
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FORT STEWART, GEORGIA

MAPS

MAP 2-1: General Location of Fort Stewart, Georgia

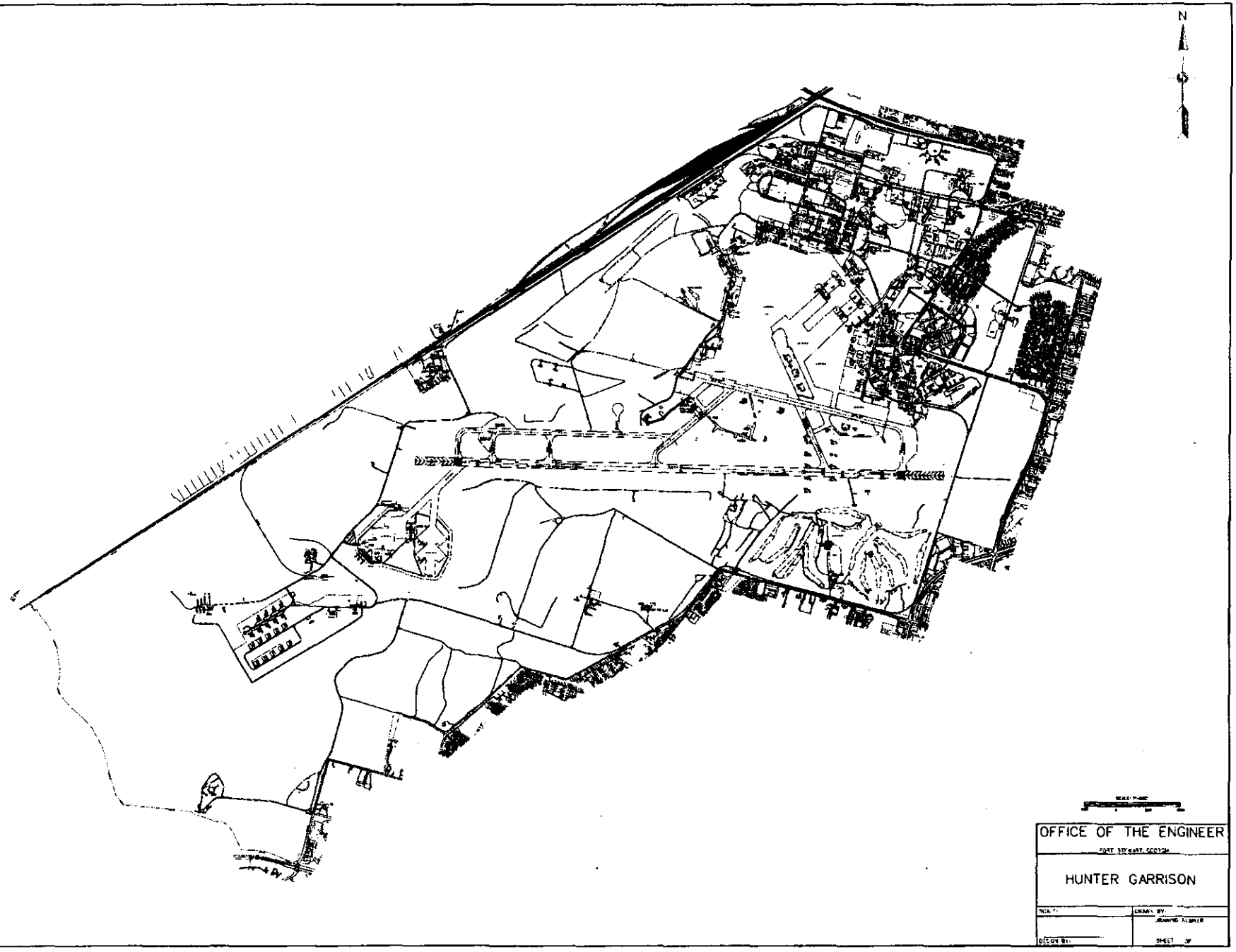

TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
FLORIDA
ATLANTA
AUGUSTA
MACON
COLUMBUS
ALBANY
VALDOSTA
HINESVILLE
FORT STEWART
HUNTER ARMY AIRFIELD
LAKE SEMINOLE
WALTER F. GEORGE LAKE
LAKE HARDING
SINCLAIR LAKE
STONE MTN. LAKE
HARTWELL RES.
CLARK HILL RES.
SAVANNAH
ATLANTIC OCEAN
I-75
I-85
I-20
I-16
I-95
280
82
84

MAP 4-1a: Fort Stewart, Georgia



Map 4-1a

MAP 4-1b: Hunter Army Airfield, Georgia

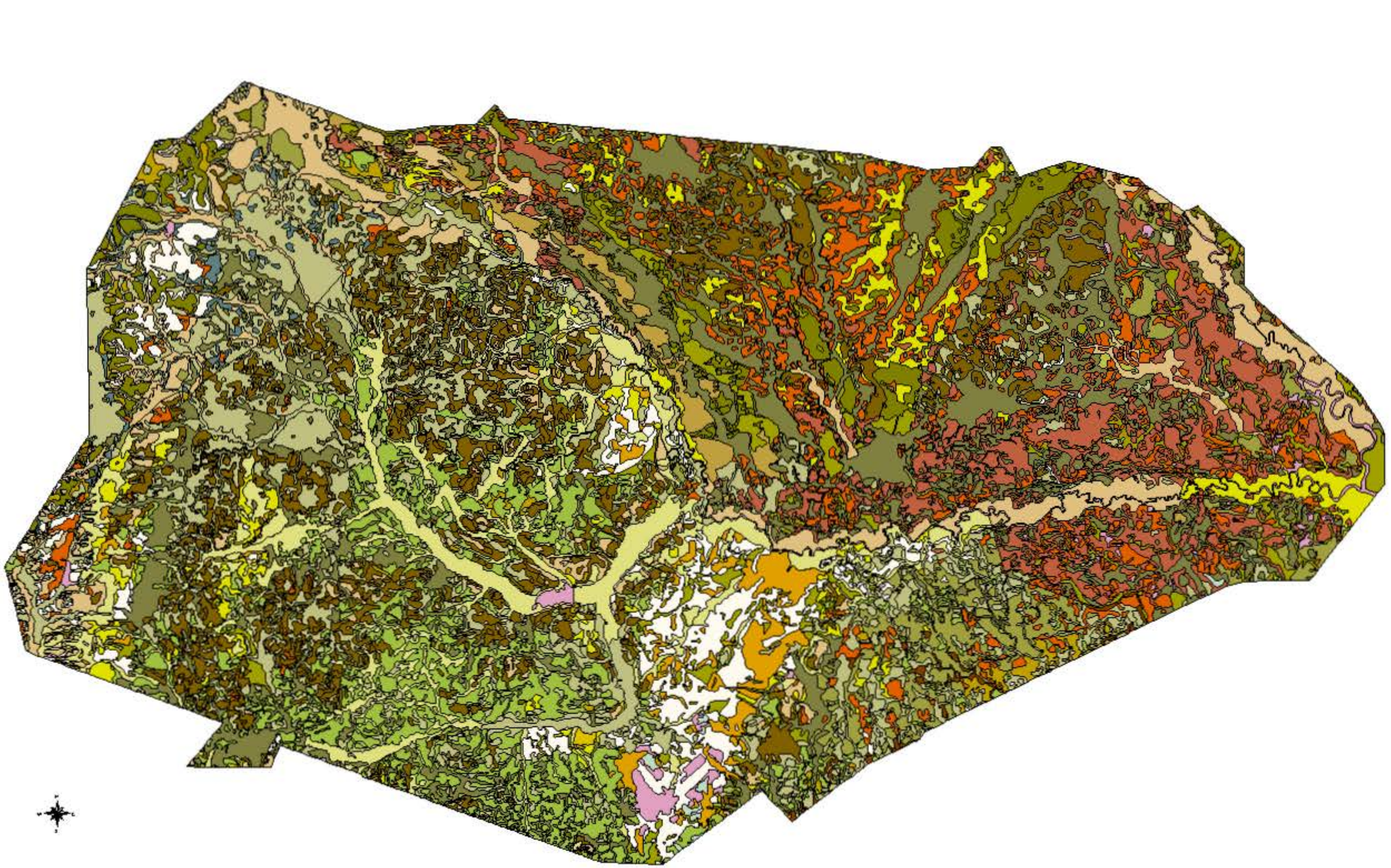


Map 4-1b

MAP 7-4: Fort Stewart Soils[1]

[1] **Map produced by GIS from NRCS soil survey completed in 1996.**

Fort Stewart Soils

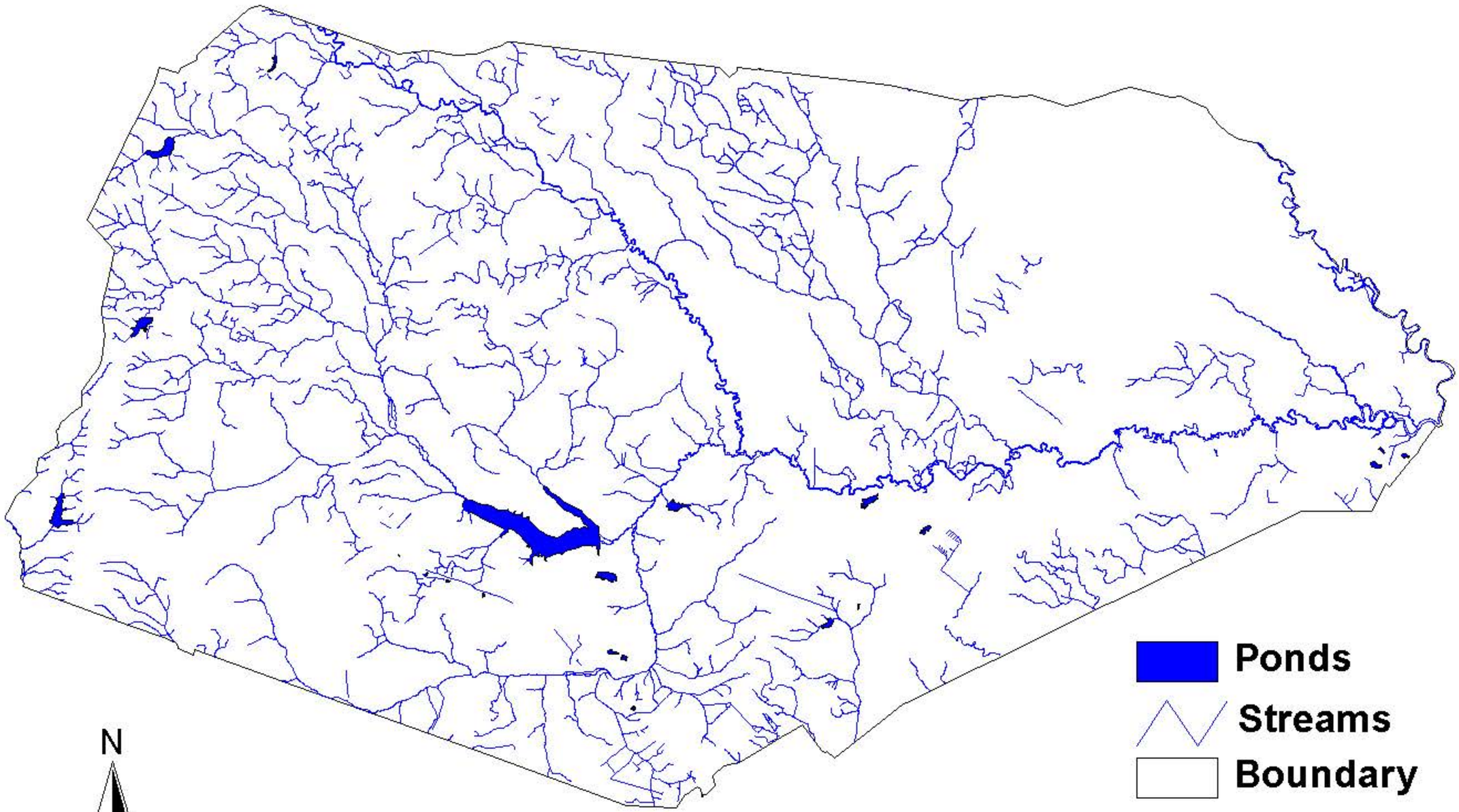


Soils.shp
- Albany fine sand
- Albany loamy fine sand
- Albany sand
- Angelina and Bibb soils
- Bayboro loam
- Bladen fine sandy loam
- Blanton sand
- Bonifay fine sand
- Borrow Pit
- Cape Fear fine sandy loam
- Cape Fear soils
- Carnegie sandy loam
- Cemetery
- Chipley fine sand
- Chipley sand
- Chipley-Urban land complex
- Coastal beach
- Cowarts loamy sand
- Craveb loamy fine sand
- Craven fine sandy loam
- Dothan loamy sand
- Echaw and Centenary fine sands
- Echaw-Urban land complex
- Ellabelle loamy sand
- Eulonia fine sandy loam
- Foxworth fine sand
- Fresh water swamp
- Fuguay loamy sand
- Fuquay loamy sand
- Hydraquents
- Irvington loamy sand
- Johnston and Bibb soils
- Johnston loam
- Kershaw coarse sand
- Kershaw sand
- Lakeland sand
- Leefield loamy and
- Leefield loamy sand
- Leon fine sand
- Lucy loamy sand
- Lynn Haven sand
- Made land
- Mandarin fine sand
- Mandarin-Urban land complex
- Mascotte fine sand
- Mascotte sand
- Mascotte-Urban land complex
- Meggett loam
- Ocilla complex
- Ocilla loamy fine sand
- Ogeechee loamy fine sand
- Olustee fine sand
- Osier and Bibb soils
- Osier soils
- Pelham loamy sand
- Pits
- Ponzer muck
- Pooler fine sandy loam
- Pooler-Bladen complex
- Riceboro loamy fine sand
- Rutlege fine sand
- Sand Pond
- Stilson loamy sand
- Tifton laomy sand
- Tifton loamy sand
- Tifton sandy loam
- Udorthents
- Unkown
- WATER
- Wahee association
- Wahee sandy loam
- Wahee-Urban land complex
- no data

8 0 8 16 Miles

MAP 7-5a(1): Fort Stewart Surface Water

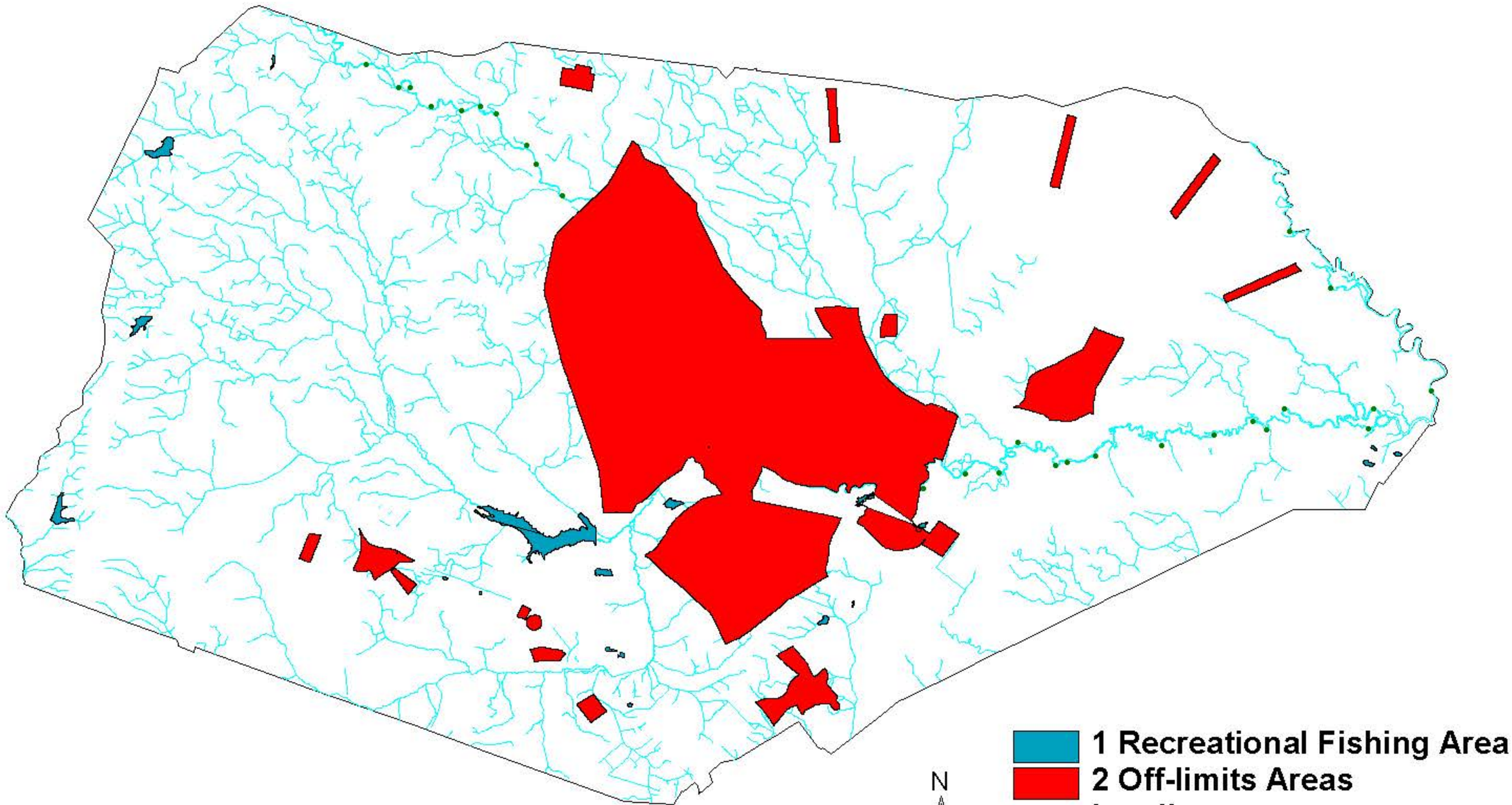
Ft. Stewart Surface Waters



5 0 5 10 15 Miles

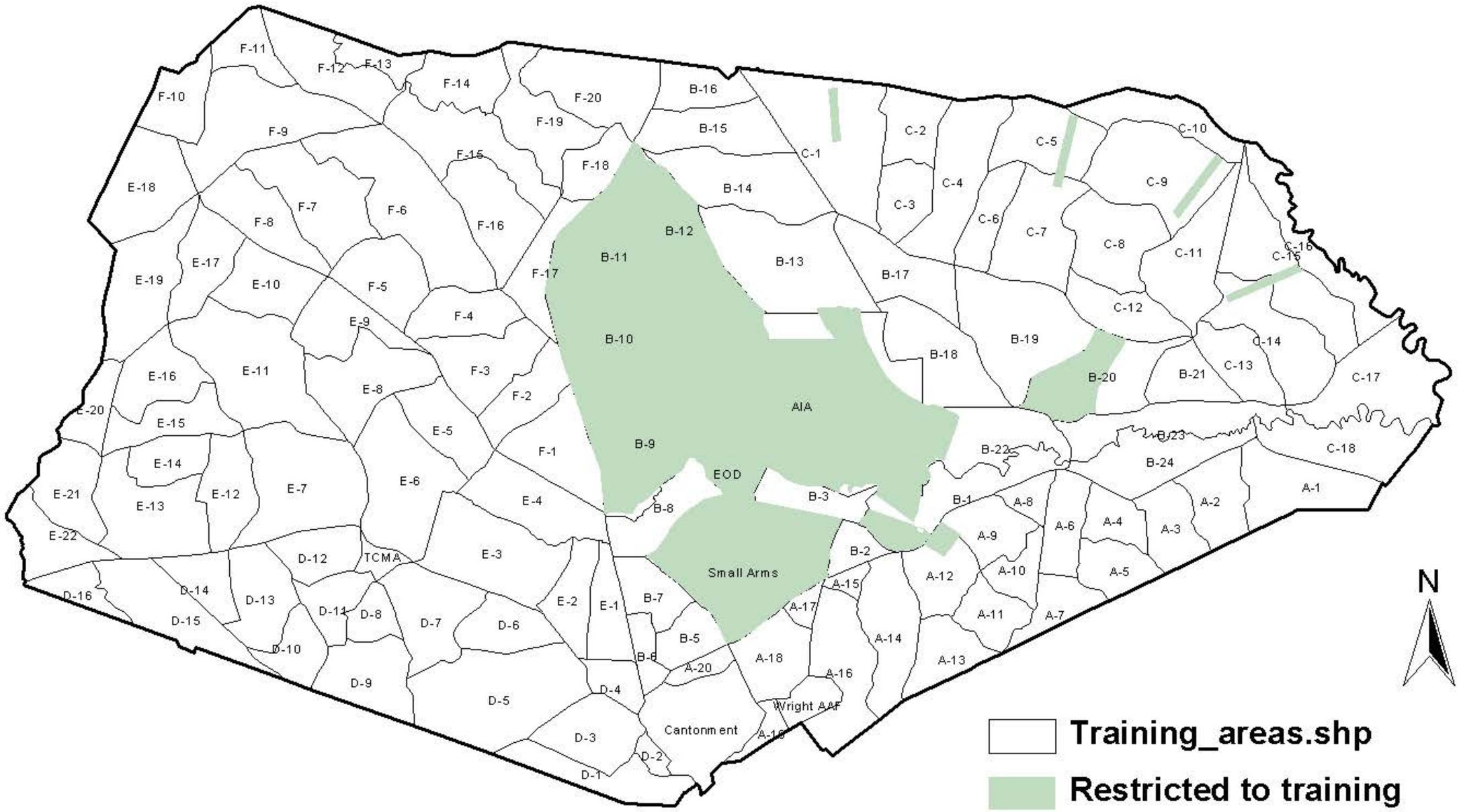
MAP 7-5a(2): Fort Stewart Recreational Fishing Resources

Ft. Stewart Recreational Fishing Resources



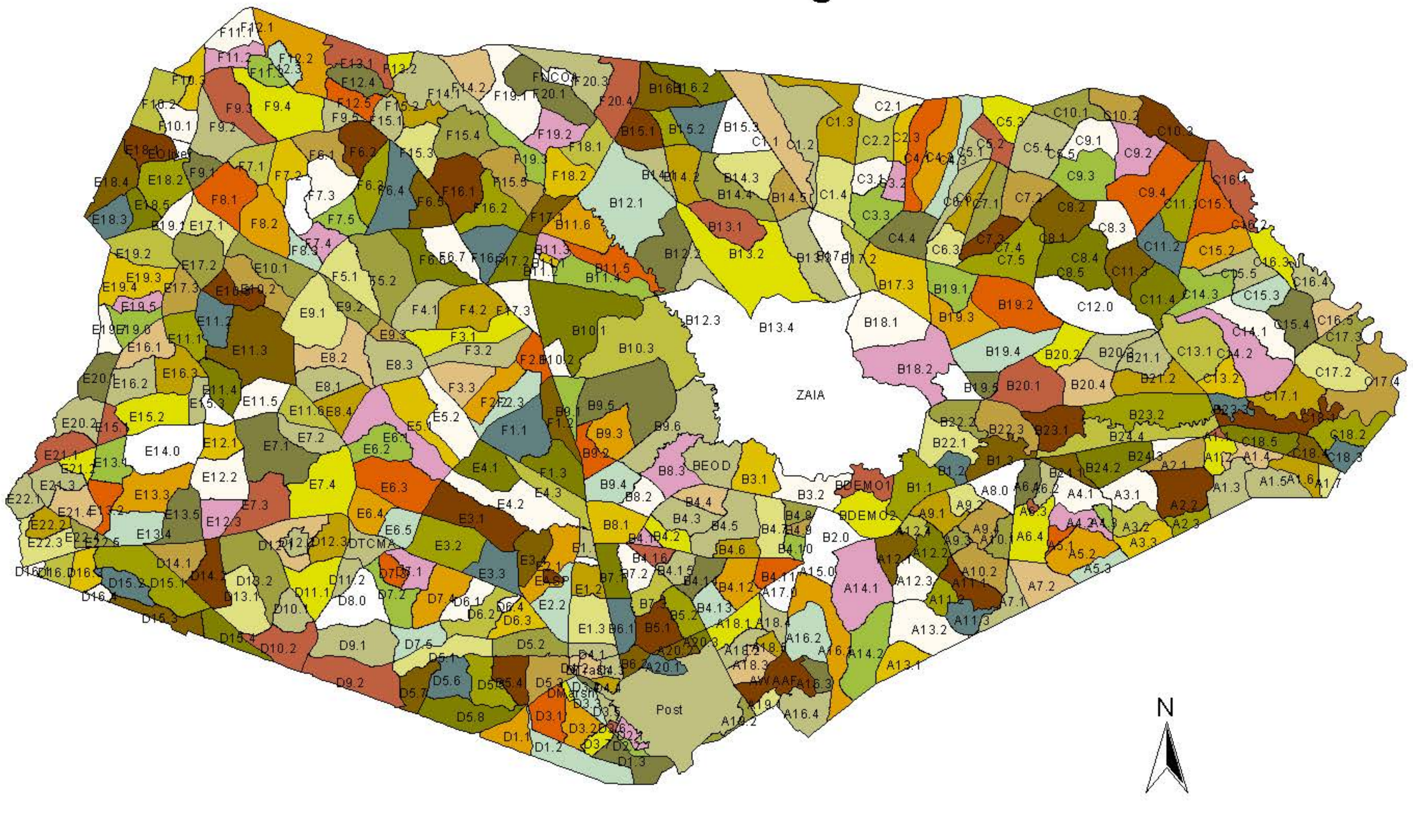
MAP 10-1: Fort Stewart Training Areas

Fort Stewart Training Areas



MAP 10-5: Natural Resources Management Units

Natural Resource Management Units



MAP 12-3a: Fort Stewart LCTA Plot Locations

Land Condition Trend Analysis (LCTA) plots

5 0 5 10 15 Miles

TAB A

Multi-Species Endangered Species Management Plan

for the

Red-Cockaded Woodpecker (*Picoides borealis*),
Eastern indigo snake (*Drymarchon corais couperi*),
Bald eagle (*Haliaeetus leucocephalus*),
Wood stork (*Mycteria americana*), and
Flatwoods salamander (*Ambystoma cingulatum*)

FORT STEWART, GEORGIA

prepared by

The Fort Stewart Endangered Species Management Planning Team,
comprised of representatives from DPW, DOT, and SJA

9 July 01

MULTI-SPECIES ENDANGERED SPECIES MANAGEMENT PLAN

for the

red-cockaded woodpecker (*Picoides borealis*), eastern indigo snake (*Drymarchon corais couperi*), bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and flatwoods salamander (*Ambystoma cingulatum*)

FORT STEWART / HAAF, GEORGIA

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Acronyms and Abbreviations

AIA	Artillery Impact Area
AR	Army Regulation
BA	Basal area
BMP	Best Management Practices
DA	Department of Army
DAC	Department of Army Civilian
DNR	Department of Natural Resources (Georgia)
DPW	Directorate of Public Works
ENRD	Environmental and Natural Resources Division (Fort Stewart)
ESA	Endangered Species Act of 1973
ESMG	Endangered Species Management Guidelines
ESMP	Endangered Species Management Plan
FR	Federal Register
FWS	Fish and Wildlife Service (U.S. Department of the Interior)
GIS	Geographic information system
GPS	Global positioning system
HAAF	Hunter Army Airfield
HMU	Habitat Management Unit
IAW	In accordance with
IRRG	Installation Regional Recovery Goal
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Management
MCG	Mission Compatible Goal
NRMU	Natural Resource Management Unit
PRC	Primary recruitment cluster
RCW	Red-cockaded woodpecker
SRC	Supplemental recruitment cluster
TES	Threatened and Endangered Species
TNC	The Nature Conservancy

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Executive Summary

Background:

Army Regulation (AR 200-3) requires the preparation of Endangered Species Management Plans (ESMPs) for listed and proposed threatened and endangered species and critical habitat present on installations. All Army land uses are subject to these regulations. Compliance with Chapter 11 of AR 200-3 involves coordination with other Federal agencies responsible for the protection of these species. Failure to implement this ESMP can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Training restrictions imposed on behalf of threatened and endangered species (TES), particularly the red-cockaded woodpecker (RCW), have caused conflict between TES conservation requirements and accomplishment of the military mission. In 1996, the Department of Army (DA) issued revised Guidelines for RCW Management (which this ESMP implements) to reduce training restrictions and increase proactive management of the RCW and its habitat. Specific changes include:

- Consideration given to RCW biological requirements **and** training mission requirements when establishing population goals for installations
- Provisions for designation of critical mission areas, where no training restrictions will be imposed on any new RCW clusters
- Off-limits area for thru-cluster maneuver traffic around cavity trees reduced from 200 ft. to 50 ft.
- List of training activities allowed within RCW clusters expanded
- Proactive management (establishment of recruitment clusters, augmentation of single bird groups, etc.) to achieve population goals now required
- Monitoring and reporting requirements increased
- New guidelines give commanders an incentive to expand RCW populations, while reducing the potential for a resultant increase in training restrictions

Current Species Status:

The red-cockaded woodpecker (RCW) (*Picoides borealis*, formerly *Dendrocopus*) is listed as endangered by the U.S. Fish and Wildlife Service (FWS).

The eastern indigo snake (*Drymarchon corais couperi*) is listed as threatened by the FWS.

The wood stork (*Mycteria americana*) is listed as endangered by the FWS.

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened by the FWS.

The flatwoods salamander (*Ambystoma cingulatum*) is listed as threatened by the FWS.

Habitat Requirements and Limiting Factors:

The primary limiting factor for the RCW is availability of suitable cavity trees; mature (greater than 80 years old) southern yellow pine trees that are living but have decay in the heartwood. Encroachment of hardwoods into the pine forest due to the exclusion of fire has also degraded RCW habitat. Installation of artificial cavities and prescribed burning provide means for overcoming these limiting factors.

The eastern indigo snake has suffered from habitat loss and over-harvest for the pet trade. Gopher tortoise (*Gopherus polyphemus*) burrows are important winter den sites for the eastern indigo snake.

Historically, bald eagles were adversely affected by pesticide contamination, shooting, and habitat loss, but their numbers have rebounded in response to protection and management, and prospects for the species' recovery are now very good with continued management.

The primary limiting factor for the wood stork is the availability of suitable foraging habitat; shallow wetlands where prey is concentrated as the swamps dry up in the spring and summer.

The flatwoods salamander has declined due to the loss or degradation of native mesic flatwoods and isolated, ephemeral wetlands.

Management Objectives:

Management will be for the protection and enhancement of existing populations on the installation and expansion into unoccupied suitable and potentially suitable habitat, and will be consistent with training mission requirements and requirements of the ESA.

Conservation Goals:

RCW:

The RCW management goal is to recover Fort Stewart's RCW population and eliminate conflicts with the training mission by eliminating the need for training restrictions (i.e., recover the population).

There is 1 inactive RCW cluster at Hunter Army Airfield (HAAF). In FY 00, there were 303 RCW clusters (including recruitment clusters) at Fort Stewart, of which 212 were active (i.e., RCWs in residence), and 20 were inactive, but have been active within the last 5 years. The other 71 clusters have not been active in the last 5 years, and management or protection of these clusters is no longer required. One currently active cluster (# 258) will be combined with an adjacent cluster due to a lack of adequate foraging resources and conflicts with the training mission. The existing cluster will be replaced by a Supplemental Recruitment Cluster, which will be established in better habitat near the current site (see next paragraph). This leaves 231existing RCW clusters that are currently subject to training restrictions on Fort Stewart and none on HAAF.

The installation's **Mission Compatible Goal (MCG)** is 411 active clusters. This is the number of protected clusters considered to be compatible with the current military mission. Construction of artificial cavities and other habitat improvements will be used to create 180 Primary Recruitment Clusters (PRCs) to achieve the MCG. PRCs will be subject to the same training restrictions as natural/existing RCW clusters, and therefore will not be located in areas where imposition of such restrictions would have unacceptable adverse impacts on the installation's training mission. PRCs will be created annually at a rate equal to or greater than the expansion potential of the RCW population (10%/year). For example, in FY 00, there were 212 active RCW clusters, so at least 21 PRCs will be established or maintained in FY 01.

Although the MCG is 411 active RCW clusters, the FWS considers 500 active clusters to be the minimum number required to maintain a viable, recovered RCW population. This is referred to as the **Installation Regional Recovery Goal (IRRG)**. The difference between the IRRG and the MCG will be satisfied by creating at least 89 Supplemental Recruitment Clusters (SRCs). **SRCs will not be subject to training restrictions**, so they cannot adversely affect the current training mission. In addition, SRCs in critical training areas (HMU-3 in Figure 1) will not be subject to standard FWS requirements for RCW foraging habitat, insuring that our ability to develop new facilities in the future will not be constrained. SRCs will be located strategically in areas where adverse mission related impacts are unlikely, thus eliminating the need for restrictions. SRCs will be created annually at a rate equal to 1/2 the expansion potential of the RCW population (1/2 of 10% = 5% per year). For example, in FY 00, there were 212 active RCW clusters, so at least 11 SRCs will be established in FY 01.

An RCW population of 500 active clusters would be adequate to meet the minimum requirements for population recovery, but it would not provide a surplus of RCWs. Without such a surplus, it will not be possible to accommodate future mission requirements that might adversely impact existing RCW clusters. Therefore, Fort Stewart will seek to establish as many RCW clusters as possible by managing the entire installation for the benefit of endangered species (i.e. fence to fence management) and by adding SRCs to all suitable habitat. These additional SRCs will not be subject to training restrictions **or foraging habitat protection requirements**. Fort Stewart's large size (current estimate is 136,929 acres of suitable and potentially suitable RCW habitat) will make it possible to support up to 185 "surplus" SRCs (i.e. above and beyond the 500 cluster population goal established by FWS). These surplus SRCs may also provide the capability to further reduce training restrictions in the future on the 231 protected clusters that currently exist on Fort Stewart.

<u>Eastern indigo snake</u>:

The conservation goals for the eastern indigo snake are: 1) to prevent decline of existing populations and 2) to manage suitable habitat adjacent to existing populations to promote population expansion. Prescribed burning to reduce hardwood midstory is beneficial to eastern indigo snakes as well as RCWs. Eastern indigo snake populations will be monitored annually. However, because these animals are seldom seen, reliable population estimates may not be achievable. Monitoring of gopher tortoise populations, a more visible commensal species, will also be conducted to provide inference on the eastern indigo snake's response to management.

Bald eagle:

Bald eagle numbers in Georgia have risen steadily since they became reestablished as a nesting species in 1979. In FY 98, there were 37 occupied nesting territories in the state, and 13 of the nests are within 40 miles of the Atlantic coast. Since FY93, a pair of bald eagles has nested and foraged on Fort Stewart in the vicinity of Pineview Lake, a recreational fishing lake in training area E21. Fort Stewart will continue to manage Pineview Lake and the associated nesting habitat to benefit these eagles.

Eagles (adults and immatures) are regularly seen foraging on other ponds and streams on the installation. The installation will continue to maintain an active fisheries management program, and it is likely that as eagle numbers continue to increase, additional eagle nests will be identified on the installation. Individual management and protection plans for any new nests will be developed as needed in cooperation with the FWS.

Wood stork:

The wood stork occasionally forages on Fort Stewart but is not known to nest here. Implementation of Best Management Practices (BMPs) (Georgia Forestry Commission 1999) for wetlands and protection of wetlands IAW other existing laws, regulations, and executive orders will protect foraging habitat for the wood stork. Establishment of a nesting colony of wood storks is not a goal of this plan due to the potential for conflict with the training mission, particularly aircraft overflight and bird-aircraft strike hazard.

Flatwoods salamander:

The primary conservation goal for the flatwoods salamander is to manage sites supporting salamander populations or potential salamander habitat to encourage long-term survival of the species on the installation. Suitable habitat for this species is extensive and widespread on the installation and has been promoted through past and current management practices, especially prescribed burning (Carlile 1995). Prescribed burns that are conducted at known or seemingly suitable salamander sites will continue to benefit this species by maintaining open-canopied flatwoods with intact, wiregrass-dominated groundcover preferred by this species. Growing season fires that sometimes burn into the dry basins of ephemeral ponds serve to cycle nutrients and maintain the open, grassy pond margins required by this species.

Actions Needed:

The major steps needed to achieve conservation goals are:
Manage forest ecosystems at Fort Stewart to improve RCW habitat using commercial thinning cuts, hardwood control, reestablishment of native ground cover, conservation and regeneration of longleaf pine, and other ecosystem management practices that will benefit the RCW.

Conduct prescribed burns on an average of once every 3 years, with burns normally conducted during the growing season.

Use direct population management techniques to increase the rate of RCW population expansion. Such management techniques include translocation and augmentation.

Enhance existing RCW clusters by provisioning artificial cavities in cavity-limited sites.

Create PRCs to accommodate an annual RCW population expansion rate of 10%.

Create SRCs to accommodate an annual RCW population expansion rate of 5%.

Protect active clusters and PRCs from damage or disturbance. Monitor military impact on SRCs in partnership with the Construction Engineering Research Laboratory (CERL).

Maintain and improve environmental awareness of military personnel using Fort Stewart, especially with respect to protection of endangered and threatened species.

Monitor RCW population status and adjust management practices based on this monitoring.

Prepare management prescriptions for each training area. Prescriptions will identify land use requirements (current and future) for training, natural resources, cultural resources, and other activities. Based on these requirements, quantify suitable and potentially suitable RCW habitat within each training area. Identify PRC and SRC locations to achieve an RCW population density of approximately 1 cluster/200 acres of suitable habitat, with at least 6350 pines greater than or equal to 10 inches diameter at breast height (DBH) and at least 8490 square feet of pine basal area (BA).

Prescribe and conduct habitat improvement actions in PRC and SRC locations as required to provide suitable recruitment sites in the future.

Conduct annual monitoring of eastern indigo snake and gopher tortoise populations.

Conduct annual monitoring of bald eagle nest success.

Note locations of foraging wood storks.

Conduct annual monitoring of flatwoods salamander breeding sites.

Total Estimated Cost of Conservation Actions:

Projected costs for the first 5 years of this plan are: FY01 - $1,751,000,
FY02 - $1,844,000, FY03 - $1,939,000, FY04 - $2,039,000, and FY05 - $2,141,000,. Funding will be requested from higher headquarters thru A106 (environmental) funding channels.

1.0 INTRODUCTION (AR 200-3: 11-5; DA RCW ESMG; RCW Recovery Plan)

The purposes of this ESMP are to: 1) present information on 5 federally listed species present at Fort Stewart, 2) discuss threats the species face on the installation, 3) define conservation goals, and 4) outline a management plan for these species and their habitats that will enable achievement of conservation goals.

These purposes are consistent with the following laws, regulations, and policy guidance:

ESA of 1973;
AR 200-3;
Department of Army *Management Guidelines for the Red-cockaded Woodpecker on Army installations* (DA RCW ESMG) (Appendix A);
Recovery Plans for the RCW (FWS 1985), eastern indigo snake (FWS 1982), bald eagle (FWS 1989), and wood stork (FWS 1996);
Department of Defense (DoD) policy of managing natural resources using ecosystem management techniques (DoD 1994).

The ESMP has restoration of the longleaf pine ecosystem as its basis, and human-related values are included. Cost of the conservation efforts and impacts to other installation activities will also be discussed.

2.0 SPECIES INFORMATION (AR 200-3: 11-5; DA RCW ESMG: V.A.)

This section provides a description of the species, including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

2-1 Species Description

RCW:

The RCW is a medium-sized bird, 8 inches long, with a black cap and nape and a large white cheek patch; the back is barred black and white. Adult males have a red patch near the eye, but the patch is seldom visible even with the aid of binoculars. The hairy woodpecker (*P. villosus*) and downy woodpecker *(P. pubescens*) are similar in appearance and occur in the same geographic areas as the RCW. The best distinguishing characteristics between the RCW and hairy woodpecker are the large white cheek patch on the RCW and the white mid-dorsal stripe and longer bill of the hairy woodpecker. The downy woodpecker also has a white mid-dorsal stripe, but is smaller than the hairy woodpecker. Vocalizations of the RCW are a rough, rasping *sripp* or *zhlip* and sometimes a higher *tsick* (Peterson 1980).

The RCW was listed as endangered IAW the ESA by the FWS on 13 October 1970 (35 *FR* 16047). More technical descriptions of the species are provided by Ligon (1970), Crosby (1971), and Jackson (1971).

Eastern indigo snake:

The eastern indigo snake is non-venomous, and is the longest snake in North America. It is heavy-bodied and is entirely iridescent bluish-black in color, except for the chin and sides of the head, which may be red, coral, or white. Scales are normally smooth, but large males may have weakly keeled scales on as many as 5 mid-dorsal rows, starting at the second quarter of the body (Layne and Steiner 1984). The anal plate is undivided. Hatchling eastern indigo snakes are 17-24 inches long, and may have considerably more red on the head and forward part of the belly than adult indigos.

The eastern indigo snake was listed as threatened IAW the ESA by the FWS in 1978 (43 *FR* 4028). More technical descriptions are provided in McRanie (1980) and Ernst and Barbour (1989).

Bald eagle:

The bald eagle is a large raptor with a wing span of approximately 7 feet. Plumage is mainly dark brown with a pure white head and tail when mature. First year juveniles are often chocolate brown to blackish, sometimes with white mottling on the tail, belly, and underwings. The head and tail become increasingly white with age until full adult plumage is reached in the fifth or sixth year (FWS 1989).

The bald eagle was listed as endangered IAW the ESA by the FWS in 1978. Since then, restoration efforts have been successful in the southeastern U.S. In 1995, bald eagles in Georgia were down-listed to threatened (60 *FR* 36010).

Wood stork:

The wood stork is a large, long-legged wading bird with a head to tail length of 33-45 inches and a wingspread of 59-65 inches. The plumage is white, except for the iridescent black primary and secondary wing feathers and the short black tail. Storks fly with necks and wings extended. On adults, the rough scaly skin of the head and neck is unfeathered and blackish in color, the legs are dark, and the feet are dull pink. The bill color is blackish. Immature storks, up to the age of about 3 years, differ from adults in that their bills are yellowish or straw colored and there are varying amounts of dusky feathering on the head and neck. During courtship and the early nesting season, adults have pale salmon coloring under the wings, fluffy undertail coverts that are longer than the tail, and toes that brighten to a vivid pink. The wood stork is also known as the wood ibis, ironhead, flinthead, and gannet (Robertson 1989).

The wood stork was listed as endangered IAW the ESA by the FWS in 1984 (49 *FR* 7335).

Flatwoods salamander:

The flatwoods salamander is a slender, small-headed species that belongs to the mole salamander family (Ambystomatidae). It reaches approximately 5 inches (129 mm) in total length and up to 3 inches (76 mm) snout-vent length (Conant and Collins 1991, Palis 1997c). The dorsum of adults is chocolate-black to silvery-gray, with fine, light gray lines that form a net-like or cross-banded pattern. The markings are highly variable, and when profuse, take on a lichenose pattern that gives the salamander a frosted appearance. The belly is black with scattered gray spots or flecks. During the breeding season (October-January) males can be distinguished from females by their slightly swollen cloacae (Palis 1996). Gravid females are heavier and more robust than males (Palis 1996). In southeastern Georgia, the similar slimy salamander (*Plethodon ocmulgee)* may be confused with the flatwoods salamander. The slimy salamander is dark black with scattered white or brassy flecks, and possesses a small nasolabial groove that runs from the nostril to the upper lip, a feature that is absent in the flatwoods salamander (Conant and Collins 1991).

The aquatic larvae of the flatwoods salamander are broad-headed and bushy-gilled, with a distinct and bold color pattern that includes yellow-cream longitudinal stripes along the sides of their chocolate brown-black bodies (Mecham and Hellman 1952, Palis 1995). A black stripe on the head extends from the snout to the gills, and passes through the eye (Palis 1995). Larvae may attain a total length of 3.8 inches (96 mm) and a snout-vent length of 1.8 inches (47 mm) before metamorphosis (Palis 1995). Recent metamorphs and juveniles retain their longitudinal stripes through their first year, a characteristic best observed by shining a bright light through the body (Palis 1995, 1996). Larvae of the mole salamander (*Ambystoma talpoideum*), a species common on Fort Stewart, also possess yellow or cream-colored stripes on the sides of the body. They are easily distinguished from flatwoods salamander larvae by the presence of a dark longitudinal stripe that runs down the middle of the belly. This characteristic is present in larvae 0.10 inches (25 mm) or greater in snout-vent length (Gibbons and Semlitsch 1991) and by dark, dorsal crossbands that interrupt the lateral stripes (Palis 1996).

The flatwoods salamander was listed as threatened by the FWS in April, 1999 (Fed. Register 64:15691-15704).

2-2 Distribution

RCW:

The RCW's range is closely tied to the distribution of southern pines. Historically, the RCW occurred from eastern Texas and Oklahoma to Florida, and north to New Jersey. The present distribution is similar, except that the species has been extirpated from Missouri, Maryland, and New Jersey (FWS 1985). Furthermore, densities of RCWs within the historic range have declined dramatically (Jackson 1971) and populations are more fragmented within the species' historic range. In Georgia, the RCW was present in 35 counties in the Coastal Plain and Piedmont physiographic provinces in 1992. Most (72%) of the RCW clusters on private lands (excluding the Red Hills region) that were active in 1982 had become inactive by 1992. This

decline appears to result from the loss of cavity trees, inadequate foraging habitat, inadequate burning, and habitat fragmentation (Baker 1995). There are no active clusters currently known from private lands within 3 miles of Fort Stewart, making recovery completely dependent on management of the Fort Stewart population.

All of Fort Stewart, with the exception of the Artillery Impact Area (AIA), was surveyed for RCWs by The Nature Conservancy (TNC) between 1992 and 1994. Aerial surveys were conducted over the AIA and no RCW clusters were found. Aerial surveys on Fort Stewart have been effective in locating new RCW clusters in the past, but they have also missed some clusters that later were found by pedestrian survey. Risk to human safety makes pedestrian survey of the AIA unfeasible, so this management plan will assume that there are no RCW clusters in the AIA.

Prior to 1992, there was no systematic RCW inventory, but newly discovered clusters were added to the installation's records as they were discovered. There were 14 clusters discovered in 1975, 125 from 1976-80, 43 from 1981-85, and 33 from 1986-92,. These data do not represent an increase in the RCW population, but rather, an increase in knowledge about the population.

RCW cavity tree locations are continually updated and stored within the Integrated Training Area Management (ITAM) geographic information system (GIS). Specific tabular data on cavity tree status (e.g., activity status, cavity height) is maintained in a dBase database in the DPW, Fish and Wildlife Branch. Efforts are underway to link this data to the ArcInfo GIS file in the ITAM GIS, increasing the utility and accessibility of the map data for all users.

There are 303 sites identified as RCW clusters or recruitment clusters on Fort Stewart (Figure 1), of which 232 are currently active or have been active within the past 5 years (Table 1). There is 1 cluster at HAAF, but it has been inactive for over 5 years. Seventy-one sites at Fort Stewart have not been active within the last 5 years (Appendix B). Management and protection of these 71 sites IAW the provisions of this plan will be discontinued if necessary to avoid conflict with training. However, some of these sites will be redesignated as SRCs or PRCs and managed/protected accordingly. Sites designated as PRC or SRC locations may be different than the original inactive cluster site in order to take advantage of better quality habitat, reduce risk of adverse mission impacts, or facilitate future management. RCW management will not be pursued at HAAF due to its small size and complications associated with prescribed burning (airfield operations and proximity to the city of Savannah).

Figure 1 - Distribution of existing RCW clusters and future SRC / PRC management areas

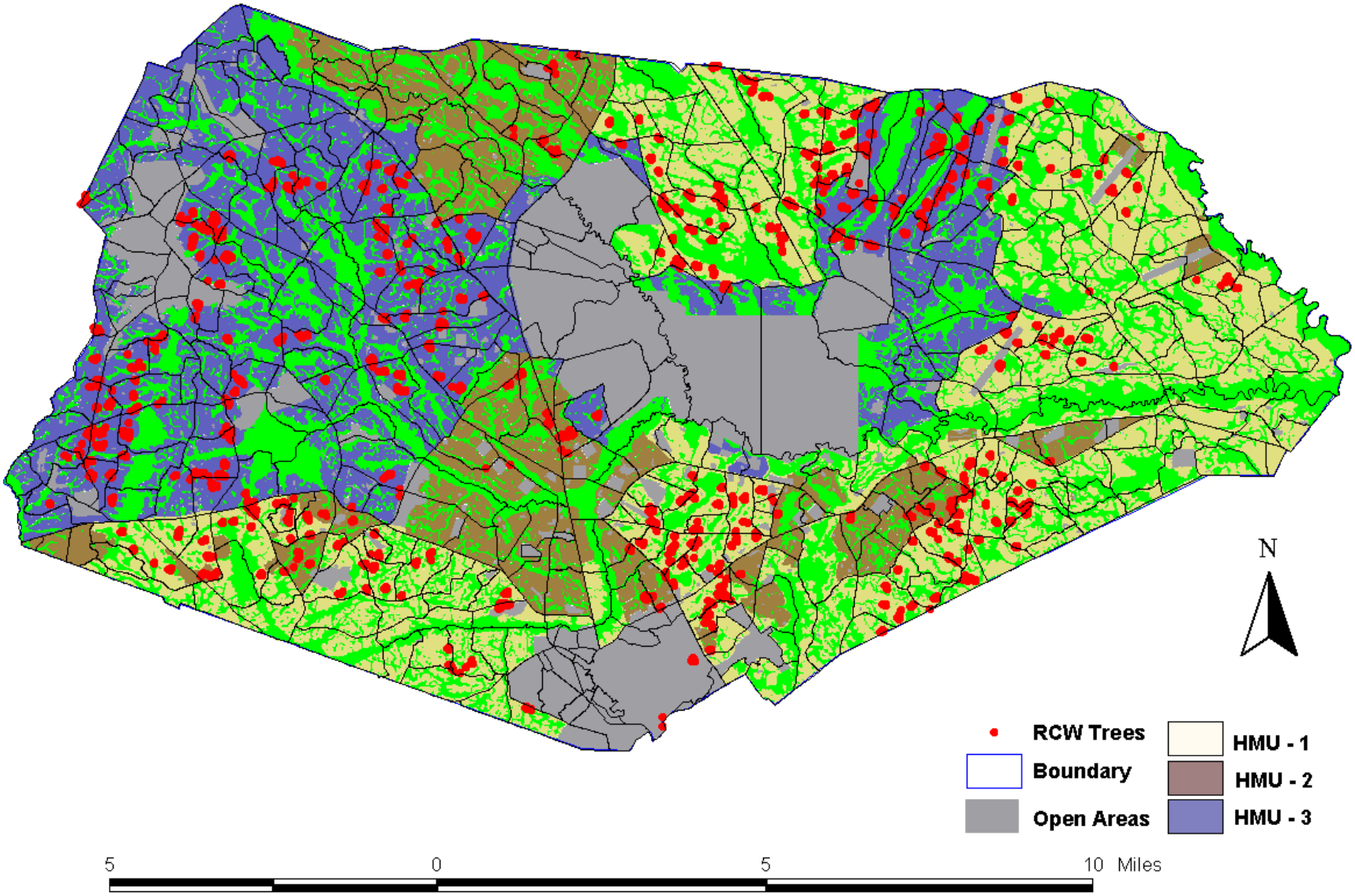

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Table 1 - Distribution of RCW clusters and proposed recruitment sites.

	Total	~~HMU-1~~ Training Mission Compatible Land - Suitable for PRCs	~~HMU-2~~ Primary Training Lands: Suitable for SRCs, with forage resources maintained at or above normal standards	~~HMU-3~~ Primary Training Lands: Suitable for SRCs, but forage resources may be reduced below normal standards.
Suitable / Potential RCW Habitat Acres	136929	58611	25617	52701
Upland Hardwood Management Acres	15214	6512	2846	5856
Wetland Acres (forested)	78400	39922	11611	26867
Non-Forest Acres	48538	11769	3104	33665
Total Acres	279081	116814	43178	119089
Active & Potentially Active Clusters *	231	113	15	103
Recruitment Sites Needed	454	180	113	161
RCW Carrying Capacity	685	293.1	128	264
Mission Compatible Goal (MCG) *	**411**			

* Does not include cluster 258

Eastern indigo snake:

The eastern indigo snake is 1 of 8 subspecies of a mostly tropical-subtropical species which range, collectively, from the southeastern U.S. to northern Argentina. Five of the 7 subspecies occur in South America, Central America, or Mexico, with only the eastern indigo snake and the Texas indigo snake (*D. c. erebennus*) occurring in the U.S.

The eastern indigo snake is restricted to the Coastal Plain of the southeastern U.S., occurring throughout most of Florida, including the lower Keys, and southeastern Georgia. Historic records are known from South Carolina, Alabama, and Mississippi, but natural eastern indigo snake populations are now extremely rare or extirpated from these states (FWS 1982, Moler 1992).

The eastern indigo snake is distributed throughout peninsular Florida, and is locally common in portions of central and southern Florida (FWS 1982, Moler 1985). Populations in the panhandle region of Florida are widespread but localized (Moler 1985). In Georgia, eastern indigo snake populations typically are associated with extensive sand ridges along major Coastal Plain streams (Diemer and Speake 1981, 1983). Diemer and Speake (1981) recorded eastern indigo snake sightings from 52 of 94 counties in the Coastal Plain, with the majority of these sightings from the Tifton Uplands and Coastal Marine Flatwoods physiographic provinces. They also mapped a number of eastern indigo snake records on or near Fort Stewart for sand ridge areas along the Altamaha, Canoochee, and Ohoopee Rivers.

The occurrence of the eastern indigo snake on Fort Stewart was first reported by Williamson and Moulis (1979), who documented the species from sandhills along the Canoochee River. Field surveys on Fort Stewart also were conducted from 1992-1994 by TNC (Gawin et al. 1995). The eastern indigo snake is uncommon and locally distributed on Fort Stewart. The majority of eastern indigo snake observations at Fort Stewart have been at gopher tortoise burrows in sandhills (Appendix C). The installation's 4 known eastern indigo snake populations are associated with sandhills along the Canoochee River, the Ogeechee River, and Beards Creek. The status of each of these populations is discussed below.

1) F training area population, Evans and Bryan Counties:

This population was first documented by Williamson and Moulis (1979), who observed several eastern indigo snakes in sandhills along Fort Stewart Road 17 (training areas F11 and F12) during 1977-1978. Recent surveys (1992-1994) by TNC reconfirmed the presence of the eastern indigo snake at these sandhills (Gawin et al. 1995). Recent sightings (1990-1997) by TNC biologists, Fort Stewart Fish and Wildlife Branch and Forest Management personnel (Appendix C) indicate that the eastern indigo snake is widely distributed throughout Canoochee River sandhills in training areas F11-F13.

This eastern indigo snake population is restricted to the northwestern corner of the installation (Canoochee River sandhills and adjacent habitats). A large bay-blackwater creek swamp in F12 provides ideal foraging habitat for eastern indigo snakes. This population probably is maintained by occasional immigration of eastern indigo snakes inhabiting extensive Canoochee River sandhills north of and contiguous with this part of the installation (Williamson and Moulis 1979, Gawin et al. 1995). Recent sightings are known from sandhills adjacent to the northern boundary of the installation (D. Stevenson, pers. obs. 1992, Williamson and Moulis 1994, R. Moulis, pers. comm., 1997).

Gopher tortoises are widespread and common throughout most of the sandhill areas inhabited by this eastern indigo snake population. Although precise data regarding the number of eastern indigo snakes present at this site is lacking, this population is presumed to be stable because eastern indigo snakes, first found here in 1977, have been observed here regularly during the last few years.

2) E21 training area population, Long County:

This population was documented by TNC biologists in 1992, when 1 adult eastern indigo snake and the shed skin of another were found in a turkey oak (*Quercus laevis*) sandhill west of Fort Stewart Road 5 in training area E21. A shed skin of an adult found in 1994 and a sighting of an adult in 1996 (Appendix C) have been reported for the same area. Intensive field surveys by TNC (Gawin et al. 1995) and video camera surveys of gopher tortoise burrows by TNC and Georgia Southern University herpetologists have been conducted at this site and in nearby sandhills on the southwestern part of the installation, but no additional eastern indigo snake observations have resulted from these efforts (Gawin et al. 1995, D. Rostal, pers. comm.).

This eastern indigo snake population is on an extensive north-south trending sand ridge (Pamlico Terrace). Gopher tortoises are widespread and locally abundant here. The few sightings here suggest that this is a small and localized eastern indigo snake population. Military training maneuvers and vehicle traffic (on and off road) associated with training are frequent in some upland areas adjacent to Fort Stewart Road 5 near this site. However, eastern indigo snakes are suspected of being more widely distributed on this part of the installation than is currently known. Sandhills adjacent to and east of Beards Creek (training areas D16 and E22) offer excellent habitat for eastern indigo snakes.

3) AIA and B3-B4 Population, Bryan and Liberty Counties:

Eastern indigo snakes were reported from the AIA and training area B4 by Williamson and Moulis (1979). Two observations have been reported for training area B3 (Appendix C). The majority of sightings have been from the north-central portion of the AIA and adjacent portions of B-12. Reliable sightings from the northeastern part of the AIA adjacent to Fort Stewart Road 78 are available for the 1960s (Appendix C). Recent sightings (1997-1998) are available for B3 and B12.

The AIA is considered a unique and exceptional site for the eastern indigo snake (Gawin et al. 1995). The AIA has an extensive sandhill component (over 1,500 acres) interspersed with bay and river swamps. The largest gopher tortoise population on the installation occurs here (Williamson and Moulis 1979, Gawin et al. 1995). Williamson and Moulis (1979) observed more eastern indigo snake specimens here in 3 days of searching than at any other eastern indigo snake locality in Georgia. Williamson and Moulis (pers. comm. 1994) indicated that the AIA may be among the best sites for the eastern indigo snake in the state. Frequent fires at this site maintain optimal habitat conditions for gopher tortoises.

Because of access restrictions, the AIA, B3-4, and B12-13 are seldom visited by Fort Stewart Fish and Wildlife Branch biologists. This may explain the relatively few recent eastern indigo snake sightings for the area. A healthy eastern indigo snake population probably continues to thrive at this site. Suitable foraging habitat is widespread in this area, and several large gopher tortoise colonies are present on sandhills adjacent the Canoochee River (Gawin et al. 1995).

4) C11 Population, Bryan County:

One recent (1996) sighting has been recorded from this part of the installation (Appendix C**)**. The status of this population is poorly known. The single observation is of an adult crossing a road in a low area. This portion of the installation is poorly-drained and forested by mesic flatwoods interspersed with creek swamps. Sandhills or other upland habitats which support gopher tortoises are limited on this part of the installation (Gawin et al. 1995). It is presumed that eastern indigo snakes in this area are wintering at 1 or more of several small gopher tortoise sites located within 1.5 miles of where this eastern indigo snake was observed. A sand ridge area west of the Ogeechee River and 3-4 miles distant from the eastern indigo snake observation also provides suitable habitat. Field searches are needed to determine the gopher tortoise sites inhabited by indigo snakes during the winter and the extent of area occupied by this population.

Bald eagle:

Bald eagles are found throughout North America. Because fish comprise the bulk of their diet, population densities are highest near large bodies of water, including man-made reservoirs, rivers, and coastal regions. Nests are usually located within 1/2 mile from water (FWS 1991). Bald eagle numbers in Georgia have risen steadily since they became reestablished as a nesting species in 1979. In FY 98, there were 37 occupied nesting territories in the state, and 13 of the nests are within 40 miles of the Atlantic coast. Since FY93, a pair of bald eagles has nested and foraged on Fort Stewart in the vicinity of Pineview Lake, a recreational fishing lake in training area E21.

Wood stork:

The wood stork is 1 of 17 species of storks occurring worldwide, and is the only stork regularly occurring in the U.S. The breeding range of the species extends from the southeastern U.S. south through Mexico, Central America, Cuba, Hispaniola, and through South America to western Ecuador, eastern Peru, Bolivia, and northern Argentina (A.O.U. 1983).

The wood stork formerly may have bred in the coastal southeastern U.S. from Texas to South Carolina. Currently, wood storks breed throughout Florida, Georgia, and coastal South Carolina. Post-breeding storks from Florida, Georgia, and South Carolina disperse occasionally as far north as North Carolina, and as far west as Mississippi and Alabama. It is believed that storks nesting in northern Florida, Georgia, and South Carolina move south during the winter months. The large numbers of storks that occur during winter in the freshwater wetlands of southern Florida far exceed the number known to breed there. Winter abundance of storks in coastal

Georgia is much reduced from autumn numbers when they are commonly seen foraging in tidal marshes at low tide (FWS 1996).

TNC conducted aerial surveys for wood storks in 1993, but none were found. Fort Stewart Forestry personnel spend considerable time conducting aerial reconnaissance of forest areas for beetle outbreaks and Fish and Wildlife Branch personnel have conducted pedestrian surveys of several wading bird rookeries. No nesting wood storks have been discovered during these activities. Foraging wood storks are seen on Fort Stewart and HAAF with some regularity in streams, impoundments, and flooded borrow pits. There are several wood stork rookeries in McIntosh and Long Counties within 30 miles of Fort Stewart, and it is possible that wood storks may nest on the installation in the future.

Flatwoods salamander:

The historical range of the flatwoods salamander includes the Lower Coastal Plain and portions of the Upper Coastal Plain of the southeastern United States, from the southern 1/2 of South Carolina south through Georgia to northern-central Florida, and west to Mobile County, Alabama (Palis 1996, FWS 1997). In presettlement times, a broad band of longleaf-slash pine flatwoods occurred across the Lower Coastal Plain portion of this region, and it is likely that flatwoods salamanders once occupied areas of suitable habitat throughout this area (FWS 1997).

The current distribution of the flatwoods salamander consists of isolated populations scattered throughout remaining pine flatwoods at sites in South Carolina, Georgia, and Florida (FWS 1997, Palis 1997b). Breeding sites located within a 2.0 mile (3.2 km) radius are considered to be part of the same population (Palis 1996, FWS 1997). The apparent stronghold for the species is in Florida, where 32 populations have been documented from west of the Suwannee River. The majority of these populations are located on the Apalachicola National Forest and at Eglin Air Force Base (FWS 1997, Palis 1997b). The only extant Florida population known from east of the Suwannee River occurs at the Osceola National Forest (FWS 1997, Palis 1997b).

In Georgia, 33 historical records from 19 counties have been reported (FWS 1997). However, flatwoods salamanders have not been relocated at any of these sites since 1980 (FWS 1997). Recent (1990-present) surveys in Georgia have documented 10 salamander populations (including 27 breeding sites). Most of these occur on Fort Stewart (5 populations and 21 breeding sites) (Gawin et al. 1995, FWS 1997). Extant Georgia populations of flatwoods salamanders are also known from Townsend Bombing Range and from the Joseph W. Jones Ecological Research Station (Ichauway Plantation) and Mahaw Wildlife Management Area in southwestern Georgia (Palis 1996, FWS 1997).

2-3 Habitat/Ecosystem

RCW:

The RCW occurs in pine or mixed pine-hardwood forests primarily in the Piedmont and Coastal Plain of the southeastern U.S. Forests inhabited by the RCW historically have been shaped by fire, either intentional burns set by humans or by naturally-occurring wildfires. Fire enables maintenance of the ecosystem; without fire, dense understory and midstory vegetation negatively affects establishment of young pine trees (Stoddard 1962).

The RCW is habitat-specific. For nesting and roosting, it requires living mature pine trees, preferably those infected with rot caused by the fungus red heart (*Fomes pini*). This disease facilitates excavation of the tree by the RCW by softening the heartwood. Cavity trees are typically found in groups of 2-10 trees. These sites are called clusters (formerly called colonies), and are home to a family group (formerly called clan) of RCWs. The RCW prefers areas with an open understory for cluster sites, and may abandon a cavity tree if the midstory approaches cavity height (Hopkins and Lynn 1971, Van Balen and Doerr 1978, USFS 1979, Hooper et al. 1980, Locke et al. 1983, Hovis and Labisky 1985, Conner and Rudolph 1989). On Fort Stewart, RCWs prefer longleaf pine (*Pinus palustrus*) for cavity trees. Approximately 79% of active, natural cavity trees are longleaf, 16% are slash (*P. elliottii*), 4% are loblolly (*P. taeda*), and 1% are pond pine (*P. serotina*). Exact numbers are not yet available from the forest inventory, but the number of longleaf, slash, and loblolly pines suitable for RCW cavities (based on DBH and age) is probably about equal. The utilization rate for longleaf appears to be significantly higher than its availability.

FWS guidelines (Henry 1984) identify suitable foraging habitat as at least 8490 square feet of pine BA, with at least 6350 pine stems 10 inches DBH or greater, in pine or pine hardwood stands within 1/2 mile of the cluster. A recent study (James et al. 1997) in the Apalachicola National Forest suggested that understory characteristics or fire history may be more important than the number or size of pine trees as a measure of RCW foraging habitat quality. This study found that group size (number of adults), number of eggs laid, and the number of RCW groups within a 1-mile radius all increased significantly ($\alpha = 0.05$) with respect to increasing percentage of wiregrass in the groundcover. The number of adults also increased significantly ($\alpha = 0.05$) with respect to increasing occurrence of pine regeneration in the stand, and decreased significantly ($\alpha = 0.05$) with respect to the percent gallberry in the groundcover. Number of adults, eggs, fledglings, and groups all decreased as tree density increased, but correlations were not significant. They hypothesized that frequent burning, which increases wiregrass and longleaf regeneration and reduces gallberry density, may play a role in the cycling of nutrients such as calcium. Calcium limitation has been shown to limit clutch size in songbirds (Graveland and Van Gijzen 1994).

Eastern indigo snake:

Sites that support eastern indigo snake populations tend to be large, undeveloped tracts of land that encompass a diversity of habitats, including sources of permanent water. The habitat preferences of the eastern indigo snake vary latitudinally, and individual snakes frequently move between habitats. In central and southern Florida eastern indigo snakes occur in a wide array of native habitat types including pine flatwoods, sandhills, oak-rosemary (*Q.-ceratiola*) scrub, cabbage palm (*Sabal palmetto*) hammocks, tropical hammocks, dry glades, bottomland hardwood swamps, and mangrove (*Avicennia* and *Rhizophora*) swamps (Carr and Goin 1959, Campbell and Christman 1982, FWS 1982, Moler 1992). In northern Florida and southern Georgia the eastern indigo snake is more habitat-specific. In this part of its range eastern indigo snakes typically spend the winter months in xeric sandhill habitats, where they den in gopher tortoise burrows or stump holes (Lawler 1977, Speake et al. 1978, Diemer and Speake 1983). Throughout its range the eastern indigo snake often forages along the margins of wetland habitats (e.g., cypress [*Taxodium*] ponds, river and creek swamps, marshes) and may move to low-lying areas to avoid high temperatures. Use of disturbed habitats such as muckland fields, canal banks, and Australian pine (*Casaurina littorea*) in Florida, and slash pine plantations and agricultural fields in Georgia, has been reported (Lawler 1977, Speake et al. 1978).

In southeastern Georgia, sandhills inhabited by eastern indigo snakes usually are located on eastern or northeastern sides of major Coastal Plain streams (Diemer and Speake 1983). Sandhills occur on deep, droughty sands (often Lakeland, Kershaw or Troup soils in Georgia) and support distinctive xeric-adapted and fire-maintained vegetation, the principal components of which are a scattered open canopy of longleaf pine, a subcanopy of turkey oak and other xerophytic oak species, and a ground cover dominated by wiregrass species (*Aristida*). Gopher tortoises and eastern indigo snakes are characteristic of periodically burned, open-canopied sandhills. In the prolonged absence of fire, sandhills will succeed to a shaded laurel oak (*Q. hemisphaerica*)-dominated xeric hammock association (Bozeman 1971), which lacks the appropriate herbaceous cover of grasses on which gopher tortoises depend for food. Periodic fire (at least once every 10 years) maintains sandhills by retarding growth and survival of encroaching oaks (Wharton 1978, FWS 1982). Diemer and Speake (1981) stated that the eastern indigo snake may persist on sandhill sites converted to slash pine plantations so long as these plantations are subject to periodic fire and support gopher tortoise populations.

Bald eagle:

While bald eagles can be found in a variety of habitats, some landscape characteristics appear to be relatively consistent. Bald eagles spend over 1/2 of the year in close association with their nesting site. Nesting sites are generally in forested areas within 1/2 mile of a permanent body of water (FWS 1992). Dominant or codominant pines, where available, appear to provide the preferred platform for nest construction. The majority of nest sites afford an unobstructed view of the surrounding area. The absence of human disturbance tends to promote continued nest site fidelity. Nonbreeding season habitats are similar to nesting habitats in many respects. However, available food resources (e.g., fish, birds, and small mammals) seem to be the most important factor while the adults are not associated so closely with the nest.

Wood stork:

Wood storks use a variety of freshwater and estuarine wetlands for nesting, feeding, and roosting sites. Nesting sites are located either in standing water or on islands surrounded by broad expanses of open water (Ogden 1991). Freshwater breeding sites may be used for many years and are most often dominated by cypress and gum species (*Nyssa*). Storks forage in a wide variety of calm, shallow wetlands where the water column is uncluttered by dense patches of vegetation. Almost any shallow depression where fish become concentrated due to reproduction or evaporative concentration may be used as feeding habitat (Coulter and Bryan 1993). Roosting sites structurally are similar to nesting sites. However, storks may use a wide variety of sites for roosting that would be unsuitable for nesting (e.g., a stand of mature trees not located over or surrounded by water) (Coulter 1990). Roosting sites may be used for a period of years or days, depending on the availability of persistent foraging areas.

Flatwoods salamander:

The flatwoods salamander has 2 life stages that occupy 2 distinct habitats. Adult flatwoods salamanders are terrestrial and the larvae are aquatic. Adults inhabit mesic, fire-maintained pine flatwoods and savannas that surround ephemeral pond breeding sites. Flatwoods habitats where this species occurs may be described as flat to gently rolling with an open-canopied overstory of scattered longleaf and slash pine (Palis 1996). Low-growing shrubs such as saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), and blueberries (*Vaccinium* spp.) are interspersed with a diverse ground cover of grasses and forbs (Palis 1996, 1997b). These flatwoods are typically underlain by poorly-drained sands that are seasonally saturated (Palis 1996). The water table may be near the ground surface year-round because of an organic hardpan layer 1.0-2.3 feet (0.3-0.7 m) beneath the surface that inhibits water penetration (Wolfe et al. 1988). The tunnels of certain burrowing crayfish species (*Procambarus*) are sometimes abundant in these habitats (Ashton 1992, D. Stevenson, pers. obs.).

Breeding and larval development of flatwoods salamanders takes place in ephemeral wetlands that include cypress ponds, grassy depressions, roadside ditches, and occasionally, shallow borrow pits (Means 1986, Gawin et al. 1995, Palis, 1996). The wetlands used for breeding by flatwoods salamanders ordinarily fill each year with winter rains (December-January) and dry by May-June (Anderson and Williamson 1976, Palis 1997b). Salamander breeding sites are typically isolated from larger and more permanent connected wetlands (creeks and river swamps) and do not support populations of predatory fishes such as largemouth bass (*Micropterus salmoides*) and bowfin (*Amia calva*).

Breeding sites are tannin-stained, acidic (average pH = 4.2), small (average size is 3.68 acres [1.5 ha]), and shallow (usually less than 1.6 feet [0.5 m] deep) (Palis 1997b). Salamander breeding sites on Fort Stewart range from less than 1 acre (0.4 ha) to approximately 6 acres (2.4 ha) in size (Gawin et al. 1995). The basins of salamander breeding sites often have a substrate of packed mud containing numerous crayfish burrows (Anderson and Williamson 1976, Palis 1996, D. Stevenson, pers. obs.).

Flatwoods salamander breeding ponds usually are forested with pond cypress (*Taxodium ascendens*), black gum (*Nyssa biflora*), and slash pine. Although forested ponds used by salamanders are often open-canopied, canopy coverage may approach almost 100% at some sites (Palis 1996). Shrubs, including myrtle-leaved holly (*Ilex myrtifolia*), fetterbush (*Lyonia lucida*), and sweet pepperbush (*Clethra alnifolia*), are common at breeding sites. Herbaceous plants often carpet the entire basin of ponds, or form a ring near the pond margin. Graminaceous plants such as beakrushes (*Rynchospora* spp.), sedges (*Carex* spp.), panic grasses (*Panicum* spp.), bluestems (*Andropogon* spp.), plumegrasses (*Erianthus* spp.), wiregrasses, hatpins (*Eriocaulon* spp.), and yellow-eyed grasses (*Xyris* spp.) are common components of these ponds in Florida and at Fort Stewart (Gawin et al. 1995, Palis 1997b, D. Stevenson, pers. obs.). Breeding sites are characteristically encircled by a wiregrass-dominated ecotone (Palis 1996). Diversity and abundance of herbaceous vegetation within the breeding ponds and at pond ectones is perpetuated by periodic fire (Kirkman 1995, Palis 1996, FWS 1997).

2-4 Life History/Ecology

RCW:

The RCW is a non-migratory, territorial, cooperative breeder. They are long-lived, with individuals frequently living up to 10 years or longer. They form social groups, which consist of either a solitary territorial male, a mated pair, or a pair with their helpers (usually male offspring from previous years). A cluster is defined as the area which contains a collection of cavity starts and cavities (roost, nest, and inactive) habitually used by a group plus a 200-foot buffer zone. There may be numerous cavities within a cluster, but there is only 1 breeding pair per group. The RCW differs from other woodpeckers in that it excavates cavities for roosting and nesting in live pine trees rather than dead ones. Cavity excavation usually takes more than 6 months, and may take several years. RCWs have a significant energy investment in their cavities, which may explain the species' high degree of site fidelity.

RCWs form lasting pair bonds. Eggs are laid in nest cavities in clutches of 2-5. Incubation lasts only 11 days, and begins before the clutch is complete and the hatch of young is staggered. 1-4 young are fledged at 26-29 days of age. Although the young forage for themselves a few days after fledging, they may continue to receive food from parents for several months (Mosby 1972). Some juvenile males disperse from their natal cluster in their first year, while others remain as helpers until the breeding male dies, at which time they may inherit the breeding role. An adult male helper may also carve off a portion of the group's territory, attract a female, and establish a new cluster. Natural expansion of RCW populations appears to be slow, even in excellent habitat. Provisioning sites with artificial cavities has been effective in increasing the rate of population expansion.

The RCW feeds primarily on insects and small arthropods, and foraging typically is concentrated in the upper boles of large pines, although females tend to forage lower. Ants constitute the majority of the diet. Fruits and mast also are consumed by the RCW in an opportunistic fashion. Individuals move from tree to tree during feeding and cover a large area during the course of a day, usually within 1/2 mile of the cluster.

A recent compilation of RCW life history was written by Jackson (1994). There are many other publications on various aspects of RCW life history.

Eastern indigo snake:

The eastern indigo snake is exclusively diurnal, and individuals may be active during all months of the year. Activity and surface movements are greatest from spring-fall, with individuals having territories of up to 125-250 acres or more during this time (Moler 1986, 1992). In Georgia, radio-tracked snakes made long-range movements during May-June from xeric habitats where they overwintered into pine flatwoods, streambottom thickets, and agricultural fields (Speake et al. 1978). The same study also found that eastern indigo snakes made extensive movements from August-November, which were attributed to snakes seeking mates or suitable locations for winter dens. The eastern indigo snake may be active when surface temperatures are 60°F or above (Landers and Speake 1980). During the winter months individuals may appear on the surface to bask, but seldom wander far from a favored retreat. Winter home ranges for eastern indigo snakes in western-central Florida averaged 25 acres or less (Moler 1986, 1992); similarly, studies in Georgia by Speake et al. (1978) found eastern indigo snakes to have limited home ranges (generally less than 10 acres) during the winter.

Surface movements by eastern indigo snakes during spring-fall may often be associated with snakes searching for food. Despite their formidable size, eastern indigo snakes are not constrictors. This species searches actively for prey, and investigators have noted that they often forage along the margins of wetlands where potential prey may be especially abundant. Eastern indigo snakes are known to eat fish, frogs, snakes, small turtles, lizards, rodents, and ground-nesting birds. They are especially fond of snakes, particularly rat snake species (*Elaphe*) (Ashton and Ashton 1988) and often eat venomous snakes, especially eastern diamondback rattlesnakes (*Crotalus adamanteus*) (Speake 1986). A 7 foot long specimen collected on Fort Stewart disgorged a southern hognose snake (*Heterodon simus*), a pygmy rattlesnake (*Sistrurus miliarius*), a young gopher tortoise, and a southern toad (*Bufo terrestris*) (R. Mount, pers. comm. 1994, R. Mount 1975). Another Fort Stewart specimen was observed eating a corn snake (*E. guttata guttata*) (R. Moulis, pers. comm. 1994). Snakes eaten by eastern indigo snakes are seized by the head, chewed vigorously, and swallowed alive (Moulis 1976). Landers and Speake (1980) cite 4 instances of predation by eastern indigo snakes on young gopher tortoises.

The eastern indigo snake breeds fall-late winter (Groves 1960, Speake et al. 1978). Confrontations between rival males may lead to combat or cannibalism (Moler 1992). Eastern indigo snake eggs are large and few in number (average 9/clutch) and are laid May-June in gopher tortoise burrows, stumps or other underground burrows (Williamson and Moulis 1979, Smith 1987). Eggs hatch approximately 90-120 days later and hatchlings are 17-24 inches long.

Adult eastern indigo snakes probably have very few predators, except for man, feral dogs, and rarely, alligators. Smaller individuals may be eaten by ophiophagus snakes (eastern kingsnakes [*Lampropeltis getula]*, eastern coral snakes [*Micrurus fulvius]),* other eastern indigo snakes,

birds of prey, and assorted carnivores (Ernst and Barbour 1989). The longevity record for this species in captivity is at least 25 years (Bowler 1977).

Eastern indigo snakes are susceptible to desiccation (Bogert and Cowles 1947) and require the humid confines of animal burrows or other shelters during periods of temperature extremes. Moler (1986) found eastern indigo snakes using hollow root channels and rodent holes at the base of large live oaks (*Q. virginianus*) as winter refuges in western-central Florida. The species has also been reported to shelter in gopher tortoise burrows, stump holes, armadillo *(Dasypus novemcinctus*) burrows, and in Florida, crab holes and limestone solution holes (Lawler 1977, Moler 1992).

In the northern part of its range (southern Georgia and northern Florida), adult eastern indigo snakes typically overwinter in gopher tortoise burrows on sandhills (Speake et al. 1978, Diemer and Speake 1981). Stump holes may also be used (Speake et al. 1978, Smith 1987). Snakes most often select inactive or abandoned gopher tortoise burrows, preferring these to burrows occupied by a gopher tortoise and often move between a number of different burrows during the same winter (Speake et al. 1978). At Fort Stewart, eastern indigo snakes have been observed entering the shafts of collapsed gopher tortoise burrows through holes (approximately the diameter of the snake) present at the original entrance or through the roof of the burrow (Williamson and Moulis 1979, TNC 1995). Gopher tortoise burrow use by eastern indigo snakes decreases when snakes become more active in the spring and begin moving to low-lying areas, but snakes are known to use gopher tortoise burrows for refuges throughout the year (Speake et al. 1978). Juvenile eastern indigo snakes do not have the same affinity for sheltering in gopher tortoise burrows as do the adults. Studies by Smith (1987) in the Florida panhandle revealed that hatchling and yearling eastern indigo snakes prefer to shelter in small burrows and holes in stumps and logs, stump holes, litter piles, and pine straw. Stump holes are important retreat sites for adults in flatwoods habitats (Smith 1987).

Bald eagle:

The breeding season of bald eagles in the southeastern U.S. generally begins with nest building activities in September. Nests are often constructed in the upper third of large pines, frequently the largest tree in a given expanse of forest within 1/2 mile of a suitable forage base. The cone-shaped, main body of the nest usually consists of sticks and can be enormous with dimensions of more than 6 feet in height and width. A depression is formed on the top of the nest and lined with a soft material such as Spanish moss (*Tilandsia usneoides*). The female is the primary nest builder with assistance from the male (FWS 1992). Two or more nests may be built by the same pair in a territory and may be used in alternate years. Courtship and mating often commence in October with aerial displays that may include dramatic acrobatics with the feet of the birds locked together (Ehrlich et al. 1988). A strong pair bond is maintained until the demise of 1 of the pair. A clutch of 1-3, most commonly 2, dull white, rounded-ovate eggs are laid November-December. The 35 day incubation period begins shortly after the first egg is laid, resulting in asynchronous hatching. This appears to be a strategy that allows 1 eaglet to gain a size advantage over the other, and only during years of abundant food resources will both chicks survive. Eaglets hatch with a thick, pale gray colored layer of down and are nearly fully feathered by 8 weeks of age. Both adults incubate the eggs, brood, and feed the young. The diet

of the eaglets is much the same as the adults, consisting of fish, birds and small mammals. Fledging generally occurs at about 10-12 weeks and the parents continue to care for the young for 4-6 weeks thereafter (Bent 1937). In the southeastern U.S., the adults and young remain as residents in a geographic locale throughout the year, but may range widely in search of food. Nesting territories of 28-112 acres are defended from intraspecific competitors (Chrest 1964).

Wood stork:

Wood storks usually nest in large rookeries and feed in flocks. They feed almost entirely on fish between 1-10 inches in length (Kahl 1964, Ogden et al. 1976, Coulter 1987). They occasionally consume crustaceans, amphibians, reptiles, mammals, birds, and arthropods. Storks most often exploit high concentrations of fish in drying pools and sloughs. Fish densities at stork foraging sites have been reported to vary from 13 individuals/square yard in eastern-central Georgia (Depkin et al. 1992) to 33 individuals/square yard in Florida (Ogden et al. 1978).
The foraging behavior of the wood stork involves tactilocation, also known as grope feeding. A feeding wood stork wades through the water with beak immersed and partially open. Upon contact with a prey item the mandibles forcibly snap shut, the head is raised, and the item is swallowed. Storks may use feeding sites that are distant to roosting or nesting sites because of their soaring abilities. They rise to high altitudes on thermal convections, then coast many miles without flapping.

Wood storks are seasonally monogamous, probably forming a new pair bond every season. The average age of first breeding is assumed to be 4 years old, but 3-year-old breeders have been documented. Mating occurs after a period of highly ritualized courtship displays at the nesting site. Storks in Georgia and South Carolina initiate nesting on a seasonal basis (March-late May) regardless of environmental conditions. Nests are constructed as high as 100 feet in cypress trees and as low as 3 feet in mangrove swamps. Nests are constructed of sticks, vines, leaves, and moss, and lined with leaves or cypress foliage. Man-made structures are also used. A single clutch of eggs is laid/breeding season. A second clutch is sometimes produced if nest failure occurs early in the season. The average clutch size is 3 (range 2-5). Incubation lasts about 30 days and begins after the first 1 or 2 eggs are laid and hatching is asynchronous. Chicks fledge after 9 weeks but return to the nest for an additional 3-4 weeks to be fed. Parent birds regurgitate whole fish into the bottom of the nest at a rate of 3-10 times/day. Wood stork colonies experience considerable variation in productivity among years and locations, probably in response to prey availability.

Since the 1960s, the wood stork population has declined in southern Florida and substantially increased in northern Florida, Georgia, and South Carolina. The number of pairs nesting in traditional colony sites in the Everglades and Big Cypress regions has declined from 8500 pairs in 1961 to less than 500 pairs (1987-1995). During this same period, the number of pairs nesting in Georgia has increased from 4 in 1965 to 1501 in 1995, and the number of pairs nesting in South Carolina has increased from 11 in 1981 to 829 in 1995.

Flatwoods salamander:

Following metamorphosis, flatwoods salamanders are fossorial and inhabit low areas in pine flatwoods where they live underground in burrows they excavate or in tunnels of crayfish (Ashton 1992, FWS 1997). Adult flatwoods salamanders have been tracked moving distances of up to 5577 feet (1700 m) from their breeding ponds to flatwoods sites. Preliminary studies indicate that the activity range of some individual salamanders in flatwoods sites may exceed 0.4 acres (0.2 ha) (Ashton 1992). Captive flatwoods salamanders have been observed eating earthworms (Goin 1950), which are abundant in some mesic flatwoods habitats (Wolfe et al. 1988). It is likely that a variety of other small invertebrates are eaten in the wild.

Adult flatwoods salamanders migrate at night to breeding sites (e.g., cypress ponds, grassy depressions) during or following rains associated with passing cold fronts from October-December (Means 1972, Anderson and Williamson 1976, Palis 1997a). Breeding population size was rather small (60 adults) at a site studied in Florida (Palis 1997a), but a much larger breeding population (over 300 adults) was documented in South Carolina (R. Moulis, pers. comm., 1997). Dr. David Rostal of Georgia Southern University is currently studying population size at several breeding sites on Fort Stewart.

The minimum viable population size needed to sustain a salamander population is unknown. High-quality habitat for this species should include several breeding sites within a matrix of pine flatwoods and savanna (Palis 1996). The presence of multiple breeding sites guards against extinction at any particular site, because it is presumed that over time salamanders can immigrate and colonize from nearby wetlands (Palis 1996). Long-term survival of a flatwoods salamander population probably requires a large area of terrestrial habitat that encompasses a suite of alternative breeding sites (Palis 1996).

When flatwoods salamanders arrive at breeding sites, courtship and egg laying take place in dry (not yet flooded) parts of the pond basin. The flatwoods salamander is unusual because it is 1 of only 2 species of ambystomatid salamanders that courts and deposits eggs on land (Anderson and Williamson 1976). Female flatwoods salamanders deposit from 97-222 eggs, which are laid singly or grouped in small clumps of up to 35 eggs in moist microhabitats (e.g., crayfish burrows, leaf litter, sphagnum moss, wiregrass clumps) within the pond basin (Anderson and Williamson 1976). The eggs develop to hatching size within 3 weeks, but will not hatch until inundated by rising pond water levels, and embryos are capable of hatching 2 months after oviposition (Anderson and Williamson 1976). Adult salamanders leave the pond basin during December-January, and exhibit homing ability by leaving the pond near the point of their arrival (Palis 1997a). Similar to other ambystomatids, it is likely that adult flatwoods salamanders return to the same breeding pond every year.

Larval flatwoods salamanders hide during the day in herbaceous vegetation but may enter the water column at night (Palis 1996, 1997b; Sekerak et al., In Press). The larvae feed on a variety of aquatic organisms and grow rapidly. Metamorphosis takes place March-April, after a larval period of 11-18 weeks (Palis 1995). Transformlings begin emigrating from their natal ponds during March-April (Palis 1996). A study in Florida found that male flatwoods salamanders may reach sexual maturity at 1 year of age, but that females do not mature until at least 2 years of age (Palis 1997a). Full adult size in the wild is probably not attained until the age of 3-4 years old

(Palis 1997a). Life span of the flatwoods salamander is unknown, but a closely related species, the ringed salamander (*Ambystoma annulatum*) is known to live up to 4 years, 11 months. Other ambystomatids may live more than 10 years (FWS 1997).

Flatwoods salamander breeding sites support populations of numerous other amphibians (i.e., ornate chorus frog [*Pseudacris ornata*], mole salamander) that breed only in isolated, ephemeral wetlands (Anderson and Williamson 1976, Moler and Franz 1988). Several species of small fish are commonly observed in salamander ponds, including the banded sunfish (*Enneacanthus obesus*), pygmy sunfishes (*Elassoma* spp.), and mosquitofish (*Gambusia holbrookii*) (Anderson and Williamson 1976, Gawin et al. 1995, Palis 1996). Many reptile species, like the eastern mud turtle (*Kinosternon subrubrum*), glossy crayfish snake (*Regina rigida*), and cottonmouth (*Agkistrodon piscivorous*) also inhabit these ponds.

The hydroperiod of flatwoods salamander breeding ponds is closely linked with timing and frequency of rainfall. During periods of drought, ponds may not fill during the breeding season or may go dry before the larvae have completed development. Conversely, unusually high summer or autumn rainfall may flood the ponds beyond their grassy edges, eliminating dry substrates within the pond basin where females typically deposit eggs. The reproductive success of amphibians that breed in ephemeral ponds may vary considerably from year to year and among ponds (Semlitsch 1987, Pechmann et al. 1991, Palis 1997b).

2-5 Relationships Between Listed Species and the Military Mission

The military mission of Fort Stewart and HAAF is land-use intensive. The installation is the home of the 3D Infantry Division (Mech.). The mission of the Division is to rapidly deploy heavy forces via land and sea to trouble spots throughout the world. Training activities are conducted year-round to maintain the high level of readiness necessary to meet this mission. The installation also supports the training needs of regional National Guard and Reserve units. Joint training exercises with forces from other installations and DoD Branches also are supported.

RCW:

The training mission cannot be relocated to avoid RCW habitat, because both are spread over the entire installation. Although all areas on the installation are used for training, mechanized infantry maneuver and live fire activities are most intensive in the E and F training areas, Red Cloud Tank Ranges, and the CALFEX area (HMU 3 in Table 1 and Figure 1). In addition, these areas also encompass the best expanses of trafficable high ground on the installation, as well as clearings for maneuver training. These areas also contain 113 active or potentially active (currently inactive but active within the last 5 years) RCW clusters, almost 1/2 of the installation total. Separation of RCW habitat and the training mission is therefore not possible. Mechanized maneuver can have significant impact on natural vegetation, including damage and destruction of mature pine trees. However, vehicle traffic tends to be concentrated in the same paths repeatedly, so natural vegetation continues to flourish over much of the landscape.. Due to the installation's flat topography, vegetation loss in tank paths does not cause significant erosion

problems in most cases (see section 4-7c). Although loss of natural pyrogenic ground cover (e.g., wiregrass) can inhibit fire spread, the use of aerial grid ignition prescribed fires can overcome this problem. This prescribed burning technique is providing effective midstory control, especially when applied during the growing season. In some areas repeated vehicle maneuver has also helped reduced midstory density. In summary, the landscape effects of maneuver activity appear to be manageable.

Since the early 1980s, a 200 foot buffer around all RCW cavity and cavity start trees has been considered "Off Limits" for mechanized training. The goals were to prevent habitat damage, and to minimize disturbance of the RCW (particularly during the nesting season). The unintended consequence was that these restrictions made it more difficult to conduct effective training activities, creating a strong disincentive for installation commanders to apply proactive management techniques (hardwood control, artificial cavities, augmentation, etc.) to recover RCW populations.

The establishment of a buffer to prevent habitat damage was considered necessary in order to protect cavity trees. It was never intended to protect all the habitat that a group of RCWs requires (i.e., 100-200 acres of foraging habitat). As stated above, heavy vehicle traffic and associated habitat damage tends to be concentrated in the same areas repeatedly, rather than being widespread across the landscape, so broad-scale protection has never been considered necessary on Fort Stewart. Since the 200-foot buffer was established in the 1980s, several important things have happened. The Army has initiated effective environmental awareness programs that have all but eliminated the incidence of trees being pushed down during training exercises. Effective techniques for constructing artificial cavities have been developed (Copeyon 1990, Allen 1991), making it possible to mitigate most cavity tree damage that might occur. This ESMP calls for at least 4 useable cavities to be maintained in each active RCW cluster. Perhaps most importantly, Fort Stewart has significantly increased staffing and funding for proactive endangered species management and monitoring, ensuring that provisions of this management plan will be implemented.

The 200-foot buffer restricted transient vehicle traffic (e.g., tanks and infantry fighting vehicles) through RCW clusters, but there is now evidence that these short duration activities do not significantly affect RCW nest success. From 1995-97, RCW nests in trees located within 200 feet from a regularly used tank trail had a success rate of 81%. The rate for nests within 200 feet from a tank trail in the heavily used E and F training areas was 75%. These success rates are similar to the installation-wide nest success rate for clusters in the normal land-use strata for the same period (80%).

Annual nest surveys (Table 2) have been conducted in all RCW clusters since 1994 to determine whether or not each cluster made a nesting attempt. These surveys involve weekly visits to each cluster to check for evidence of incubation or feeding young. Each cluster was assigned to 1 of 4 land-use strata: 1) maneuver (clusters located in heavily used maneuver areas), 2) live fire (clusters located in small arms live fire areas), 3) dudded (clusters located in large caliber impact areas), and 4) normal clusters (all others). To determine whether or not the percent of nesting active clusters was the same for all land-use strata, a Kruskal-Wallace non-parametric test was performed (Kruskal and Wallace 1952). We chose to use a non-parametric test because our

sample sizes were small and percentage data rarely are distributed normally. The critical value for $H_{0.05,4,4,4,4}$ (approximated by a χ^2 distribution with 3 degrees of freedom) was 7.82 ($\alpha = 0.05$). The calculated value of *H* was 5.43. Because the calculated value of *H* was less than the critical value of *H*, we could not reject the null hypothesis that the percent of nesting active clusters was the same among land-use strata (i.e., there was no difference among land-use strata).

Since 1995, nesting success (number of young fledged) (Table 3) has been monitored in a random sample of 25% of RCW clusters. We conducted a Kruskal-Wallace test on the null hypothesis that the percent of sample clusters that fledged at least 1 chick was the same among land-use strata. The critical value of $H_{0.05,4,4,4,4}$ (approximated by a χ^2 distribution with 3 degrees of freedom) was 7.82 ($\alpha = 0.05$). The calculated value of *H* was 7.69. Because the calculated value of *H* was less than the critical value of *H* we could not reject the null hypothesis that the percent of nesting sample clusters that successfully fledged at least 1 chick was the same among land-use strata (i.e., nesting success did not differ among land-use strata).

Table 2 - Number of active clusters, number of nests, percent of all active clusters that nested, and percent of active clusters that nested by land use strata from 1994-1999.

			PERCENT OF ACTIVE CLUSTERS THAT NESTED				
YEAR	# ACTIVE	# NESTS	ALL CLUSTERS	MANEUVER	LIVE FIRE	DUDDED	NORMAL
1994	157	100	64 (100/157)	73 (16/22)	59 (10/17)	62 (8/13)	63 (66/105)
1995	166	110	66 (110/166)	70 (16/23)	70 (16/23)	64 (7/11)	65 (71/109)
1996	166	123	74 (123/166)	95 (20/21)	70 (14/20)	55 (6/11)	73 (83/114)
1997	175	133	76 (133/175)	79 (19/24)	71 (15/21)	67 (8/12)	77 (91/118)
1998	189	141	75 (141/189)	76 (19/25)	78 (18/23)	69 (11/16)	74 (93/125)
1999	198	165	83 (165/198)	80 (22/25)	96 (22/23)	94 (15/16)	79 (106/134)
1994-99	1051	772	73 (772/1051)	80 (112/140)	75 (95/127)	70 (55/79)	72 (510/705)

Table 3. Percent of nesting sample clusters that fledged at least 1 chick from 1995-99.

YEAR	ALL SAMPLES	MANEUVER SAMPLES	LIVE FIRE SAMPLES	DUDDED SAMPLES	NORMAL SAMPLES
1995	76 (25/33)	75 (3/4)	67 (4/6)	100 (3/3)	75 (15/20)

1996	94 (32/34)	100 (4/4)	100 (5/5)	100 (2/2)	91 (21/23)
1997	78 (28/36)	75 (3/4)	100 (4/4)	100 (2/2)	73 (19/26)
1998	83 (30/36)	100 (5/5)	100 (4/4)	100 (2/2)	76 (19/25)
1999	84 (37/44)	83 (5/6)	83 (5/6)	100 (3/3)	83 (24/29)
1995-99	83 (152/183)	87 (20/23)	88 (22/25)	100 (12/12)	80 (98/123)

These data indicate that military training is not having a significant ($\alpha = 0.05$) effect on RCW reproduction. In addition, the kind of forest that the RCW requires is well suited for most types of training. This forest type is open (trees 20-25 feet apart affords room for vehicle maneuver) with a low profile midstory (provides visibility for target acquisition). Military training activities frequently cause wildfires, which have helped maintain some RCW habitat in an open condition. Areas of incompatibility include the military's requirement for openings for landing zones, drop zones, firing ranges, free dig zones, artillery position areas, maneuver lane engagement areas, etc.; and the RCWs need for some limitation on the amount of disturbance occurring near an active nest. Fort Stewart's large size will make it possible to accommodate the military's need for openings, and provide enough high quality RCW habitat so that a few nest failures will not have a significant effect on the population. Use of SRCs will allow natural resource managers to proactively manage the ecosystem to encourage RCW population expansion across the entire installation, without any potentially adverse effects on the training mission. If mission activities have any adverse effects on the RCW, it is expected that these will be offset by the positive effects of proactive management, so that the RCW population will continue to increase and recovery will be achieved. Available data indicate that this approach is working. From 1994 to 1999 the number of RCW nests on Fort Stewart increased from 100 to 164, and the number of active clusters increased from 157 to 198. Population trends will continue to be monitored to determine the effectiveness of management activities.

New management techniques, new data on the effects of training activities, and increased proactive management and environmental awareness on DA installations made it reasonable to reconsider the need for the restrictions that had been placed on training activities within 200 feet of a cavity tree, and in 1996, DA and FWS agreed on new guidelines for RCW management that significantly reduced training restrictions and increased DA commitment to proactive RCW management (DA 1996). The new guidelines and this ESMP are based on the premise that RCW conservation and military training are not mutually exclusive. Under this ESMP, Fort Stewart will recover its RCW population **AND** fulfill its military missions. The plan will be reviewed annually and revised every 5 years to ensure that both objectives are being met. If any irresolvable conflicts arise, they will be referred to higher headquarters for resolution.

Eastern indigo snake:

Eastern indigo snake populations on Fort Stewart occur in some of the most heavily used training areas and in the AIA. Neither the snakes nor the training mission can be relocated to different areas. The primary risk to the eastern indigo snake from training activities on Fort Stewart is direct mortality from vehicle traffic, or damage to gopher tortoise burrows or other retreats. The probability of a vehicle running over an eastern indigo snake is difficult to estimate, but it has never been recorded at Fort Stewart. Damage to gopher tortoise burrows occurs occasionally, but it does not appear to be a significant problem. There are no "Off Limits" areas to restrict training in gopher tortoise and eastern indigo snake habitat, but protection of gopher tortoise burrows is encouraged in Post Range Regulation (Fort Stewart Reg. 385-14), and awareness of the need to avoid damage to gopher tortoise burrows is included in the training provided to each soldier when they arrive on post. Continued emphasis on environmental awareness and avoidance of damage to gopher tortoise burrows are expected to be adequate to protect eastern indigo snakes and their habitat. Gopher tortoise and eastern indigo snake populations will be monitored to ensure effectiveness of management activities.

Bald eagle:

Bald eagles are associated with wetland habitats, especially for foraging, and these habitats are seldom if ever used for military training. However, nests may be located in or adjacent to high ground that is suitable for training. Such is the case with the 2 eagle nests on Fort Stewart. The Pineview Lake nest is located in a recreational area, so protective restrictions for this nest have had little effect on training activities. The E13 nest is in a heavily used training area, but it is situated between 3 RCW clusters, so ground training within much of the protected 750-foot radius around the nest is already restricted to protect the RCW. Current restrictions of low altitude (less than 1000 feet) aircraft flight have the greatest effect on training. The air corridor along Fort Stewart Road 5, approximately 750 feet west of the E13 nest, continues to be open for low altitude aircraft operation, and eagles nested successfully at this site from its discovery in 1995 thru 1997 and in 1999. Training restrictions appear to be sufficient to protect the eagle, and current restrictions do not have a significant adverse effect on training activities.

Bald eagle numbers are increasing in coastal Georgia, and the species was down-listed to threatened in 1995. Immature and single adult eagle are seen on Fort Stewart with increasing regularity, and it is likely that bald eagles will establish an additional nest in the next 5 years. As new nests are discovered, individual management and protection plans will be developed for each nest in cooperation with the FWS, striking a balance between the needs of the eagle and the needs of the training mission. If bald eagles establish nests in heavily used training areas, it is reasonable to assume that current training activities do not represent an unacceptable disturbance, and additional training restrictions should be imposed only if there is a clear need.

Wood stork:

Wood storks are associated with wetland habitats that are seldom, if ever, used for military training. Occasional incidents of vehicle traffic through such habitats are usually unintentional, resulting from the vehicle operator being disoriented. Habitat management guidelines for the wood stork recommend prohibiting aircraft operation within 500 feet of a nesting colony, but

wood storks do not nest on the installation. If a nesting wood stork colony becomes established on the installation, such restrictions could adversely affect training activities. Low altitude aircraft operations occur in virtually every area of the installation at some point during the conduct of various training activities. There are therefore no areas where establishment of a nesting wood stork colony could not be pursued without the potential for conflict with the training mission.

Unlike the RCW, the wood stork's recovery is not dependent on the establishment of a breeding population on the installation. There are adequate regional opportunities for establishing nesting wood stork colonies on state and federal wildlife refuges and private lands. Therefore, conservation efforts for this species will focus on protection of foraging habitat by adhering to BMPs for wetlands management, rather than attempting to establish a nesting wood stork colony on the installation.

Flatwoods salamander:

Flatwoods salamander habitat is widespread on the installation and includes many areas that are not heavily used or impacted by mechanized training activities (e.g., A6-10, B4, B19-21, C5-9, and D5-9). Military training does not pose a severe threat to salamander habitat at these sites. Fort Stewart soldiers are instructed to avoid wetlands as part of the installations ongoing environmental awareness training program. Tank operators generally avoid driving through low-lying sites including isolated wetlands.

Prescribed burning is mutually beneficial to the flatwoods salamander and the military mission. Large-scale clearings for new ranges or drop zones may adversely affect salamander populations by degrading terrestrial habitat, even if wetlands are avoided. Such situations will be evaluated on a case-by-case basis in the biological assessment for each project.

2-6 Reasons for Listing

RCW:

Population decline in response to habitat loss is the reason for listing this species as endangered. Logging or clearing of mature pine forests and fire suppression have been the primary causes of habitat loss and degradation. Specific causes of RCW population decline include hardwood encroachment around cavity trees (Van Balen and Doerr 1978, Locke et. al 1983, Conner and Rudolph 1989, Costa and Escano 1989, Loebb et. al 1992), extensive clearcutting (Jackson 1986, Ortego and Lay 1988, Conner and Rudolph 1989), shortage of potential cavity trees (Hooper 1988, Costa and Escano 1989, Rudolph and Conner 1991), and demographic isolation (Costa and Escano 1989). Without appropriate management of the species and its habitat, the RCW will continue to decline. Recovery for the species requires establishment of at least 15 viable populations distributed through the physiographic provinces of the southeastern U.S. (FWS 1985). Fort Stewart is the only large federal property in the Coastal Plain of Georgia with sufficient suitable habitat to support a viable RCW population. Management of the installation's RCW population is critical to the species' recovery and down-listing.

Eastern indigo snake:

The eastern indigo snake was listed as threatened by the FWS in 1978 (43 FR 11082-11093). A precipitous decline in eastern indigo snake numbers during the 1960s and 1970s prompted this listing (FWS 1982). Eastern indigo snakes have been extirpated or are now extremely rare from Alabama, Mississippi, and South Carolina where they historically occurred (FWS 1982). Today, sizable populations are known only from Florida and Georgia. Certainly, the decline of this species continues as landscapes increasingly become developed and agriculturalized. Some of the most favorable eastern indigo snake habitat remaining is in private ownership leased by organized hunt clubs (Speake et al. 1978).

The most significant factor behind the decline of this species is habitat loss or degradation. Large acreages of eastern indigo snake habitat have been converted for agricultural or silvicultural uses. Native longleaf pine sandhills and flatwoods, habitats to which eastern indigo snake populations are closely tied in the northern part of its range, have diminished rapidly and to the point where these ecosystems themselves are now considered imperiled (Wharton 1978, Means and Grow 1985, Noss 1989). Increasing fragmentation of habitats supporting eastern indigo snake populations is a concern because these snakes travel widely and have large home ranges, often moving considerable distances between upland and wetland habitats. Habitat fragmentation has resulted in increased mortality from highway fatalities.

Because the life history of the eastern indigo snake is intimately connected to that of the gopher tortoise, especially in northern part of range, factors that adversely affect gopher tortoise populations may also have a negative impact on the eastern indigo snake. Gopher tortoise populations have declined dramatically in the Florida panhandle due to human exploitation for food (Diemer 1992). Because gopher tortoises require open pine habitats with diverse and abundant herbaceous layers, they will disappear from fire-suppressed sites. Although some pine plantations are subjected to regular fires and support gopher tortoise and eastern indigo snake populations (Diemer and Speake 1981), most probably do not. The excavation of remnant lighterwood pine stumps similarly has had a damaging effect on the eastern indigo snake because stump holes may frequently be used as retreats by snakes, especially at sites lacking adequate gopher tortoise burrows (Speake et al. 1978, Moler 1992).

Until they were given legal protection in the 1970s, eastern indigo snakes were frequently collected for the pet trade, and some populations were depleted by overcollection (FWS 1982). Federal and state listing has curtailed collection of the eastern indigo snake. The gassing of gopher tortoise burrows, a method used by snake hunters to collect the eastern diamondback rattlesnake, has been shown to be lethal to the eastern indigo snake (Speake and Mount 1973). There is serious concern about the effects of gassing on eastern indigo snake numbers. Although illegal in both Georgia and Florida, gassing is thought to be widely practiced in parts of northern Florida and southern Georgia. The effects of pesticides that may accumulate in eastern indigo snakes because they are upper-level predators (Lawler 1977) is essentially unstudied, but also may be of significant concern.

Bald eagle:

Myriad human-caused factors caused a decline in bald eagle numbers in the mid to late 1800s and the first part of this century. Declines in waterfowl, shorebirds, and other major prey species also precipitated a decline in eagle numbers. Indiscriminate killing of eagles coupled with habitat loss continued the decline until the 1940s when the Bald Eagle Protection Act was passed. This law afforded some protection for the bald eagle and slowed the decline. With the advent of widespread use of dichloro-diphenyl-trichloroethane (DDT) in the late 1940s, eagle reproductive failures became increasingly common. Bald eagles south of the fortieth parallel were listed as endangered under the Endangered Species Preservation Act of 1966 (16 USC 668-668d) and received additional protection when the ESA of 1973 (16 USC 1531), as amended, was passed. This added attention and protection seemed to be pivotal in the rebound of this species. Annual nationwide bald eagle surveys conducted by the FWS have reflected a promising trend since 1974. In fact, the bald eagle was down-listed to threatened in July 1995 (FWS 1995) in the lower 48 States. This down-listing was cited as 1 of the success stories of the ESA. It appears that the major threats to this species existence have been overcome. However, protection from indiscriminate killing, harassment ,and especially habitat loss will be necessary to reach a recovered population.

Wood stork:

The FWS listed the wood stork as endangered in 1984 for several reasons. Loss of breeding habitat due to wetland drainage and hydroperiod alteration are believed to have lowered productivity and availability of fish for the wood stork, as well as for other wading bird species (Ogden and Nesbitt 1979). Water level manipulations caused by intensive water management in southern Florida has decreased the area subjected to natural flooding followed by gradual drying. Increased predation by raccoons (*Procyon lotor*) may occur when low water levels facilitate entry into breeding ponds. Perpetually flooded ponds do not allow cypress and other tree species to regenerate and decreases nest tree regeneration. Human disturbance may cause adults to leave nests, exposing eggs and downy nestlings to predators and the elements. Pesticide contamination has not been a major problem affecting wood stork reproduction. However, reproduction of some northern and central Florida colonies were affected adversely by DDE (Fleming et al. 1984). Urban and agricultural expansion in southwestern Florida continue to adversely impact remaining wood stork colonies.

Flatwoods salamander:

The flatwoods salamander has experienced significant population declines because approximately 80% of native pine flatwoods throughout its range have been converted to agriculture, urban development, or pine plantations. Disruption of natural fire cycles also has contributed to the decline (FWS 1997). Continued destruction and degradation of the flatwoods salamander's habitat threatens remaining populations (FWS 1997, Palis 1997b). Recent range-wide status surveys have documented flatwoods salamanders at only 12 of 97 historical (pre-1990) localities in Alabama, South Carolina, Georgia, and Florida (FWS 1997). Various

factors that have contributed to the decline of flatwoods salamander populations are discussed below.

Herbicides and pesticides constitute a threat to flatwoods salamanders and other amphibians, because their permeable skins absorb substances from the surrounding aquatic or terrestrial environment (Duellman and Trueb 1986). Salamander eggs and larvae are acutely susceptible to these substances. Fertilizers applied in pine plantations may lead to eutrophication of nearby salamander wetlands and promote algal blooms (Palis 1997c). Flatwoods salamander larvae never have been collected from algal-choked wetlands (Palis 1997c). Salamander breeding sites are small (often less than 1 acre [0.4 ha]) ponds that receive surface runoff from adjacent pine habitats. Earthworms, which are probably the primary food of flatwoods salamanders, are known to accumulate contaminants (Beyer 1990).

The open pine flatwoods habitats and grassy breeding sites required by the flatwoods salamander are ecosystems maintained by periodic growing-season fires. Fires that burn into the dry basins of salamander ponds serve to cycle nutrients and perpetuate growth and dominance of herbaceous plants needed for salamander reproduction (Jordan et al. 1997). In the prolonged absence of fire, ponds become dominated by woody vegetation and shading reduces herbaceous cover (Palis 1996, Jordan et al. 1997).

To the detriment of pond-breeding amphibians like the flatwoods salamander, firebreaks to suppress wildfires or to control prescribed burns are sometimes placed around the margins of ponds, or "tied-off" into ponds so that firebreaks bisect the basin of the pond. Additionally, firebreaks may alter significantly the natural hydrology and topography of the ponds, destroy herbaceous vegetation within ponds or at pond ecotones, and may provide corridors that allow predatory fishes to enter the ponds (Gawin et al. 1995, Palis 1996, Jordan et al. 1997).

Modern commercial forestry poses a significant threat to the flatwoods salamander throughout much of its range (FWS 1997, Palis 1997b). Pine plantation site preparation methods often include bedding and ditching. These practices alter soil topography, ground cover vegetation, and hydrological flow. Alteration of hydrological flow may lower surface water tables and shorten pond hydroperiods. Both of these practices adversely affect flatwoods salamander habitats, and have been implicated as the cause of a dramatic decline of a flatwoods salamander population in Florida (Means et al. 1996).

Intensive pine plantation management is not practiced at Fort Stewart. However, logging of large, remnant slash pines from the margins or interiors of cypress ponds previously has resulted in soil compaction, rutting, and disturbance to the grassy ecotones of some ponds on Fort Stewart (Gawin et al. 1995). Rutting and soil compaction in ponds on Fort Stewart is most severe in wet weather periods when water tables are near the surface, but is prone to occur year-round in ponds located in poorly-drained flatwoods areas (D. Stevenson, pers. obs.). Ruts alter local hydroperiods, disrupt pond floor topography, and may eliminate herbaceous vegetation that salamanders need for oviposition, cover, and foraging habitat (Gawin et al. 1995, Jordan et al. 1997).

2-7 Conservation Measures

RCW:

The FWS has developed and is implementing a recovery plan for the RCW (FWS 1985). The plan calls for management of forest stands to enhance habitat for the species, and for continued research. Since approval of the RCW recovery plan in 1985, researchers have developed effective techniques for construction of artificial cavities. Translocation of juvenile RCWs to augment single birds or to establish new pairs has also been successful. These techniques, along with aggressive hardwood control and other habitat improvements, have enabled managers of most of the remaining RCW populations to stabilize or increase populations. Federal agencies are using these techniques to manage RCW populations proactively, and prospects for recovery of the species are excellent (Costa 1995). The following DoD installations have ongoing management programs for the RCW: Fort Stewart, Fort Bragg, Camp McCall, Fort Benning, Fort Gordon, Fort Jackson, Fort Polk, Eglin Air Force Base, Shaw Air Force Base, Poinsett Weapons Range, Dare County Bombing Range, Avon Park Air Force Range, Camp LeJeunne, Charleston Naval Weapons Station, and Sunny Point Military Ocean Terminal.

Although most of the remaining large RCW populations are on public lands, several paper companies that own large tracts of land in the Coastal Plain are voluntarily managing sections of their forests for habitat enhancement. Large populations also remain in the Red Hills region of southern Georgia (Engstrom and Baker 1995) and in the towns of Southern Pines and Pinehurst, N.C. (Carter et. al 1983). Development of incentives to encourage private landowners to actively manage the populations may hold promise for ensuring their continued existence, but the future of the RCW is clearly dependent on management of federal lands.

Eastern indigo snake:

A formal recovery plan for the eastern indigo snake has been developed (FWS 1982). Research objectives of this plan include development of population monitoring methods, determination of habitat requirements of juvenile eastern indigo snakes (completed, FWS 1982), investigation of captive breeding and restocking potential for the species (completed, FWS 1982), description of the species' reproductive behavior in the wild, determination of the effects of pesticide exposure on the eastern indigo snake, and determination of optimum gopher tortoise burrow density required by the eastern indigo snake in the northern part of its range. The eastern indigo snake is state listed as endangered by Mississippi and South Carolina and as threatened by Florida (1971) and Georgia (1977). Traffic of eastern indigo snakes through the pet trade was curtailed by listing the species as federally threatened in 1978. Some southern Florida eastern indigo snake populations are believed to have recovered subsequent to gaining federal protection in 1978, and the eastern indigo snake may no longer be threatened in southern Florida (FWS 1982). Several Georgia natural areas known to be significant sites for the eastern indigo snake have been dedicated or acquired within the last few years (e.g., General Coffee State Park and Ohoopee Dunes Natural Area).

Bald eagle:

In addition to the Bald Eagle Protection Act of 1940, the Endangered Species Protection Act of 1966, and the ESA of 1973, as amended, several other public and private agencies have supported the conservation of bald eagles. More than 1,000,000 dollars have been spent annually over the past decade on recovery and protection of the bald eagle (FWS 1995).

The FWS Southeastern States Bald Eagle Recovery Plan (1989) provides specific management guidance for bald eagles found in this geographic region. This guidance is the basis of Fort Stewart's bald eagle management in the 2 known nest locations.

Wood stork:

The FWS has developed a set of management guidelines for wood stork nesting, feeding, and roosting habitats (FWS 1996). Draft guidelines have been developed by the Florida Game and Fresh Water Fish Commission for professionals conducting forestry practices on lands where wood storks occur. The final guidelines will have the concurrence of the U.S. Forest Service.

South Carolina and Georgia have been successful in managing man-made diked impoundments for use by wood storks. Water levels are manipulated to imitate natural drought cycles, but drying and flooding are artificially accelerated using water control structures and may be timed within season for maximum utility. Storks have fledged young from artificial nesting structures on diked impoundments at Harris Neck National Wildlife Refuge in coastal Georgia since 1993. Regional plans are now being developed for the ecological restoration of the Everglades basin, which should significantly improve habitat for wood storks in southern Florida.

Aerial surveys of nesting colonies were conducted 1957-1961, in the mid-1970s, and 1991-1995 to locate important habitats and to identify potential threats to the southeastern population of wood storks. Aerial surveys will be reinitiated in 2001. Results to date show populations to be increasing in Georgia, but declining in Florida. A study conducted by Bryan (1994) documented 110 roost sites in the coastal zone of Georgia and South Carolina. Researchers plan to assess the degree of genetic interrelatedness among wood stork colonies, so that managers can determine whether the increase in numbers of storks breeding in the northern portion of their range is the result of high productivity in those colonies, increased immigration from Florida, or both.

Flatwoods salamander:

Since the flatwoods salamander was only recently listed as a threatened species, there is currently no recovery plan for the species. The FWS will develop and implement a recovery plan in the near future, which will identify and address conservation measures necessary for the recovery of this species. The effectiveness of translocation or reintroduction of flatwoods salamanders has not been studied. Similarly, the merits of restoring or rehabilitating flatwoods salamander habitats have not been studied intensively. Attempting to reintroduce salamander populations as well as restoring habitats will be expensive and labor-intensive. Conservation efforts on Fort Stewart and elsewhere should focus on managing existing populations and suitable flatwoods salamander habitat. Opportunities to restore degraded habitats on Fort

Stewart will be considered on a case-by-case basis as prescriptions are prepared for each NRMU during the next 5 years.

3.0 CONSERVATION GOALS (AR 200-3: 11-5; DA RCW ESMG III.A., III.F., III.G., III.H., and V.B.; RCW Recovery Plan)

Establishment of conservation goals is essential for preparation of this ESMP. They provide the basis for identifying the amount of land needed and the appropriate level of management intensity. Goals should be considered long term, but are subject to change, through consultation with the FWS, based upon changing circumstances, changing missions, or new scientific information. Estimates of carrying capacity or populations goals for individual Natural Resource Management Units (NRMU) will be refined as area specific prescriptions are prepared over the next 5 years (see section 4.0). Overall conservation goals will be reexamined in conjunction with the 5 year review/revision of the ESMP.

RCW:

The Installation Regional Recovery Goal (IRRG) is the number of groups which the FWS identifies as the installation's potential contribution to regional recovery of the RCW. The FWS has established this goal at 500 active clusters. Under the ESA, the installation has a responsibility to carry out conservation programs that support recovery of endangered species. However, imposition of training restrictions on 500 RCW clusters would have unacceptable adverse impacts on the installation's training mission. Therefore, DA Guidelines for RCW management allow for the establishment of a Mission Compatible Goal (MCG) that includes all active and potentially active clusters that currently exist on the installation, and provides for population expansion in areas free of conflicting current and projected mission activities. Based on these criteria, the installation's MCG is 411 active clusters. **Only the 411 clusters that comprise the MCG will be subject to training restrictions.** The difference between the MCG and the IRRG will be satisfied by establishing Supplemental Recruitment Clusters (SRCs) that will be managed to promote RCW population expansion. **SRCs will not be subject to any training restrictions.**

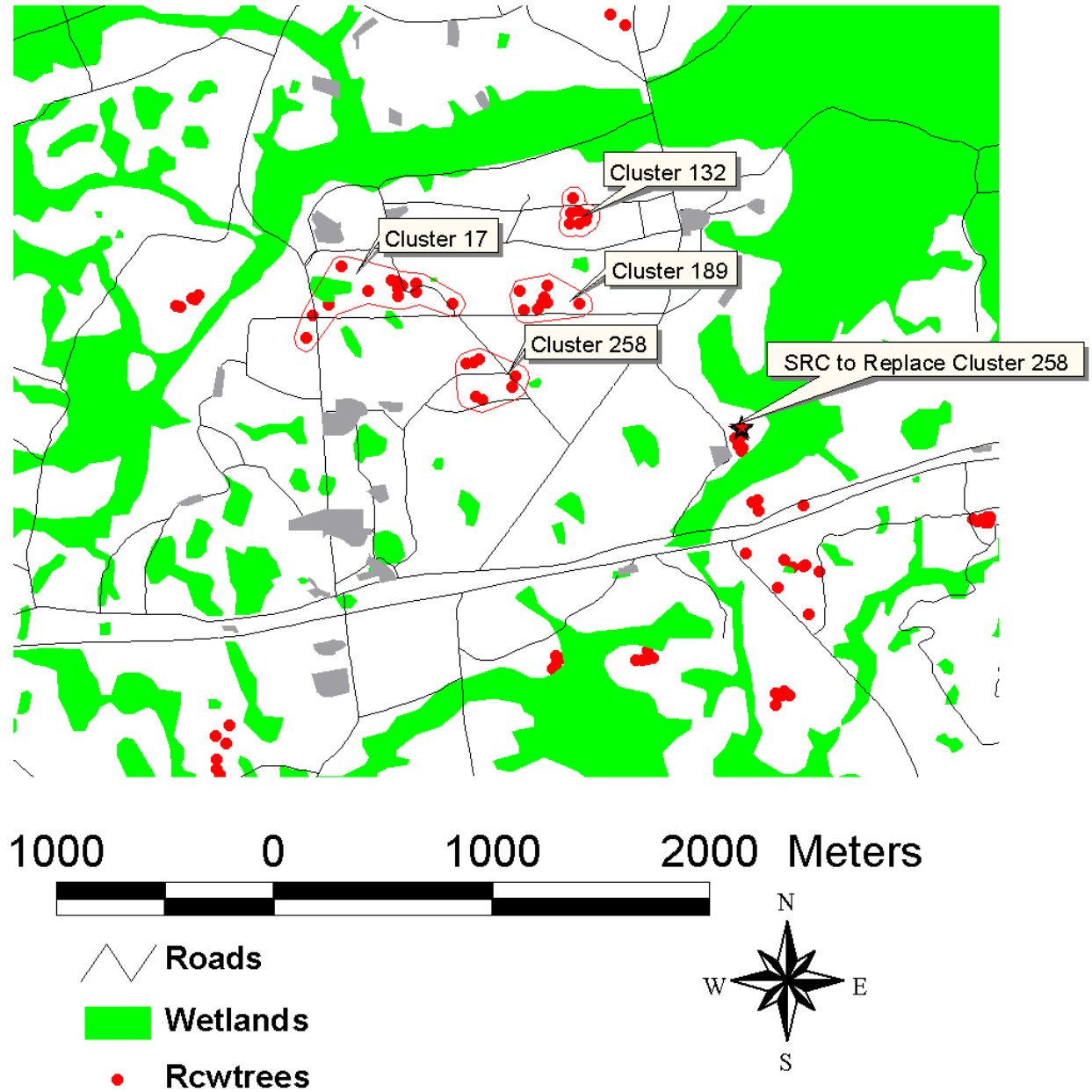
Once the IRRG is achieved, actions that might adversely affect RCW clusters will be allowed to proceed (following appropriate consultation with the FWS), as long as a minimum of 500 active clusters is maintained. This will be an important asset for future installation commanders who must provide facilities to support missions and weapons systems that are constantly changing, and still maintain compliance with the ESA. In order to safeguard the ability to implement future actions that might reduce the RCW population, additional SRCs will also be established to achieve a population density of 1 active cluster per 200 acres across the installation. Given our current estimate of 136,929 acres of suitable habitat, this will provide a surplus of 185 clusters above and beyond the 500 cluster IRRG (Table 1, Figure 1). **These additional SRCs will not be subject to training restrictions.** Their existence will provide future installation commanders a high degree of flexibility to establish necessary training facilities and still maintain the 500 active clusters required to meet the IRRG. Managing to sustain a surplus of RCWs will also insulate the population from catastrophic events such as hurricanes, enhance the

efficiency of genetic interchange within the population, and minimize the risk of isolation of clusters within the population.

As stated above, the MCG of 411 active clusters includes all active and potentially active clusters that currently exist on the installation, except cluster 258 (233 clusters). Cluster 258 is a special case. It was discovered during the FY97 nesting season with 2 RCWs working on several cavity starts in the vicinity of a cavity start tree (tree # 1041) that was on record as part of cluster 189. Tree 1041 was an outlier, located almost 500 meters from the center of cluster 189. There were no completed cavities near tree 1041, so the site was provisioned with 2 artificial cavity inserts (which the birds occupied immediately) and was designated as cluster 258. Cluster 258 is in a heavily used maneuver area (E12), with 2 other active clusters within ½ mile (clusters 17 and 189). There has never been a nest in cluster 258, and it has had at least 4 different RCWs in residence since FY98. At times there appear to have been no RCWs roosting there (based on absence of fresh resin wells and roost observations). Foraging resources for cluster 258 exceed Henry guidelines requirements, but overlap with the foraging area for RCW cluster 189 (located approximately 600 meters northeast of cluster 258) reduces available foraging resources for cluster 189 below Henry guidelines requirements. This situation makes it impossible to adequately thin pine stands to maintain suitability of the area for mechanized maneuver training without "taking" RCWs in cluster 189 according to current guidelines. To alleviate the situation, an SRC will be established approximately 1400 meters east of cluster 258 in suitable RCW habitat, and the trees currently assigned to cluster 258 will be reassigned to cluster 189 (Figure 2).

The RCW Recovery Plan (FWS 1985) identified 250 effective breeding pairs as the threshold for recovery. More recent research utilizing long term demographic data sets and application of viability models, has suggested that the minimum viable population size may be higher (Lennartz and Heckel 1987, Reed et al. 1988, Walters 1990, Reed et al. 1993, Carter et al. 1995, DeLotelle et al. 1995). The current consensus is that viability requires 350 potential breeding groups.

Figure 2 = SRC to replace RCW cluster 258



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Specific data from Fort Stewart for the years 1997-2000 indicate that 350 potential breeding groups can be sustained by a population of 399 active clusters, and that the population will reach such a size by the year 2015 if current trends continue (Table 4). Population trend data will be analyzed during the annual plan review and 5 year revision. Adjustments to the IRRG will be made as appropriate based on a 5 year average of local nesting success data.

Table 4. RCW population trend.

In order to accommodate training mission requirements, 3 RCW Habitat Management Units (HMUs) have been established (Figure 1, Table 1). All existing active and potentially active RCW clusters in all 3 HMUs will be protected from possible training damage IAW FS Regulation 385-14 (Appendix F). New clusters will be established, protected, and managed as follows:

HMU-1 - This HMU encompasses lands where military training activities can accommodate protective restrictions on new RCW clusters. All recruitment clusters established in this HMU will be designated as PRCs (i.e. subject to training restrictions). Selection of PRC sites will be coordinated with DOT staff to further reduce potential for training mission conflicts. Foraging habitat will be provided IAW paragraph 4-2.

HMU-2 - This HMU encompasses lands where imposition of training restrictions on any new RCW clusters would have unacceptable adverse impacts on the installation's training mission. All recruitment clusters and new natural clusters established in this HMU will be designated as SRCs (i.e. **not** subject to training restrictions). Selection of SRC sites will be coordinated with DOT staff to further reduce potential for training mission conflicts. Foraging habitat will be provided IAW paragraph 4-2.

HMU-3 - This HMU encompasses the installation's most heavily used mechanized maneuver training lands. Imposition of training restrictions on any new RCW clusters in this area would have unacceptable adverse impacts on the installation's training mission. New facilities are likely to be needed in this HMU in the future to accommodate training requirements. Development of these facilities is likely to require clear cutting or severely thinning substantial areas of forest. All recruitment clusters and new natural clusters established in this HMU will be designated as SRCs (i.e. **not** subject to training restrictions). Selection of SRC sites will be coordinated with DOT staff to further reduce potential for training mission conflicts. Foraging habitat will be provided IAW paragraph 4-2 wherever possible. However, development of future training facilities may, in some cases, reduce foraging resources below the standards in the FWS guidelines (Henry 1989). There is evidence that RCWs may not require as many trees as required by the Henry guidelines. Beyer et al. (1996) studied 106 RCW groups in Florida with 1,200-13,176 pines within 1/2 mile of the cluster. Sixty-seven percent of the clusters sampled had fewer pines greater than or equal to 10 inches DBH and 73% had lower pine BA than the Henry guidelines require. The researchers found no association between number of young fledged and the number of available pine trees. The researchers envisioned management conflicts in the future, because increasing RCW populations will result in more RCWs sharing the same amount of habitat. Ultimately, many clusters will have foraging resources that do not meet the Henry guidelines. They concluded that adherence to the Henry guidelines does not appear to be a valid reason to limit management activities that would otherwise benefit RCWs.

The military needs an open landscape in which to train. Much of this area will continue to be forested, but existing clearings will continue to be required, and creation of new clearings is likely to be necessary to accommodate current and future mission requirements. Stand densities in forested areas will also need to remain low to allow for armored vehicles to maneuver freely. A total of 524 clusters will be managed IAW standard guidelines for foraging (Henry 1989) and

nesting habitat (293 clusters in HMU-1, 128 clusters in HMU-2, and 103 existing clusters in HMU-2), which is more than adequate to achieve the IRRG (Table 1). Since all SRCs in HMU-3 are in excess of the number required for recovery, it is prudent to establish SRCs there, while guaranteeing the military that future land management actions will not be constrained by the need to abide by the requirements of the Henry guidelines for these SRCs. This will provide the opportunity to learn whether RCWs can be managed successfully without restricting training activities or management of the landscape to support the training mission.

The RCW population goal for HAAF is zero. There is currently 1 inactive cluster on the HAAF golf course. It was inactive at the time of discovery in 1993 and had apparently been inactive for over 10 years. Reestablishment of an RCW population at HAAF would not be feasible. Prescribed burning would be complicated by the potential for conflict with airfield operations and by the airfield's proximity to the city of Savannah. There are less than 4000 acres of uplands on HAAF and most of that is urbanized land. With extraordinary effort, it might be possible to sustain 5-10 clusters on HAAF, but such a small population would contribute little to the RCW's recovery and would draw management resources away from Fort Stewart's more viable population.

In order to achieve the installation's RCW conservation goal, MCG, and IRRG, PRCs will be established annually at the optimum rate of growth for the population and SRCs will be established at 1/2 the optimum rate. The optimum annual growth rate is estimated at 10%/year. Similar increases in the number of potential breeding pairs have been achieved at Eglin Air Force Base, Fla. and Camp LeJeunne, N.C. (J. Walters, pers.comm). At Fort Stewart, the number of RCW nests increased by an average of 10% annually from 1994-1999.

The optimum rate of growth will be applied to the number of active clusters to determine the number of recruitment sites to provision with artificial cavities. For example, in FY 00 there were 212 active clusters, so 21 (10% of 212) PRCs and 11 (5% of 212) SRCs will be established or maintained in FY 01. The number of PRCs and SRCs established in subsequent fiscal years will be based on the number of active clusters in the preceding nest year. Unoccupied PRCs and SRCs will be maintained or reprovisioned as necessary and counted toward the annual quota. Additional PRCs and SRCs will be established annually so that the total number of unoccupied PRCs will always equal at least 10% of the number of active clusters, and the number of unoccupied SRCs will always equal at least 5% of the number of active clusters. Estimates of the annual optimum growth rate will be adjusted as new data become available and will be based on a 5-year average increase in the number of nests or the number of active clusters, whichever is greater.

<u>Eastern indigo snake</u>:

The conservation goal for the eastern indigo snake will be to maintain the 4 extant populations on Fort Stewart and to encourage expansion into suitable unoccupied habitat. Longleaf-wiregrass ecosystem management (e.g., frequent burning, reestablishment of native groundcover) for the RCW will support the achievement of these goals.
<u>Bald eagle</u>:

The conservation goal for the bald eagle will be to continue to support a nesting pair of eagles in the vicinity of Pineview Lake. Suitable nesting and foraging habitat for additional eagle pairs will be provided by protecting wetlands IAW applicable laws and regulations. Continued management of recreational fish ponds will also benefit the bald eagle.

Wood stork:

The conservation goal for the wood stork will be to provide suitable foraging habitat by protecting wetlands IAW applicable laws and regulations.

Flatwoods salamander:

The conservation goal for the flatwoods salamander will be to maintain the 5 existing populations and 21 breeding sites currently known on Fort Stewart, and to manage other areas of suitable flatwoods salamander habitat in a manner to encourage the establishment of viable salamander populations. Longleaf pine-wiregrass ecosystem management (including frequent burning and reestablishment of native ground cover) for the benefit of the RCW will help to achieve these goals.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS (AR 200-3: 11-5)

There are 120 training areas on Fort Stewart and each is subdivided into NRMUs. Most NRMUs are bound by roads or swamps that serve as fire control lines for prescribed burning. A few NRMUs need to have permanent boundaries established or improved. During the next 5 years, prescriptions will be prepared for each training area.

These prescriptions will guide and prioritize habitat management actions necessary to achieve the goals of this plan. They will be entered into the GIS database and updated annually during review of this plan and the INRMP. Preparation of these prescriptions will provide a more accurate estimate of the actual carrying capacity for RCWs than can currently be provided. The RCW carrying capacity for each NRMU, and the installation MCG will also be updated during the annual plan review in coordination with FWS, based on the individual NRMU prescriptions. Management prescriptions and actions incorporated within this ESMP will be developed IAW the applicable ESMGs, this ESMP, and the INRMP. Actions included within this ESMP are considered to be necessary to achieve conservation goals for the RCW at Fort Stewart.

Prescription preparation will be scheduled for each training area between FY00-FY04 (Table 5). Prescription preparation priorities may be adjusted in response to military training priorities, changing habitat conditions, etc. A prototype management prescription has been developed for training area A11 (Appendix D). In general, prescriptions will include the following information:

Acreage:
- Total acreage
- Permanent clearings and non-forest acreage
- Wetland acreage
- Forested upland acreage

TES:
- Number and location of RCW clusters
- RCW carrying capacity
- Location of PRCs and schedule for provisioning
- Location of SRCs and schedule for provisioning
- Description of foraging resources for each RCW cluster, PRC, and SRC
- Location of special habitats and management recommendations for other species, including state listed species and federal species of concern

Land management:
- Wildlife clearings
- Permanent firebreaks
- Prescribed burn schedule
- Timber thinning schedule and entry cycle
- Prescribed burn plan
- Fire suppression SOP
- Proposed timber sales
- Proposed reforestation actions
- Proposed habitat rehabilitation actions (wiregrass planting, etc.)
- Proposed hardwood control actions

Land Use:
- Existing and proposed facilities (ranges, drop zones, recreational facilities, etc.)
- Primary types of training conducted (live fire, mechanized maneuver, etc.)

Special concerns:
- Erosion / sediment control
- Noise
- Road and tank trail maintenance
- Cultural and archaeological sites
- Research areas
- Wetland mitigation set aside areas

Table 5. Schedule for training area prescription preparation, FY00-FY04.

FY00	FY01	FY02	FY03	FY04
A-6	A-5	A-4	A-3	A-1
A-8	A-7	A-17	A-14	A-2
A-9	B-1	B-5	A-15	A-16
A-10	B-13	B-12	B-6	A-19
A-11	B-20	B-15	B-18	A-20
A-12	C-1	B-17	B-19	B-10
A-13	C-2	B-21	C-8	B-11
A-18	C-3	C-6	C-13	B-16
B-2	C-4	C-9	D-1	B-22
B-3	C-5	C-10	D-8	B-23
B-4	C-7	C-11	D-15	C-14
B-7	D-7	C-12	D-16	C-16
B-8	D-12	C-15	E-9	C-17
B-9	D-13	D-4	E-12	C-18
B-14	E-13	D-5	E-22	D-2
B-24	E-14	E-5	F-5	D-3
D-11	E-16	E-7	F-8	D-6
D-14	E-17	E-10	F-9	D-9
D-TCMA	E-4	E-11	F-10	D-10
E-19	E-20	E-15	F-11	E-1
E-6	E-21	E-16	F-12	E-2
E-8	F-2	F-1	F-13	E-3
E-18	F-3	F-4	F-14	
F-7	F-6	F-16	F-15	
F-17	F-20	F-18	F-19	

RCW:

Protect active and potentially active RCW clusters and PRCs from damage or disturbance (signs, bands, etc.).

Manage forest ecosystems at Fort Stewart to improve RCW habitat. These efforts will include midstory control, prescribed burning, commercial thinning, provisioning trees with artificial cavities, re-establishing native ground cover, and planting longleaf pine.

Use direct population management techniques to increase the rate of RCW recruitment. Such management techniques include translocation and augmentation.

Maintain and improve an awareness program on the requirements to protect RCWs among those who use Fort Stewart, especially military personnel

Monitor RCW population status and adjust management practices based on this monitoring (adaptive management). See details in Section 5.

Eastern indigo snake:

Maintain a record of all eastern indigo snake sightings.

Conduct annual surveys for eastern indigo snakes at known sites. See details in Section 5.

Conduct annual gopher tortoise surveys at 12 of the 36 installation populations to be surveyed . See details in Section 5.

Maintain and improve an awareness program on the requirements to protect indigo snakes among those who use Fort Stewart, especially military personnel.

Bald eagle:

Prohibit all human activity within 750 feet of the nest (other than brief entry to check nest status) during the nesting season (1 December-30 April or until young have fledged).

Close area E13 to hunting from 1 December until eaglets have fledged, if the eagles use the E13 nest site.

Retain snags and large pines suitable for eagle nest sites during thinning cuts.

Prohibit the following activity within 1500 feet (Figure 3) of the nest during the nesting season:

- Logging
- Mechanized maneuver or live fire
- Low altitude flight (less than 500 feet).
- Use of chemicals toxic to wildlife

Maintain a 750-foot radius protected area along the eastern shore of Pineview Lake (Figure 3).

Maintain a buffer extending from the Pineview Lake nest site out into the water for a distance of 500 feet. Mark the boundary with floating line, buoys, and signs.

Maintain a record of all bald eagle sightings.

Conduct field surveys (ground or air) in areas where regular sightings indicate that a bald eagle nest may have become established.

Identify important foraging areas based on regular sightings of bald eagles and incorporate these into the area prescriptions to ensure their protection.

Maintain and improve an awareness program on the requirements to protect bald eagles among those who use Fort Stewart, especially military personnel.

Wood stork:

Maintain a record of all wood stork sightings.

Conduct field surveys (ground or air) in areas where regular sightings indicate that a nesting colony of wood storks may have become established.

Identify important foraging areas based on regular sightings of wood storks and incorporate these into the area prescriptions to ensure their protection.

Maintain and improve an awareness program on the requirements to protect wood storks among those who use Fort Stewart, especially military personnel.

Flatwoods salamander:

Maintain records of all flatwoods salamander collections, observations, and survey efforts.

Monitor salamander populations by conducting annual dipnet surveys for flatwoods salamander larvae at known breeding sites (see details in Section 5.0).

Develop, maintain, and improve an awareness program that focuses on the value of isolated wetland habitats for animals and plants.

Prepare natural resource management prescriptions for each NRMU during the next 5 years that identify existing salamander populations, suitable salamander habitats, and management actions that would benefit the flatwoods salamander.

4-1 Habitat Management Units (DA RCW ESMG: V.D.)

RCW:

There are 3 RCW HMUs (Figure 1). The divisions are based on military land use and compatibility with RCW conservation and protection requirements. Acreage and current number of RCW clusters for each HMU are provided in Table 1. Note that the 279,081 acre figure for total installation acreage, as measured by GIS, is different from the official real estate figure of 279,270 acres used elsewhere in this plan. This difference of 189 acres arises from minor inaccuracies in boundary delineation. It is not considered significant and may or may not be resolved in the next 5 years.
The estimate of carrying capacity is based on the premise that all areas classified as wetlands on the National Wetlands Inventory (NWI) maps are not manageable as pine or pine hardwood forest suitable for RCWs and that all upland forested areas (other than those designated for hardwood management) are manageable as RCW habitat. Neither premise is likely to hold true all the time, but in the absence of current forest inventory data, they are the best tools for

estimating the amount of potential RCW habitat. Acreage estimates for clearings and urbanized land were made from aerial photographs. Acreage estimates for hardwood areas are based on plans to retain 10% of the forested upland area in mast producing hardwoods for bivouac sites, concealment islands, and game habitat. During the prescription preparation process, forest inventory data will be used to refine the estimate of suitable or potentially suitable RCW habitat. Preliminary data show that some areas classified as wetlands by NWI are being classified as pine or pine-hardwood stands on the forest inventory, which would increase the estimated RCW carrying capacity. It is also expected that additional military requirements may be identified during the prescription process, which would reduce the acreage available for RCW management and lower carrying capacity. These factors will probably offset each other, so the final estimate of RCW carrying capacity for each NRMU will not usually change. Any changes in the estimate will be coordinated with the FWS during the annual plan review.

Due to the installation's large size, NRMUs will be used to manage individual parcels of land within the HMUs. These NRMUs are subdivisions of the installation's 120 training areas, which are used to schedule and coordinate training activities. Appendix J lists the acres of suitable habitat, number of existing clusters, and RCW carrying capacity for each training area.

Eastern indigo snake:

The Fort Stewart eastern indigo snake HMU comprises 101,130 acres (Figure 4). It encompasses all or portions of B1-DEMO, B3, B4, B8-B9, B12-13, B17-B19, C5-C18, D13-D16, EOD, E12-E22, F9-F15, and F17-F20.

Bald eagle:

There are 2 bald eagle HMUs that consist of the buffer areas around the nest sites (Figure 3). There is 1 bald eagle nest at Pineview Lake (training area E22), and 1 nest in training area E13. Both nests are apparently used by the same pair of eagles. The Pineview Lake nest was used in FY93 and FY94, and the E13 nest was used in FY95-FY99. Although the Pineview Lake nest has not been used since 1994, the lake continues to serve as the eagles' primary feeding area. The area around the inactive nest is an important perching area for the eagles and human activity within 750 feet of the nest will continue to be prohibited. Human activity will also be prohibited in the lake itself within 500 feet of the shoreline adjacent to the nest (Figure 3). Pineview Lake will continue to be managed as a recreational fishery and will serve as the eagles' primary foraging area.

Wood stork:

There are no designated HMUs for the wood stork. HMUs may be designated in the future if a breeding colony or significant foraging area is identified. Wetland protection and management will continue to benefit the wood stork.

Flatwoods salamander:

A total of 10 HMUs that encompass 79,917 acres have been designed for the flatwoods salamander on Fort Stewart (Figure 5). The boundaries of HMUs follow NRMU boundaries. HMUs have been designed to include sites that are known to support flatwoods salamander populations as well as other areas of suitable habitat that may support salamander populations. Each HMU includes mesic pine flatwoods sites containing isolated cypress pond wetlands.

Suitable salamander habitat is extensive and widespread on the installation. Authorities on the flatwoods salamander have noted that the survival of individual salamander populations requires flatwoods sites that contain multiple breeding sites (Palis 1996). HMUs developed for the flatwoods salamander on Fort Stewart are extensive and encompass numerous mesic pine flatwoods sites that contain complexes or clusters of isolated cypress pond wetlands. Additionally, HMUs include all known or potential salamander breeding sites previously identified during a base-wide survey conducted by TNC (Gawin et al. 1995), as well as historic sites reported by Williamson and Moulis (1979).

Not all isolated wetlands present within HMUs are suitable salamander breeding habitat. Integrity and suitability of some ponds has been adversely affected by historic land use, fire suppression, ditching, and other activities. Some ponds are naturally too deep or too shady, or lack the grassy vegetation preferred by salamanders. During future preparation of management prescriptions for NRMUs on Fort Stewart, each NRMU will be evaluated individually with the specific purpose of locating and mapping suitable salamander breeding sites.

4-2 Foraging Habitat (DA RCW ESMG V.D.)

RCW

Forest management practices will ensure that each RCW cluster has adequate foraging resources as defined by current FWS guidelines (Henry 1989) (see exception for SRCs in HMU-3, Section 3.0). These guidelines require 6350 pine stems with a DBH of at least 10 inches, and at least 8490 square feet of pine BA within 1/2 mile of each cluster. However, a recent study (James et al. 1997) suggests that understory characteristics and fire history may be more important than number or size of pine trees as a measure of RCW foraging habitat quality. When the installation forest inventory is completed (April 1998), Fort Stewart will analyze the relationship between standard measures of foraging resources (number of pine stems, etc.) and measures of RCW population vigor (density, group size, nesting success rates, etc.). Other factors such as fire history and groundcover type will also be examined. If these analyses, or other independent

Figure 3 - Bald eagle nest sites and management zones

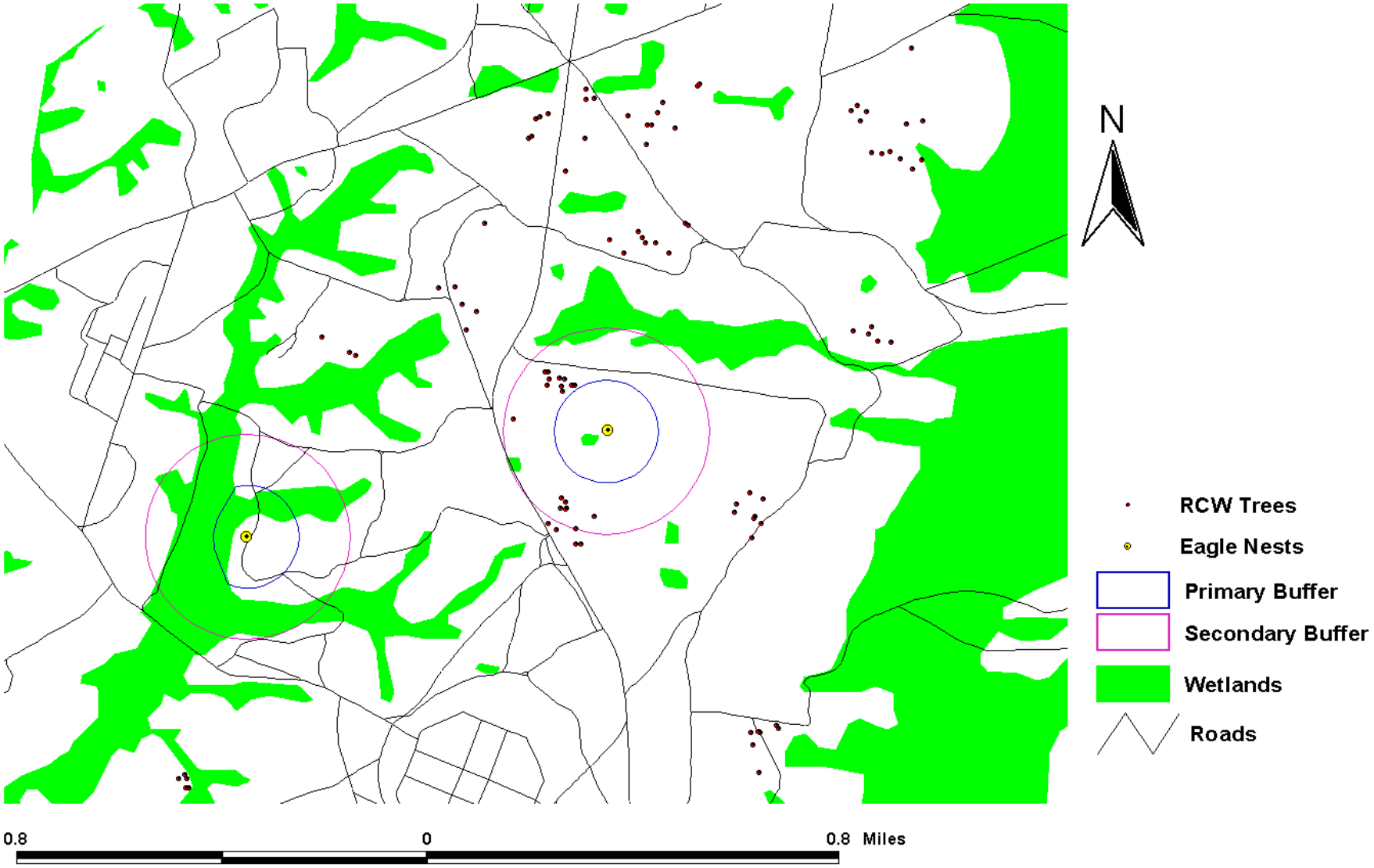

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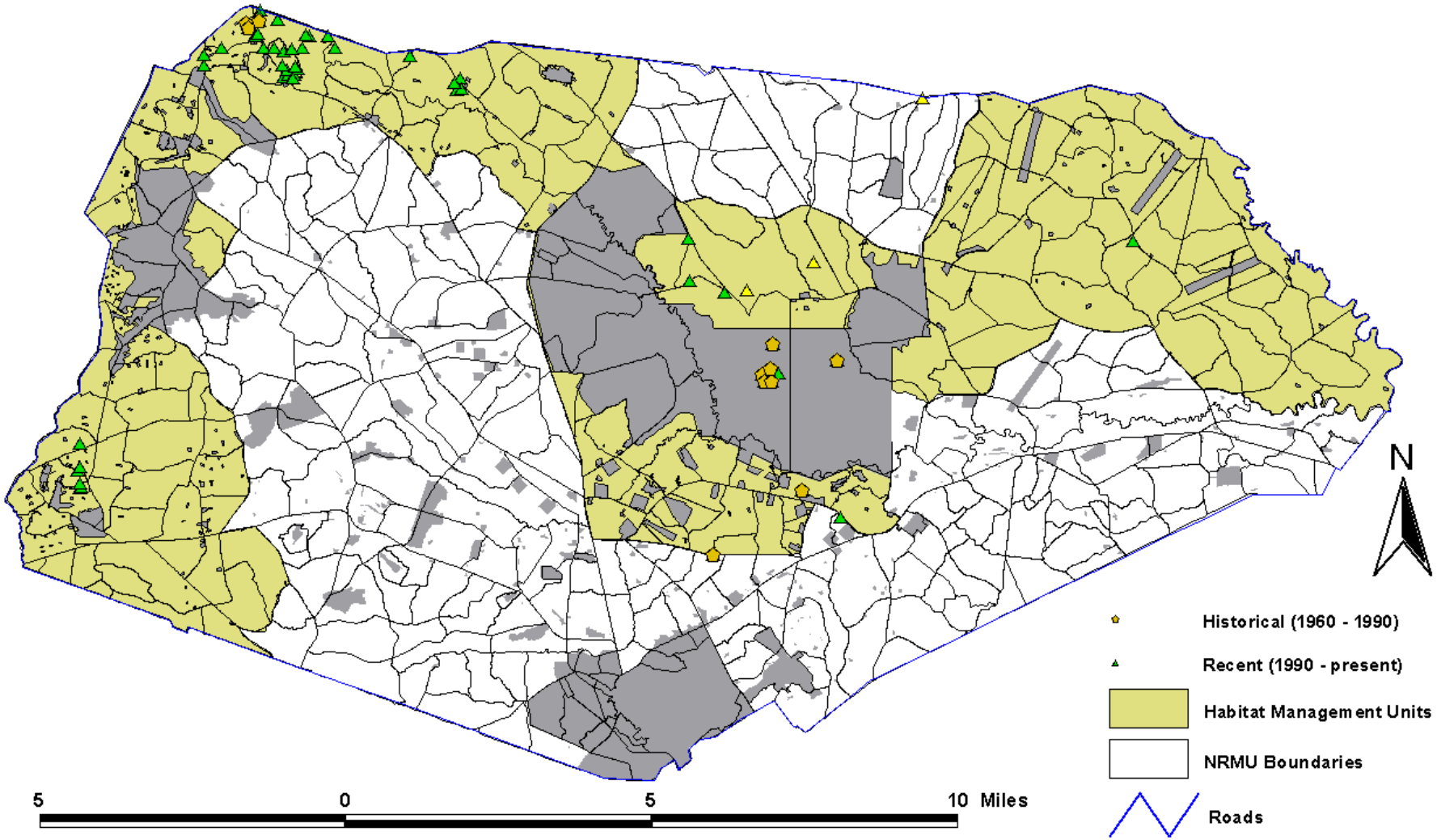
Figure 4 - Indigo snake populations and habitat management unit boundaries



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research, identifies better criteria for establishing threshold values for RCW foraging habitat, foraging guidelines may be modified during the annual review of this plan, in coordination with the FWS.

Eastern indigo snake:

Eastern indigo snakes forage primarily near wetlands, which are plentiful and well distributed on the installation. Wetlands will continue to be protected and managed IAW applicable laws and BMPs. Prescribed fires will not be artificially excluded from wetlands, unless the wetland's proximity to a highway makes it likely that smoke from a smoldering fire would present a significant safety hazard.

Bald eagle:

Bald eagles forage primarily in wetlands, which are plentiful and well distributed on the installation. Wetlands will continue to be protected and managed IAW applicable laws and BMPs. Recreational fish ponds provide important foraging areas for bald eagles, and they will benefit from continued management of these fisheries. Pineview Lake is the primary foraging area for the pair of eagles that has nested on the installation since FY93.

Wood stork:

Wood storks forage exclusively in wetlands, which are plentiful and well distributed on the installation. Wetlands will continue to be protected and managed IAW applicable laws and BMPs. Wood storks also occasionally use recreational fish ponds as foraging habitat, and they may benefit from continued management of these fisheries.

Flatwoods salamander:

Adult flatwoods salamanders eat worms and other invertebrates that they probably consume in their burrows or near the ground surface. Prescribed burning of flatwoods habitats on Fort Stewart will perpetuate open-canopied pine flatwoods ecosystems with a diverse ground cover that supports healthy forest floor invertebrate populations.

The aquatic larvae of the flatwoods salamander forage in grassy microhabitats in sunlit, shallow water areas. Future prescribed burns will not be excluded from cypress ponds and other isolated wetland habitats on Fort Stewart unless the wetland's proximity to a highway, or an unusually high fuel buildup within the wetland make it likely that a smoldering fire would present a significant safety hazard. Allowing fires to creep into or burn through the basins of these wetlands will foster the open, grassy vegetation zones within the ponds that provide optimal habitat for salamander larvae.

4-3 Fragmentation of Nesting Habitat (DA RCW ESMG V.D.)

RCW

To minimize the fragmentation of nesting and foraging habitat, RCW foraging habitat will be provided adjacent to and contiguous with the cluster to the maximum extent possible.

Eastern indigo snake:

The eastern indigo snake HMU includes suitable nesting and foraging habitats, so fragmentation should not be an issue for this species.

Bald eagle:

Bald eagles range over very large areas, and nesting habitat fragmentation is not likely to be a limiting factor for this species. Any actions that might isolate the E-13 eagle nest from Pineview Lake will be avoided if possible. Otherwise, consultation with the FWS will be initiated.

Wood stork:

Wood storks do not nest on the installation. Furthermore, storks are known to travel long distances daily, lessening the likelihood of any adverse effects arising from habitat fragmentation. Fort Stewart's wetlands will be conserved IAW applicable laws and BMPs. Fragmentation of nesting habitat is not likely to be an issue for wood storks on Fort Stewart.

Flatwoods salamander:

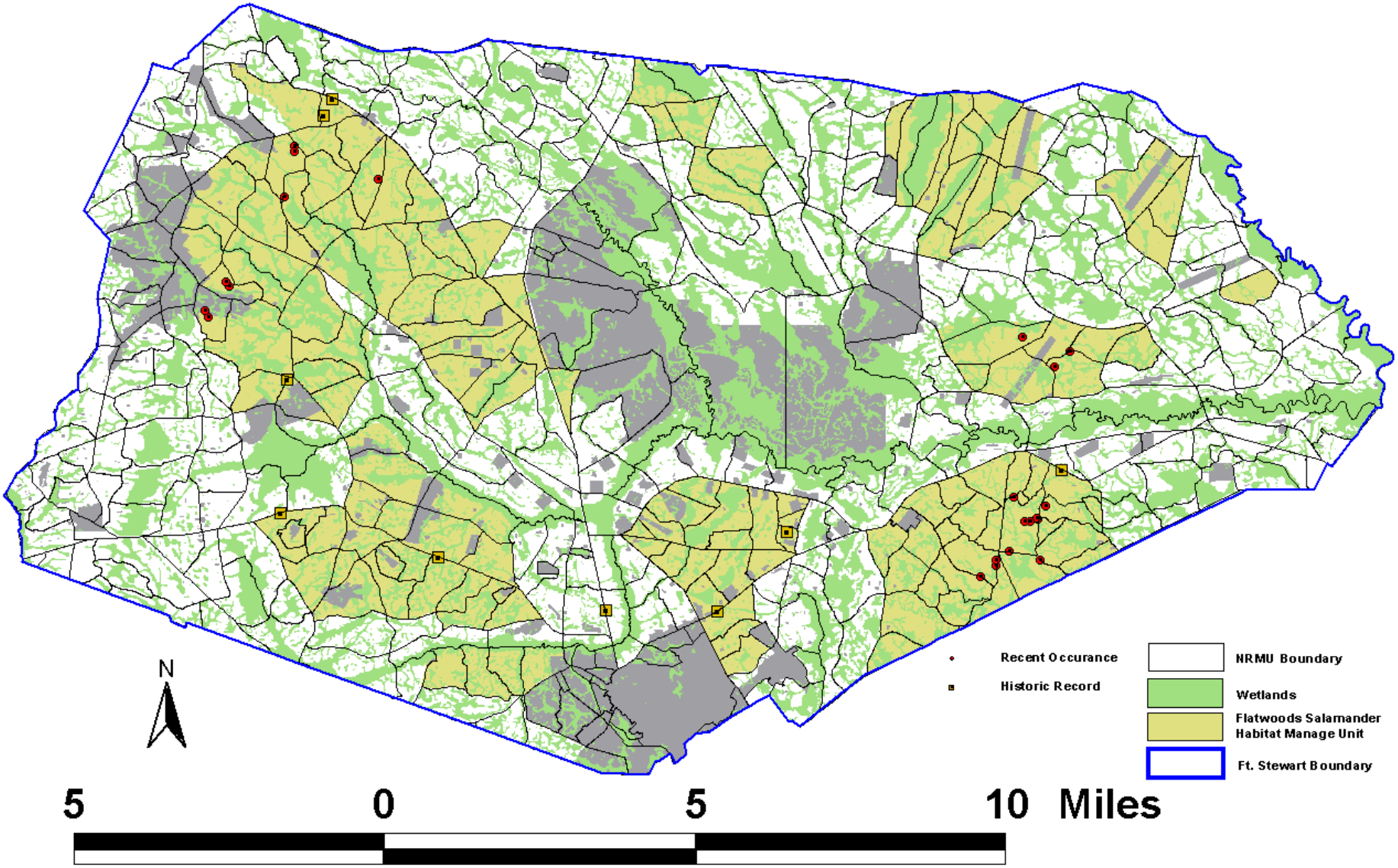
Fort Stewart's wetlands will be conserved IAW applicable laws and BMPs. Fragmentation of salamander breeding habitat is not likely to be an issue on Fort Stewart, except in the case of construction projects. Projects that may fragment flatwoods salamander will be addressed on a case-by-case base in the project's biological assessment.

4-4 Demographic and Genetic Interchange (DA RCW ESMG V.D.)

RCW:

The creation of 3 adjoining HMUs will provide contiguous (with exception of narrow hardwood bottoms) areas of RCW habitat for all active and proposed recruitment clusters. Within the HMUs, management efforts will focus on connecting all active RCW clusters into a single, demographically connected population. The degree of isolation of an RCW group from other groups is an important factor in long term survival (Conner and Rudolph 1991, Beyer et al. 1996, Thomlinson 1996). RCW groups with fewer than 5 other active clusters within 1.25 miles appear to be especially vulnerable to habitat conditions, while those in higher density areas are not (Hooper and Lennartz 1995). Carrying capacity for the RCW at Fort Stewart is estimated at

Figure 5 - Flatwoods salamander HMUs



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1 cluster/200 acres of suitable habitat. Given our current estimate of 136,929 acres of suitable habitat, a saturated population would have a simple density of 1 cluster/407 acres over the entire 279,270 acre installation. At this density the average number of clusters in a 1.25-mile radius circle would be approximately 8.

RCW populations that are separated by at least 3 miles are considered to be separate subpopulations. By this definition, there are currently 6 subpopulations that comprise the installation metapopulation. Three of these subpopulations contain only 1 active RCW cluster each, and are at high risk of extirpation. Suitable or potentially suitable unoccupied habitat located in gaps between subpopulations, or within 1 mile from an isolated active cluster will be given the highest priority for habitat improvement and establishment of PRCs or SRCs. Translocation of juveniles and augmentation of single bird groups will be used where necessary to activate recruitment clusters or establish pairs. Once the subpopulations are connected and the total population size reaches 350 potential breeding pairs, sufficient demographic and genetic interchange should occur naturally to protect the population from genetic deterioration (e.g., loss of alleles).

Eastern indigo snake:

Presently, eastern indigo snake populations are known from 4 disjunct sites on the installation. Historically, these populations may have been more wide-ranging, and the current known populations may in fact represent isolates of what was once a single wide-ranging and interbreeding population. The eastern indigo snake HMU has been designed to provide corridors of suitable habitat that connect the 4 eastern indigo snake populations. The HMU allows for expansion of these populations, and potentially, genetic interchange among these 4 populations in the future. Genetic interchange among the 4 populations will benefit the eastern indigo snake on Fort Stewart by serving to increase genetic diversity.

Bald eagle:

Bald eagles range over large areas in their daily foraging activities, especially during the non-nesting season, so demographic and genetic interchange can occur efficiently even though nest sites may be widely distributed. There are several eagle nests within 100 miles of the Pineview Lake nest, and single adult and juvenile eagles are seen regularly on the installation's lakes and rivers. Demographic and genetic interchange should not be a problem for eagles on Fort Stewart.

Wood stork:

Wood storks range over large areas in their daily foraging activities, so demographic and genetic interchange can occur efficiently even though breeding colonies may be widely distributed. This should not be an issue for the wood stork on Fort Stewart, because the species does not nest here.

Flatwoods salamander:

There are 5 known flatwoods salamander populations at Fort Stewart. Each of these are considered metapopulations, because multiple breeding sites have been confirmed or probably exist for each of these populations (Gawin et al. 1995). Good to outstanding examples of suitable flatwoods salamander habitat occurs over much of the installation (Figure 5). The extent of these areas suggests that genetic interchange occurs, or potentially could occur, among some of the known populations. Prospects for the future of the flatwoods salamander at Fort Stewart are good because there are several extensive tracts of high-quality mesic pine flatwoods that contain numerous cypress ponds suitable for breeding.

4-5 Deletion of Inactive Nest Sites (DA RCW ESMG V.D.)

RCW:

A monitoring plan (Section 5.0) has been implemented for the Fort Stewart HMUs. Part of this plan includes annual inspections of habitat in RCW clusters. The DA RCW ESMG allows installations to cease management and protection of clusters that are continuously inactive for 5 years or longer. Fort Stewart will only use this provision on a case-by-case basis, and proposals for cessation of management or protection will be coordinated with the FWS during the annual review of the ESMP. Cessation of management or protection will only be used if an inactive cluster is interfering with the military mission or when habitat quality is substandard. Most inactive clusters will continue to be managed as PRCs or SRCs, either at their current locations, or at nearby sites where habitat quality is better. In such cases, individual inactive cavity trees that have little potential for reactivation and/or pose a conflict with training may be deleted from management. Such deletions will be recorded in the permanent data record for the tree. The use of such management techniques as midstory removal, prescribed burning, artificial cavities, and translocation will enable the return of many of these inactive clusters to active status. The current status of all RCW clusters and their future management status (natural cluster, SRC, PRC, or delete from management) has been determined (Appendix B).

Eastern indigo snake:

N/A

Bald eagle:

Bald eagles often have more than 1 nest, and alternate nests may be used in different years. Management guidelines recommend continuation of management and protection of abandoned nests for at least 5 years (FWS 1989). The Pineview Lake nest has not been used since FY94, so protection of this site could be discontinued in FY00. However, this nest is located in a recreational area that is not used for normal military training. Protection of this nest has little effect on the military mission. Furthermore, Pineview Lake continues to be the eagle's primary foraging area, and the protected area around the abandoned nest is an important perching area.

Protection of this nest will be continued regardless of its status, but the distance that the protected zone extends into the lake will be reduced from 750 feet to 500 feet (see Section 4.0).

Wood stork:

N/A

Flatwoods salamander:

N/A

4-6 HMU Management Practices and Compatibility with Other Sensitive Species

This ESMP covers all federally listed threatened and endangered species found on the installation except the shortnose sturgeon (*Acipenser brevirostrum*), which is covered in a separate ESMP (Weber et al. 1996). Habitat management practices are designed to restore natural ecosystem function through emulation of natural processes, which should benefit all species. Intensive management tools will also be used to meet the special needs of individual species (e.g., artificial cavities).

A comprehensive survey for federally listed, state listed, and federal species of concern on Fort Stewart and HAAF was conducted by TNC between 1992-1994, so knowledge of the occurrence and distribution of sensitive species is good (Appendix E).

The most important natural process influencing the assemblages of plants and animals on the installation is fire, because longleaf pine ecosystems are dependent on fire for their existence (Christensen 1993). Historically, lightning frequently ignited fires that burned large acreages each year, primarily in the spring and summer. Fire return intervals in pre-settlement times have been estimated at 2-3 years in the longleaf forests of the lower Coastal Plain. In the twentieth century, modern fire detection (fire towers, aircraft) and suppression techniques (fire plow, bulldozer), and landscape fragmentation by roads, agriculture, and urbanization, interrupted the spread of natural fires, allowing the invasion of shrubs and mesophytic pines into the longleaf dominated forests (Frost 1993). Prescribed burning gained favor in the mid-twentieth century, but the primary purpose of the controlled burns was fuel reduction. Such burning was normally limited to backing fires set during the dormant season, which failed to perpetuate the open understory characteristic of the original longleaf forests.

Given this history, it appears that the sensitive flora and fauna found on the installation today evolved in the presence of fire, and have survived several decades of disruption of the natural fire regime, although the condition of many populations has been degraded. Reintroduction of growing season fire should benefit all of the fire-adapted species, although some individuals may be lost. For example, a fire may top-kill many stems in a Georgia plume (*Elliottia racemosa*) population, but the fire-adapted vegetation quickly recovers and plants intolerant of fire are suppressed. This improves conditions for sensitive or fire-adapted species to flourish.

The fire tolerance level for some plant species on Fort Stewart is presumed to be low, as in silky camellia (*Stewartia malacodendron),* or unclear as in Georgia plume. Prescribed burn prescriptions for areas containing such species will include provisions for their protection. Protection may involve exclusion of fire, or variation in the season or type of fire applied. Response of the vegetation will be monitored and future management will be adapted accordingly.

Some experts suggest that late-summer fires (August-September) may adversely affect juvenile eastern indigo snakes that shelter in pine straw and palmetto debris. Late summer burning within the eastern indigo snake HMU will be kept to a minimum, but may be used when necessary to establish a seedbed for longleaf pine.

Actions described for RCW management are consistent with conservation and management of other federally listed and candidate species. Most of these species, as well as state listed species, are associated with fire-maintained longleaf pine ecosystems, occurring either on the uplands or in the wetlands scattered across the landscape. Both of these communities are favored by management practices for the RCW. The RCW is a keystone species with regard to overall longleaf pine ecosystems. In general, good RCW management is good longleaf pine ecosystem management, and species associated with this ecosystem are generally favored by RCW management. Management effects will be monitored, and adaptations to this plan will be made, as appropriate, in consultation with the FWS during the annual review of the INRMP and ESMP.

4-7 Habitat Management (DA RCW ESMG V.E.)

4-7a Management Priorities

The priority for management is to provide a landscape that supports the installation's training mission, while meeting our responsibilities under the ESA, Clean Water Act, and other applicable laws. Although Fort Stewart is managing its natural resources to conserve native species and to provide commercial forest products and recreational opportunities, the production of forest products and recreational opportunities is a secondary priority. These management activities are described within the INRMP (Fort Stewart 1999). Implementation of the INRMP will fully incorporate implementation of this ESMP. If the 2 plans are found to be inconsistent, the ESMP will take precedence. Timber removal for construction or military training purposes will be done in consultation with the FWS if threatened and endangered species habitat is affected.

<u>RCW</u>:

Priority for management activities will be given to active clusters. Clusters located in gaps between subpopulations will be given priority for augmentation moves and establishment of PRCs and SRCs.

<u>Eastern indigo snake</u>:

Management of the 4 existing subpopulations will be the highest priority. Management actions designed to connect the subpopulations will be pursued as a secondary priority.

Bald eagle:

Protection of the Pineview Lake and E13 nest sites will be the highest priority. Maintenance of records of bald eagle sightings will be the second highest priority for this species. If regular sightings indicate that another bald eagle nest exists, the site will be evaluated for threats and specific management recommendations will be developed to protect the nest in a manner consistent with the needs of the training mission.

Wood stork:

Maintenance of records of wood stork sightings will be the highest priority action for this species. If regular sightings indicate that an important foraging area exists, or if a breeding colony is discovered, the site will be evaluated for threats and specific management recommendations will be developed to protect the foraging area in a manner consistent with the needs of the training mission.

Flatwoods salamander:

Management of the 5 known populations, and the 21 breeding sites documented for these populations, will be the highest priority. Another management priority will be to maintain the integrity of open-canopied, wiregrass-dominated flatwoods sites containing cypress pond complexes that have been identified as having potential to support salamander populations (Figure 5). Prescribed fire plans for the RCW in these areas will support achievement of this objective.

4-7b Midstory Control (DA RCW ESMG V.E.)

RCW :

Clusters, PRCs, and SRCs will be kept clear of dense midstory, maintaining an open, park-like stand. All midstory within 50 feet of cavity trees will be eliminated. Beyond 50 feet, some pine midstory may be retained for regeneration, and a few selected hardwoods may also be retained. Hardwood stocking will not exceed 10 square feet of BA, 10% of canopy cover, or 10% of midstory canopy cover in clusters, PRCs, or SRCs. The INRMP calls for 10% of the upland acreage to be maintained in mast-producing hardwoods to support game management goals and to provide cover and concealment for military units. The hardwood management areas will be located as far away from RCW clusters as possible, and will never be located inside a cluster. Prescribed burning will be the primary method used to control midstory. Mechanical control (mowing, chain saw, etc.) or herbicide injection of single stems may be used where fire is not effective due to a lack of fuel or large stem diameter. Commercial thinnings and post sales may also be used to thin dense pine midstory and merchantable hardwoods.

In accordance with the 1996 Management Guidelines for the RCW on Army Installations (Appendix A), Fort Stewart's INRMP and ESMP goals will be to establish a prescribed burning program that provides for a fire return interval of 3 years or less in RCW HMUs, with goals of conducting most burns during the growing season. Live fire range areas will be burned on a 1- to 2-year cycle to minimize wildfires. Due to concerns about smoke and safety on Interstate 95, training areas A1, C17, and C18 will be burned primarily in the winter, and the average burn interval may exceed 3 years. In other areas, burns will be conducted primarily during the growing season (March-September), although some areas will require 1 or 2 dormant season burns to reduce fuel so that growing season fires can be conducted safely. Winter burns may also be used to "catch up" areas that were scheduled for growing season burning, but could not be burned due to training activity, weather, etc., and fuel accumulation is too heavy to conduct the burn in the next growing season. Prescribed burns during July-September will be avoided as much as possible in areas that contain habitat for sensitive reptiles in order to minimize the risk to dispersing juveniles. Most burns will be conducted using aerial ignition in a grid pattern. This type of ignition is very effective in areas where ground fuel is broken by bare strips created by vehicle traffic. It also reduces burnout time, thus reducing smoke management concerns. As fuel loads are reduced over the next several years, it may be possible to ignite perimeter roads, rather than using aerial ignition. This type of ignition would produce a combination of backing, flanking, and head fires, which would more closely mimic the natural fire regime.

It is expected that weather, access limitations, and other factors will prevent adherence to a rigid 3-year burn schedule. Some areas may be burned at a 1- or 2-year interval to introduce some variation, while sandhill areas may be allowed to go 4 or 5 years between burns if a 3-year accumulation of fuel proves inadequate to provide effective hardwood control. During each 5-year revision of this ESMP, the burn history of each NRMU will be reviewed, and variation in the burn interval and month of burning will be introduced as necessary.

Fire plows will be used in clusters only in emergency situations. RCW cavity trees in non-dudded areas will be protected against accidental ignition by pre-burning, raking, foaming, wetting, or other effective means. Protection of cavity trees in dudded areas (e.g., Luzon Range, AGR1-AGR3) will be limited to measures that can be carried out without risking personnel safety. During the nesting season, all cavity trees in the burn unit will be checked for nests on the day of the burn (climb or remote video camera). The area around any active nest will be pre-burned, with a high pressure water or foam unit standing by to extinguish the cavity tree in case of accidental ignition.

All prescribed burns will be planned and conducted in a manner that minimizes the risk of smoke from the burn obscuring visibility on nearby highways. Prescriptions will identify wind direction, minimum mixing height, and other weather parameters that must be met on the day of the burn. In some cases, the installation commander (or his designee) may exercise his authority to close or restrict traffic on state highways 119 and 144 on Fort Stewart in order to allow prescribed burning that could not be safely conducted otherwise, or to ensure motorist safety in cases where smoke from a wildfire or previously conducted prescribed burn threatens motorist safety. Such highway closures will be implemented in cooperation with the installation Provost

Marshal, and will be coordinated with appropriate state and local authorities to the maximum extent practicable.

Eastern indigo snake:

Midstory control measures for the RCW will also benefit the eastern indigo snake. Prescribed burns will be avoided as much as possible during mid-July to September in eastern indigo snake HMUs. This will minimize risk to young eastern indigo snakes that may shelter in pine straw or palmetto debris in pine uplands.

Bald eagle :

Bald eagle nesting areas will not be burned during the eagle nesting season (October-May). Eagle nest trees will be protected from fire as necessary to avoid root damage from smoldering peat fires.

Wood stork:

If a nesting colony of wood storks is discovered on the installation, the possible impacts of fire on the wood stork rookery will be incorporated into the burn plan for that NRMU.

Flatwoods salamander:

Midstory control for the RCW will also benefit the flatwoods salamander. When feasible, prescribed burns of salamander habitat will be conducted during the growing season. These burns mimic the natural fire regime of flatwoods communities, promote the herbaceous ground cover of pond margins and ecotones important to flatwoods salamander, and should not harm post-larval salamanders because they are below ground at this time (Carlile 1995; Palis 1996, 1997c). At flatwoods sites that have not burned recently, winter fires may be needed to reduce fuel loads before the reintroduction of growing-season burns. Adult flatwoods salamanders are not apt to be harmed by winter fires because they are in underground refugia at the times when burns may be conducted (Palis 1997c). Surface movements of salamanders to ponds occur from October-January, but these movements occur during wet conditions when prescribed burns are not conducted (Palis 1997c, D. Stevenson, pers. obs.).

Mechanical midstory control will be avoided as much as possible in pine flatwoods habitats and in wetland-upland ecotones where equipment could create ruts that may alter local hydroperiods. No herbicides will be applied within wetlands or wetland ecotones located in flatwoods salamander HMUs. No broadcast application of herbicides will be conducted in salamander HMUs.

As part of the INRMP being developed for Fort Stewart, a system of roads, trails, and permanent firebreaks will be established to divide the 421 NRMUs into manageable burn units. No new firebreaks will be plowed around the margins of or through cypress ponds or similar isolated wetlands within salamander HMUs.

4-7c Erosion Control (DA RCW ESMG V.E.)

Erosion control is a major part of the ITAM Land Rehabilitation and Maintenance (LRAM) program on Fort Stewart and HAAF. Although erosion is not a significant problem in most forested areas due to the installation's flat topography, stream siltation is a concern at some road crossings. These concerns will be addressed by the LRAM program, using sediment catch basins and other technologies.

4-7d Forest Management (DA RCW ESMG: V.F.)

RCW:

The forest management program is described in Sections 12-3b, 13-3, and 14-2 of the INRMP (Fort Stewart 1997). A complete forest inventory was completed in 1998. Many inventory items are specifically designed to help make management decisions regarding RCWs. These include understory and fire fuel data as well as timber stand characteristics. In future years, approximately 10% of NRMUs will be inventoried annually by the Fish and Wildlife Branch.

Fort Stewart is divided into 421 NRMUs for administrative purposes, but management is on an individual stand (minimum size of 10 acres) basis. Hunter Army Airfield is managed as a separate administrative unit. There is no set rotation age for the forest. Currently, the forest is dominated by trees in the 40-60 year age class. In order to establish a better balance of age classes, approximately 10% of each NRMU will be regenerated on each entry, while retaining 6-10 of the oldest available trees in each regeneration cut. This regulation method will provide a continuum of age classes from 0-150 years, with scattered old-growth relicts that will remain until they die naturally. Well distributed group selection or irregular shelterwood cuts will be used to establish the regeneration areas. Regeneration cuts will not exceed 40 acres in size, except when necessary to convert slash and loblolly stands back to longleaf. Group selection cuts will be 1/4-2 acres in size.

Pine BA will be maintained at 50-80 square feet/acre by thinning stands to 50 square feet of BA during each entry cycle. This type of forest also provides a landscape that is conducive to maneuver training. The goal will be to achieve an average spacing of 25 feet between trees, while providing adequate foraging resources for RCWs (see paragraph 4-2) within 1/2 mile of each cluster. The 25 feet spacing goal is an average, and does not imply that every tree will be 25 feet from its nearest neighbor. Thinning goals can best be expressed in terms of square feet of BA/acre (Table 6).

Table 6. Average tree spacing and density with respect to BA.

AVG. DBH	50 BA TREES/ACRE	50 BA SPACING	60 BA TREES/ACRE	60 BA SPACING	70 BA TREES/ACRE	70 BA SPACING	80 BA TREES/ACRE	80 BA SPACING
6	255	13	306	12	357	11	408	10
8	143	17	172	16	201	15	229	14
10	92	22	110	20	128	18	147	17
12	64	**26**	76	24	89	22	102	21
14	47	**31**	56	**28**	66	**26**	75	24
16	36	**35**	43	**32**	50	**29**	57	**28**
18	28	**39**	34	**36**	40	**33**	45	**31**
20	23	**44**	28	**40**	32	**37**	37	**34**
22	19	**48**	23	**44**	27	**41**	30	**38**
24	16	**52**	19	**48**	22	**44**	25	**41**
26	14	**57**	16	**52**	19	**48**	22	**45**
28	12	**61**	14	**56**	16	**52**	19	**48**
30	10	**65**	12	**60**	14	**55**	16	**52**

Stand densities below 50 BA may be too sparse to provide optimal RCW foraging habitat, especially in smaller DBH classes. Such densities may be appropriate in areas where there is a specific military requirement, but not in normal silvicultural thinnings. To maintain desired spacing (Table 6), the target for a thinning will normally be 50 BA for stands with an average DBH of less than 12 inches, 60 BA for stands averaging 14 inches DBH, and 70 for stands with an average DBH of 16 inches or greater.

Snags, relicts, and residuals in thinning cuts will be retained indefinitely. Pines over 60 years old (or the oldest age class present in the stand is less than 60 years old) will not be removed solely for reasons of physical defect, lack of vigor, etc. In general, older age class trees should not be removed unless it is necessary to relieve crowding of other pines in the same or older age class.

Longleaf pine, the species most preferred by the RCW, will be favored for retention, followed by slash, loblolly, shortleaf, pond pine, and spruce pine in that order. This does not mean that a thinning cut should seek to eliminate all species other than longleaf. The goal is to have longleaf dominated stands on all suitable sites. The presence of longleaf is the best indicator of suitability. Other pine species will continue to be represented in the stand mix to the extent that they are compatible with frequent growing season fires. On wetter sites, fire intensity and coverage patterns may be such that slash pine will be the dominant species, while on drier sites, more longleaf seedlings will survive. Ultimately, fire management regimes will be more important than harvest practices in shaping the species composition of the future forest.

During each entry cycle, approximately 10% of each slash or loblolly plantation and 20% of each slash or loblolly old field will be regenerated to longleaf pine. Clearcutting and replanting are specifically authorized by ESMGs when the purpose is conversion of off-site pine species to longleaf pine. Old fields and pine plantations in RCW HMUs that do not contain enough longleaf to allow their natural conversion to longleaf will be planted with longleaf seedlings, or if possible, allowed to seed in from adjacent longleaf stands. However, artificial regeneration will not be a major forest management program at Fort Stewart. It is difficult to protect newly

planted lands from mechanized military traffic, and this makes this technique less effective. Longleaf pine is more difficult to regenerate than loblolly. Regularly scheduled prescribed burns may have to be adjusted to accommodate longleaf regeneration. Some longleaf seedling mortality is acceptable, however, and seedling protection will not be allowed to compromise landscape scale objectives in NRMUs containing regeneration areas.

Eastern indigo snake:

Forest management actions and issues for the eastern indigo snake are generally the same as those described for the RCW. One additional concern is the impact of harvesting resinous pine stumps. Stumps provide important subterranean habitats for species like the eastern indigo snake, as well as many other reptiles and amphibians. For this reason, pine stumps will not be harvested, except when necessary to facilitate construction projects. In sandhill areas known to support eastern indigo snakes, the following guidelines also apply: 1) avoid timber harvest activities during the period when eastern indigo snakes are using gopher tortoise burrows for winter dens (November-April), 2) Fish and Wildlife Branch personnel will flag gopher tortoise burrows prior to timber harvest in order to help equipment operators avoid damage to burrows, 3) leave windrows intact to provide cover and foraging habitat for eastern indigo snakes, except for periodic breaks (approximately every 100 meters) to allow movement of gopher tortoises, 4) consult with the FWS prior to applying any biocides.

Bald eagle:

In thinning cuts, dominant pine trees with well-formed crowns should be retained for roosting and perching trees. This is consistent with normal thinning practices.

Wood stork:

Timber harvest will be conducted IAW the Georgia Forestry Commission's BMPs for wetlands.

Flatwoods salamander:

Forest management prescriptions developed for the RCW (e.g., selective timber harvest, longleaf pine-wiregrass restoration projects) will benefit the flatwoods salamander by promoting and sustaining open-canopied pine flatwoods with intact, wiregrass-dominated ground cover. Disturbance to soil layers and ground cover vegetation has been identified as a threat to the flatwoods salamander, because the survival of this species appears to be closely tied to the presence of native, intact ground cover (Palis 1996, 1997c, FWS 1997). Logging of large, remnant slash pines from the margins or interiors of cypress ponds has previously resulted in soil compaction, rutting, and disturbance to the grassy ecotones of some ponds on Fort Stewart (Gawin et al. 1995). Rutting and soil compaction in ponds on Fort Stewart is most severe in wet weather periods when water tables are near the surface, but is prone to occur year-round in ponds located in poorly-drained flatwoods areas (D. Stevenson, pers. obs.).

Timber harvest operations on Fort Stewart are generally low-impact, and do not involve site preparation techniques such as bedding that have been shown to be detrimental to salamander populations (Means et al. 1996). In salamander HMUs where timber harvest is conducted in the future, logging will be restricted to periods of dry weather conditions. Cypress ponds and other potential salamander breeding sites located within timber harvest areas will be delineated by painting trees encircling the borders of these wetlands, including a 100 foot (30.5 m) buffer. Logging will be prohibited within this buffer and within the wetlands. Exceptions may be made on a case-by-case basis to allow logging within the buffer zone if soils are not saturated and timber removal is deemed necessary to maintain or improve habitat suitability for flatwoods salamanders.

4-7e Pine Straw Harvesting (DA RCW ESMG: V.G.)

No pine straw harvesting will be performed within HMUs in stands scheduled for burning within 2 years. This will ensure that sufficient pine straw will be available to allow for effective burning. All pine straw harvesting on the installation is, and will be, performed by hand. Trucks and equipment used for bailing, loading, and hauling straw will not be allowed inside RCW clusters or bald eagle nesting areas during the nesting season.

4-7f Southern Pine Beetle Control. (DA RCW ESMG V.E.) Southern pine beetles will be controlled by salvage harvests or cut and leave treatments. Such activities will be in consultation with the FWS when they may affect listed species. The Fort Stewart INRMP (Fort Stewart 1995) describes the overall forest insect and disease control program. Conversion to longleaf and maintaining a spacing of 20-25 feet between trees will help reduce the risk of pine beetle infestation (Gara and Coster 1968).

4-7g Wildfire Suppression

Wildfires will be allowed to burn whenever feasible, but suppression of wildfires will continue to be necessary to protect personnel and facilities, avoid unacceptable smoke management risks, and to protect RCW cavity trees or other sensitive habitats. When weather conditions are unusually dry or windy, suppression may also be necessary to protect timber resources, although silvicultural practices (e.g., reestablishment of longleaf, reduced stocking density, frequent prescribed burning to reduce fuels) will minimize the need for fire suppression. Fires will be suppressed by non-soil disturbing means whenever possible. When soil disturbance (i.e., use of fireplow) is necessary, efforts will be made to utilize existing firebreaks to control the fire. Firebreaks will not be plowed in wetlands or within 200 feet of an RCW cavity tree except in emergency situations. A fire suppression plan for each NRMU will be developed as part of the area prescription (paragraph 4.0), and will include a map showing RCW clusters, wetlands, and other sensitive habitats, as well as permanent firebreaks and other potential fire control lines. Areas disturbed by new firebreaks will be repaired as soon as practicable (within 72 hours, if possible). Specific restoration plans for new firebreaks will be developed on a case-by-case basis by Fish and Wildlife Branch, Forestry Branch, and ITAM staff. Fish & Wildlife Branch will have primary responsibility for firebreak restoration work. Restoration will generally involve restoring natural grade by pushing or pulling the plowed earth and vegetation back into

the furrow. Area prescriptions (paragraph 4.0) may also include provisions for restoration of existing firebreaks where appropriate.

4-7h Disturbance of Nesting Habitat During Nesting Season. (DA RCW ESMG V.E.)

RCW:

Logging and similar activities will not be conducted in clusters during the nesting season (March - July). Exceptions may be made by the TES Management Supervisor to allow these activities during March if it is determined that nesting activities are not underway, or during June - July if it is determined that young have fledged and are foraging outside the cluster. Nesting data at Fort Stewart indicate that it is unnecessary to prohibit activity in clusters for the entire March-July period. It is important to maximize use of this time period for RCW habitat management. Management activities can also be done in inactive clusters during the nesting season with approval of the TES Management Supervisor.

Eastern indigo snake:

Gopher tortoise burrows that may harbor eastern indigo snakes will be marked and protected IAW paragraph 4-7d above.

Bald eagle:

Timber harvest activities will not be conducted within 1500 feet of an eagle nest during the nesting season (October-May). See section 4-1 for additional restrictions.

Wood stork:

Wetlands will be protected IAW applicable laws and BMPs.

Flatwoods salamander:

Flatwoods salamander females lay their eggs October-December in the dry basins of isolated wetlands. Threats to salamander nesting from military training on Fort Stewart are considered minimal. Soldiers are instructed to avoid wetlands as part of the installations ongoing environmental awareness training program.

The effects of autumn-winter fires on flatwoods salamanders are essentially unknown. Often autumn-winter fires do not burn through ponds or burn lightly into ponds due to wet conditions. Future efforts will be made to conduct growing-season burns at sites containing salamander breeding habitat. In some instances, a series of winter season fires may be needed to reduce fuel loads before carrying out growing-season fires.

4-7i Construction of Artificial Nest Sites (DA RCW ESMG: V.H.)

RCW:

Restoration and construction of cavities is a high priority project on Fort Stewart. About 642 artificial inserts have been installed on Fort Stewart since December 1993 using the technique described by Allen (1991). Fish and Wildlife Branch personnel will also receive training in FY00 on drilling artificial cavities using the technique described by Copeyon (1990), and this technique will be used in sites where it is more appropriate. Lengthening rotation ages is expected to reduce the need for artificial cavities in the long term.

The need for artificial cavity construction will be evaluated each year during site visits. A minimum of 4 useable cavities are required for each cluster. Often, more are needed to accommodate fledgling use, helper use, and cavity competitors (e.g., southern flying squirrels [*Glaucomys volans*]). If there is an inadequate number of cavities at a cluster, artificial cavities will be constructed, provided there are suitable trees. Construction of artificial cavities and cavity starts in existing clusters will be performed IAW Allen (1991) and Copeyon (1990) and will be accomplished by fully trained personnel. In heavily used training areas, selection of trees for artificial cavities will also consider the resultant change in the shape of the protected area around the cluster, and efforts will be made to maximize compatibility with the training mission. Current records indicate that 17 active clusters are below this standard. Additional cavities will be installed in these clusters in FY01.

In addition to providing sufficient useable cavities in all active clusters, artificial cavities will also be used to establish PRCs and SRCs. PRC and SRC sites will be selected during the preparation of prescriptions IAW paragraph 4.0. PRCs will be created annually at a rate equal to the expansion potential of the RCW population (approximately 10%/year). In FY00, there were 212 active RCW clusters, so 21 PRCs will be established prior to the FY01 RCW nesting season. SRCs will be created annually at a rate equal to 1/2 of the expansion potential of the RCW population (1/2 of 10% = 5%/year). In FY00, there were 212 active RCW clusters, so 11 SRCs will be established prior to the FY00 RCW nesting season. Each PRC and SRC will be provisioned with at least 2 cavities and 3 starts.

Eastern indigo snake:

N/A

Bald eagle :

Artificial nest structures have been used successfully for bald eagles. There are no current plans to use such structures to expand the installation's bald eagle population. Artificial nests may be useful for encouraging eagles to relocate from areas where protection of the nest site conflicts with training mission requirements. Any such use will be coordinated with the FWS.

Wood stork:

Artificial nest structures have been successfully used for wood storks (Robinette and Davis 1992). This technique will not be used on Fort Stewart, because the conservation goal does not include establishment of a breeding wood stork colony.

Flatwoods salamander:

N/A

4-8 Restricted Activities (DA RCW ESMG: V.I.)

4-8a Markings.

RCW:

All cavity trees known on Fort Stewart and HAAF have been marked with 2 white reflective bands approximately 4 inches wide and 1 foot apart. Bands are placed on the bole approximately 4-6 feet from the base of the tree. Cavity trees are also numbered with an aluminum tag nailed to the trunk near the ground. Yellow warning signs (Figure 6) are posted around the 200-foot buffer zone. This same marking will be used on PRCs**. SRCs will be invisible to training.** Cavity trees in SRCs will be numbered with an aluminum tag near the ground, but they will not be marked, and no buffer zone will be established.

Eastern indigo snake:

N/A

Bald eagle :

The off-limits area around the Pineview Lake eagle nest is marked with signs (Figure 7) on land, and by a floating line in the water. The off-limits area around the E13 nest is marked by signs.

Wood stork:

N/A

Flatwoods salamander:

Known flatwoods salamander breeding sites will be marked by placing signs (Figure 8) approximately 125 feet (38 m) apart, so that the signs encircle these wetlands. Signs will be placed along the wetland edge, facing outward. The specific location of the protective boundaries will be determined during the prescription preparation process (paragraph 4.0). A painted boundary line will mark potential breeding habitat in timber sale areas.

Figure 6. RCW cluster boundary sign.

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Figure 7. Bald eagle nest area boundary sign.

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Figure 8. Flatwoods salamander breeding pond boundary sign.

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4-8b Training Restrictions

Instruction regarding protection of sensitive species is included in environmental awareness training (Environmental Compliance Officer class , etc.). Guidelines and restrictions have been incorporated into Fort Stewart's Range Regulation (Fort Stewart Reg. 385-14) (Appendix F). Violations are most likely to be observed by personnel of the Environmental and Natural Resources Division (ENRD), Game Warden Office, or DOT Range Division. The policy is to report all violations to DOT Range Division for action. Range Division will involve ENRD, PMO, and Staff Judge Advocate, as necessary. Depending on the nature and severity of the violation, action may involve a letter to the unit commander or prosecution of an individual soldier under the Uniform Code of Military Justice. Range Division maintains a record of all training violations reported. Individuals in violation of these regulations are subject to action under the UCMJ or through the magistrate court.

Upon approval of this ESMP, Section 14-1 of FS Regulation 385-14 will be updated as follows:

<u>RCW:</u>

Implement training restrictions IAW the 1996 Management Guidelines for the RCW on Army Installations (Appendix A). Training restrictions for the RCW will only apply to clusters included in the MCG. The MCG comprises all existing clusters that have been active in the last 5 years across the installation, and all new clusters (PRCs) to be established in HMU 1. As new cavity trees (natural or artificial) are added to existing clusters and PRCs in the future, they will also be subject to training restrictions. Training restrictions will not apply to SRCs, or to any new trees associated with them in the future.

<u>Eastern indigo snake:</u>

Change the last sentence in paragraph 14-1, a to read “Damage to gopher tortoise burrows should be avoided, since these burrows are used by the indigo snake as denning and egg laying sites.”

<u>Bald eagle:</u>

Mechanized maneuver, live fire are prohibited within 1500 feet of the eagle nest tree during the nesting season (October - May). Low altitude flight (less than 500 feet) is prohibited within 1000 feet of the nest tree during the nesting season. A Notice to Aviators (NOA) has also been posted regarding the prohibition against low altitude flight around the eagle nests at Pineview Lake , training area E13, and a nest on private land (Vernonburg) near HAAF. If the nest is abandoned, the NOA may be canceled after coordination with FWS.

<u>Wood stork:</u>

No change.

<u>Flatwoods salamander:</u>

Vehicle traffic and excavation are prohibited within known flatwoods salamander breeding ponds.

4-8c Restrictions on Other Activities

The installation Hunting and Fishing Regulation (Fort Stewart Reg. 420-4) prohibits entry into off-limits areas around eagle nests, and prohibits taking of any species other than a game bird or animal during a lawful season. Researchers who have collecting permits from GA DNR and/or FWS must also obtain written permission from the Fort Stewart Fish and Wildlife Branch prior to collecting specimens on the installation. Persons authorized to collect specimens will provide the Fort Stewart Fish and Wildlife Branch with a copy of the annual collecting report required by GA DNR and/or FWS. If the collecting activities include species that are listed or proposed for listing on the state or federal list of threatened or endangered species, a quarterly report will be provided. The report will include number of specimens collected, collection site, purpose, and current disposition.

RCW:

Timber harvest activities during the nesting season will be conducted IAW section 4-7-h.

Eastern indigo snake:

Timber harvest activities will be conducted IAW section 4-7-d.

Gassing of gopher tortoise burrows to collect eastern diamondback rattlesnakes is widely practiced in southeastern Georgia. An annual rattlesnake roundup is hosted in Claxton, Georgia, located just west of the installation. The gassing of gopher tortoise burrows or other disturbances to gopher tortoise burrows by rattlesnake hunters is a perceived but unquantified threat to the eastern indigo snake on Fort Stewart. TNC reported evidence of rattlesnake hunting at 2 sites on Fort Stewart (Gawin et al. 1995). Two eastern indigo snakes have been found dead on Fort Stewart during the winter at gopher tortoise burrows, 1 in 1977 and 1 in 1996 (Appendix C), but it is unknown if these snakes were killed by gassing.

Although legal protection has greatly curtailed the collection, sale and trade of the eastern indigo snake, they are probably still collected by a few individuals. Mr. Thomas Hilliard of the Fort Stewart, Forestry Branch stated in 1994 that 2-3 eastern indigo snakes had been removed from Fort Stewart in recent years by collectors (Gawin et al. 1995). The Fort Stewart eastern indigo snake population located in F11-F13 may be vulnerable to the adverse affects of gassing and snake collecting due to the proximity of this site to the installation boundary.

Current federal, state and Army regulations prohibit killing, collecting, harming, or harassing the eastern indigo snake on Fort Stewart. The gopher tortoise is listed as a threatened species by the Georgia Department of Natural Resources (DNR) and AR 420-4 prohibits damage to gopher tortoise burrows, the gassing of gopher tortoise burrows for snakes residing in these burrows,

and the introduction of any foreign object or material into these burrows.

Fort Stewart game wardens have been informed about those sites on the installation that harbor eastern indigo snake and gopher tortoise populations. Game wardens regularly patrol these areas and enforce installation regulations and federal and state laws applying to the collection of eastern indigo snakes and disturbance to gopher tortoise burrows. The Game Wardens also enforce regulations regarding "Off-Limits" areas for the bald eagle.

Bald eagle:

Timber harvest activities during the nesting season will be conducted IAW section 4-7-h.

Training area E13 will be closed for recreational use from December-May, unless observations indicate that the eagles are not using this nest site. The area around the alternate nest site on the east side of Pineview Lake will also be posted as "Off-Limits", since it provides an important resting area for the eagles throughout the year. The alternate nest site buffer zone will extend 750 feet from the nest along the eastern shore of Pineview Lake, and 500 feet into the lake itself (Figure 3). The boundary will be marked with floating line, buoys, and signs.

Wood stork:

N/A

Flatwoods salamander:

Use of seines or nets to collect bait from cypress ponds is not permitted on Fort Stewart (Fort Stewart Regulation 420-4).

The boundaries of known flatwoods salamander breeding sites will be marked with signs (Figure 8) as a measure to help prevent disturbance in these sites. To prevent rutting, soil compaction, and other disturbances to salamander breeding sites, logging will be prohibited within 100 feet (30.5 m) of known and/or potential salamander breeding sites located within flatwoods salamander HMUs. Prior to timber marking, Fort Stewart Fish and Wildlife Branch personnel will visit timber sale sites to identify potential salamander breeding habitats. A 100-foot buffer around suitable breeding habitats will be demarcated by painting trees at intervals of approximately 125-feet (38-m) paralleling the edges of ponds. Logging will be prohibited within this buffer and within the wetlands. Exceptions may be made to allow logging within buffer zone if soils are not saturated and if timber removal is deemed necessary to maintain or improve habitat suitability for flatwoods salamanders. Timber harvest activities within 450 meters of the outer edge of any known flatwoods salamander breeding pond will be conducted in accordance with the following guidelines:

- Log only during dry periods and keep soil disturbance to a minimum
- Allow a minimum interval of 10 years between harvests
- Maintain a basal area of 45-50 sq. ft. / acre in pine flatwoods habitat
- Selective harvest only within 164 meters of the breeding pond
- Clearcut no more than 25% of the pine flatwoods habitat between 164-450 meters from the breeding pond
- Shape clearcuts so that habitat continuity is maintained
- Minimize skid trails and their effects through the use of pallets, bridges, and prescription planning
- Locate skid trails parallel rather than perpendicular to wetland edges
- Do not locate log landings within 450 meters of a breeding pond. Exceptions may be made with the approval of the DPW Fish and Wildlife Branch in cases where it would serve to reduce overall soil and groundcover damage (i.e. locate log decks in old fields or disturbed areas within the 450 meter buffer zone rather than damage intact sites beyond the 450 meter zone). In such cases, appropriate restoration actions will be taken.
- Do not conduct intensive mechanical site preparation such as root raking, discing, stumping, bedding or other methods which cause significant soil disturbance
- Utilize prescribed fire as the preferred site preparation method, and limit herbicide use to manual application following BMPs when fire cannot be employed

4-9 Augmentation, Translocation, Recruitment, and Permitting (DA RCW ESMG: V.J.)

RCW:

Augmentation may be used in any single bird groups identified during monitoring activities described in Chapter 5 of this ESMP, depending upon availability of suitable juveniles. Priority will be given to the augmentation of solitary male groups. Adult RCWs will not be taken from resident sites.

Fort Stewart may provide RCWs for translocation to support efforts to expand smaller populations, at the request of the FWS RCW Recovery Coordinator. Specific decisions regarding the types and numbers of birds to be moved will be made jointly by Fort Stewart Fish and Wildlife Branch and FWS personnel based on availability of juveniles, local need for augmentation within the installation, and priority of need on other properties. All off-post moves will require FWS approval, but final authority to make specific birds available will rest with Fort Stewart. Fort Stewart may also serve as a recipient site for imperiled RCWs being translocated IAW the State of Georgia's Habitat Conservation Plan, currently under final review by the FWS.

Translocations of juvenile males and females have been done on Fort Stewart with limited success in attempts to create new pairs. In FY98, Fort Stewart cooperated with U.S. Forest Service and West Virginia University to field test a portable aviary developed by Clemson and SRP. The aviary provided an opportunity to acclimate translocated juvenile RCWs at their release site and hopefully increase their site affinity. Preliminary results were encouraging. All 3 of the birds released from aviaries remained at the release site for at least 19 days, and 2 were still roosting at their release sites in March 1998 (over 30 days post release). In contrast, 2 out

of 3 RCWs released at control sites (w/o an aviary) never returned. Fish and Wildlife Branch will continue to use translocation as a tool to increase the number of pairs in each subpopulation where appropriate. Permits for RCW capture, banding, augmentation, and translocation are on file in the Fish and Wildlife Branch.

Eastern indigo snake:

Translocation of eastern indigo snakes has not been attempted at Fort Stewart, but the technique may hold promise. Dr. Dave Rostal, Georgia Southern University has expressed interest in conducting an experimental release of captive reared eastern indigo snakes on Fort Stewart. This proposal is currently under review.

Bald eagle:

Translocation of juvenile eagles (hacking) has been a popular tool for re-establishing eagle populations, and has been used in coastal Georgia from 1979-1995. Eagle numbers now appear to be at a self-sustaining level, and additional translocations are not currently planned (Jim Ozier, DNR, pers. comm.).

Wood stork:

N/A

Flatwoods salamander:

N/A

4-10 Impact and Direct Fire Areas (DA RCW ESMG V.E.)

RCW:

The Fort Stewart RCW HMUs include surface danger zones (SDZ) for direct fire armor and small arms ranges, a mortar range (Luzon), and 3 AGRs, as well as artillery firing positions. The AIA in the center of the installation is heavily dudded and is not included in the RCW HMUs. Luzon and the AGRs are also dudded, but are part of the RCW HMUs. Other SDZs are not dudded.

The AIA is a clearcut, but there is a 1000-meter buffer zone around it that is forested. The area has been surveyed by helicopter and no RCWs were found, but habitat quality is good and will only improve as trees age and frequent prescribed burns and wildfires continue to keep the forest open. The 1000-meter buffer zone on the northern side of the AIA is included in the RCW HMU because it provides foraging habitat for 1 active RCW cluster (# 99), and contains high quality RCW habitat for expansion. The eastern, southern, and western buffer zones are not included in the RCW HMU (Figure 1).

Entry into the Luzon area requires a flack jacket, helmet, and Explosive Ordnance Disposal (EOD) escort. There are 4 active RCW clusters (# 21, 85, 104, and 111) in the dudded area around Luzon range. All 4 of these clusters have been monitored for nesting success from 1994-1999. Due to the risk of possible injury to personnel during the frequent visits required for nest monitoring, these clusters will be deleted from intensive monitoring. Management will continue, and the clusters will still be monitored for activity and nesting attempts. Prescribed burning of this area will be conducted annually in March, prior to the initiation of nesting. Protection of cavity trees will be limited to non-ground disturbing measures, and personnel will leave the area as soon as backing fires have been ignited. Human safety will be the primary concern. The installation will continue to collect data on these clusters and they will be counted toward the recovery goal.

Eastern indigo snake:

The eastern indigo snake population that inhabits the AIA, the Small Arms Impact Area (training area B4), and training area B3 is within an area that receives frequent live fire. Due to nearly continuous use by the Army, access to this area is infrequent. Additionally, personnel are not permitted to enter the AIA because of the danger posed from unexploded ordnances.

The restrictions outlined above will continue to limit the efforts of the Fort Stewart Fish and Wildlife Branch to regularly monitor eastern indigo snake populations. Recent surveys and ground reconnaissance conducted by TNC determined that optimal habitat for eastern indigo snakes, including large gopher tortoise populations and intact wetland foraging areas, is present in the northern portion of the AIA , north and adjacent to the AIA in training areas B12 and B13, and throughout much of B3 and B4 (Gawin et al. 1995).

Observations of eastern indigo snakes in this area span a period of nearly 20 years (1975-1991) and the large amount of suitable habitat present here suggests that this population is doing well. Monitoring will be conducted in B3 and B4 to the extent that access is available (see paragraph 6.0). Monitoring will not be conducted in the AIA due to the risk posed by duds.

Bald eagle:

There are no known bald eagle nests in dudded areas.

Wood stork:

There are no known important wood stork habitats in dudded areas.

Flatwoods salamander:

The Fort Stewart HMUs for the flatwoods salamander encompass SDZs that include small arms ranges (training area B4), a mortar range (Luzon), and several active AGRs. Recent surveys and ground reconnaissance of these areas identified optimal habitat conditions for the flatwoods salamander (Gawin et al. 1995; D. Stevenson, pers. obs.). Access into B4 is greatly curtailed because this area receives nearly continual live fire. Luzon and the AGRs are dudded and dipnetting surveys for flatwoods salamanders are not possible here due to the danger posed by unexploded ordnance.

These restrictions will limit the efforts of Fort Stewart biologists to monitor known or suspected flatwoods salamander populations at these sites. Monitoring and surveys for flatwoods salamanders will be conducted periodically in B4. Minnow trap sampling may be conducted in the vicinity of the AGRs and Luzon, pending EOD approval.

4-11 Minimization of TES Management Impacts on the Fort Stewart Military Mission (DA RCW ESMG: III.B.)

RCW:

This ESMP is designed to factor RCW management into the military mission, and to factor the mission into RCW management. The kind of open forest preferred by the RCW is also conducive to mechanized military training, except that trainers also need large clearings. Fort Stewart's large size will make it possible to provide these clearings and still have adequate forest to support a recovered RCW population. The conflict comes when training restrictions are imposed and when military training standards require large open areas. For example, the M1A2 Main Battle Tank to be fielded to Fort Stewart Armor units in 2000 and 2001 requires a qualification range four kilometers wide and eight kilometers long. The 1996 DA RCW ESMG reduced restrictions significantly in return for increased commitment to proactive RCW habitat management. Most important for the 3d ID, vehicles, including armor, can now pass through the 200-foot RCW buffer zone, as long as they stay ≥ 50 feet away from marked RCW cavity trees. The ESMG also allows establishment of SRCs, which are not subject to training restrictions. In implementing this ESMP, Fish and Wildlife Branch personnel, in coordination with DOT Range Division, will seek to minimize conflict by establishing SRCs where RCW habitat is good and training intensity is low.

RCWs appear to be tolerant of noise and activity, as evidenced by the numerous active clusters adjacent to roads and ranges. The main concern is during the nest season, when prolonged activity near the nest tree may cause the adults to abandon the nest. Artificial cavities can be installed to create an SRC where there is little evidence of training activity. These sites can support RCWs, even if they are only a few hundred meters from a frequently used tank trail or range. **SRCs are invisible to training. They are not marked with the standard white bands and signs. They are not and never will be subject to training restrictions.** Habitat management for SRCs will be the same as for PRCs and natural clusters. However, if it is necessary to convert forest land to non-forest use in order to support training mission

requirements (e.g., new drop zones, firing ranges, maneuver areas, etc.), habitat for SRCs may be reduced or eliminated. In such cases , the FWS will be notified, and if necessary, efforts will be made to provision suitable adjacent habitat with artificial cavities to minimize impact on the RCW population. If the action reduces the RCW carrying capacity for an NRMU, the ESMP will be modified during the next annual review to reflect the reduction.

The installation's primary maneuver areas (E and F training areas, Red Cloud Ranges, CALFEX), as well as many smaller bivouac areas and Tactical Operations Centers (TOC) have been designated as SRC areas (Figure 1, HMU-2 and HMU-3). These areas currently contain 118 RCW clusters with training restrictions. They also contain enough habitat to support an estimated 274 additional RCW clusters. Under this ESMP, any new clusters established in these areas will be designated as SRCs, and will not be subject to training restrictions. The RCW also benefits, because the habitat will be managed to provide the old trees and open conditions the birds prefer.

Eastern indigo snake:

No training restrictions are imposed on behalf of the eastern indigo snake. Soldiers who encounter them are advised to leave the snakes alone, and to avoid damage to gopher tortoise burrows as much as possible. Impact on the mission is negligible.

Bald eagle:

The eagle nest and foraging area at Pineview Lake is in a recreational area, where training does not normally occur. The E13 nest is surrounded by 3 RCW clusters and a large swamp, so there is little training activity in its vicinity. The greatest potential for impact is the restriction on low altitude overflight, especially the air corridor along Fort Stewart Road 5 (Blue Route) and Fero Airstrip. The 1500-foot restricted area extends to the eastern edge of the air corridor, but traffic along the corridor has been allowed to proceed as normal since the nest was discovered in 1995. The air traffic has had no apparent effect on the eagles, which nested successfully in E13 from 1995-1997, and in 1999-2000.

Wood stork:

The wood stork forages occasionally on the installation but does not nest here. There are no restrictions imposed on its behalf. Soldiers are advised to leave the birds alone if they encounter them. Impact on the mission is negligible.

Flatwoods salamander:

No training restrictions are imposed on behalf of the flatwoods salamander. Soldiers who encounter them are advised to leave the salamanders alone, and to avoid damage to their breeding habitat as much as possible. Impact on the mission is negligible.

4-12 Awareness Training Program (AR 200-3: 11-10)

An Environmental Compliance Officer (ECO) class is taught quarterly by ENRD personnel at Fort Stewart. The course includes a 1-hour segment on TES awareness. Each battalion that conducts training at the installation must designate an officer or senior NCO as the battalion ECO and he or she must attend the ECO training. The ECO serves as the battalion specialist for environmental matters, and conducts additional awareness training for other soldiers in the battalion. TES issues are also emphasized in the ITAM segment of the ECO course.

ENRD and ITAM staffs jointly support environmental awareness training at Fort Stewart. The ITAM program shows the video "Fort Stewart and the Environment" and issues a Fort Stewart Environmental Field Card to inprocessing soldiers. Additionally, environmental awareness information is disseminated to officers and noncommissioned officers attending the Company Commanders/First Sergeant and Range Certification Courses. There will also be one-time bulk issue of updated versions of these materials to all Fort Stewart Soldiers upon approval of this ESMP. ITAM has developed videos, information cards, handbooks, map overlays, and other products to improve soldier awareness of environmental issues. These products are continually updated, and new products are added as needed.

The awareness training program will help ensure success of TES management on Fort Stewart and help avoid ESA violations during training and other activities. The awareness training program covers unit and individual responsibilities and liability under Federal law, the importance of protecting the TES, and balancing the accomplishment of the installation's mission with conservation of TES and their habitat.

5.0 SURVEYS, INSPECTIONS, MONITORING AND BIOLOGICAL ASSESSMENTS

(AR 200-3: 11-5, 11-6; DA RCW ESMG V.C.)

Effectiveness of the implementation of this ESMP will be monitored and future management plans will be adapted to improve effectiveness as necessary, based on the results of the monitoring program. Biological Assessments will be prepared for all proposed actions (construction or other significant land disturbing activity) that are beyond the scope of this ESMP or other existing biological assessments. Proposed construction projects in existing urbanized/developed areas (i.e. "Non-Forest" areas in Table 1 and Figures 1, 4, and 5) will be considered to be within the scope of this ESMP. Surveys for all species potentially affected will be conducted as necessary to support these assessments. When conducting monitoring activities, efforts will be made to minimize disturbance of the species being monitored.

Fort Stewart contains several hundred isolated wetlands which may be suitable breeding ponds for flatwoods salamanders. Due to a persistent drought beginning in 1998 and continuing through the time of this writing (2000), sampling of potential flatwoods salamander breeding ponds to determine presence/absence of larval salamanders has not been possible. In order to determine which ponds merit management and protection as flatwoods salamander breeding ponds, Fort Stewart plans to initiate a 3 year project with a recognized expert on flatwoods salamanders to classify each potentially suitable wetland as either a confirmed breeding pond (based on specimen collection from the pond), highly likely breeding pond, potential breeding pond, or unlikely breeding pond. Classification would be based on habitat characteristics in the

pond as well as adjacent terrestrial flatwoods habitat. Fort Stewart will work cooperatively with the FWS to develop the final classification protocols and to establish policies for making "may affect" determinations in biological assessments based on the survey results.
Pond classifications will be further refined in the future based on results of larval surveys in years when ponds fill normally.

RCW:

Prior to any timber harvest or other significant land disturbing activity, personnel trained and experienced in RCW survey techniques will conduct a 100% survey of the affected area in order to identify any RCW cavity trees that may be present. The TES management supervisor may delegate this responsibility to qualified, experienced forest technicians in the Forestry Branch for silvicultural actions. At a minimum, the condition of each cluster's foraging habitat will be evaluated every 15 years during the normal silvicultural entry cycle and prescriptions developed accordingly.

Each cluster, PRC, and SRC that has not been deleted from management IAW paragraph 4-5 will be inspected at least annually. Inspections will be conducted in March-April, and will be used to develop habitat prescriptions. Data recorded will include, but is not limited to, hardwood midstory density and height, condition of cavity trees and cavities, activity status of each cavity, description of any damage from training activity, fire, wind, etc., and the location and status of any newly discovered cavity trees. Recommendations for remedial measures will be included whenever necessary. PRCs and SRCs that were not active in the spring inspection will be inspected again in the fall for RCW occupancy.

All suitable RCW habitat will be surveyed for new cavity trees every 10 years, with 10% of the installation being surveyed annually. All cavity trees will be accurately mapped (using a GPS unit) and data will be collected on a standardized form (Appendix G).

During the nesting season, each active cluster will be visited weekly to check for nesting activity. Suspected nest trees will be climbed or inspected with a remote video camera to confirm presence of an RCW nest. Monitoring will cease once a nest is confirmed, except for a random sample of approximately 25% of the total number of clusters. These clusters will be monitored for nesting success (number of fledglings). The same random sample of clusters has been monitored since 1995, with additional clusters added each year to insure that nesting success continues to be monitored in at least 25% of the active clusters as the population grows. Active and inactive clusters are comparably represented in the sample, with 25% of the active clusters (49/198) and 24% of the inactive clusters (23/96) represented in 1999. This sample set will continue to be used, and as the population grows, new sample clusters will be added from a list of random numbers (Appendix K). Appendix B identifies which clusters are currently included in the 25% sample. Nestlings and adults may also be banded opportunistically at non-sample sites to provide additional birds for translocation (see paragraph 4-9), but productivity data from these sites will not be included with the 25% random sample.

When the sample set was established in 1995, efforts were made to ensure that it included a cross section of clusters from across the installation, with all land-use categories and habitat types represented. Habitat categories are difficult to identify with integrity. Many clusters on Fort Stewart contain sandhill and flatwoods habitat, and actual home ranges have not been identified. For this reason, no distinctions were made on the basis of habitat. Each cluster was assigned a land-use category (mechanized maneuver training, small arms live fire, dud producing live fire, or normal). The distinctions between these land-use categories are not discrete, especially for maneuver training, which although concentrated on the western 1/2 of the installation, may occur anywhere during major training exercises. Similarly, the distance to which noise from live fire ranges may affect RCWs has not been clearly established, making distinction of clusters potentially affected by live fire uncertain. The general distribution of artillery firing positions and the potential for blanks and artillery simulators to be used at any location further confounds our ability to isolate the possible effects of noise. The current 25% sample will continue to be used, but when new clusters are added to the sample set as the RCW population expands, they will be chosen randomly, without regard to artificially assigned habitat and land-use categories. Instead, CERL will conduct research to determine whether or not there is a correlation between military land use and RCW population health (Appendix H).

A draft research and monitoring plan was submitted by CERL on behalf of Fort Stewart to the FWS for peer-review on 8 April, 1997. FWS subsequently submitted this draft plan to 3 independent experts for their review. FWS forwarded reviewer comments to CERL in June 1997. Concurrent with this review process, preliminary research studies were initiated on Fort Stewart during the 1997 RCW breeding season in accordance with protocols of the draft research and monitoring plan. Reviewer's comments and lessons-learned from preliminary research activities were incorporated as revisions in the final plan, which is included in this ESMP (Appendix H). This research is currently programmed to be performed during FY98-00. Upon completion of this research, Fort Stewart will continue long-term monitoring and reporting of potential training effects consistent with protocols (Appendix I) approved under a FWS biological opinion issued for Fort Bragg in December, 1997.

All adults and nestlings in the 25% sample set of clusters will be banded with color bands and FWS aluminum numbered bands. Each cluster in the sample will be monitored to determine number of adults, number of eggs, number and sex of fledglings, number of nests (i.e., renesting attempts), and number of breeding groups (i.e., splitting into 2 clusters).

Fledglings will be counted as soon as possible after the projected fledging date. They may also be counted as nestlings when they are approximately 23-25 days old. If comparisons of advanced nestling counts and fledgling counts show that the methods provide comparable results, future monitoring may use either method to estimate number of fledglings. This change would be made during annual review of the ESMP in coordination with the FWS.

In addition to clusters in the 25% sample set, all PRCs and SRCs that become active will be monitored for productivity (number of fledglings) for 5 years after they activate. Thereafter, they will be integrated into the normal 25% monitoring program by including them in the pool of clusters from which new sample clusters are randomly selected as the population grows.

For all training areas containing RCW clusters, PRCs, or SRCs, the type, duration, date of training, number of units, and approximate number of soldiers involved, approximate number and types of vehicles and equipment involved, and other relevant information will be recorded to contribute to an understanding of the effects (or lack thereof) of military training on the RCW.

Active clusters that do not nest by the end of May will be visited late in the nesting season (June-July) to determine whether or not a potential breeding pair of RCWs is present. Adults will be captured and banded if necessary to make this determination.

Survey and monitoring results for all clusters will be recorded and retained permanently, allowing for trend analysis. Map location data will be entered into the installation GIS. The GIS will be used to generate maps for distribution by DOT to military units. Fish and Wildlife Branch staff will input map data into the GIS weekly. ITAM personnel will produce maps for distribution to soldiers annually. Tabular data for trend analysis will be maintained in a dBase database in the Fish and Wildlife Branch. The tabular data and the GIS data can be linked using ArcView software.

Monitoring results will be reviewed and analyzed annually. An annual report will be provided to the FWS, with a copy furnished through command channels to ODEP IAW the DA RCW ESMG (Appendix A). If an annual report and analysis shows an RCW population decrease of more than 5% , the installation will notify the FWS and FORSCOM and reinitiate consultation with the FWS within 30 days. The installation will conduct a review of available data and seek to determine the cause of the decline within 90 days. The installation, in consultation with the FWS, will then develop and implement a plan to prevent further population decline. The remedial plan will require approval by the installation commander, and will not include the imposition of training restrictions on SRCs unless expressly approved by the installation commander and FORSCOM. In the event of an incidental take, FWS and FORSCOM will be notified immediately. Any incidental take or other ESA violation will be reported IAW the requirements of AR 200-3, paragraph 11-9.

A forest survey will be conducted in 10% of the NRMUs in the HMUs each year, so that the entire installation will be surveyed every 10 years. Forest survey data will also be updated following timber harvest to reflect new stand conditions. Data will be gathered to determine the quantity and quality of foraging and nesting habitat for the RCW. Surveys will use a recognized plot sampling technique, such as the random line plot cruise, random point sample cruise, or the line strip cruise method. Forest surveys in dudded areas may be conducted using accepted aerial photography interpretation methods.

Eastern indigo snake:

Future monitoring of eastern indigo snake populations on Fort Stewart will be essential to determine the success of this ESMP. Because eastern indigo snake populations depend on the presence of gopher tortoise burrows, gopher tortoise populations on Fort Stewart will also need to be monitored. The gopher tortoise is a federal species of concern and state listed as threatened by the DNR. The installation has benefited from previous surveys conducted by The Nature Conservancy and Georgia Southern University. Unless specifically stated otherwise, future surveys provided for in this plan will be conducted by Fort Stewart.

The FWS Biological Opinion on the installation's on-going mission (FWS 1992) recommended that management of the eastern indigo snake on Fort Stewart include regular monitoring of gopher tortoise populations. Specifically, the Biological Opinion stated that gopher tortoise surveys should be conducted at least once every 5 years, with the majority conducted once every 3 years, to document numbers and distribution of active gopher tortoise burrows and habitat quality for eastern indigo snakes. The opinion also encouraged initiating gopher tortoise studies that collect demographic data (sex ratio and size class information), to determine if Fort Stewart gopher tortoise populations are healthy. The distribution and abundance of the gopher tortoise on Fort Stewart was documented by a recent installation-wide inventory conducted by TNC (Gawin et al. 1995). An ongoing study of gopher tortoise populations in F11, F12, and E21 is being conducted by Dr. David Rostal of Georgia Southern University. This study has provided information on gopher tortoise population structure, fecundity, size at maturity, and burrow use.

The purpose of eastern indigo snake surveys will be to determine the presence of this species at those sites from which it is currently known and to document new populations at other sites. Eastern indigo snake surveys will be conducted annually at those sites on Fort Stewart currently known to support eastern indigo snake populations (except for the population in the AIA). Additional sites within eastern indigo snake HMUs thought to have high potential for this species, including sites where eastern indigo snakes may become established through expansion of known populations, will also be surveyed.

Surveys for eastern indigo snakes will be conducted on warm days during November-April and will focus on locating eastern indigo snakes and shed skins at gopher tortoise burrows and stump holes. Mirrors and flashlights will be used to view the interior of gopher tortoise burrows. Eastern indigo snakes found during these surveys may be held briefly for measurements and photographs before release at the capture site. Notes on behavior and condition of snakes observed, and habitat description of the observation site, will also be recorded.

Gopher tortoise monitoring will be conducted to provide data on trends of numbers and size distributions of active and inactive gopher tortoise burrows. Gopher tortoise populations will be monitored once every 10 years at 30 sites (Figure 9). Beginning in FY00, 1/10 (3) of the sites will be surveyed annually. The next 3 sites will be surveyed in FY01 and so on with the last 3 sites surveyed in FY2009. Sites have been selected in a manner reflecting the distribution and abundance of the gopher tortoise on Fort Stewart, and include those sandhill areas in the C, E, and F training areas known or suspected of being inhabited by eastern indigo snakes. Some

gopher tortoise populations on Fort Stewart occupy extensive, continuous tracts of sandhill habitat of up to several hundred acres in size, and 2 or more monitoring sites have been selected for some of these populations. Gopher tortoise burrow surveys will be conducted from April-October during periods of warm and dry weather conditions when gopher tortoise are active and burrow activity status can be readily determined. Since seasonal variation in activity and interburrow movements may affect the measurement of local gopher tortoise density, all resurveys of sites will be conducted at the same time of year as the initial survey to the maximum extent possible.

Sites containing smaller, non-survey populations and sites with high tortoise potential but for which no tortoise burrows have previously been located, will be visited once every 5-10 years to determined continued tortoise presence/absence. Additionally, timber survey and red-cockaded woodpecker habitat survey crews will record presence of tortoise burrows on their surveys.

Gopher tortoise sites will be surveyed using "absolute" surveys. For each tortoise population, pedestrian surveys of all suitable habitat will be conducted. All tortoise burrows found will be classified as active, inactive, or abandoned using the following criteria:

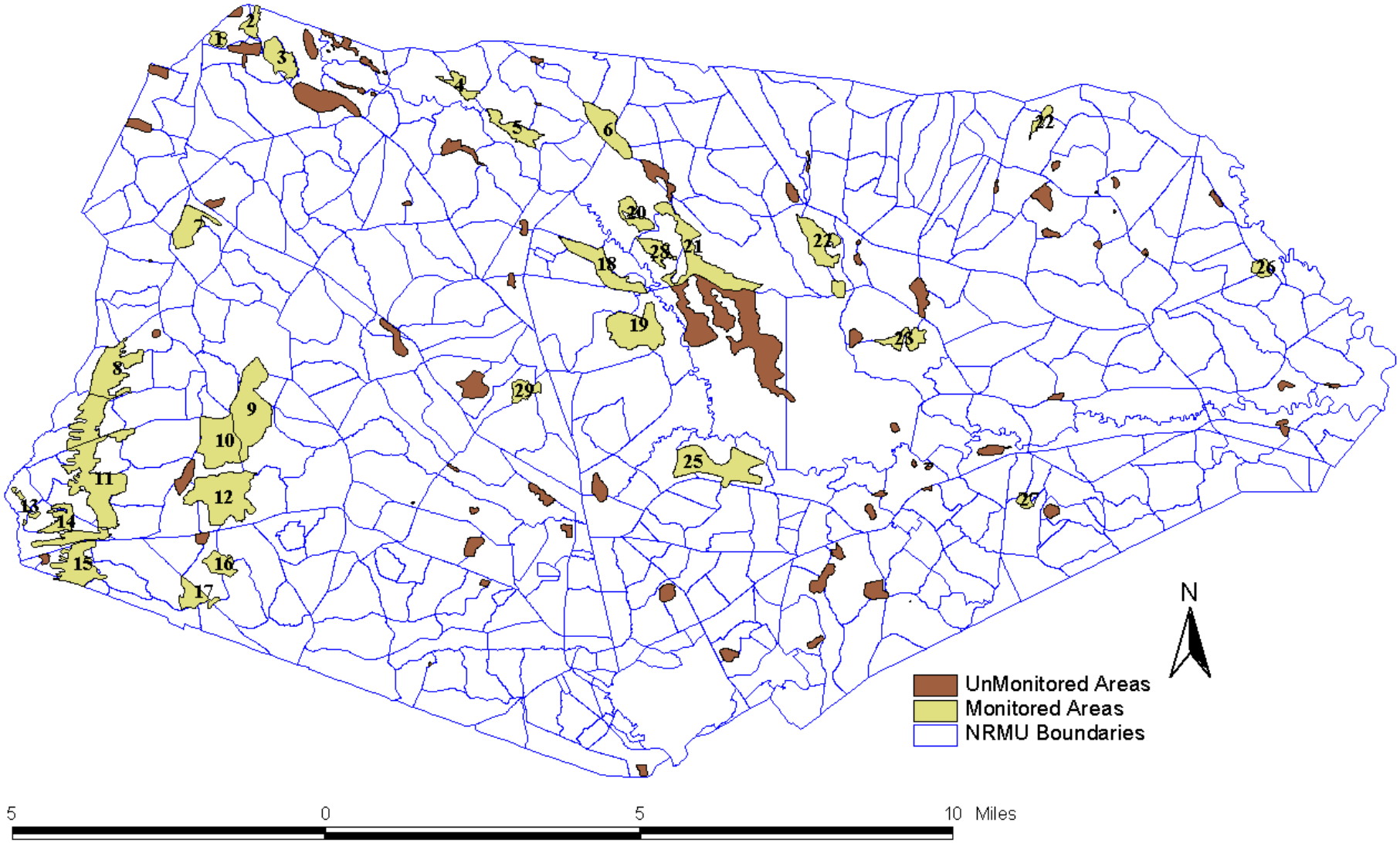
active - loose soil on the tunnel floor and mound with tortoise footprints or shell scraping signs (from plastron abrading the sand) at the burrow mouth or inside burrow; mouth of burrow not obscured; fresh tortoise scats and well-defined foraging paths often near mound.

inactive - recent use apparent but soil of tunnel floor and mound hard-packed without tracks or shell scrapings; cobwebs and leafy debris usually present; burrow unoccluded by debris and could be used by a tortoise without modification; scats, if present, old and weathered; foraging trails, if present, not well-defined.

abandoned - old (former) burrows which would require modification or excavation for tortoise occupancy; mouth of burrow eroded, collapsed or occluded with debris, and no longer retains the classic half-arc shape; abandoned burrows are often modified by armadillos and other animals.

Burrow widths of all active and inactive tortoise burrows found on transects will be measured to the nearest 0.5 cm. To measure burrow widths, a pair of meter sticks fastened together at the 50-cm mark to form a connected pair of calipers will be placed in the burrows to a depth of 50 cm and spread open so that one stick touches either side of the burrow. From burrow width data, tortoise size (carapace length) can be estimated (Martin and Layne, 1987). From carapace length (CL), the size class of a tortoise can be estimated. Juvenile tortoise are 50-120 mm CL, subadults are ca. 120-240 mm CL, adult males are ca. 230-240+ mm CL, and adult females are ca. 250-270 mm CL (Landers et al., 1982).

Figure 9 - Gopher tortoise populations and monitoring sites



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Vegetation sampling will be conducted at 75 m intervals along line transects to measure canopy cover, shrub cover, herbaceous ground cover, percent wiregrass, and level of disturbance following the methods of Cox et al., 1987. Additionally, the following will be recorded for each transect: weather conditions, general description of the habitat, soil type, time since last fire, response of vegetation to last fire event (e.g. is wiregrass flowering, was burn successful in killing back some of the oak/shrub layer on-site), quality of area for the gopher tortoise and eastern indigo snake, and notes on recent anthropogenic disturbances which may be detrimental to gopher tortoise (burrow being collapsed by vehicle activity, firebreak plowed through areas with concentrations of burrows, etc).

To aid in estimating local population size, burrow occupancy rates will be measured. At selected tortoise monitoring sites, twenty active and twenty inactive tortoise burrows will be inspected using a remote video camera to determine tortoise occupancy. The burrow occupancy rate data obtained from these camera surveys will be used to derive a site-specific conversion factor (% of active and inactive burrows which are occupied by a tortoise), which can in turn be employed to estimate population size.

Bald eagle:

The bald eagle nests at Pineview Lake and training area E13 will be visited on foot approximately once every 2 weeks beginning in December to determine the onset of nesting. Observers will be unobtrusive, remaining as far away from the nest as possible and leaving the area as soon as eagles are observed. Once a nest is confirmed, ground visits will be made once every 4-6 weeks. If nestlings cannot be seen and counted from the ground, aerial observations will be conducted from a helicopter to count the nestlings when they are nearly old enough to fledge. Again, observers will remain as far away from the nest as possible and leave the area as soon as eaglets are counted. Results will reported to DNR annually for inclusion in their state-wide eagle nesting survey.

Wood stork:

The DNR conducts aerial surveys for wading bird rookeries. Fort Stewart will cooperate with DNR to include the installation in these surveys on dates when such use of the installation's restricted air space does not conflict with training.

Flatwoods salamander:

Annual monitoring of flatwoods salamander populations on Fort Stewart will be initiated in FY 2000 at 10 known breeding sites. Most other recently documented salamander breeding sites, (Gawin et al. 1995) as well as ponds at or near historic sites where the actual breeding pond was not identified (Williamson and Moulis 1979) will be sampled biennially, beginning in FY 2000. Other documented sites (ditches, wet firebreaks, etc.) will be monitored opportunistically. Currently, GSU is monitoring 1 salamander breeding site with a drift fence. Monitoring protocols have been scheduled for all breeding sites (Table 7). In drought years, monitoring may not be possible at some or all sites.

At sites monitored annually, dipnet or minnow trap sampling will be conducted 1-2 times a year during February - March to survey flatwoods salamander larvae. Biennial monitoring will involve dipnet surveys February-March to determine larval presence or absence. In order to document new flatwoods salamander breeding sites, additional ponds located within salamander HMUs will be sampled as time permits.

Table 7. Flatwoods Salamander Sites and Monitoring Protocols.

Larvae captured will be measured (snout-vent length and total length in mm) and weighed (to the nearest 0.1 g) after being placed in a plastic bag with a small amount of water. For each larva collected, distance from shore, depth, and dominant plant species at the collection site will be recorded. The following data will be recorded on each salamander survey: air temperature, water temperature, pH, maximum depth, number of dipnet sweeps or minnow trap-nights, and other aquatic fauna observed.

6.0 TIME, COSTS, AND PERSONNEL (AR 200-3: 11-5; 11-13)

The initial planning and funding period for implementation of this ESMP is 5 years, though most components of the plan extend beyond this time frame. Projected annual costs have been entered into the A106 funding program. They are all eligible for Army environmental funding. These data will be updated at least annually. Personnel requirements identified in Table 8 are specific to the TES Management Section of the Fish & Wildlife Branch. Other activities within the Fish and Wildlife Branch, Forestry Branch, Environmental Branch, and ITAM carry out programs that benefit TES management goals (prescribed burning, environmental awareness, wetlands management, administrative support, etc.) under separate authority and funding. Any significant reductions in these programs would require adjustments to TES Management funding and staffing in order to continue to implement this ESMP.

Table 8. TES Mgt. Personnel Requirements

Position Title	Position Type	Required Staffing	Existing Staffing	
			DAC	Contract / ORISE
Supervisory Wildlife Biologist	DAC	1	1	
Wildlife Biologist	DAC	5	5	
Wildlife Technician	DAC	6	6	
Botanist	DAC	1	1	1
Herpetologist	DAC	1	1	1
GIS Operator	Contract	1		1
ORISE Intern	Contract	2		1
TOTAL		**17**	**14**	**4**

Contract-hire biologists/technicians and ORISE interns will be used in lieu of DACs if hiring restrictions prevent filling vacant positions.

7.0 CHECKLIST (AR 200-3: 11-5)

The following checklist will be used to help monitor implementation of this ESMP.

ESMP implementation checklist.

Schedule	Activity	Implemented	
		Date	Signature
FY01	Visit each RCW cluster and PRC and provide protective signs and reflective bands		
FY01	Visit each RCW cluster, PRC, and SRC, and update cavity tree data		
FY01	Conduct nest checks in each RCW cluster, PRC, and SRC		
FY01	Implement the eastern indigo snake monitoring plan		
FY01	Implement the gopher tortoise monitoring plan		
FY01	Determine bachelor RCW groups and augment with juvenile female RCWs		
FY01	Conduct surveys for the eastern indigo snake		
FY01	Conduct gopher tortoise surveys at 1/3 of the survey sites		
FY01	Close E-13 to hunting during the bald eagle nesting season (1 Dec. - 30Apr.)		
FY01	Conduct an ECO awareness training course once each quarter		
FY01	Prepare NRMU management prescriptions (Table 5)		
FY01	Implement NRMU management prescriptions as they are completed		
FY01	Maintain a balance of 18 unoccupied PRCs and 9 unoccupied SRCs		
FY01	Record sightings of wood storks		
FY01	Discontinue management of RCW clusters that have been inactive for 5 years		
FY01	Control hardwood midstory in clusters where hardwood BA exceeds 10 sq.ft./ac.		

ESMP implementation checklist (cont'd).

Schedule	Activity	Implemented	
		Date	Signature
FY01	Conduct flatwoods salamander surveys		
FY01	Record sightings of bald eagles		
FY01	Train Fish and Wildlife Branch personnel to use the Copeyon method for constructing RCW cavities		
FY01	Ensure that each active RCW cluster, PRC, and SRC has 4 useable cavities		
FY01	Report training restriction violations to DOT		
FY01	Report to the commander on ESMP effectiveness		
FY05	Review and update ESMP		

8.0 INDIVIDUALS AND ORGANIZATIONS CONTRIBUTING TO THE PLAN

8-1 Fort Stewart ESMP Team

Tim Beaty - DPW, ENRD, Fish & Wildlife Branch
Drew Brown - DOT, Range Division, ITAM (contractor)
Howard Bullard - DOT, Range Division
Larry Carlile - DPW, ENRD, Fish & Wildlife Branch
Tommy Hilliard - DPW, ENRD, Forestry Branch
Jeff Mangun - DPW, ENRD, Forestry Branch
Ron Owens - DPW, ENRD, Fish & Wildlife Branch (contractor)
Terry Peters- SJA
Jerry Purcell - DPW, ENRD, Forestry Branch
Eric Spadgenske - DPW, ENRD, Fish & Wildlife Branch
Dirk Stevenson - DPW, ENRD, Fish & Wildlife Branch (contractor)
Linton Swindell - DPW, ENRD, Fish & Wildlife Branch
Dena Thompson - DPW, ENRD, Fish & Wildlife Branch (contractor)

8-2 Individuals Contacted

Name	Affiliation / Expertise
Ralph Costa	U.S. Fish and Wildlife Service Department of Forest Resources 261 Lehotsky Hall Box 341003 Clemson, SC 29634-1003
Bob Hooper	U.S. Forest Service Charleston, SC
Jim Ruhl	U.S. Forest Service Apalachicola National Forest, FL
Joan Berish	FL Game & Fresh Water Fish Comm. 4005 S. Main St. Gainesville, FL 32601
Paul Moler	FL Game & Fresh Water Fish Comm. 4005 S. Main St. Gainesville, FL 32601
John Palis	Herpetologist P.O. Box 387 Jonesboro IL 62952
Dave Rostal, Ph.D.	Biology Dept. Georgia Southern University Statesboro, GA

8-3 Cooperating Agencies

U.S. Fish & Wildlife Service (FWS)

Georgia Department of Natural Resources

National Marine Fisheries Service (NMFS)

U.S. Forest Service

Georgia Forestry Commission

Natural Resource Conservation Service

8-4 Cooperative Plan

This ESMP will be implemented as part of the Integrated Natural Resources Management Plan (Fort Stewart 2001), a cooperative plan involving Fort Stewart, FWS, NMFS, and Georgia Department of Natural Resources and required by the Sikes Act (16 U.S.C. 670a et seq.), as amended.

9.0 Coordination and Consultation

Fort Stewart will enter into formal consultation with the FWS regarding this ESMP and the INRMP to update the existing biological opinion issued in 1992.

10.0 GLOSSARY

Augmentation - Relocation of a RCW, normally a juvenile female, from 1 active cluster to another active cluster.

Basal Area - The cross-sectional area (square feet) of trees/acre measured at approximately 4.5 feet from the ground.

Buffer Zone - The zone extending outward 200 feet from the outermost cavity trees in a cluster.

Cavity - an excavation made in a tree, or artificially created, for roosting or nesting by RCWs.

Cavity restrictor - a metal plate that is placed around an RCW cavity to prevent access by larger species. A restrictor also prevents a cavity from being enlarged, or if already enlarged, shrinks the cavity entrance diameter to a size that prevents access by larger competing species.

Cavity start - an incomplete cavity excavated by, or artificially created for, RCWs.

Cavity tree - A tree containing 1 or more active or inactive RCW cavities or cavity starts.

Cluster - The aggregate area encompassing cavity trees occupied or formerly occupied by an RCW group plus a 200 foot buffer zone (formerly called "colony").

Effective breeding pairs - Groups that successfully fledge young.

Group - A social unit of at least 1 RCWs that inhabits a cluster (formerly called a "clan"). A group may include a solitary territorial male, a mated pair; or a pair with helpers (offspring from previous years).

Habitat Management Unit (HMU) - Designated area managed for TES

Impact/danger areas - The land within the training complex used to contain fired, air-dropped, or launched ammunition or explosives and resulting fragments, debris, unexploded ordnance, and components from various weapons systems.

Population - A RCW population is the aggregate of groups that are close enough so that the dispersal of individuals maintains genetic diversity and all the groups are capable of genetic interchange. Population delineations should be made irrespective of land ownership.

Population goal - A desired RCW population. For purposes of this ESMP, terms for 3 types of population goals are relevant:

1. installation Population Goal - The number of groups that can be supported on Fort Stewart.

2. Recovery population goal - The number of groups required on Fort Stewart to ensure recovery of the RCW in this region.

3. Mission compatible goal - The number of training-restricted clusters that is compatible with the installation's military mission

Recovery population - at least 250 effective breeding pairs, annually.

Recruitment - The designation and management of habitat for the purpose of attracting a new breeding group to that habitat.

Recruitment cluster - A cluster site designated and managed for the purpose of attracting a new breeding group to that habitat. There are 2 types of recruitment clusters:

1. Primary recruitment cluster - A recruitment cluster managed for the purpose of attracting additional RCW groups toward meeting the mission compatible goal; applicable training restrictions apply.
2. Supplemental recruitment cluster - A recruitment cluster managed for the purpose of attracting additional RCW groups over and above the mission compatible goal needed to reach the recovery goal; training restrictions will never apply.

Recruitment stand - A stand of trees, at least 10 acres in size, with sufficient suitable RCW nesting habitat to support a RCW cluster group. Stand and supporting foraging area should be located 3/8-3/4 mile from a cluster or other recruitment stand.

Relict tree - A pine tree, usually more than 100 years old, having characteristics making it attractive to the RCW for cavity excavation.

Replacement stand - A stand of trees, minimum of 10 acres, to provide suitable nesting habitat for colonization when the current cluster becomes unsuitable. The stand should be approximately 20-30 years younger than the active cluster. While it is preferable for

replacement stands to be contiguous to the active colony, at no time should they be more than 1/4 mile from the cluster, unless there is no suitable alternative.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, arrangement, and condition so as to be distinguishable from the forest on adjoining areas.

Translocation - The relocation of 1 or more RCWs from an active cluster to a cluster or recruitment stand that contains artificially constructed cavities.

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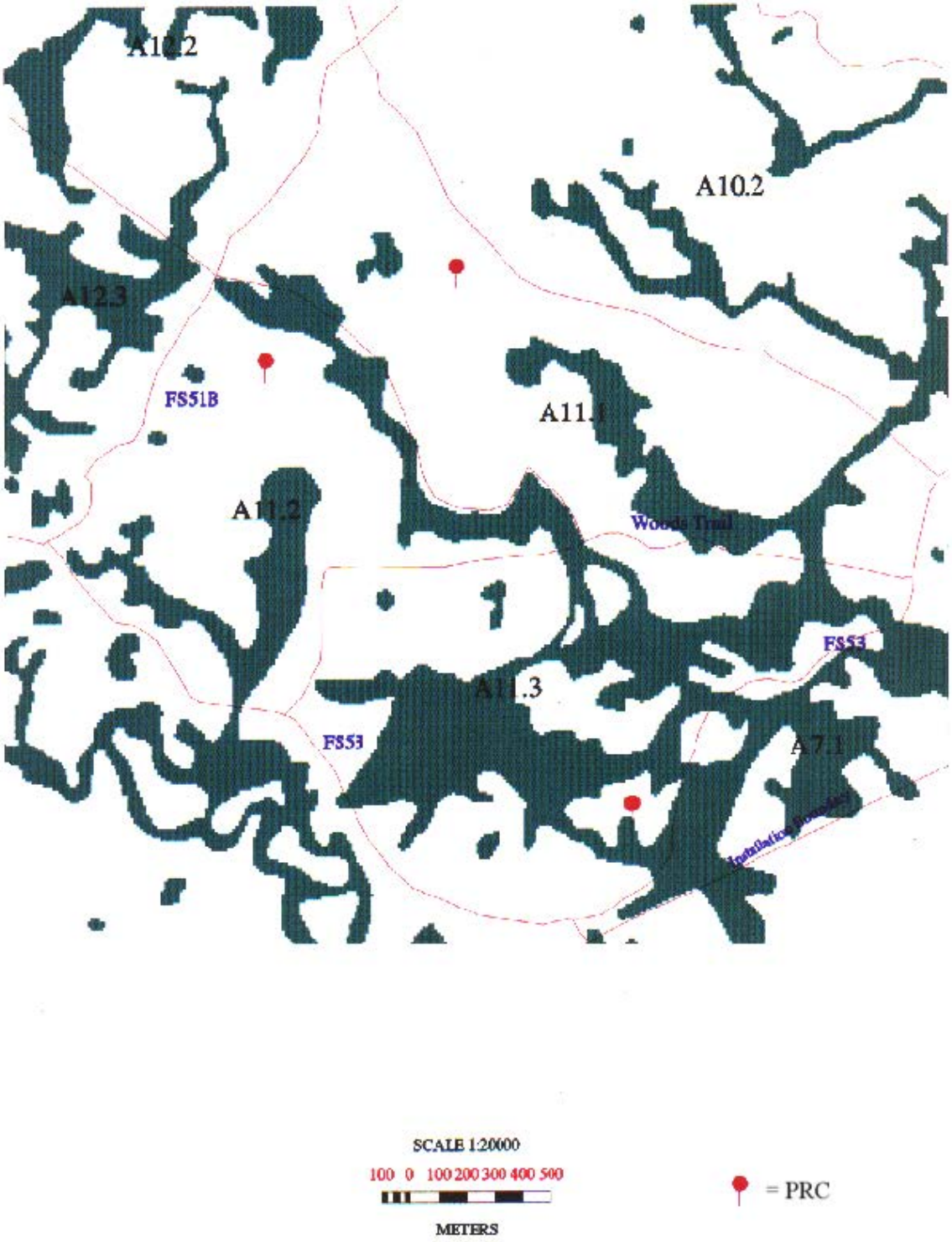
Figure 1. NRMU A-11 management boundaries and approximate locations of PRCs.



FIRE MANAGEMENT PLAN

NRMU - A-11.1

Figure 2. A-11.1 NRMU boundary and location of PRC.

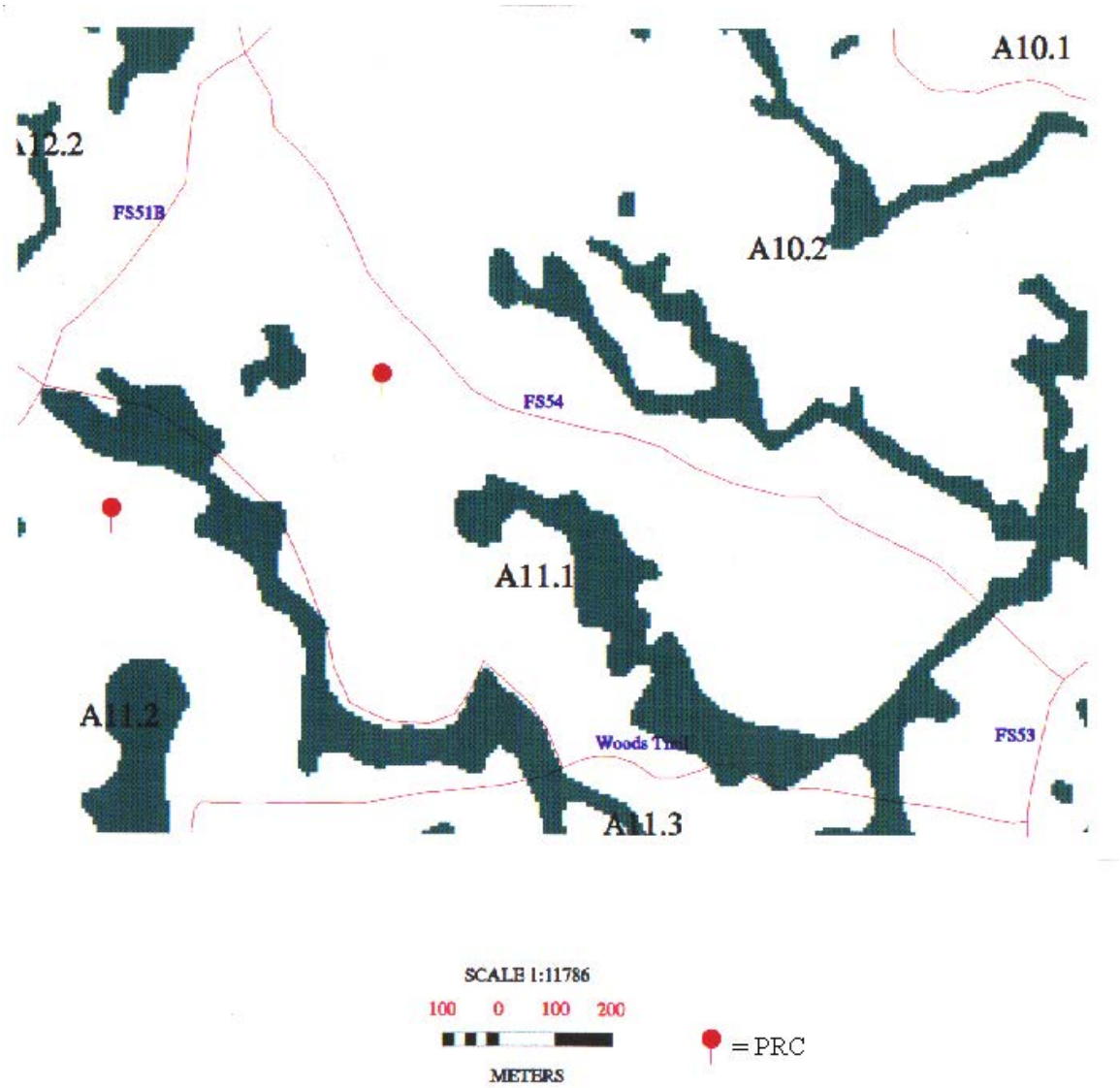


Figure 3. A-11.2 NRMU boundaries and location of PRC.

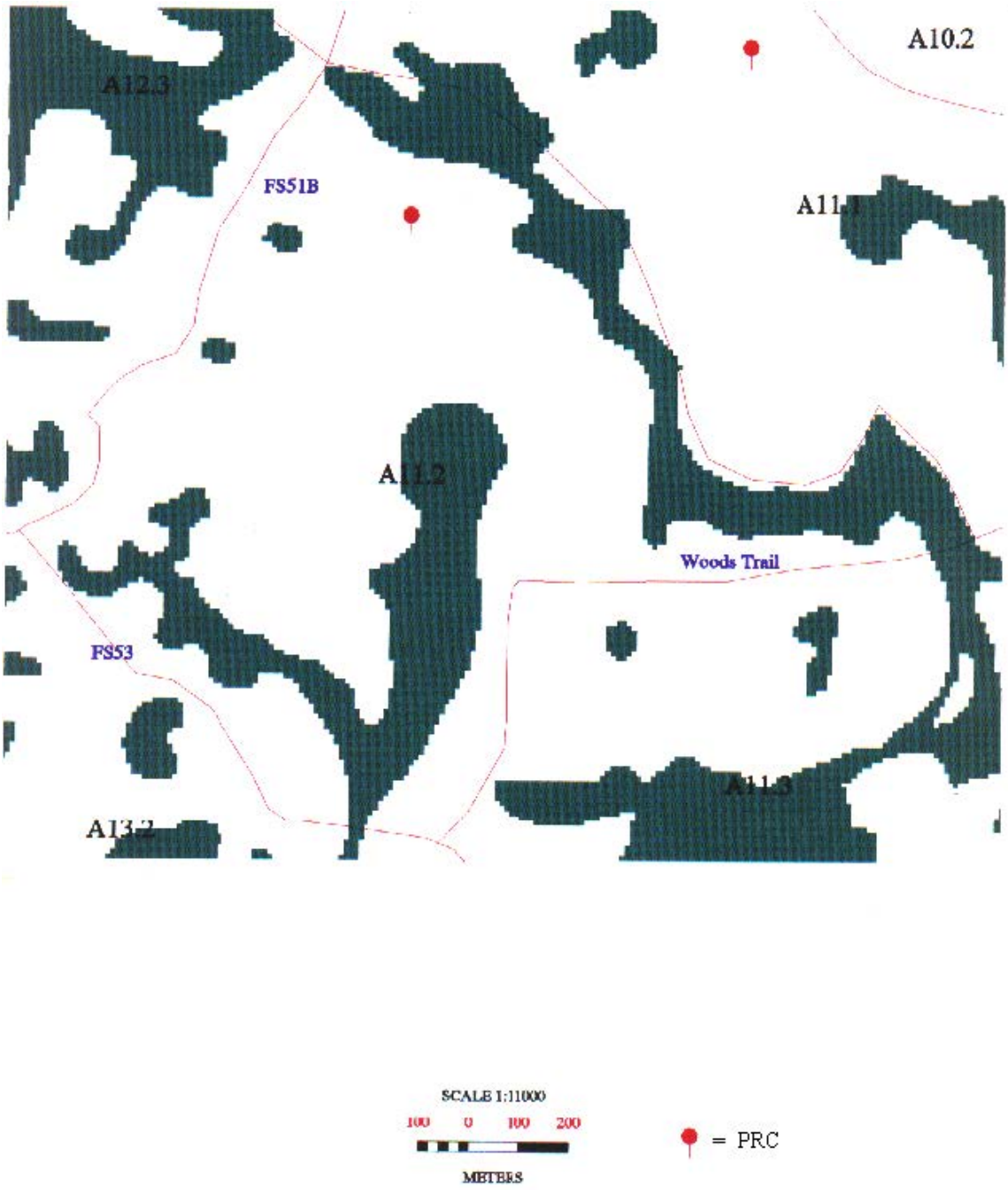


Figure 4. A-11.3 NRMU boundaries and location of PRC.

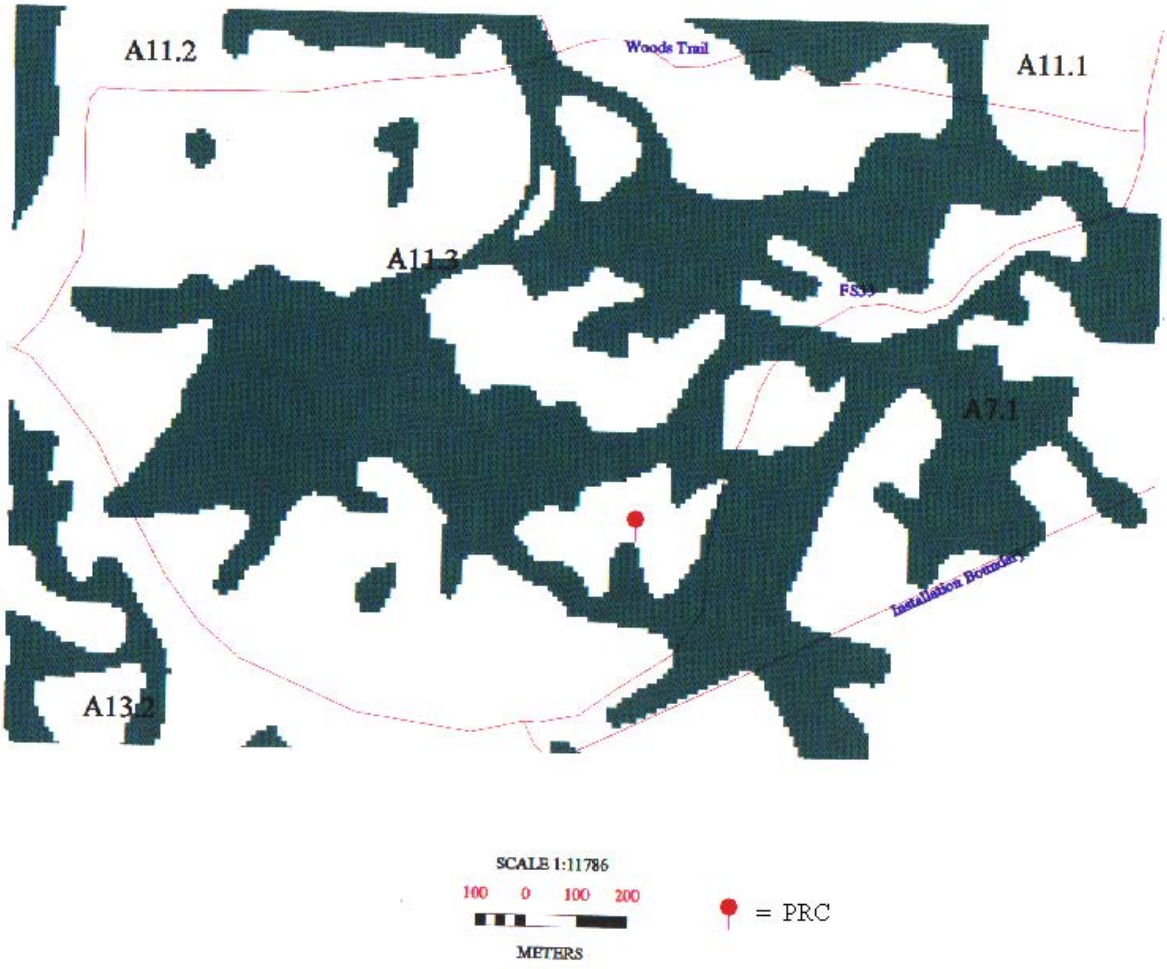


Figure 5. Pine DBH Distribution in A11 NRMUs.

DBH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	Avg. DBH
A11.1	63	51	37	34	10	5	2	1	0	0	0	0	0	0	9.0
A11.2	34	30	23	17	15	5	2	1	1	0	0	0	0	0	9.7
A11.3	49	25	20	22	12	8	3	1	0	0	0	0	0	0	9.5
A11 TOTAL	47	33	24	23	13	7	2	1	0	0	0	0	0	0	9.4

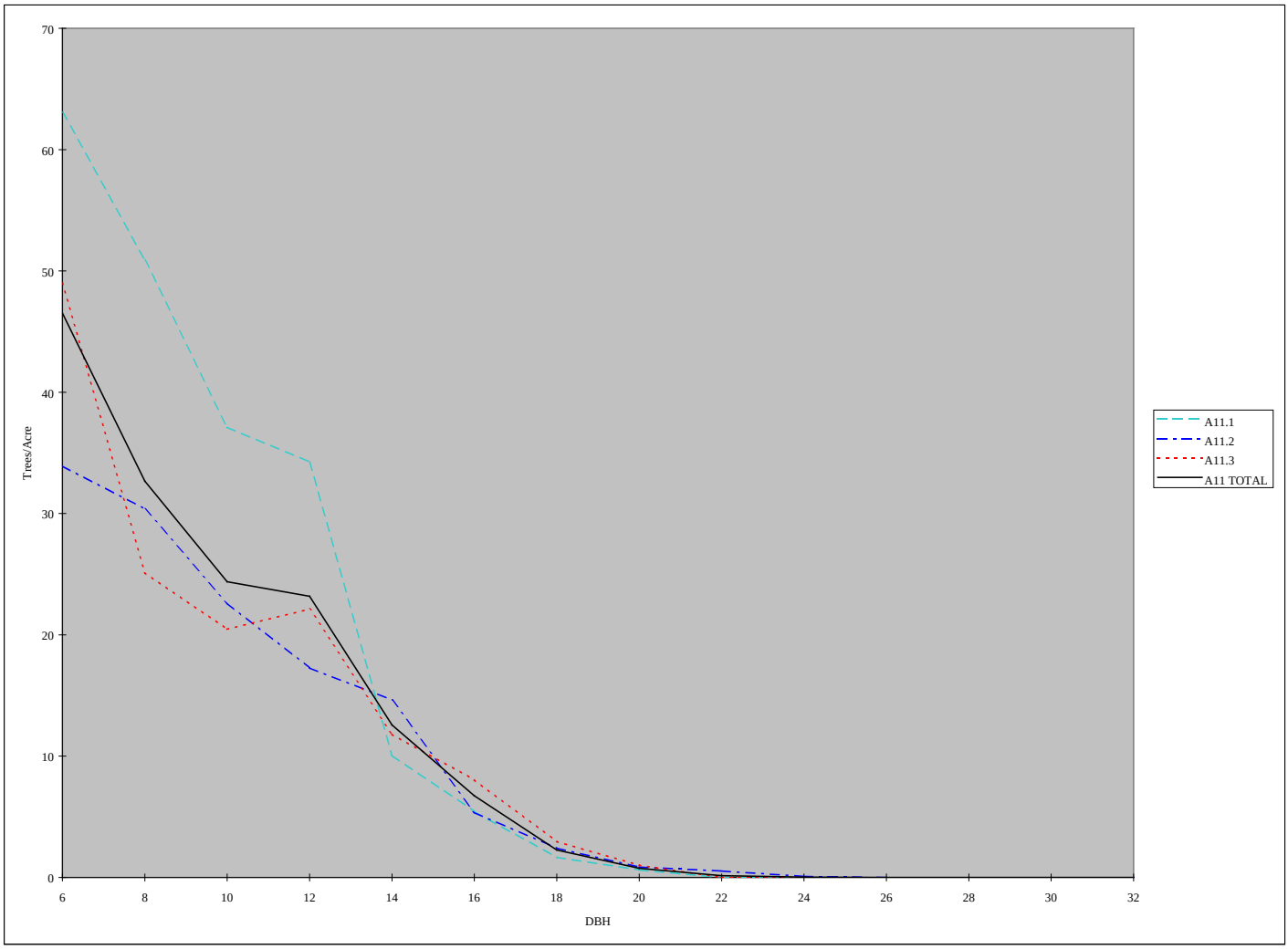


Figure 6. RCW cluster boundary sign.

Figure 7. Bald eagle nest area boundary sign.

Figure 8. Flatwoods salamander breeding pond boundary sign.

Figure1. Distribution of existing RCW cluster and future SRC/PRC management areas

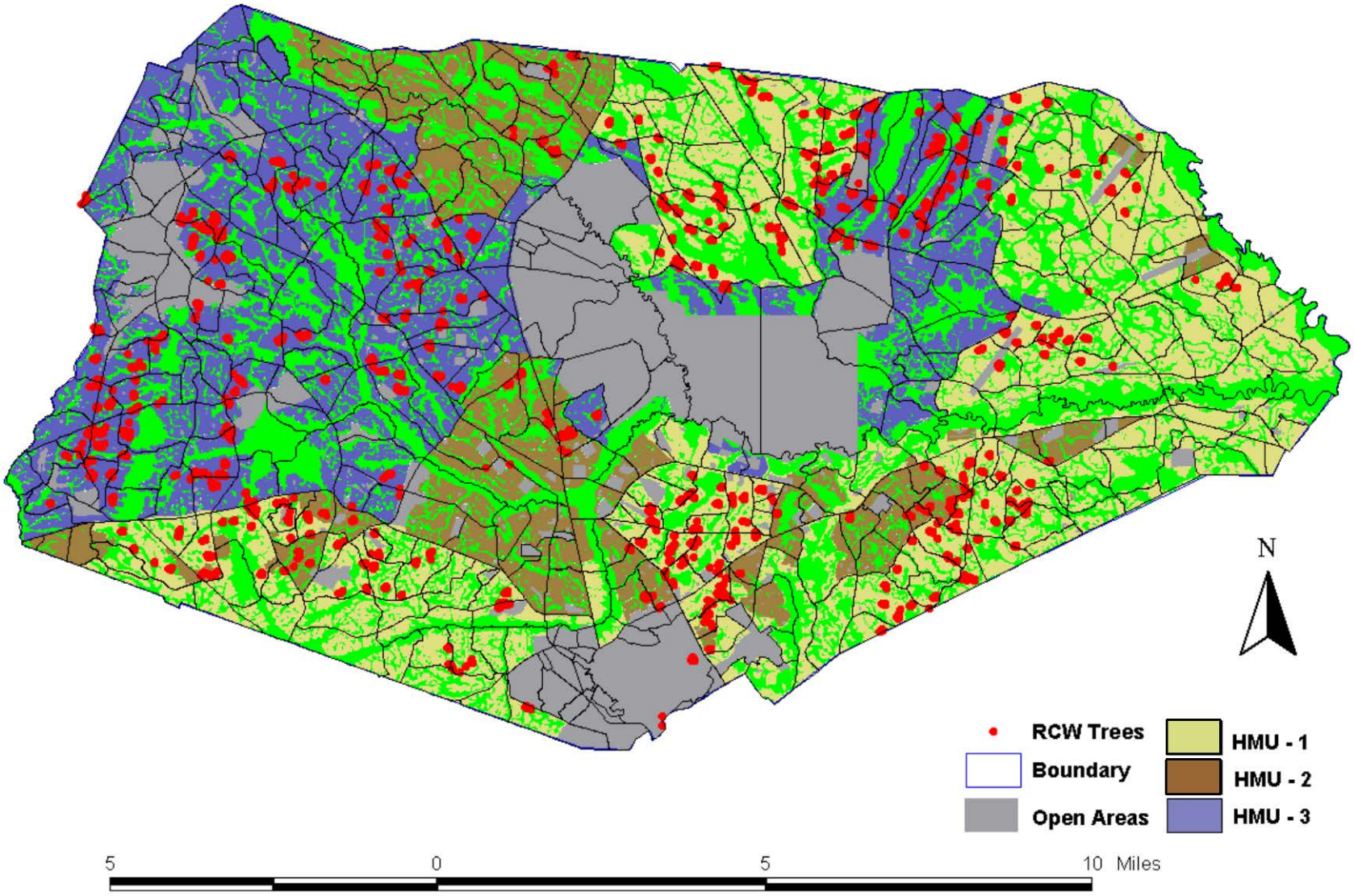


Figure 2. SRC Site to Replace Cluster 258

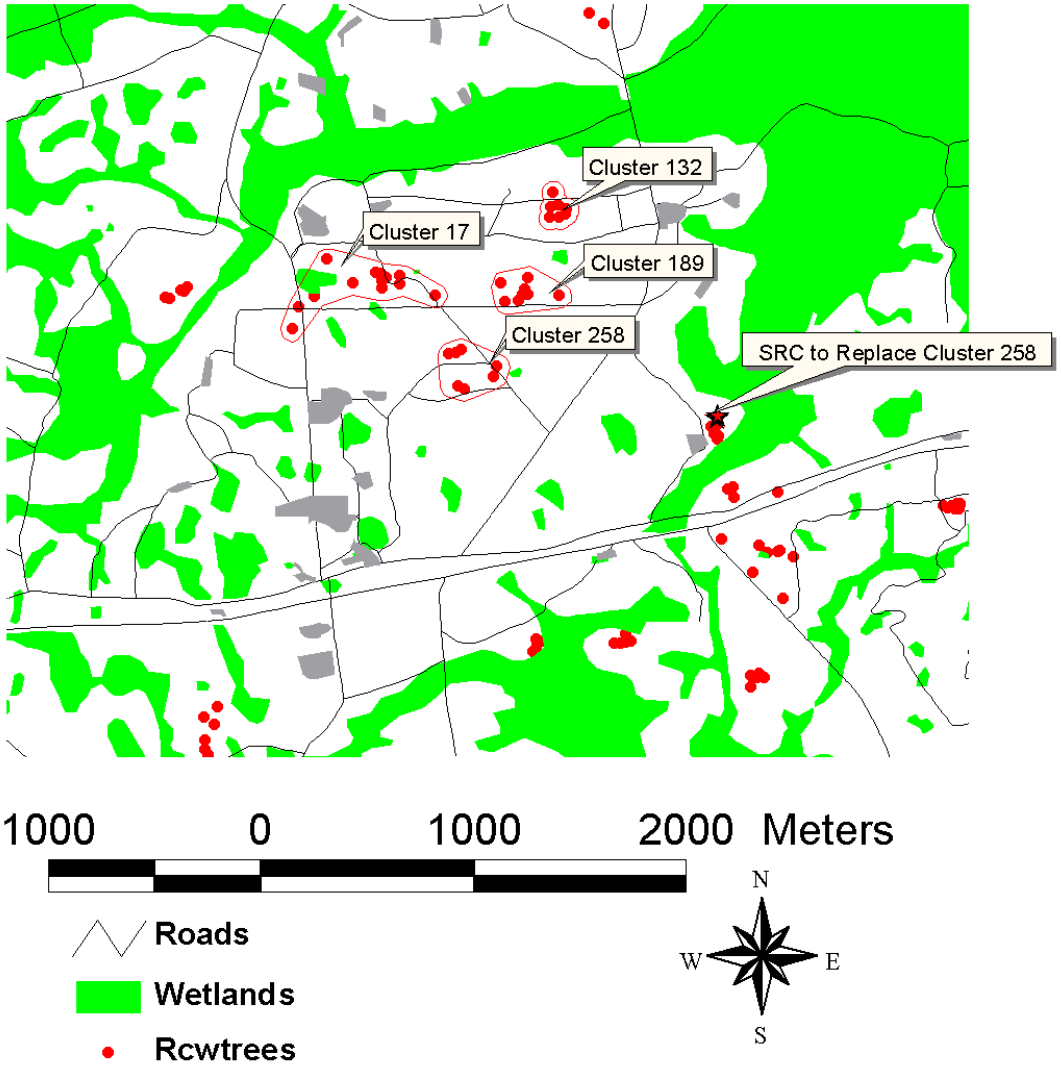


Figure 3. Bald eagle nest sites and management zones

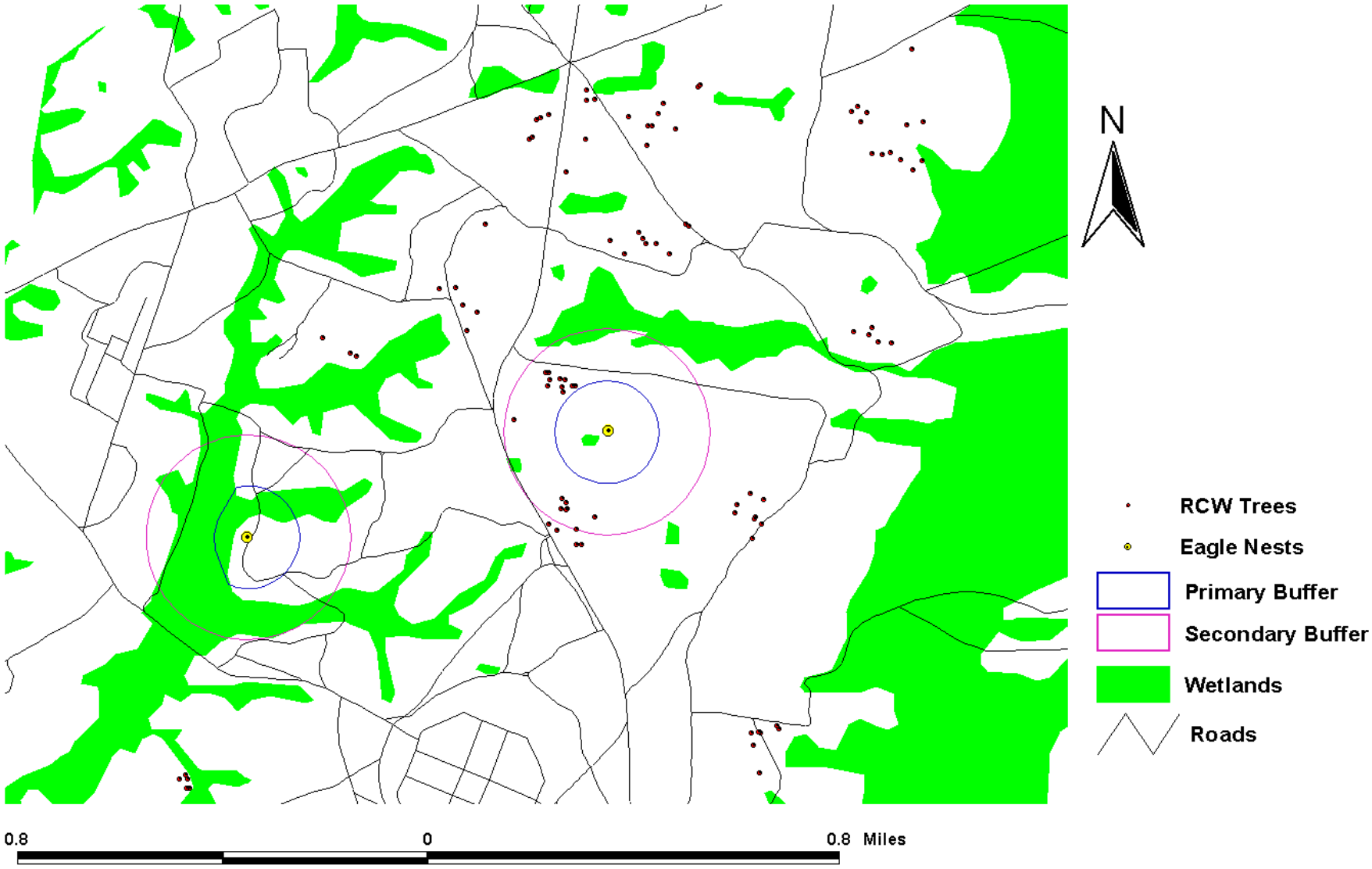


Figure 4. Indigo snake populations and habitat management unit boundaries

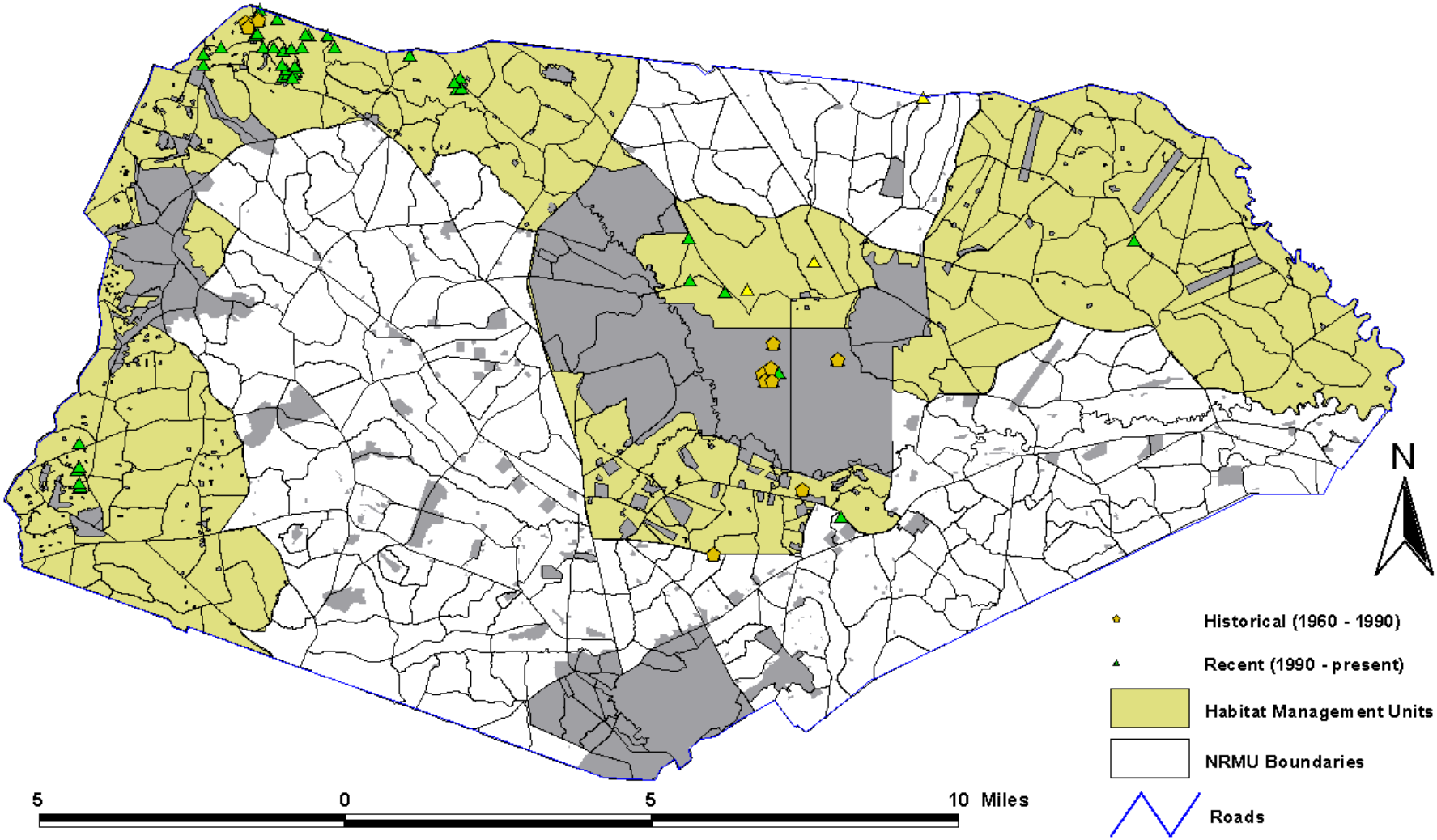


Figure 5. Flatwoods salamander HMUs

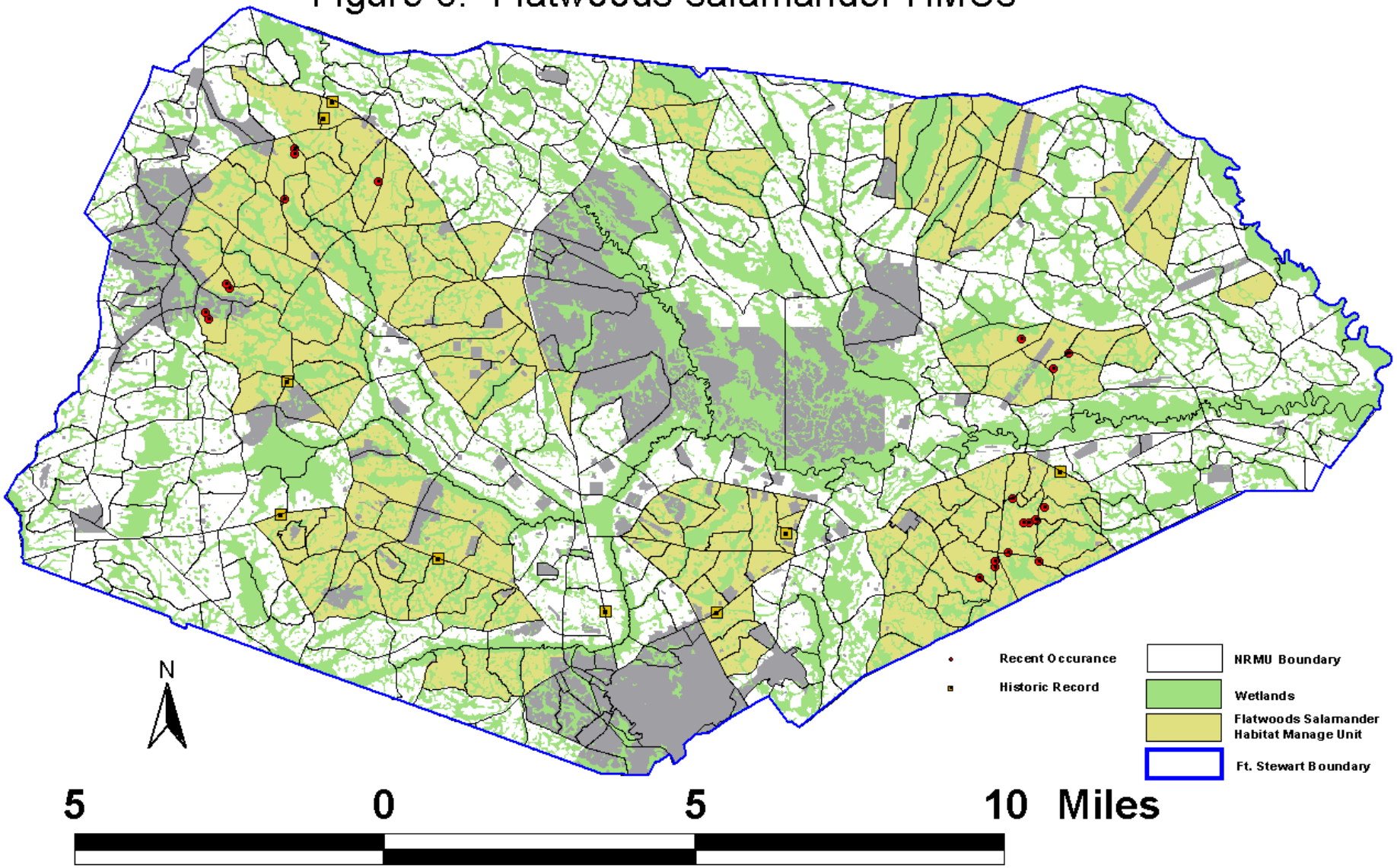
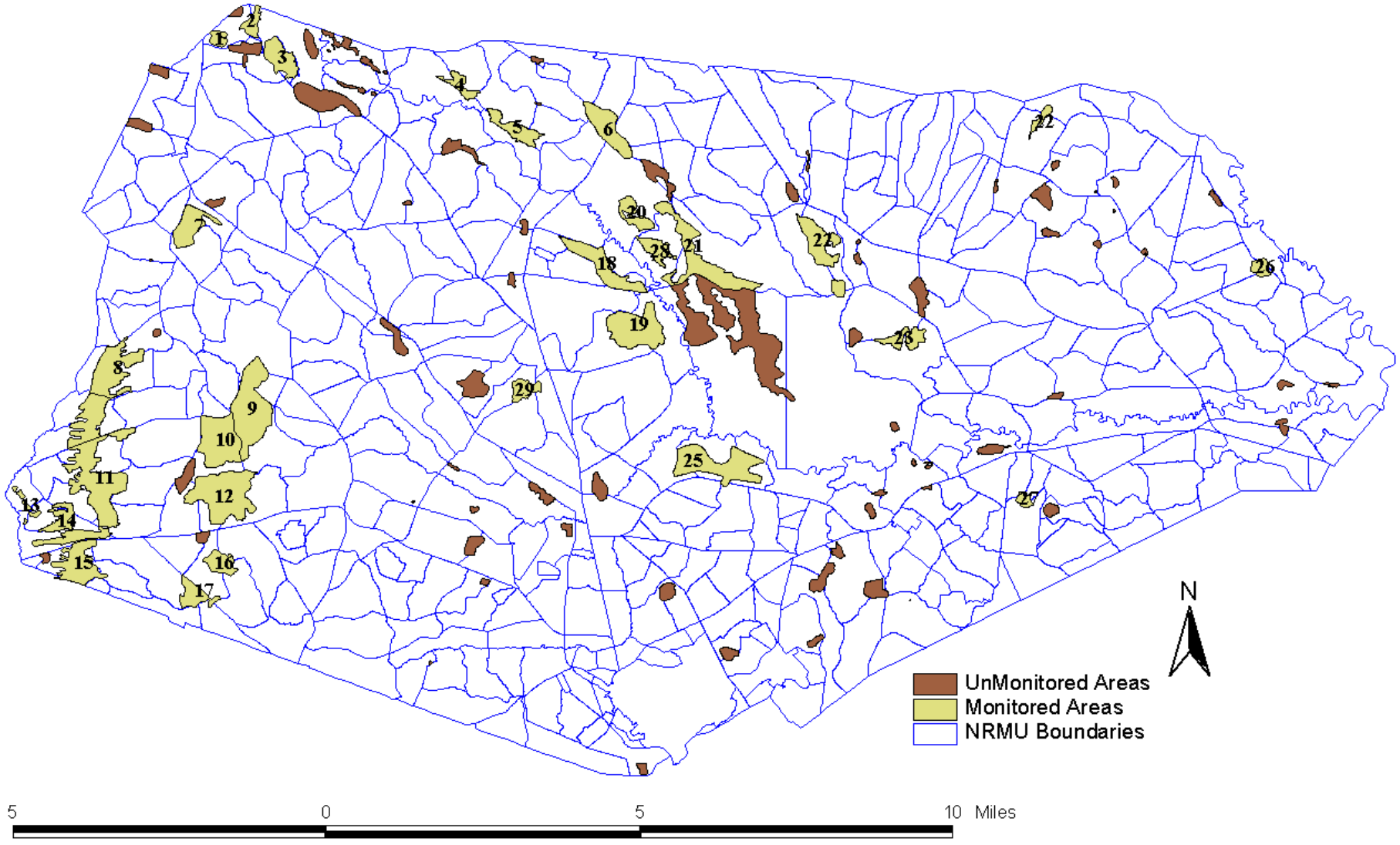


Figure 9. Gopher tortoise populations and monitoring sites



1996
"Management Guidelines for the Red-cockaded Woodpecker on Army Installations"

Management Guidelines
for the Red-cockaded Woodpecker
on Army Installations

Table of Contents
(References to paragraphs)

I. **General**.

A. Purpose. The purpose of these guidelines is to provide standard RCW management guidance to Army installations for developing installation endangered species management plans (ESMPs) for the Red-cockaded Woodpecker (RCW). Installation RCW ESMPs will be prepared according to these guidelines and chapter 11, AR 200-3, Natural Resources - Land, Forest, and Wildlife Management. These guidelines establish the baseline standards for Army installations in managing the RCW and its habitat. Installation RCW ESMPs will supplement these guidelines with detailed measures to meet installation-specific RCW conservation needs. The requirements in RCW ESMPs will apply to all activities on the installation.

B. Applicability. The guidelines are applicable to Army installations where the RCW is present and to installations with inactive clusters that the installation, in consultation with the U.S. Fish and Wildlife Service (FWS), continues to manage in an effort to promote reactivation.

C. Revision. These guidelines will be revised as necessary to be consistent with the latest RCW recovery plan and to incorporate the latest and best scientific data available.

D. Goal. The Army's goal is to implement management guidelines which will allow the Army to train for assigned combat and other missions while concurrently developing and implementing methods to assist in the recovery and delisting of the RCW.

E. Existing Biological Opinions. Installations will continue to comply with the requirements of existing biological opinions until RCW ESMPs are prepared in accordance with these management guidelines and chapter 11, AR 200-3 and are approved through consultation with the FWS. RCW ESMPs should be drafted to incorporate the requirements of existing biological opinions, as modified to conform to these management guidelines through consultation with the FWS.

II. **Consultation**.

A. In preparing RCW ESMPs and taking action that may affect the RCW, installations will comply with the consultation requirements of section 7 of the Endangered Species Act (ESA); the implementing FWS regulations at 50 CFR part 402; and chapter 11, AR 200-3.

B. Early entry into informal consultation with the FWS is key to resolving potential problems and establishing the foundation to address issues in a proactive and positive manner. If, through informal consultation, the FWS concurs in writing that the RCW ESMP or other action is not likely to adversely affect any endangered or threatened species, formal consultation is not required. Issue resolution through informal consultation is the preferred method of consultation.

C. When consulting with the FWS on RCW ESMPs and other actions that may affect the RCW, the opinions of the FWS will normally be consistent with these guidelines. In exceptional cases, however, FWS opinions may require installations to take measures inconsistent with these guidelines. After every effort has been made at the installation and MACOM levels to resolve inconsistencies, installations will report, through MACOM channels, to the Office of the Director of Environmental Programs (ODEP), Headquarters, Department of the Army, FWS opinions that are not consistent with these guidelines. ODEP will expeditiously review these reports and determine if HQDA-level action is necessary. If feasible, installations should delay implementation of measures recommended by the FWS that are inconsistent with these guidelines until after the ODEP review is completed.

III. **Army Policies Applicable to RCW Management.**

A. *Conservation*. Implementation of RCW ESMPs, prepared in accordance with these guidelines, will meet the Army's responsibility under the ESA to assist in conservation of the RCW. Conservation, as defined by the ESA, means the use of all methods and procedures which are necessary for endangered and

threatened species survival and to bring such species to the point of recovery where measures provided by the ESA are no longer necessary.

B. *Mission Requirements*. Installation and tenant unit mission requirements do not justify violating the ESA. Mission considerations are necessary in determining the installation management and recovery goals. The keys to successfully balancing mission and conservation requirements are long-term planning and effective RCW management to prevent conflicts between these interests. In consultations with the FWS, installations will preserve the ability to maintain training readiness, while meeting ESA conservation requirements.

C. *Cooperation with U.S. Fish and Wildlife Service*. The Army will work closely and cooperatively with the FWS on RCW conservation. Installations should routinely engage in informal consultation with the FWS to ensure that proposed actions are consistent with the ESA requirements.

D. *Ecosystem Management*. Conservation of the RCW and other species is part of a broader goal to conserve biological diversity on Army lands consistent with the Army's mission. Biological diversity and the long-term survival of individual species, such as the RCW, ultimately depend upon the health of the sustaining ecosystem. Therefore, RCW ESMPs should promote ecosystem integrity. Maintenance of ecosystem integrity and health also benefit the Army by preserving and restoring training lands for long-term use.

E. *Staffing and Funding*. Installation commanders are responsible for ensuring that adequate professional personnel and funds are provided for the conservation measures prescribed by these guidelines and RCW ESMPs. Commanders are responsible for accurately identifying the funding needed to meet the requirements of these guidelines. RCW conservation projects are funded through environmental channels and will be identified in the Environmental, Pollution Prevention, Control and Abatement Report (RCS 1383).

F. *Conservation on Adjacent Lands*. Necessary habitat for the RCW includes nesting and foraging areas. Both of these RCW habitat components may be located entirely on installation lands. There may be instances, however, where one of these components is located on installation land, while a portion of the other is located on adjacent or nearby non-Army land. The FWS and installations should initiate cooperative management efforts with these landowners, if such efforts would compliment installation RCW conservation initiatives.

G. *Regional Conservation*. The interests of the Army and the RCW are best served by encouraging conservation measures in areas off the installation. The FWS and installations should participate in promoting cooperative RCW conservation plans, solutions, and efforts with other federal, state, and private landowners in the surrounding area.

H. *Management Strategy*. These guidelines require installations to adopt a long-term approach to RCW management consistent with the military mission and the Endangered Species Act. First, installations are required to establish installation RCW population goals in consultation with the FWS using the methodology described in para V.B below. Once established, the installation must designate sufficient nesting and foraging habitat to attain and sustain the goals. The goals will also dictate the required management intensity level. Next, installations must develop an ESMP to attain and sustain the installation RCW population goals in accordance with chapter 11, AR 200-3. Fourth, installations are required to ensure that all units and personnel that conduct training and other activities at the installation comply with the requirements of the installation RCW ESMP.

IV. **Definitions.**

Augmentation - Relocation of an RCW, normally a juvenile female, from one active cluster to another active cluster.

Basal area (BA) - The cross-sectional area (in square feet) of trees per acre measured at approximately four and one-half feet from the ground.

Biological diversity - The variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Buffer zone - The zone extending outward 200 feet from a cavity tree or cavity start tree in an active or primary recruitment cluster.

Cavity - An excavation in a tree made, or artificially created, for roosting and nesting by RCWs.

Cavity restrictor - A metal plate that is placed around an RCW cavity to prevent access by larger species. A restrictor also prevents a cavity from being enlarged, or if already enlarged, shrinks the cavity entrance diameter to a size that prevents access by larger competing species.

Cavity start - An incomplete cavity excavated by, or artificially created for, RCWs.

Cavity tree - A tree containing one or more active or inactive RCW cavities or cavity starts.

Cluster - (formerly called "colony") - The aggregate area encompassing cavity trees occupied or formerly occupied by an RCW group plus a 200 foot buffer area.

Effective breeding pairs - Groups that successfully fledge young.

Group - (formerly called "clan") - A social unit of one or more RCWs that inhabits a cluster. A group may include a solitary, territorial male; a mated pair; or a pair with helpers (offspring from previous years).

Habitat Management Unit (HMU) - Designated area(s) managed for RCW nesting and foraging, including clusters and areas determined to be appropriate for recruitment and replacement stands.

Impact areas - The ground within the training complex used to contain fired or launched ammunition or explosives and the resulting fragments, debris, and components from various weapons systems.

Population - A RCW population is the aggregate of groups which are close enough together so that the dispersal of individuals maintains genetic diversity and all the groups are capable of genetic interchange. Population delineations should be made irrespective of land ownership.

Population goals - A desired RCW population. For purposes of these guidelines, terms for three types of population goals may be relevant to developing an installation's ESMP:

1. Recovery population goal - The number of groups required in a physiographic region to ensure recovery of the RCW in that region.

2. Installation Regional Recovery Goal - The number of groups which FWS identifies as the installation's potential contribution toward meeting the recovery population goal.

3. Installation Mission Compatible Goal - The number of training-restricted clusters which the installation identifies as currently compatible with the installation's on-going operations, suitable habitat, and missions considering its conservation responsibilities.

Provisioning - The artificial construction of cavities or cavity starts.

Recovery population - A total of 250 or more effective breeding pairs annually, for a five year period.

Recruitment - The designation and management of habitat for the purpose of attracting a new breeding group to that habitat.

Recruitment stand - A stand of trees, minimum of 10 acres in size, with sufficient suitable RCW nesting habitat identified to support a new RCW group. Stand and supporting foraging area should be located 3/8 mile to 3/4 mile from a cluster or other recruitment stand.

Recruitment cluster - A cluster site designated and managed for the purpose of attracting a new breeding group to that habitat. Installations may have two types of recruitment clusters:

1. Primary recruitment cluster - A recruitment cluster managed for the purpose of attracting the growth of additional RCW groups toward meeting the Installation Mission Compatible Goal; generally applicable training restrictions will apply to recruitment clusters.

2. Supplemental recruitment cluster - A recruitment cluster managed for the purpose of attracting the growth of additional RCW groups over and above the Mission Compatible Goal needed for the installation to reach the Installation Regional Recovery Goal; training restrictions will never apply to supplemental recruitment clusters.

Relict tree - a pine tree usually more than 100 years old having characteristics making it attractive to the RCW for cavity excavation.

Replacement stand - a stand of trees, minimum of 10 acres in size, identified to provide suitable nesting habitat for colonization when the current cluster becomes unsuitable. The stand should be approximately 20 - 30 years younger than the active cluster. While it is preferable for replacement stands to be contiguous to the active colony, at no time should they be more than 1/4 mile from the cluster, unless there is no suitable alternative.

Stand - an aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, arrangement, and condition so as to be distinguishable from the forest on adjoining areas.

Sub-population - the aggregate of groups which are close enough together to allow for demographic interchange between groups. A sub-population does not have a significant demographic influence on adjacent sub-populations, but there is sufficient genetic interchange between the sub-populations to be considered one population.

Suitable acreage - installation acreage determined to be currently suitable for occupation by RCWs based upon vegetation and dominant land uses and acreage potentially suitable for occupation by RCWs through reasonable and practicable management practices - for example, acreage with severe mid-story encroachment would be considered as potentially suitable acreage and therefore suitable acreage; however, urban-type areas, the cantonment, impact areas, or areas free of vegetation, such as drop-zones, field landing strips, or gun positions, would not be considered suitable or potentially suitable acreage.

Translocation - the relocation of one or more RCWs from an active cluster to an inactive cluster or recruitment stand that contains artificially constructed cavities.

V. **Guidelines for Installation RCW ESMPs**.

Installations will prepare RCW ESMPs and manage RCW populations according to the following guidelines. Installations will update ESMPs every five years or when circumstances dictate.

A. *RCW ESMP Development Process.*

Preparation of installation RCW ESMPs requires a systematic, step-by-step approach. RCW populations (current and goal), RCW habitat (current and potential), and training and other mission requirements (present and future) must be identified. Detailed analysis of these factors and their interrelated impacts are required as a first step in the development of an ESMP. Installations should use the following or a similar methodology in conducting this analysis:

1. Identify the current RCW population and its distribution on the installation.

2. Identify areas on the installation currently and potentially suitable for RCW nesting and foraging habitat.

3. Establish the installation RCW population goal(s) with the FWS according to the guidance in B below.

4. Identify installation and tenant unit mission requirements. Overlay these requirements on the RCW distribution scheme.

5. Identify mission requirements that are incompatible with the conservation of RCW habitat.

6. Identify areas on the installation where conflicting mission requirements could be relocated to avoid RCW habitat.

7. Identify critical mission areas where activities cannot reasonably be relocated.

8. Identify areas which could support RCW augmentation or translocation.

9. Identify areas suitable for RCW habitat and free of conflicting present and projected mission activities. These are prime areas for designation as recruitment stands.

10. Analyze the information developed above using the guidance contained in these guidelines.

11. Prepare the RCW ESMP to implement the best combination of options, consistent with meeting the established RCW population goals, while minimizing adverse impacts to training readiness and other mission requirements.

B. *RCW Population Goals.*

1. The first step in RCW management is to determine the Installation Regional Recovery Goal and Installation Mission Compatible Goal in accordance with paragraph V.B.2 below. Once the goals are established, they will be used to designate the amount of land needed for RCW HMUs and the appropriate level of management intensity. Goals should be considered long-term but are subject to change, through consultation with the FWS, based upon changing circumstances, changing missions, or new scientific information. In conjunction with the 5 year review of ESMPs, installations will reexamine population goals to reflect changing conditions.

2. ESMPs must clearly state the installation RCW population goals. The goals will be established through informal or formal consultation with FWS using the following methodology:

a. Installation Regional Recovery Goal. Through consultation with FWS determine the installation "share" of the recovery population goal.

(1) Determine the number of active clusters required in the population to achieve recovery.

(2) Count RCW groups on other federal, state or private lands that are demographically functioning as part of the regional population as contributing to the overall regional recovery goal.

(3) Determine the installation's carrying capacity to support RCWs based upon suitable acreage and known ecosystem attributes..

(4) Any deficit between steps (1) and (2), considering the limitations of step (3), will be considered the installation's potential contribution toward the overall recovery goal and will be termed, for ESMP purposes, the Installation Regional Recovery Goal.

b. Installation Mission Compatible Goal. The installation will determine its known capacity to integrate RCW management with on-going and planned mission requirements and dominant land uses. During this process, the installation will seek input from FWS.

(1) Determine suitable acreage.

(2) Determine the installation carrying capacity to support RCWs , the calculation of suitable acreage, known ecosystem attributes, and acreage required as exempt for critical and essential mission requirements. Installations may only exempt acreage as essential for mission requirements when, considering their conservation responsibilities under the Endangered Species Act, they determine that imposing generally applicable training restrictions upon such certain specific lands would unacceptably hinder mission accomplishment. The Mission Compatible Goal should be carefully calculated considering the current and future installation and tenant unit missions, the amount and distribution of suitable habitat on the installation, the quality of the habitat, the distribution of clusters, the configuration of sub-populations, the recovery potential and the RCW Recovery Plan objectives, etc. The Installation Mission Compatible Goal should strike a reasonable balance between the present and future installation and tenant unit missions and the installation's duty to conserve the endangered species.

c. ESMP goals. If the Installation Regional Recovery Goal is less than the Installation Mission Compatible Goal, then the installation will use the Installation Regional Recovery Goal as the ESMP Goal. If the Installation Regional Recovery Goal is greater than the Installation Mission Compatible Goal, then the installation will use both goals in the ESMP. The installation ESMP will include maps for planning and future reference which show the configuration of all active clusters and primary recruitment clusters required to reach the Installation Regional Recovery Goal. These maps will also show the supplemental recruitment clusters scheduled for management in the 5-year planning period. These maps will be updated during the 5-year revision process. If the number of recruitment sites identified in the initial 5-year plan falls short of the Installation Regional Recovery Goal, the installation will also identify the additional habitat management areas where supplemental recruitment clusters will be added to meet this goal. Installations will identify and manage a minimum of 200 acres of suitable habitat for each identified recruitment cluster.

d. Maintenance of ESMP goals. A population that has achieved the Installation Regional Recovery Goal need only be maintained at that level; however, installations should continue to encourage population growth where feasible and compatible with the military mission. A maintenance strategy is also appropriate for populations which have attained the maximum population that can be supported by available suitable habitat, irrespective of population size. Maintenance activities will, however, also vary according to the population size. For example, smaller, nonviable populations may require occasional augmentation, predator control, etc.

3. The population goal established for an installation will dictate the required RCW management intensity level. An installation which has not achieved its population goals requires an active recruitment/augmentation strategy. Annually, the installation will determine the number of recruitment clusters to provision with artificial cavities, cavity restrictors, etc., and concurrently manage those recruitment clusters using the following methodology:

a. Primary recruitment clusters. In order to increase the current population, the installation will annually add recruitment clusters within the limitations of available nesting and foraging habitat of at least the optimum rate of growth of the RCW to meet the Mission Compatible Goal (or the Installation Regional Recovery Goal if it is less than the Mission Compatible Goal). The optimum rate of growth of an installation's RCW population will be determined by the installation's population size and population distribution and will be detailed in the installation's ESMP.

b. Supplemental recruitment clusters. If the Installation Regional Recovery Goal is greater than the Installation Mission Compatible Goal, the installation will annually add supplemental recruitment clusters within the limitations of available nesting and foraging habitat. These supplemental will be added over and above the recruitment clusters described in paragraph V.B.3.a above, at the rate of at least one-half of the rate of growth to attain the Installation Regional Recovery Goal. The installation will identify and subsequently manage these supplemental recruitment clusters in areas not already selected by the installation as a recruitment cluster in paragraph V.B.3.a above. Installations will manage these supplemental clusters concurrently and in addition to recruitment clusters managed for the purpose of meeting the Installation Mission Compatible Goal.

(1) Management of these supplemental recruitment clusters will be closely coordinated with FWS. FWS will provide incidental take provisions for supplemental recruitment clusters occupied as part of the authorized program to exceed the Mission Compatible Goal in order to reach the Installation Regional Recovery Goal. Training or other land use restrictions will never apply to recruitment clusters managed under this approach; however, this does not authorize installations to engage in non-training related construction activities in occupied supplemental recruitment clusters absent consultation with FWS.

(2) The installation will separately manage and track the supplemental recruitment clusters as contributing to the Installation Regional Recovery Goal. As with other recruitment clusters, the supplemental recruitment clusters will be provisioned and managed in woodpecker-suitable habitat. The installation will give priority to adding supplemental recruitment clusters in training area acreage previously exempted from consideration as RCW habitat because of critical or essential mission requirements under paragraph V.B.2.b. Installations may elect to count as either supplemental recruitment clusters or primary recruitment clusters, those clusters where RCWs voluntarily move into a stand which has not been designated previously as a recruitment cluster.

c. During the development of the installation's ESMP, and at the 5-year review, if a cluster or recruitment cluster identified previously as active has no RCW activity for a period of five consecutive years, the installation may cease actively managing that cluster.

C. *Surveys, Inspections, Monitoring and Reporting Programs*.

1. Installations will conduct the following surveys and monitoring programs.

a. Five-Year installation-wide RCW surveys. Effective management of the RCW requires an accurate survey of installation land for RCW cavity and cavity-start trees. The survey must document the location of RCW cavity and cavity-start trees as accurately and precisely as possible (using Global Positioning System and Geographic Information System, if available) and the activity within all clusters. An installation-wide survey will be conducted every five years. Installations may conduct the survey over the five year period, annually surveying one-fifth of the installation.

b. Project surveys. Prior to any timber harvesting operations, construction, or other significant land-disturbing activities, excluding burning, a 100-percent survey of the affected area will be conducted by natural resources personnel trained and experienced in RCW survey techniques and supervised by a RCW biologist, if such survey has not occurred within the preceding year. Installations will conduct project surveys in accordance with the survey guidance in V. Henry, Guidelines for Preparation of Biological Assessments and Evaluations for the Red-cockaded Woodpecker, U.S. Fish and

Wildlife Service, Southeast Region, Atlanta, Georgia (September 1989). When conducting project assessments, installations may, through informal consultation with FWS, reduce the forage habitat requirements from the Henry guidelines by one-third, or as specified in paragraph V.D.2.d below. In the case of range construction, the survey will also include the surface danger zone for the weapons to be used on that range except for new ranges which use existing dedicated impact areas.

c. Inspections. Clusters that have not been deleted from management in accordance with paragraph V.D.2.b below must be inspected annually (consistent with safety considerations at paragraph V.E.5.a). Recruitment clusters must be inspected twice per year (fall and pre-breeding dispersal periods) to document RCWs occupancy; once occupied, use monitoring criteria in paragraph V.C.1.e. These are prescriptive inspections, used to develop treatments and modifications of treatments to maintain suitable nesting habitat. At a minimum, installations will inspect and record data for:

(1) density and height of hardwood encroachment;

(2) height of RCW cavities;

(3) condition of cavity trees and cavities;

(4) a description of damage from training (to include: damage to cavity and cavity start trees requiring remedial measures if any, soil disturbance adjacent to cavity and cavity start trees requiring remedial measures if any, and general condition of the forage habitat of the cluster being monitored if impacted by training activities), fires (prescribed or wild), etc.; and

(5) evidence of RCW activity for each cavity tree (includes each cavity in the tree) within the cluster. See 2a below for guidance on the maintenance of survey and monitoring records.

d. Ten-year forest survey. In addition to the RCW survey required in 1a above, installations will conduct, as required by AR 200-3, an installation-wide forest survey at least every ten years. In conducting the forest survey, data will be gathered to determine accurately the quantity and quality of available foraging and nesting habitat for the RCW. Alternately, installations may survey over the 10 year period, e.g., ten percent of the installation annually. Forest surveys will be conducted using a recognized plot sampling technique, such as the random line plot cruise, the random point sample cruise, or the line strip cruise method. Forest surveys in impact areas may be conducted using scientifically accepted, aerial photography interpretation methods.

e. Monitoring. Installations will conduct monitoring programs to scientifically determine demographic trends within the population as a whole. Sample sizes will be determined by the number of clusters and their dispersion on the installation by habitat category (*e.g.*, longleaf pine/scrub oak, pine flatwoods, pine mixed hardwoods) and by category of use (*e.g.*, non-dud producing ranges, mounted and dismounted training areas, cantonment areas, bivouac areas, etc.). Sample sizes will be of sufficient size to have statistical validity and to ensure that population trends and important biological information can be determined for the entire installation. Monitoring activities will be done annually to acquire data to determine the number of adults and fledglings per site, sex of birds, number of breeding groups, number of nests, and number of cavity trees. Monitoring will include color banding of birds. Installations will coordinate with FWS to determine if additional monitoring, in other than impact areas, may be required to address installation specific issues, e.g., fragmented populations or on-going translocation programs. In addition to the monitoring outlined in this paragraph, installations with supplemental recruitment clusters will monitor and record the following information of military training and activities occurring within all training areas containing monitored active clusters and recruitment clusters during the five-year period, whether or not the clusters become active: a) type of training that took place, b) duration of training, c) date of training, d) units and approximate numbers of soldiers involved in the training, e) approximate number

and types of vehicles and equipment involved in the training, and f) other relevant information that would contribute to an understanding of the effects of military training upon RCW habitat.

(1) Active Clusters. Installations with 25 active clusters or fewer will monitor all sites annually. Installations with more than 25 active clusters will annually monitor sample sizes based on the following: 25 percent of the RCW active clusters located in each habitat and usage category on the installation, with a minimum of three RCW clusters per habitat type or a total of 25 clusters, whichever is greater.

(2) Recruitment Clusters. Installations with recruitment clusters designed to attain either the Mission Compatible Goal or the Installation Regional Recovery Goal will monitor all recruitment clusters for at least five years after they become occupied by RCWs. If, after the five-year period, a recruitment cluster is still active, monitoring will be integrated into the active cluster monitoring program outlined in paragraph V.C.1.e.(1).

2. Results from surveys and monitoring will be recorded and reported as follows:

a. Survey/monitoring records. Survey and monitoring results for all clusters will be recorded and retained permanently allowing for trend analysis.

b. Research on compatibility of military training with RCWs. ODEP will ensure that monitoring of population data gathered from all installations with primary recruitment clusters and supplemental recruitment clusters is evaluated for trend analysis and will share this analysis with FWS. Research data will be analyzed at least once every five years for population trends. In consultation with FWS, trend analysis from paragraphs a and b above, and other outside 5 year research programs, will dictate the revision, continuation, or cancellation of military training restrictions for all clusters considered part of the mission compatible goal. Trend analysis will not effect supplemental recruitment clusters.

c. Annual Reporting. Installations will annually report RCW population data to FWS. Along with the population data, installations will report all actions taken to recruit RCWs or improve RCW habitat (see Appendix 2 for content and format of report). A copy of this report will be furnished through command channels to ODEP. The Army will host an annual meeting with FWS and the installations to discuss installation RCW population data. During these meetings, if it becomes clear that an installation is accomplishing less than 50% of its ESMP growth goals over a period of several years, then the installation will informally consult with the FWS to determine if reinitiating formal consultation is desirable.

d. Notification. The installation will immediately notify FWS and their MACOM in the event of incidental take. The installation will notify FWS and their MACOM, and reinitiate consultation with FWS, within 30 days of discovering a 5% population decrease. MACOMs will report either of these occurrences to ODEP. In the event of an incidental take, the installation will also comply with AR 200-3, paragraph 11-9. Upon discovery of a 5% population decrease, the installation will continue to abide by these guidelines and will conduct a systematic review of available data including regional trends to determine the cause of the decrease within 90 days. If the cause is training related, within 150 days the installation in consultation with FWS will develop and implement a plan to prevent further population decline.

e. RCW maps. Survey data will be used to generate installation RCW maps accurately depicting the location of RCW clusters, RCW-related training restricted areas, HMUs, cavity trees, etc. A copy of these maps will be included in the ESMP. The initial ESMP produced according to these guidelines will identify the clusters where the area subject to training restrictions have changed as a result of implementation of these guidelines as opposed to the 21 June 1994 guidelines. Relevant maps will be widely distributed for use by those conducting land use activities on the installation, including military training, construction projects, range maintenance, etc. Maps will be updated at least every five years to

coincide with the installation-wide RCW survey or when a 20 percent change in the number of clusters occurs, whichever is sooner.

D. *RCW Habitat Management Units*.

1. Designation of habitat management units (HMUs). Installation RCW ESMPs will provide for the designation of nesting and foraging areas within HMUs sufficient to attain and sustain the installation RCW population goals. Determination of the installation's population goals is a prerequisite to HMU designation. HMU delineation is an important step in the planning process because it defines the future geographic configuration of the installation RCW population. Areas designated as HMUs for all active and recruitment clusters must be managed according to these guidelines.

2. Areas included within HMUs.

a. HMUs will encompass all clusters, areas designated for recruitment and replacement, and adequate foraging areas as specified in d below.

b. During the development of the installation's ESMP, and at the 5-year review, in consultation with the FWS, clusters that have been documented as continuously inactive for a period of five consecutive years or more may be deleted from HMUs. Designated recruitment clusters that have not been occupied for a period of five consecutive years may also be deleted from HMUs. Once deletion of a cluster from management is approved by the FWS, existing cavities may be covered to discourage reactivation.

c. In designating HMUs, fragmentation of nesting habitat will be avoided. Installations will attempt to link HMUs with HMU corridors, allowing for demographic interchange throughout the installation population.

d. Adequate foraging habitat, in size, quality, and location, must be provided within HMUs. The foraging habitat needed to support active clusters will be calculated and designated according to the range-wide guidelines in V. Henry, Guidelines for Preparation of Biological Assessments and Evaluations for the Red-cockaded Woodpecker, U.S. Fish and Wildlife Service, Southeast Region, Atlanta, Georgia (September 1989) or other physiographic-specific guidelines approved by the FWS. While the Henry guidelines are used to establish minimum forage acreage requirements, some installations may have data to support forage habitat minima below the Henry standard. If installations can provide data to support forage habitat requirements different from the Henry guidelines, the installation, in consultation with FWS, may establish installation specific forage minima for recruitment sites, project assessments, and habitat management. These forage requirements will apply to all active sites and recruitment sites identified for management in the ESMP. Recruitment sites identified to meet long-term population goals will be evaluated with the same criteria used in the goal setting procedure. A minimum of 200 acres of potential/suitable habitat will be identified and managed for recruitment sites to meet the Installation Mission Compatible Goal and the Installation Regional Recovery Goal. The underlying strategy is to identify and actively manage RCW habitat in the short to mid-term with the long-term population goal always in sight. Adhering strictly to the Henry guidelines, or applying forage habitat requirements to areas presently lacking RCW groups, may preclude long-term habitat management. This could increase the time required to reach installation RCW population goals. .

3. Minimization of RCW management impacts on the installation's mission. To the extent consistent with RCW biological opinions, HMUs should be located where there will be a minimum impact upon current and planned installation missions/operations and should be consistent with land usage requirements in the Real Property Master Plan.

4. Demographic and genetic interchange. Installations should delineate HMUs to maximize the linkage between sub-populations on and off the installations and with populations off the installation. Where fragmentation exists, installations should develop plans to link sub-populations on the installation by designating habitat corridors where practical.

E. *HMU Management Practices*. All HMU management activities and practices will be consistent with the conservation of other candidate and federally listed species.

1. Clusters and recruitment stands within HMUs.

a. Due to RCW biological needs, clusters require a higher management intensity level than other areas within HMUs. Within HMUs, maintenance priority will be given to active clusters over both inactive clusters and recruitment stands.

b. Clusters and recruitment stands will be kept clear of dense midstory. An open, park-like pine stand is optimal. All midstory within 50 feet of cavity trees will be eliminated. Beyond 50 feet, some pine midstory will be retained for regeneration and some selected hardwoods may be retained for foraging by species other than the RCW. Hardwoods will not exceed 10 percent of the area of the canopy cover nor 10 percent of the below canopy cover within the cluster or recruitment stand. Hardwood stocking will be kept below 10 square feet per acre.

c. The priority of forest management in cluster sites and recruitment stands is to maintain and produce potential cavity trees greater than 100 years of age. For this reason, no rotation age shall be set in these areas. In thinning clusters and recruitment stands, dead, dying, or inactive cavity trees will be left for use by competitor species. Thinning should occur only when pine species basal area (BA) exceeds 80 and should not exceed the removal of more than 30 BA to avoid habitat disruption (timber prescriptions within clusters should normally be on a 10 year cycle). Pine species basal areas should be kept within the range of approximately 50 to 80 square feet, maintaining average spacing of 20 to 25 feet between trees, but retaining clumps of trees.

d. Trees within HMUs affected by beetle (e.g., Ips beetle, southern pine beetle) infestation should be evaluated and treated appropriately. Treatment options will be developed in consultation with the FWS. Possible treatments include the use of pheromones or cutting and leaving, cutting and removing, or cutting and burning infected trees. Cavity trees may be cut only with the approval of the FWS. Prior to cutting an infected cavity tree, a suitable replacement cavity tree will be identified and provisioned.

e. Timber cutting, pine straw harvesting, and habitat maintenance activities, with the exception of burning activities, will not be conducted in active sites during the nesting season, occurring from April through July depending upon the installation's location. If a biologist, experienced in RCW management practices, determines that habitat maintenance activities, exclusive of timber cutting and pine straw harvesting, will have no effect on nesting activities, they may be conducted at anytime.

2. Other areas within HMUs. While not requiring the same level of intense management for clusters and recruitment stands, the quality of foraging and replacement stands should be maintained by a prescribed burning program sufficient to control hardwood growth and ground fuel buildup and to eliminate dense midstory. Improving the quality of foraging habitat will reduce the quantity (acreage) required to maintain the installation RCW population.

3. Midstory control. Prescribed burning is normally the most effective means of midstory control and is recommended as the best means of maintaining a healthy ecosystem. Prescribed burning will be conducted at least every three years in longleaf, loblolly, slash pine, and shortleaf pine systems. Burning must be conducted in accordance with applicable Federal, state, and local air quality laws and regulations. With the agreement of the FWS, the burn interval may be increased to no more than five years after the hardwood midstory has been brought under control. Mechanical and chemical

alternatives should only be used when burning is not feasible or is insufficient to control a well- advanced hardwood midstory. Application of herbicide must be consistent with applicable Federal, state, and local laws and regulations. Cavity trees will be protected from fire damage during burning. Burning should normally be conducted in the growing season since the full benefits of fire are not achieved from non-growing season burns. Winter burns may be appropriate to reduce high fuel loads. Use of fire plows in clusters will be used only in emergency situations.

4. Erosion control. Installations will control excessive erosion and sedimentation in all HMUs. Erosion control measures within clusters will be given priority over other areas within HMUs.

5. Impact and direct fire areas.

a. Impact areas.

(1) Impact areas that contain or likely contain unexploded ordnance or other immediate hazardous materials (radiological or toxic chemicals) can pose danger to personnel. Natural resources conservation benefits to be gained by intensive management in high risk areas generally are not justified. Certain installations may have impact areas or other areas that have been contaminated with improved conventional munitions or submunitions where entry by personnel is forbidden.

(2) Designation of impact areas, safety restrictions on human access to impact areas, range operations in impact areas, and the associated effects of these actions on RCW management activities may adversely affect the RCW and other federally listed species within impact areas. These actions may lead to the possibility and necessity of incidental take. FWS will provide incidental take provisions for impact areas where it is not feasible or economical to either relocate or protect the RCW.

(3) To the degree practicable, clusters and surrounding foraging area should be designated as "no fire areas" to protect clusters from projectile damage.

b. Direct fire areas.

(1) Direct fire, non-dud producing impact areas that do not contain unexploded ordnance or other immediate hazardous materials may be included within HMUs, subject to the guidelines set forth below.

(2) In HMUs which are not impacted upon by weapons firing, RCW management will be the same as for HMUs outside of impact areas. In HMUs where there is a significant risk of projectile damage to foraging or nesting habitat, the following guidelines apply:

(a) Range layout will be modified/shielded where practical and economically feasible to protect HMUs from projectile damage. Protective measures that will be considered include reorienting the direction of weapons fire, shifting target arrays, establishing "no fire areas" around RCW clusters or HMUs, revising maneuver lanes, constructing berms, etc.

(b) Installations should develop alternate HMUs near existing HMUs but outside the affected range complex. Augmentation and translocation should be considered as a means of removing RCWs from high risk areas.

F. *Timber Harvesting and Management in HMUs*.

1. Timber harvesting in HMUs will be permitted if consistent with the conservation of the RCW. If permitted, a harvest method will be implemented that maintains or regenerates the historical pine ecosystem. In most ecosystems inhabited by the RCW, historical conditions are characterized by old-

growth longleaf pines in an uneven-age forest, with small (1/4 to 2 acres) even-age patches varying in size. Timber harvesting methods must be carefully designed to achieve and maintain historical conditions through emulation of natural processes.

2. Longleaf sites will not be regenerated to other pine species. Where other species have either replaced longleaf pine (due to fire suppression) or been artificially established on sites historically forested with longleaf, forest management should be directed toward regeneration back to longleaf by natural or artificial methods.

3. At a minimum, sufficient old-growth pine stands will be maintained by: lengthening rotations to 120 years for longleaf pine and 100 years for other species of pine; indefinitely retaining snags, six to ten relict and/or residual trees per acre when doing a seedtree cut, or shelterwood cut; and indefinitely retaining snags, all relicts, and residuals in thinning cuts. No rotation age will be established for cluster sites or replacement stands. The above rotation ages and retention rates do not apply to off-site stands of sand pine, loblolly pine, or slash pine that will be converted back to longleaf.

G. *Pine Straw Harvesting within HMUs*. Sufficient pine straw must be left in HMUs to allow for effective burning and to maintain soils and herbaceous vegetation. Areas within HMUs will not be raked more than once every three to six years. Baling machinery will not be used or parked within clusters.

H. *Restoration and Construction of Cavities.*

1. Restoration. Active and inactive cavities found to be in poor condition during periodic inspections will be repaired whenever feasible to prolong their use. Cavity restrictors can be installed on enlarged RCW cavity entrance holes (greater than two inches in diameter) to optimize the availability of suitable cavities. They also may be installed to protect properly-sized cavities where suitable cavities are limited, the threat of enlargement is great, or where another species is occupying a cavity. Priorities for the installation of restrictors, in descending order, will be: (a) active single tree clusters, (b) single bird groups, (c) clusters with less than four suitable cavities, and (d) others. Restrictors will be installed according to scientific procedures accepted by the FWS. Restrictors will be closely monitored, especially in active clusters. Adjustments to the positioning of the restrictors will be made to ensure competitors are excluded and RCW access is unimpeded.

2. Construction. Artificial cavities will be constructed in areas designated for recruitment or translocation and in active clusters where the number of suitable cavities is limiting. The objective is to provide at least four suitable cavities per active cluster and two cavities plus three advanced starts for each recruitment stand. Priorities for installation of artificial cavities in descending order will be: (a) single cavity tree active clusters, (b) active clusters with insufficient cavities to support a breeding group, (c) inactive clusters designated as and managed for replacement or recruitment stands with an insufficient number of usable cavities within one mile of an active cluster, (d) new replacement/recruitment stands within one mile of an active cluster, (e) inactive clusters designated as and managed for replacement or recruitment stands within three miles of an active cluster, (f) recruitment or potential habitat within three miles of an active cluster, and (g) replacement/recruitment stands beyond three miles of an active cluster. Cavity construction may be by either the drilling or insert techniques. Construction must be according to scientific procedures accepted by the FWS and accomplished by fully trained personnel.

I. *Protection of Clusters.*

1. Markings. Installations will implement the following marking guidance by 1 Jan 1998.

a. Cavity and cavity-start trees in active and primary recruitment clusters. These trees will be marked with two white bands, approximately four to six inches wide and one foot apart. The bands will be centered approximately four to six feet from the base of the tree. Warning signs (e

below) may be posted on or immediately adjacent to the cavity and cavity start trees. A uniquely numbered small metal tag will be affixed to the cavity tree for monitoring and identification purposes.

b. Cavity and cavity-start trees in supplemental recruitment clusters. These trees may be marked with one white band approximately one inch wide. The band will be centered approximately four to six feet from the base of the tree. Warning signs (e below) will not normally be posted. A uniquely numbered small metal tag will be affixed to the cavity tree for monitoring and identification purposes.

c. Buffer zone for cavity and cavity start trees within active clusters and primary recruitment clusters. Warning signs (e below) will be posted at reasonable intervals along the 200 foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, trails, firebreaks, and other likely entry points into the buffer zone.

d. The installation will mark all cavity and cavity start trees in a managed cluster in accordance with paragraph V.I.1.a and b, above. At a minimum, four suitable cavity or cavity start trees will be marked and protected within each cluster (see paragraph V.H.2). Based on the installation biologist's determination, if more than four cavity trees are required to support the cluster, the required number of trees will be protected.

e. Warning sign. Signs will be posted and will be constructed of durable material, ten inches square (oriented as a diamond), white or yellow in color, and of the design in Figure 1. The RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8 inches in height.

f. Training on non-Army lands. Installations conducting long-term training on private, state, or other federal lands with RCW habitat will attempt to obtain agreement from the landowners on compliance with these markings guidelines. If a landowner does not agree to comply with these guidelines, even with the installation paying the costs associated with compliance, installations will educate troops training on such lands to help them recognize the markings used by the landowner.

2. Training within RCW clusters.

a. RCW and RCW habitat will be managed biologically by clusters. Training restrictions will apply to marked buffer zones around cavity trees.

b. The training restrictions in this section apply to buffer zones within marked active clusters and primary recruitment clusters. RCW-related training restrictions do not apply to supplemental recruitment clusters, inactive clusters and foraging areas.

c. Standard training guidelines within active clusters and primary recruitment clusters:

(1) Military training within marked cavity tree buffer zones is limited to military activities of a transient nature (less than 2 hours occupation) . A list of prohibited and permitted training activities within buffer zones is contained at Appendix 1.

(2) Military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road, trail, or firebreak.

3. Training throughout the installation. Installations will give priority to maintaining and improving the habitat of RCW clusters; however, in addition to the HMU management practices at para. V.E, installations will observe the following measures to maintain and improve potentially suitable habitat for the RCW throughout the installation

a. Military personnel are prohibited from cutting down or intentionally destroying pine trees unless the activity is approved previously by the installation biologist and/or forester and is authorized for tree removal. Hardwoods may be cut and used for camouflage or other military purposes.

b. Units will immediately report to range control known damage to any marked cavity or cavity start tree and/or any known extensive soil disturbance in and around RCW clusters .

c. The installation will immediately (within 48 hours) reprovision a cavity tree if one is destroyed.

d. Installations will as soon as practicable (normally within 72 hours) repair damage to training land within a cluster to prevent degradation of habitat.

e. All digging for military training activities in suitable acreage will be filled within a reasonable time after the completion of training

f. Training guidelines will be actively enforced through installation training and natural resources enforcement programs, prescribed in chapters 1 and 11, AR 200-3, and installation range regulations.

J. *Augmentation and Translocation.*

1. Augmentation can be a useful tool to expand and disperse the RCW population into designated HMUs. Augmentation also provides a means to maintain genetic viability in populations with fewer than 250 effective breeding pairs. Installation plans will provide for the augmentation of single-bird groups. Clusters will be made suitable in accordance with the requirements/procedures outlined in paragraph V.H. above before augmentation is attempted.

2. In exceptional situations, installations may translocate RCWs from active clusters to inactive clusters or recruitment/replacement stands where cavities have been artificially constructed. For example, translocation could be used to move RCWs from live fire areas where there is a significant risk of harm to the birds. The current scientific literature indicates serious limitations in successfully translocating adult RCWs, in particular, adult territorial males. Translocation will be accompanied by an intensive monitoring program.

3. In areas to receive RCW, habitat designation and improvement work ensuring that nesting and foraging habitat meet the standards established by these guidelines (V.E.1.b and c, V.E.2, V.D.2.d) must be completed before augmentation or translocation is attempted.

4. Neither augmentation nor translocation will be undertaken without the approval of and close coordination with the FWS. Installations must obtain an ESA section 10 permit (scientific purposes) or an incidental take statement under ESA section 7 and all applicable marking, banding, and handling permits prior to moving any RCW through augmentation or translocation.

APPENDIX 1

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES

YES means that activity may be conducted within 200 feet of a marked cavity tree

NO means the activity may not be conducted within 200 feet of a marked cavity tree

MANEUVER AND BIVOUAC	
HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING ONLY (2 HOURS MAXIMUM)	**YES**
HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR	**NO**
DELIBERATE DEFENSE, LIGHT INFANTRY	**NO**
DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR	**NO**
ESTABLISH COMMAND POST, LIGHT INFANTRY	**NO**
ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR	**NO**
ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR	**NO**
ESTABLISH CS/CSS SITES	**NO**
ESTABLISH SIGNAL SITES	**NO**
FOOT TRANSIT THRU THE COLONY	**YES**
WHEELED VEHICLE TRANSIT THRU THE COLONY (1)	**YES**
ARMORED VEHICLE TRANSIT THRU THE COLONY (1)	**YES**
CUTTING NATURAL CAMOUFLAGE, HARD WOOD ONLY	**YES**
ESTABLISH CAMOUFLAGE NETTING	**NO**
VEHICLE MAINTENANCE FOR NO MORE THAN 2 HOURS	**YES**
WEAPONS FIRING:	
7.62mm AND BELOW BLANK FIRING	**YES**
.50 CAL BLANK FIRING	**YES**
ARTILLERY FIRING POINT/POSITION	**NO**
MLRS FIRING POSITION	**NO**
ALL OTHERS	**NO**
NOISE:	
GENERATORSNO	
ARTILLERY/HAND GRENADE SIMULATORS	**YES**
HOFFMAN TYPE DEVICES	**YES**
PYROTECHNICS/SMOKE:	
CS/RIOT AGENTS	**NO**
SMOKE, HAZE OPERATIONS ONLY, GENERATORS OR POTS (2)	**YES**
SMOKE GRENADES	**YES**

APPENDIX 1 (cont'd)

INCENDIARY DEVICES TO INCLUDE TRIP FLARES	**NO**

STAR CLUSTERS/PARACHUTE FLARES	**YES**
HC SMOKE OF ANY TYPE	**NO**

DIGGING:

TANK DITCHES	**NO**
HASTY INDIVIDUAL FIGHTING POSITIONS, HAND DIGGING ONLY, FILLED AFTER USE	**YES**
DELIBERATE INDIVIDUAL FIGHTING POSITIONS	**NO**
CREW-SERVED WEAPONS FIGHTING POSITIONS	**NO**
VEHICLE FIGHTING POSITIONS	**NO**
OTHER SURVIVABILITY / FORCE PROTECTION POSITIONS	**NO**
VEHICLE SURVIVABILITY POSITIONS	**NO**

NOTES:

1. Vehicles will not get any closer than 50 feet of a marked cavity tree unless on existing roads, trails or firebreaks.

2. Smoke generators and smoke pots will not be set up within 200 feet of a marked cavity tree, but the smoke may drift through the 200 feet circle around a cavity tree.

NOTE: The above training restrictions apply to RCW cavity trees in training areas but not to cavity trees located in dedicated impact areas.

APPENDIX 2

Red-Cockaded Woodpecker (RCW) Data Update - FY ___

INSTALLATION: _____ DATE: _____

RCW Population: _____ POC: _____

DSN #: _____

A. RCW Cluster Survey and Inspection Results.

1. Number of clusters managed _____

2. Number of active clusters _____
   a. Number of active supplemental recruitment clusters _____
   b. Number of active clusters with training restrictions _____

3. Total acres of suitable acreage _____

4. Acres 100% surveyed for "new" RCW clusters in this FY _____

5. Number clusters inspected once per year for training impacts _____
   a. Number of clusters checked with damage to cavity trees _____
   b. Number of clusters checked with soil disturbance requiring remedial measures _____
   c. Number of clusters checked with habitat disturbance requiring remedial measures _____

6. Number recruitment clusters inspected twice per year for training impacts _____
   a. Number of clusters checked with damage to cavity trees _____
   b. Number of clusters checked with soil disturbance requiring remedial measures _____
   c. Number of clusters checked with other habitat disturbance requiring remedial measures _____

B. Monitoring Results

	Total		Active	PRCs	SRCs
1. Number of clusters where monitoring was completed	_____	_____	_____	_____	
1a. Number found active	_____	_____	_____	_____	
1b. Number of breeding groups	_____	_____	_____	_____	
1c. Number of nests found		_____	_____	_____	_____
1d. Number of cavity tress		_____	_____	_____	_____

C. Unit Reports

1. Number of unit reports to range control of tree damage _____
1a. Number of reprovisioning actions taken in response (synopsis enclosed) _____

2. Number of unit reports of extensive soil disturbance _____
2a. Number of remedial actions taken in response (synopsis enclosed) _____

D. Affirmative RCW Habitat Improvement Measures Carried Out This FY

	Total			Active	PRCs		SRCs
1. Number of clusters sites needing burning this year		_____	_____	_____	_____		
1a. Number burned			_____	_____	_____	_____	
2. Number of cluster sites needing midstory treatment	_____	_____	_____	_____			
2a. Number treated			_____	_____	_____	_____	
3. Number of foraging acres needing to be burned		_____	_____	_____	_____		
3a. Number acres burned		_____	_____	_____	_____		
4. Number of foraging acres needing midstory treatment	_____	_____	_____	_____			
4a. Number acres treated	_____	_____	_____	_____			
5. Number of cluster sites needing cavity restrictors	_____	_____	_____	_____			
5a. Number of clusters receiving restrictors		_____	_____	_____	_____		
5b. Number of cavity trees receiving restrictors	_____	_____	_____	_____			
6. Number of cavity trees needing to be marked		_____	_____	_____	_____		
6a. Number marked			_____	_____	_____	_____	
7. Number of buffer zones needing to be marked		_____	_____	__	_____		
7a. Number marked			_____	_____	__	_____	
8. Number of translocations scheduled		_____	_____	_____	_____		
8a. Number of translocations received			_____	_____	_____	_____	

D. Affirmative RCW Habitat Improvement Measures Carried Out This FY (Cont'd)

	Total	Active	PRCs		SRCs

9. Number of clusters needing artificial cavities	_____	_____	_____	_____		
9a. Number receiving inserts		_____	_____	_____	_____	
9b. Number receiving drilled cavities			_____	_____	_____	_____
9c. Number receiving drilled starts		_____	_____	_____	_____	
9d. Total number of cavities treated			_____	_____	_____	_____
9e. Number treated cavities with RCW use		_____	_____	_____	_____	
(1) ocular sign of use		_____	_____	_____	_____	
(2) confirmed roosting		_____	_____	_____	_____	
(3) nesting attempted		_____	_____	_____	_____	
(4) young fledged			_____	_____	_____	_____

APPENDIX 2a

Recruitment Cluster Inspection, Monitoring & Training Data

Type Recruitment Cluster: _____ Cluster Number: _____
(Primary or Supplemental)

A. Results of inspections and monitoring. Yes/No

Spring inspection and monitoring:

1. Visual, from ground, sign of use _____
2. Cavity inspected confirmed roosting _____
3. Nesting attempted _____
4. Fledged young
_____
5. Habitat assessment/general condition:
   5a. Damage to cavity or cavity start tree _____
   5b. Soil disturbance requiring remedial measures _____
   5c. Other habitat disturbance requiring remedial measures _____
6. Number of adults: _____
7. Number of fledglings: _____
8. Sex of birds: _____

Fall inspection:

1. Visual, from ground, sign of use _____
2. Cavity inspected confirmed roosting _____
3. Nesting attempted _____
4. Fledged young
_____
5. Habitat assessment/general condition:
   5a. Damage to cavity or cavity start tree _____
   5b. Soil disturbance requiring remedial measures _____
   5c. Other habitat disturbance requiring remedial measures _____

B. Training Data:

Number of Unit Training Events _____
(Recorded at Range Control/Conducted at Recruitment Cluster location)
For each training event:

1. Date of training
2. Approximate duration of training
3. Type of training
4. Training activities (list activities conducted contained in Appendix 1)
5. Approximate number of soldiers involved
6. Approximate number and type of vehicles involved
7. Misc.

APPENDIX 2b

Active Cluster Inspection, & Monitoring Data

Cluster Number: _____

A. Results of inspection and monitoring. Yes/No

1. Visual, from ground, sign of use _____
2. Cavity inspected confirmed roosting _____
3. Nesting attempted _____
4. Fledged young
   _____
5. Habitat assessment/general condition:
   - 5a. Damage to cavity or cavity start tree _____
   - 5b. Soil disturbance requiring remedial measures _____
   - 5c. Other habitat disturbance requiring remedial measures _____
6. Number of adults: _____
7. Number of fledglings: _____
8. Sex of birds: _____

B. Training Data (if the installation has recruitment clusters):

Number of Unit Training Events _____
(Recorded at Range Control/Conducted at Recruitment Cluster location)
For each training event:

1. Date of training
2. Approximate duration of training
3. Type of training
4. Training activities (list activities conducted contained in Appendix 1)
5. Approximate number of soldiers involved
6. Approximate number and type of vehicles involved
7. Misc.

Appendix C. Eastern indigo snake observations at Fort Stewart.

ca. 1960. Large (7 feet) adult, sandhills near Canoochee River (precise locality not known). R.H. Mount (Auburn Univ.), pers. comm. to D. Stevenson, 1996.

1960s. Adult(s), AIA near Fort Stewart Road 78, Bryan County. B. Lufburrow (Forestry Branch), pers. comm. to T. Beaty.

21 Feb. 1977. Adult male (6.5 feet), found dead in gopher tortoise burrow in sandhills, Training Area F11, west of Fort Stewart Road 17, Evans County. C. Willis and G. Williamson. (Savannah Sci. Mus. Specimen #5444).

15 Oct. 1977. Specimen observed in sandhills habitat, Training Area F12, east of Fort Stewart Road 17, Evans County. G. Williamson and R. Moulis (Savannah Sci. Mus.).

17 Mar. 1978. Specimen observed in sandhills habitat, F11, west of Fort Stewart Road 17, Evans County. G. Williamson and R. Moulis (Savannah Sci. Mus.).

23 Mar. 1978. Adult observed in Training Area B4 on Fort Stewart Road 46, west of Fort Stewart Road 46A, surrounding habitat mesic pine flatwoods, cypress ponds, and blackwater creek swamp, Liberty County. S. Williams (Fish and Wildlife Branch).

18 Mar. 1979. Egg shell fragments on gopher tortoise burrow mound, sandhills south of Fort Stewart Road 45 and east of Alligator Bay, AIA, 4.6 miles north-northwest of Trinity, Bryan County. R. Moulis, G. Williamson, and R. Redmond (Savannah Sci. Mus. Specimen #7776).

18 Mar. 1979. Specimen observed in sandhills east of Fort Stewart Road 45 and west of Jones Bay, AIA, 4.6 mi. north-northwest of Trinity, Bryan County.
G. Williamson and R. Moulis (Savannah Sci. Mus.).

25 Mar. 1979. Specimen observed in sandhills south of Fort Stewart Road 45 and east of Alligator Bay, AIA, Bryan County. G. Williamson and R. Moulis (Savannah Sci. Mus.).

25 Mar. 1979. Adult male (6.6 feet) at entrance to inactive gopher tortoise burrow in scrub oak-sandhills south of Fort Stewart Road 45 and east of Alligator Bay, AIA, 4.6 mi. north-northwest of Trinity, Bryan County. (Savannah Sci. Mus. Specimen # 9319, photo).

8 Apr. 1979. Specimen observed in sandhills east of Fort Stewart Road 45 and east of Alligator Bay, AIA, 4.6 mi. north-northwest of Trinity, Bryan County. G. Williamson and R. Moulis (Savannah Sci. Mus.).

12 Nov.1989. Adult observed eating corn snake in upland habitat near Observation Point 4, Training Area B3, Liberty County. R. Moulis (Savannah Sci. Mus.).

1 Aug. 1991. Large adult seen crossing Fort Stewart Road 13 just north of junction with Fort Stewart Road 16, Training Areas F10 and F11, Evans County. G. Davis (Forestry Branch), pers. comm. to Fish and Wildlife Branch.

Dec. 1991. Shed skin of adult found on sandhill, AIA, near Fort Stewart Road 45, Bryan County. K. Lutz (TNC), pers. comm. to Fish and Wildlife Branch.

22 Apr. 1992. Subadult observed at entrance to abandoned gopher tortoise burrow on sandhills, Training Area F11, west of Fort Stewart Road 17, Evans County. D. Stevenson and R.A. Peck (TNC).

22 Apr. 1992. Adult male at entrance to abandoned gopher tortoise burrow on sandhills, Training Area F12, east of Fort Stewart Rd 17 and near installation boundary, Evans County. D. Stevenson and R. Peck (TNC), photographed.

12 Aug. 1992. Intact shed skin of adult in saw palmetto clump on sandhill, Training Area E21, west of Fort Stewart Road 5 and south of Fort Stewart Road 4, Long County. D. Stevenson, R.A. Peck, and K. Lutz (TNC).

Oct. 1992. Partial shed skin of small adult found at "Pacman" sandhill site, Training Area F11, east of Fort Stewart Road 13, Evans County. D. Stevenson and D. Thompson (TNC).

17 Dec. 1992. Large (7 feet) adult male observed at entrance to inactive gopher tortoise burrow on sandhill, Training Area E21, west of Fort Stewart Road 5 and south Fort Stewart Rd 4, Long County. D. Stevenson (TNC, Savannah Sci. Mus. Specimen #13058, photo).

21 Mar. 1993. Subadult male at entrance to inactive gopher tortoise burrow, Training Area F12, east of Fort Stewart Road 17, Evans County, D. Stevenson and B. Cash (TNC).

21 Mar. 1993. Adult male (>6 feet) observed coiled in brush pile near stump hole, gopher tortoise burrows nearby, Training Area F11, west of Fort Stewart Road 17, Evans County. D. Stevenson and B. Cash (TNC).

16 Nov. 1993. Adult male (approx. 6.5 feet) basking outside stump hole, gopher tortoise burrows nearby, Training Area F11, west of Fort Stewart Road 17, Evans County. Probably same specimen as 21 Mar. 1993. B. Cash (Ga. South. Univ., Savannah Sci. Mus. Specimen #13071, photo).

16 Nov. 1993. Subadult male (approx. 4 feet) seen basking outside stump hole (with above snake), gopher tortoise burrows nearby, Training Area F11, west of Fort Stewart Rd 17, Evans County. B. Cash (GSU).

12 May. 1994. Intact shed skin of a large adult at a gopher tortoise burrow, Training Area E21, west of Fort Stewart Road 5 and south of Fort Stewart Road 4, Long County. D. Stevenson (TNC), H. Lefcourt, and K. Thomas (GSU).

Aug. 1994. Adult (5 feet) observed on surface in sandhill-oak hammock habitat north of the Canoochee River, Training Area F13,south of Fort Stewart Trail 18A, Bryan County. M. Elfner (LCTA) and E. Spadgenske (Fish and Wildlife Branch), photographed.

20 Feb. 1996. Large (6-7 feet) adult seen basking under leaf litter at hole near inactive gopher tortoise burrow in sandhill-oak hammock, Training Area F12, west of Fort Stewart Trail 17, Evans County. S. Osborn (Fish and Wildlife Branch).

27 Feb. 1996. Large (7 feet 4 inches) adult male observed at inactive gopher tortoise burrow in sandhill, Training Area E21, west of Fort Stewart Road 5 and south of Fort Stewart Road 4, Long County. S. Williams and A. Lassahn (Fish and Wildlife Branch), photographed.

Mar. 1996. Adult (4 feet) found dead just inside gopher tortoise burrow in sandhill-oak hammock, Training Area F12, west of Fort Stewart Trail 17, Evans County. S. Osborn and S. Williams (Fish and Wildlife Branch).

Mar. 1996. Adult at entrance to gopher tortoise burrow in sandhill-oak hammock, Training Area F12, west of Fort Stewart Trail 17, Evans County. S. Osborn and S. Williams (Fish and Wildlife Branch). Not the same snake as 20 Feb. 1996.

11 Sep. 1996. Adult (6 feet) observed on Fort Stewart Road 88, surrounding habitat large cypress strand-mesic pine flatwoods, Training Area C11, Bryan County. S. Williams and W. Williamson (Fish and Wildlife Branch).

Aug. 1996. Shed skin of adult found in sandhill-oak hammock, Training Area F12, west of Fort Stewart Trail 17, Evans County. S. Osborn (Fish and Wildlife Branch).

Dec. 1996. Intact shed skin of adult found on sandhill, Training Area F12, east of Fort Stewart Road 17, Evans County. B. McCarty (Forestry Brach).

Spring, 1997. Adult crossing Fort Stewart Road 104 (between Observation Points 2 and 3), surrounding habitat sandhill. Training Area B3, Liberty County. (Fort Stewart Game Warden Office).

12 Sep. 1997. Adult observed on surface in pine flatwoods, Training Area F12, west of Fort Stewart Trail 17 and near reservation boundary, Evans County. B. McCarty (Forestry Branch).

10 Dec. 1997. Adult male (7+ ft.) near tortoise burrow in sandhill, Training Area F11, west of Fort Stewart Road 17, Evans County. D. Stevenson (Fish and Wildlife Branch) and K. Hastie (LCTA), photographed.

20 Dec. 1997. Adult male (6+ ft.) near tortoise burrow in sandhill, shed of indigo snake found nearby. Training Area B12, west of Fort Stewart Road 45, Bryan County. D. Stevenson (Fish and Wildlife Branch) and B. Willis (GSU), photographed.

2 Jan. 1998. Shed skin of adult male near tortoise burrow in sandhills, Training Area B12, southwest junction of Fort Stewart Roads 45 and 79, Bryan County. D. Stevenson and R. Owens (Fish and Wildlife Branch).

5 Jan. 1998. Adult male (6 ft. 1 inches) near tortoise burrow in sandhill (same site as 2 January 1998 above and probably same individual), Training Area B12, southwest junction of Fort Stewart Roads 45 and 79, Bryan County. D. Stevenson and E. Spadgenske (Fish and Wildlife Branch), J. Jensen (Georgia DNR), and S. Johnson (Univ. of Florida), photographed.

May 6 2000. Adult (est. 5+ ft TL) found AOR at 1015 hrs in Charlie 4 at installation boundary (found on F.S. Rd. 69, 20 m E. jct. of Rds. 43/69). L. Carlile, J. O'Neal

17 July 2000. Adult female, probably post-partum, (6 ft TL, photographed) found along sand road, near Ohoopee River. Tattnall Co. D. Stevenson.

21 August 2000. Shed skin of adult (no keels) found in turkey oak sandhill near a tortoise burrow in F12.3 (shed fairly recent) K. Dyer

23 Oct 2000. Shed skin of large adult male indigo snake found in dry longleaf pine habitat. Bravo 13, west of Rd 70 (found in RCW cluster 230), Bryan Co. L. Carlile.

27 Dec 2000. Shed skin of large adult male indigo snake found in dry longleaf pine habitat. Bravo 13, west of Rd 70 (found in RCW cluster 230), Bryan Co. D Stevenson & L. Carlile.

25 May 2001. Shed skin (fairly fresh) of large adult male indigo snake found at adult inactive tortoise burrow in xeric sandhill. Echo 21, west and near F.S. Rd. 5, Long Co. D. Rostal, M. Hohmann, A. Safer.

ESMP Appendix D - MANAGEMENT PRESCRIPTIONS

Training Area - A11

Acreage Summary

NRMU	A11.1	A11.2	A11.3	Total
Total Acreage	436	333	449	1218
Clearings	0	0	0	0
Wetland	64	95	181	340
Forested Upland	372	238	268	878

Land Use

Existing And Proposed Facilities - none.

Primary Types Of Training Conducted - dismounted maneuver.

Principle Natural Resource Uses - manage the ecosystems for endangered species support , as well as for wetlands mitigation banking and research area.

TES Occurrence Summary

	Federally listed species					State listed / Federal species of concern					
NRMU	RCW	Bald Eagle	Indigo Snake	Wood Stork	Shortnose Sturgeon	Mammals	Birds	Herptiles	Fish	Arthropods / Invertebrates	Plants
A11.1							X				
A11.2							X				
A11.3							X				

RCW Population Goal

NRMU	Carrying Capacity	Existing Clusters	PRCs Needed
A11.1	1	0	1
A11.2	1	0	1
A11.3	1	0	1

The RCW population goal will be achieved by installing artificial cavities at 3 PRC sites, 1 in each A-11 NRMU (Figure 1, Action 1, and Action 4).

Special Habitats

A portion of A-11.1 was considered an important conservation area by The Nature Conservancy (TNC 1995) because it forms part of the headwaters of the Raccoon Branch system.

Fishes - The restoration of historical hydrologic flow to A-11 by means of a reworked culvert should create Mud sunfish (*Acantharchus pomotis*) and Eastern mudminnow (*Umbra pygmaea*) habitat where none currently exists.

Herptiles - No flatwoods salamanders (*Ambystoma cingulatum*) or gopher frogs *(Rana capito*) have been detected in A-11, but suitable habitat exists in the form of a few isolated, ephemeral ponds. Suitable breeding sites and adjacent pine forest will be enhanced by frequent use of prescribed growing season fire and thinning of dense pine canopy. Wetlands will be protected during logging operations to prevent soil disturbance. Potential breeding habitat for sensitive herptiles will be delineated by Fish and Wildlife Branch with a painted boundary prior to or during timber marking by Forestry Branch. Enhancement of

upland herptile habitats will be achieved by frequent prescribed fire and by reducing tree basal area through timber thinnings.

Birds - Bachman's sparrow (*Aimophila aestivalis*) occurs in A-11 and RCW management guidelines (e.g., timber thinnings and prescribed burning) will improve existing suitable habitat and create suitable habitat where none currently exists.

Land Management

Wildlife Clearings - none.

Fire Management

Prescribed Burn Schedule

FY	1998	1999	2000	2001	2002
A-11.1		W*	GS		
A-11.2		GS			GS
A-11.3		W*	GS		

*Portions of A-11.1 and A-11.3 have marked timber in them and should be excluded from fire until the timber is harvested. These NRMUs should be scheduled for a winter burn the first winter after logging operations are completed, then scheduled for growing season burns thereafter (Action 5, 6, 7, and 8).

Prescribed Burn Plans - A prescribed burn plan for each NRMU in A-11 is attached.

Fire Suppression SOP - Due to the designation of A-11 as a wetland bank, special care will be taken to avoid plowing new firebreaks. There are 7 firebreaks (Figures 2, 3, and 4) in A-11 that will be maintained permanently. No plowed firebreaks will be maintained in wetlands. Fire suppression by means of plowing will be performed only on these breaks, except in emergencies involving human safety. Most wildfire events in A-11 should be viewed as "let burn" situations. Preferred suppression tactics will include the use of foam or pumper truck units.

Forest Management

Timber Thinning Schedule

NRMU	A11.1	A11.2	A11.3
DATE(FY)	1998	1999	1998
# PRCs	1	1	1

Proposed Timber Sales - Portions of A-11.1 and A-11.3 are currently marked for a timber sale and the remainder of A-11.1 will be marked for thinning in FY 98 (Action 3). The purpose of timber sales in A-11 will be to restore or maintain ecosystem function, with particular emphasis on improvement of habitat for the RCW and other threatened and endangered species. Because A-11 is a Fort Stewart wetland mitigation bank, care must be taken to prevent rutting and skidder damage during logging operations. As conversion to a growing season burn regime is accomplished, it is expected that some pine timber in wetlands will die due to fire stress. These trees will not be salvaged, but will be left in place to provide wildlife habitat. The reduction of pine basal area in wetlands due to fire will enhance the quality and function of the wetlands by decreasing the amount of water lost to evapotranspiration and by increasing the duration of flood events.

Age Class Balance - DBH distribution (Figure 5) is skewed in the 12 inch diameter class. Thinnings should be designed to reduce overstocking in the 12 inch diameter classes.

Proposed Reforestation Actions - none within the next 5 years.

Proposed Habitat Rehabilitation - none within the next 5 years.

Proposed Hardwood Control Action - Minor hardwood control will be necessary in PRC sites when they are provisioned, but no large-scale control of hardwoods is anticipated, except by use of prescribed fire.

Cultural Resource Management (CRM)

	CRM SURVEY SCHEDULE							
NRMU	DONE	FY98	FY99	FY2000	FY2001	FY2002	FY2003	FY2004
A11.1		*						
A11.2		*						
A11.3		X						

* An archeological survey of A-11.3 is scheduled for October 1997. The remaining A-11 NRMUs need to be scheduled for CRM survey in FY 1998 to facilitate logging of marked timber in A-11.1 (Action 2 and Action 3).

Cultural/Archaeological Sites - no significant CRM sites are currently known in A-11.

Special Concerns

Wetland Mitigation And Set-aside Areas - A-11 has been designated as a wetland mitigation bank .

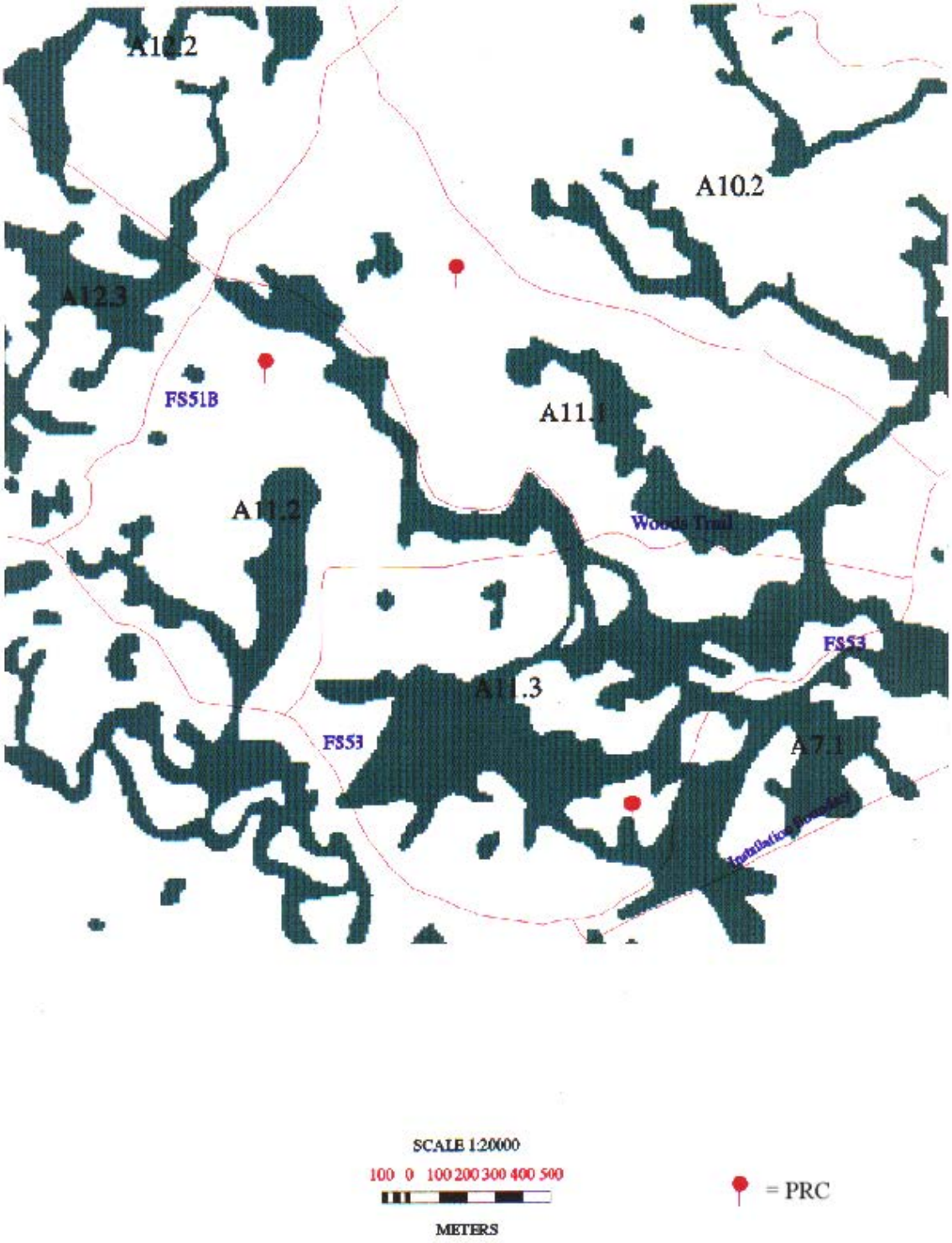
Research Areas - Monitoring of the wetland bank is being conducted under a contract administered by the Corps of Engineers (COE), Savannah District. The COE will be apprised of land management plans to avoid conflicts with the purposes of the wetland bank, and to allow the contractor time to protect monitoring equipment (e.g., hydrometers) that might be damaged by management actions.

A-11 is an ideal location for conducting research with minimal conflicts with the military mission. Monitoring/survey of suitable herptile habitats will be conducted when conditions in isolated wetlands are likely to attract herptiles .

Summary Of Actions

Action #	Date (FY)	Action
1	1998	Provision 1 PRC each in A-11.1 and A-11.3
2	1998	Schedule archaeological survey of all A-11 NRMUs for FY 98.
3	1998	Thin RCW habitat in A-11.1 and A-11.3.
4	1999	Provision 1 PRC in A-11.2.
5	1999	Conduct dormant season burns in A-11.1 and A-11.3.
6	1999	Conduct growing season burn in A-11.2.
7	2000	Conduct growing season burns in A-11.1 and A-11.3.
8	2002	Conduct growing season burn in A-11.2.

Figure 1. NRMU A-11 management boundaries and approximate locations of PRCs.



FIRE MANAGEMENT PLAN

NRMU - A-11.1

Acres - 436

Overstory type - mixed stands of longleaf, slash, and loblolly pine with interspersed hardwood bottoms and cypress/gum ponds

Average crown height - 70-80 feet

Height to bottom of crown - 50-60 feet

Midstory type - assorted oaks, gums, and pines

Understory type - grasses, gallberry, palmetto, and blueberries on the uplands, leaf litter in the drains

Fuel loading - light to heavy

Topography and soil - generally flat topography with Pooler fine sandy loam, Cape Fear fine sandy loam, Ellabelle loamy sand, Ocilla loamy fine sand, Riceboro loamy fine sand, Mascotte fine sand, Bayboro loam, and Wahee sandy loam.

Purpose of burn - Improve and maintain RCW, Bachman's sparrow, and herptile habitat, reduce competition from hardwoods, induce flowering by wiregrass, and promote longleaf pine regeneration.

Intensity desired - medium.

Personnel needs - helicopter crew, ground crew

Equipment needs - helicopter, rakes, foam or pumper unit

Passed smoke screening system - yes

Smoke sensitive areas - Fort Stewart cantonment area lies to the southwest, Evans Field lies to the northwest, and a few rural residences lie to the southeast.

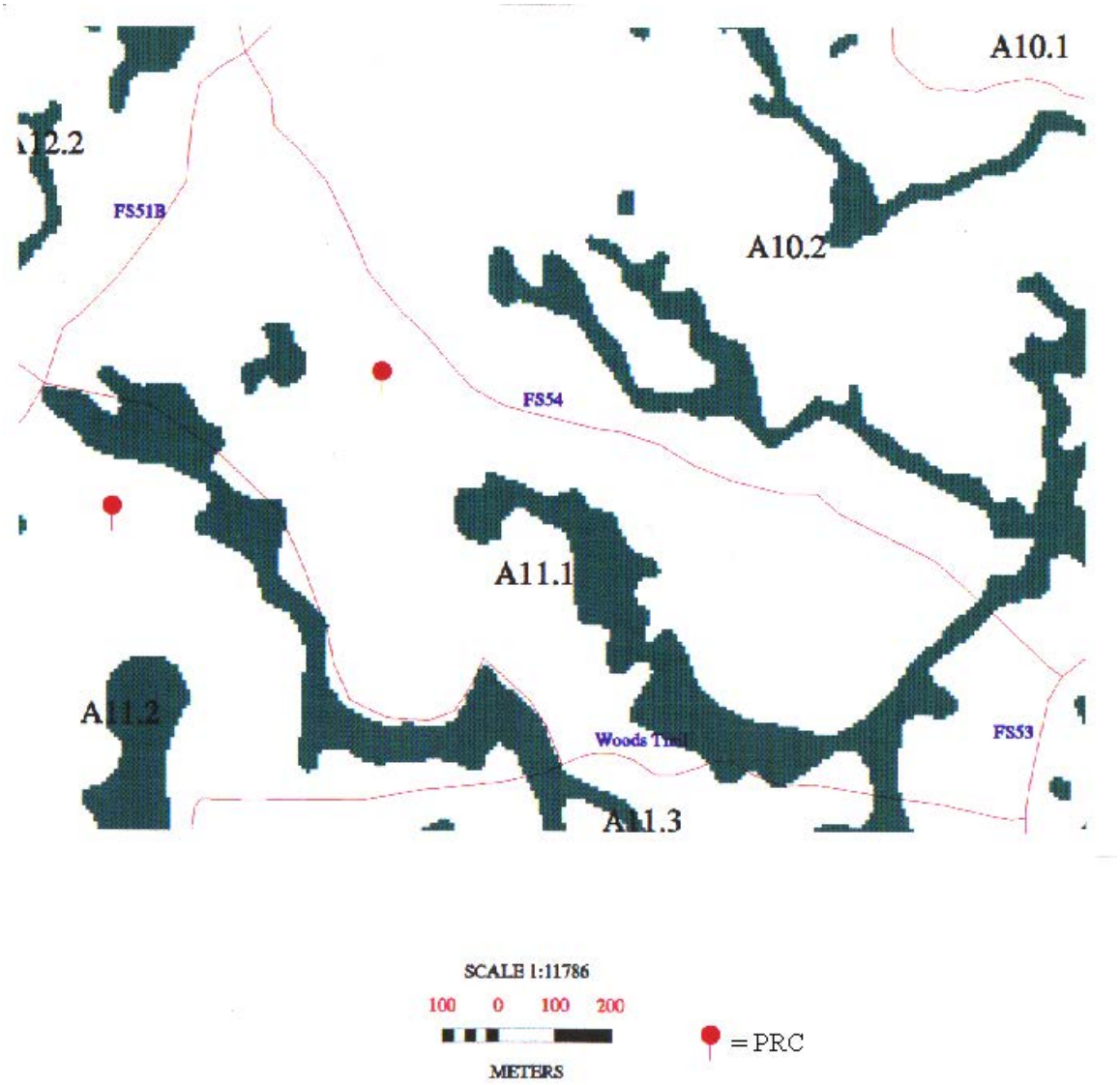
Special precautions/exclusions - PRC site (Figure 2). The southwestern boundary of A-11.1 is formed by an intermittent stream. Adequate water needs to be in stream to prevent jumps into A-11.2 and A-11.3.

Others to notify - Forestry Branch, Fort Stewart fire towers, Fish and Wildlife Branch, Range Control, Evans Field

Firebreak information - There are 3 permanent firebreaks in A-11.1 (Figure 2). These firebreaks may be used in the event of wildfires.

Weather Factors	Preferred	Actual
Surface winds	SW, 1-5 mph	
Transport winds	SW, 9-20 mph	
Minimum mixing height	1700 ft	
Dispersion index	≥ 13	
Maximum temperature	95°F	
Minimum relative humidity	30%	
Minimum fine fuel moisture	10%	
Starting time	1000-1400	
Burn technique	Aerial grid ignition	
Days since rain	3-5	
Prepared by: Lawrence D. Carlile	Title: Endangered Species Biologist	
Burn Certificate Number - 238	Date prepared: 16 September 1997	

Figure 2. A-11.1 NRMU boundary and location of PRC.



FIRE MANAGEMENT PLAN

NRMU - A11.2

Acres - 333

Overstory type - mixed stands of longleaf, slash, and loblolly pine with interspersed hardwood bottoms and cypress/gum ponds

Average crown height - 70-80 feet

Height to bottom of crown - 50-60 feet

Midstory type - assorted oaks, gums, and pines

Understory type - grasses, gallberry, palmetto, and blueberries on the uplands, leaf litter in the drains

Fuel loading - light to heavy

Topography and soil - generally flat topography with Pooler fine sandy loam, Cape Fear fine sandy loam, Ellabelle loamy sand, Ocilla loamy fine sand, Riceboro loamy fine sand, Mascotte fine sand, and Bayboro loam.

Purpose of burn - Improve and maintain RCW, Bachman's sparrow, and herptile habitat, reduce competition from hardwoods, induce flowering by wiregrass, and promote longleaf pine regeneration.

Intensity desired - medium.

Personnel needs - helicopter crew, ground crew

Equipment needs - helicopter, rakes, foam or pumper unit

Passed smoke screening system - yes

Smoke sensitive areas - Fort Stewart cantonment area lies to the southwest, Evans Field lies to the northwest, and a few rural residences lie to the southeast.

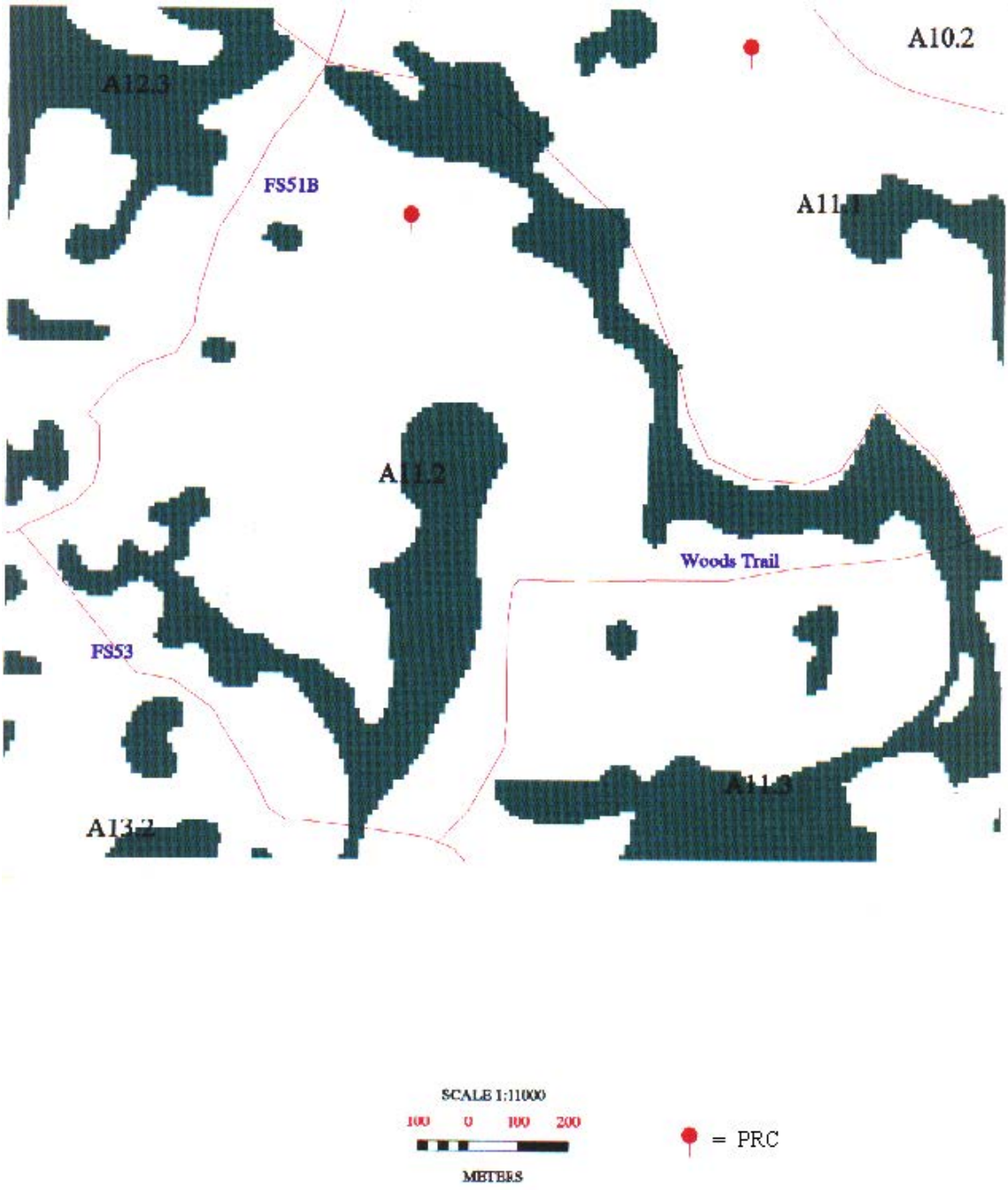
Special precautions/exclusions - PRC site (Figure 3). The northeastern boundary of A-11.2 is formed by an intermittent stream. Adequate water needs to be in stream to prevent a jump into A-11.1.

Others to notify - Forestry Branch, Fort Stewart fire towers, Fish and Wildlife Branch, Range Control, Evans Field

Firebreak information - There are 2 permanent firebreaks in A-11.2 (Figure 3). These firebreaks may be used in the event of wildfires.

Weather Factors	Preferred	Actual
Surface winds	SW, 5-10 mph	
Transport winds	SW, 10-20 mph	
Minimum mixing height	1700 ft	
Dispersion index	≥ 13	
Maximum temperature	95°F	
Minimum relative humidity	30%	
Minimum fine fuel moisture	10%	
Starting time	1000-1400	
Burn technique	Aerial grid ignition	
Days since rain	3-5	
Prepared by: Lawrence D. Carlile	Title: Endangered Species Biologist	
Burn Certificate Number - 238	Date: 16 September 1997	

Figure 3. A-11.2 NRMU boundaries and location of PRC.



FIRE MANAGEMENT PLAN

NRMU - A-11.3

Acres - 449

Overstory type - mixed stands of longleaf, slash, and loblolly pine with interspersed hardwood bottoms and cypress/gum ponds

Average crown height - 70-80 feet

Height to bottom of crown - 50-60 feet

Midstory type - assorted oaks, gums, and pines

Understory type - grasses, gallberry, palmetto, and blueberries on the uplands, leaf litter in the drains

Fuel loading - light to heavy

Topography and soil - generally flat topography with Bladen fine sandy loam, Pooler fine sandy loam, Ellabelle loamy sand, Ocilla loamy fine sand, Riceboro loamy fine sand, Mascotte fine sand, and Bayboro loam, and Wahee sandy loam.

Purpose of burn - Improve and maintain RCW, Bachman's sparrow, and herptile habitat, reduce competition from hardwoods, induce flowering by wiregrass, and promote longleaf pine regeneration. .

Intensity desired - medium.

Personnel needs - helicopter crew, ground crew

Equipment needs - helicopter, rakes, foam or pumper unit

Passed smoke screening system - yes

Smoke sensitive areas - Fort Stewart cantonment area lies to the southwest, Evans Field lies to the northwest, and a few rural residences lie to the southeast.

Special precautions/exclusions - PRC site (Figure 4). The northeastern boundary of A-11.3 is formed by an intermittent stream. Adequate water needs to be in stream to prevent a jump into A-11.1.

Others to notify - Forestry Branch, Fort Stewart fire towers, Fish and Wildlife Branch, Range Control, Evans Field

Firebreak information - There are 2 permanent firebreaks in A-11.3 (Figure 4). These firebreaks may be used in the event of wildfires.

Weather Factors	Preferred	Actual
Surface winds	SW, 5-10 mph	
Transport winds	SW, 10-20 mph	
Minimum mixing height	1700 ft	
Dispersion index	≥ 13	
Maximum temperature	95°F	
Minimum relative humidity	30%	
Minimum fine fuel moisture	10%	
Starting time	1000-1400	
Burn technique	Aerial grid ignition	
Days since rain	3-5	
Prepared by: Lawrence D. Carlile	Title: Endangered Species Biologist	
Burn permit number: 238	Date: 16 September 1997	

Figure 4. A-11.3 NRMU boundaries and location of PRC.

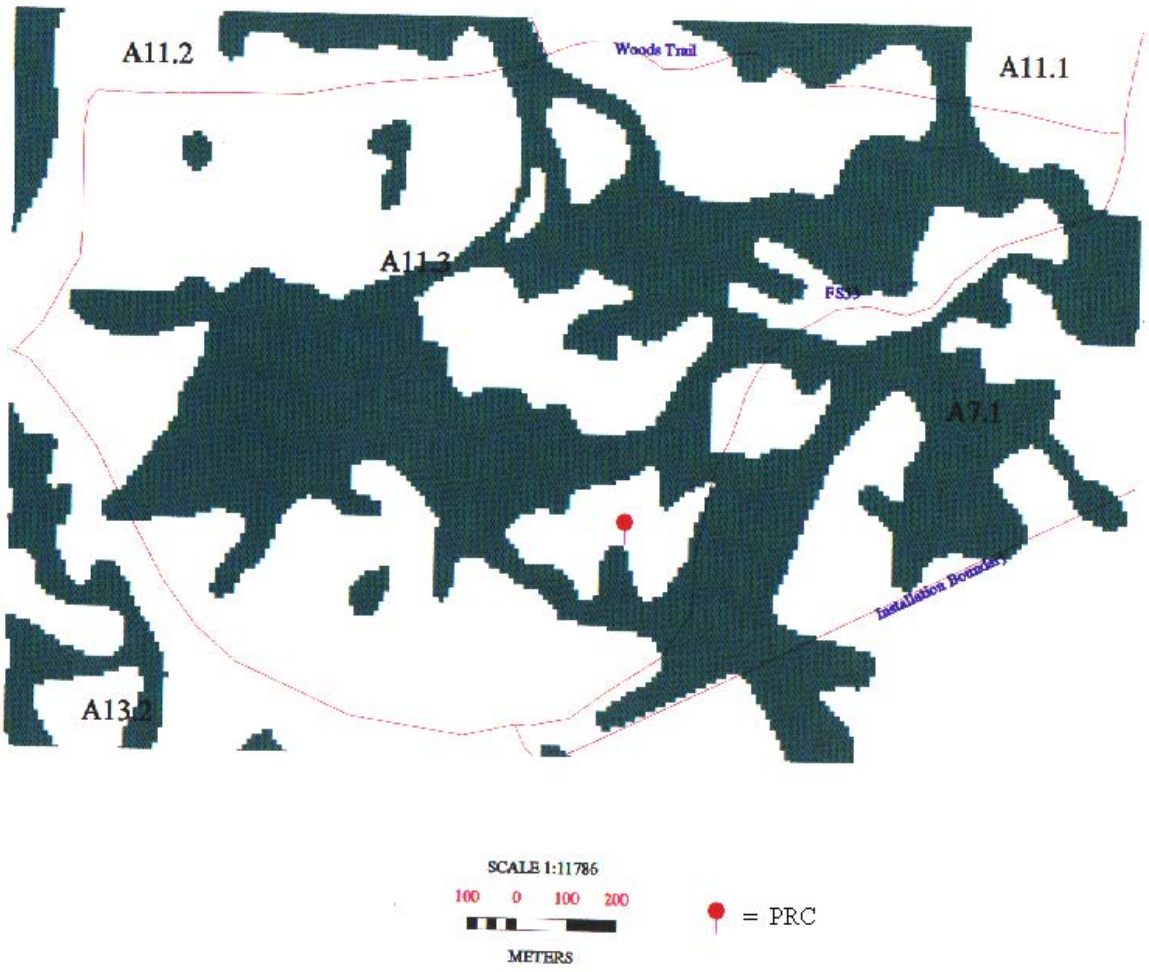
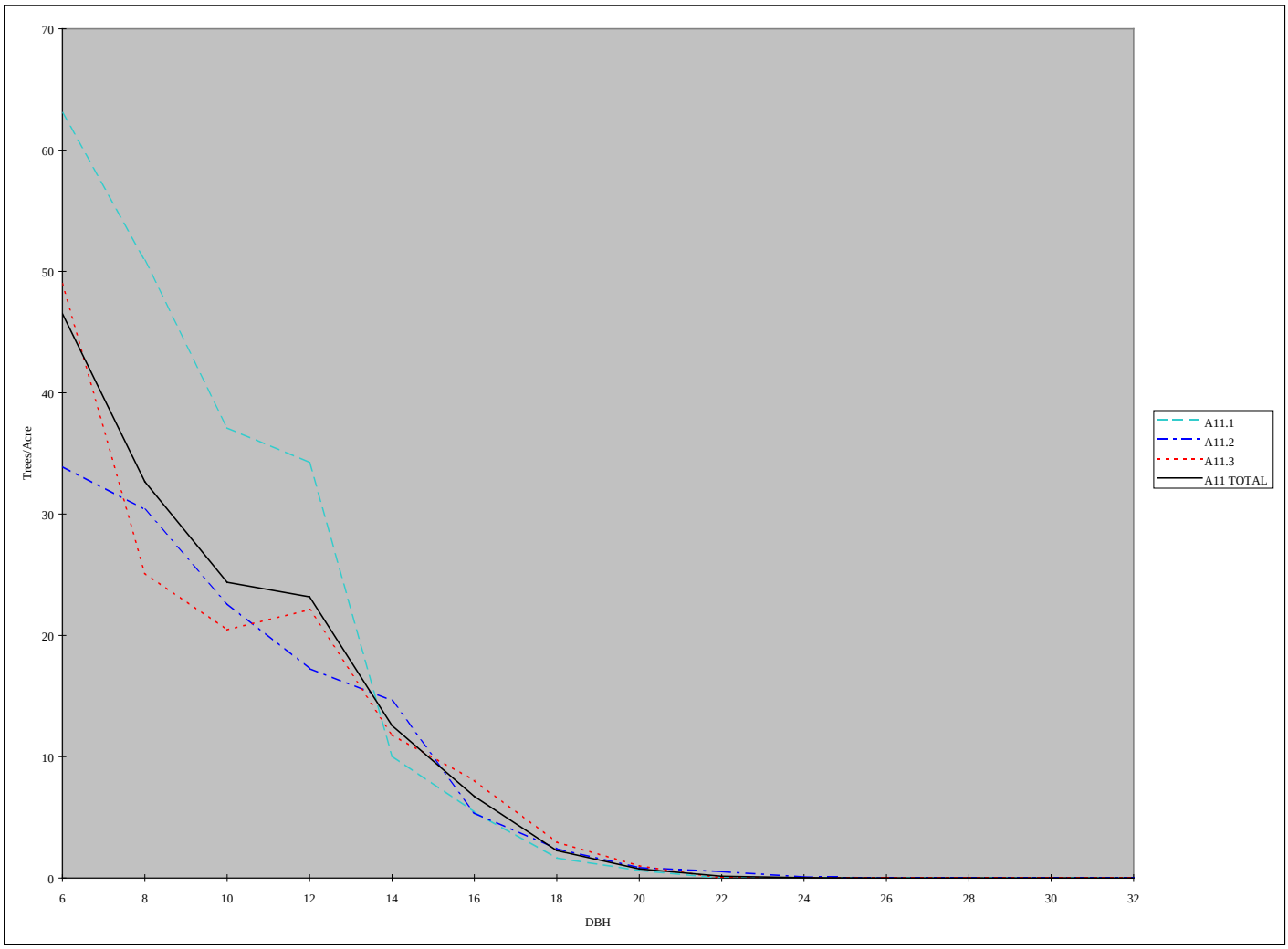


Figure 5. Pine DBH Distribution in A11 NRMUs.

DBH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	Avg. DBH
A11.1	63	51	37	34	10	5	2	1	0	0	0	0	0	0	9.0
A11.2	34	30	23	17	15	5	2	1	1	0	0	0	0	0	9.7
A11.3	49	25	20	22	12	8	3	1	0	0	0	0	0	0	9.5
A11 TOTAL	47	33	24	23	13	7	2	1	0	0	0	0	0	0	9.4



Appendix E. Common and scientific names and locations of species recorded by TNC survey, 1992-1995.

AREA	COMMON NAME	SCIENTIFIC NAME
A1	Black-fruited spike-rush	*Eleocharis melanocarpa*
A1	Mud sunfish	*Acantharchus pomotis*
A3	Bachman's sparrow	*Aimophila aestivalis*
A3	Dwarf siren	*Pseudobranchus striatus*
A4	Carolina gopher frog	*Rana capito capito*
A4	Flatwoods salamander	*Ambystoma cingulatum*
A4	Gopher tortoise	*Gopherus polyphemus*
A4	Red-cockaded woodpecker	*Picoides borealis*
A5	Red-cockaded woodpecker	*Picoides borealis*
A6	Bachman's sparrow	*Aimophila aestivalis*
A6	Dwarf siren	*Pseudobranchus striatus*
A6	Flatwoods salamander	*Ambystoma cingulatum*
A6	Green-fly orchid	*Epidendrum conopseum*
A6	Rainbow snake	*Farancia erytrogramma*
A6	Red-cockaded woodpecker	*Picoides borealis*
A6	Gopher tortoise	*Gopherus polyphemus*
A7	Bachman's sparrow	*Aimophila aestivalis*
A7	Georgia ironweed	*Vernonia pulchella*
A7	Red-cockaded woodpecker	*Picoides borealis*
A8	Bachman's sparrow	*Aimophila aestivalis*
A8	Brown snake	*Storeria dekayi*
A8	Carolina gopher frog	*Rana capito capito*
A8	Red-cockaded woodpecker	*Picoides borealis*
A9	Bachman's sparrow	*Aimophila aestivalis*
A9	Gopher tortoise	*Gopherus polyphemus*
A9	Rainbow snake	*Farancia erytrogramma*
A9	Red-cockaded woodpecker	*Picoides borealis*
A9	Slender glass lizard	*Ophisaurus attenuatus*
A10	Bachman's sparrow	*Aimophila aestivalis*
A10	Pineland yellow-eyed-grass	*Xyris stricta*
A10	Red-cockaded woodpecker	*Picoides borealis*
A11	Bachman's sparrow	*Aimophila aestivalis*
A12	Bachman's sparrow	*Aimophila aestivalis*
A12	Eastern mudminnow	*Umbra pygmaea*
A12	Mud sunfish	*Acantharchus pomotis*
A12	Red-cockaded woodpecker	*Picoides borealis*
A13	Bachman's sparrow	*Aimophila aestivalis*
A13	Gopher tortoise	*Gopherus polyphemus*
A13	Red-cockaded woodpecker	*Picoides borealis*
A14	Bachman's sparrow	*Aimophila aestivalis*
A14	Eastern coral snake	*Micrurus fulvius*

A14	Gopher tortoise	*Gopherus polyphemus*
A15	Eastern coral snake	*Micrurus fulvius*
A15	Slender glass lizard	*Ophisaurus attenuatus*
A16	Bachman's sparrow	*Aimophila aestivalis*
A16	Gopher tortoise	*Gopherus polyphemus*
A16	Incised groovebur	*Agrimonia incisa*
A18	Bachman's sparrow	*Aimophila aestivalis*
A18	Florida pine snake	*Pituophis melanoleucus mugitus*
A18	Gopher tortoise	*Gopherus polyphemus*
A18	Red-cockaded woodpecker	*Picoides borealis*
A20	Black swamp snake	*Seminatrix pygaea*
A20	Mud sunfish	*Acantharchus pomotis*
A20	Slender glass lizard	*Ophisaurus attenuatus*
AIA	Dwarf siren	*Pseudobranchus striatus*
AIA	Eastern indigo snake	*Drymarchon corais couperi*
AIA	Mole skink	*Eumeces egregius*
B1	Bannerfin shiner	*Notropis leedsi*
B1	Gopher tortoise	*Gopherus polyphemus*
B3	Bannerfin shiner	*Notropis leedsi*
B3	Eastern indigo snake	*Drymarchon corais couperi*
B3	Gopher tortoise	*Gopherus polyphemus*
B3	Hairy fever-tree	*Pinckneya pubens*
B3	Needle palm	*Rhapidophyllum hystrix*
B3	Silky camellia	*Stewartia malacodendron*
B3	Wood stork	*Mycteria americana*
B4	Bachman's sparrow	*Aimophila aestivalis*
B4	Carolina gopher frog	*Rana capito capito*
B4	Eastern indigo snake	*Drymarchon corais couperi*
B4	Flatwoods salamander	*Ambystoma cingulatum*
B4	Red-cockaded woodpecker	*Picoides borealis*
B5	Gopher tortoise	*Gopherus polyphemus*
B5	Red-cockaded woodpecker	*Picoides borealis*
B6	Brown snake	*Storeria dekayi*
B6	Flatwoods salamander	*Ambystoma cingulatum*
B6	Rainbow snake	*Farancia erytrogramma*
B7	Bachman's sparrow	*Aimophila aestivalis*
B7	Bannerfin shiner	*Notropis leedsi*
B7	Mud sunfish	*Acantharchus pomotis*
B7	Red-cockaded woodpecker	*Picoides borealis*
B7	Slender glass lizard	*Ophisaurus attenuatus*
B8	Carpenter frog	*Rana virgatipes*
B8	Gopher tortoise	*Gopherus polyphemus*
B8	Silky camellia	*Stewartia malacodendron*

B9	Bachman's sparrow	*Aimophila aestivalis*
B9	Carolina gopher frog	*Rana capito capito*
B9	Hooded pitcherplant	*Sarracenia minor*
B9	Mud salamander	*Pseudotriton montanus*
B9	Red-cockaded woodpecker	*Picoides borealis*
B9	Slender glass lizard	*Ophisaurus attenuatus*
B10	Bachman's sparrow	*Aimophila aestivalis*
B10	Gopher tortoise	*Gopherus polyphemus*
B11	Bachman's sparrow	*Aimophila aestivalis*
B11	Bachman's sparrow	*Aimophila aestivalis*
B11	Gopher tortoise	*Gopherus polyphemus*
B11	Michaux orchid	*Habenaria quinqueseta var quin*
B11	Wild coco	*Eulophia ecristata*
B12	Bachman's sparrow	*Aimophila aestivalis*
B12	Carpenter frog	*Rana virgatipes*
B12	Dwarf siren	*Pseudobranchus striatus*
B12	Gopher tortoise	*Gopherus polyphemus*
B12	Little-leaf whitethorn	*Ceanothus microphyllus*
B12	Mud sunfish	*Acantharchus pomotis*
B12	Pondspice	*Litsea aestivalis*
B12	Red-cockaded woodpecker	*Picoides borealis*
B12	Striped newt	*Notophthalmus perstriatus*
B12	Zenobia	*Zenobia pulverulenta*
B13	Bachman's sparrow	*Aimophila aestivalis*
B13	Eastern coral snake	*Micrurus fulvius*
B13	Gopher tortoise	*Gopherus polyphemus*
B13	Mud sunfish	*Acantharchus pomotis*
B13	Red-cockaded woodpecker	*Picoides borealis*
B13	Striped newt	*Notophthalmus perstriatus*
B14	Bachman's sparrow	*Aimophila aestivalis*
B14	Few-flower gay-feather	*Liatris pauciflora*
B14	Gopher tortoise	*Gopherus polyphemus*
B14	Pondspice	*Litsea aestivalis*
B14	Red-cockaded woodpecker	*Picoides borealis*
B14	Yellow coneflower	*Rudbeckia nitida var nitida*
B15	Bachman's sparrow	*Aimophila aestivalis*
B15	Carpenter frog	*Rana virgatipes*
B15	Few-flower gay-feather	*Liatris pauciflora*
B15	Pondspice	*Litsea aestivalis*
B15	Red-cockaded woodpecker	*Picoides borealis*
B16	Slender glass lizard	*Ophisaurus attenuatus*
B16	Spotted turtle	*Clemmys guttata*
B17	Bachman's sparrow	*Aimophila aestivalis*

B17	Gopher tortoise	*Gopherus polyphemus*
B17	Pineland yellow-eyed-grass	*Xyris stricta*
B17	Pondspice	*Litsea aestivalis*
B17	Red-cockaded woodpecker	*Picoides borealis*
B17	Torrey beakrush	*Rhynchospora torreyana*
B18	Bachman's sparrow	*Aimophila aestivalis*
B18	Carolina gopher frog	*Rana capito capito*
B18	Dwarf siren	*Pseudobranchus striatus*
B18	Gopher tortoise	*Gopherus polyphemus*
B18	Mole skink	*Eumeces egregius*
B19	Bachman's sparrow	*Aimophila aestivalis*
B19	Flatwoods salamander	*Ambystoma cingulatum*
B19	Green-fly orchid	*Epidendrum conopseum*
B20	Bachman's sparrow	*Aimophila aestivalis*
B20	Brown snake	*Storeria dekayi*
B20	Dwarf siren	*Pseudobranchus striatus*
B20	Eastern mudminnow	*Umbra pygmaea*
B20	Gopher tortoise	*Gopherus polyphemus*
B20	Hooded pitcherplant	*Sarracenia minor*
B20	Red-cockaded woodpecker	*Picoides borealis*
B21	Red-cockaded woodpecker	*Picoides borealis*
B22	Carolina gopher frog	*Rana capito capito*
B22	Gopher tortoise	*Gopherus polyphemus*
B23	Dwarf siren	*Pseudobranchus striatus*
B24	Bannerfin shiner	*Notropis leedsi*
B24	Dwarf siren	*Pseudobranchus striatus*
C1	Bachman's sparrow	*Aimophila aestivalis*
C1	Carpenter frog	*Rana virgatipes*
C1	Gopher tortoise	*Gopherus polyphemus*
C1	Mud sunfish	*Acantharchus pomotis*
C1	Pondspice	*Litsea aestivalis*
C1	Red-cockaded woodpecker	*Picoides borealis*
C2	Bachman's sparrow	*Aimophila aestivalis*
C2	Pondspice	*Litsea aestivalis*
C2	Red-cockaded woodpecker	*Picoides borealis*
C3	Bachman's sparrow	*Aimophila aestivalis*
C3	Gopher tortoise	*Gopherus polyphemus*
C3	Red-cockaded woodpecker	*Picoides borealis*
C4	Bachman's sparrow	*Aimophila aestivalis*
C4	Dwarf siren	*Pseudobranchus striatus*
C4	Florida pine snake	*Pituophis melanoleucus mugitus*
C4	Horned beakrush	*Rhynchospora careyana*
C4	Mud salamander	*Pseudotriton montanus*

C4	Pondspice	*Litsea aestivalis*
C4	Red-cockaded woodpecker	*Picoides borealis*
C5	Bachman's sparrow	*Aimophila aestivalis*
C5	Black-fruited spike-rush	*Eleocharis melanocarpa*
C5	Florida pine snake	*Pituophis melanoleucus mugitus*
C5	Gopher tortoise	*Gopherus polyphemus*
C5	Pondspice	*Litsea aestivalis*
C5	Red-cockaded woodpecker	*Picoides borealis*
C5	Striped newt	*Notophthalmus perstriatus*
C6	Bachman's sparrow	*Aimophila aestivalis*
C6	Red-cockaded woodpecker	*Picoides borealis*
C7	Bachman's sparrow	*Aimophila aestivalis*
C7	Carpenter frog	*Rana virgatipes*
C7	Eastern mudminnow	*Umbra pygmaea*
C7	Gopher tortoise	*Gopherus polyphemus*
C7	Red-cockaded woodpecker	*Picoides borealis*
C7	Striped newt	*Notophthalmus perstriatus*
C8	Bachman's sparrow	*Aimophila aestivalis*
C8	Gopher tortoise	*Gopherus polyphemus*
C9	Bachman's sparrow	*Aimophila aestivalis*
C9	Eastern coral snake	*Micrurus fulvius*
C9	Gopher tortoise	*Gopherus polyphemus*
C9	Little-leaf whitethorn	*Ceanothus microphyllus*
C9	Red-cockaded woodpecker	*Picoides borealis*
C9	Sedge	*Carex lonchocarpa*
C10	Bachman's sparrow	*Aimophila aestivalis*
C10	Mud salamander	*Pseudotriton montanus*
C10	Red-cockaded woodpecker	*Picoides borealis*
C10	Southern hognose snake	*Heterodon simus*
C10	Spotted turtle	*Clemmys guttata*
C11	Bachman's sparrow	*Aimophila aestivalis*
C12	Bachman's sparrow	*Aimophila aestivalis*
C12	Green-fly orchid	*Epidendrum conopseum*
C12	Red-cockaded woodpecker	*Picoides borealis*
C13	Gopher tortoise	*Gopherus polyphemus*
C14	Bachman's sparrow	*Aimophila aestivalis*
C14	Green-fly orchid	*Epidendrum conopseum*
C15	Bachman's sparrow	*Aimophila aestivalis*
C15	Black-fruited spike-rush	*Eleocharis melanocarpa*
C15	Carolina gopher frog	*Rana capito capito*
C15	Gopher tortoise	*Gopherus polyphemus*
C15	Red-cockaded woodpecker	*Picoides borealis*
C15	Torrey beakrush	*Rhynchospora torreyana*

C16	Carolina scalystem	*Elytraria caroliniensis*
C16	Hemlock water-parsnip	*Sium suave*
C16	Rainbow snake	*Farancia erytrogramma*
C16	Slender-leaved dragon-head	*Physostegia leptophylla*
C17	Gopher tortoise	*Gopherus polyphemus*
C17	Mud sunfish	*Acantharchus pomotis*
C17	Sedge	*Carex lonchocarpa*
C18	Gopher tortoise	*Gopherus polyphemus*
C18	Pondspice	*Litsea aestivalis*
CNT	Red-cockaded woodpecker	*Picoides borealis*
CNT	Sand spike-rush	*Eleocharis montevidensis*
D1	Bachman's sparrow	*Aimophila aestivalis*
D1	Gopher tortoise	*Gopherus polyphemus*
D1	Red-cockaded woodpecker	*Picoides borealis*
D2	Red lovegrass	*Eragrostis secundiflora*
D3	Golden topminnow	*Fundulus chrysotus*
D4	Mud sunfish	*Acantharchus pomotis*
D5	Bachman's sparrow	*Aimophila aestivalis*
D5	Georgia ironweed	*Vernonia pulchella*
D5	Hooded pitcherplant	*Sarracenia minor*
D5	Red-cockaded woodpecker	*Picoides borealis*
D5	Torrey beakrush	*Rhynchospora torreyana*
D6	Bachman's sparrow	*Aimophila aestivalis*
D6	Carolina gopher frog	*Rana capito capito*
D6	Gopher tortoise	*Gopherus polyphemus*
D7	Bachman's sparrow	*Aimophila aestivalis*
D7	Carpenter frog	*Rana virgatipes*
D7	Flatwoods salamander	*Ambystoma cingulatum*
D7	Red-cockaded woodpecker	*Picoides borealis*
D8	Red-cockaded woodpecker	*Picoides borealis*
D8	Bachman's sparrow	*Aimophila aestivalis*
D9	Bachman's sparrow	*Aimophila aestivalis*
D9	Mud salamander	*Pseudotriton montanus*
D10	Needle palm	*Rhapidophyllum hystrix*
D11	Bachman's sparrow	*Aimophila aestivalis*
D11	Red-cockaded woodpecker	*Picoides borealis*
D12	Acid-swamp yellow-eyed-grass	*Xyris serotina*
D12	Bachman's sparrow	*Aimophila aestivalis*
D12	Boykin's lobelia	*Lobelia boykinii*
D12	Carolina gopher frog	*Rana capito capito*
D12	Carpenter frog	*Rana virgatipes*
D12	Dwarf siren	*Pseudobranchus striatus*
D12	Eastern coral snake	*Micrurus fulvius*

D12	Flatwoods salamander	*Ambystoma cingulatum*
D12	Georgia ironweed	*Vernonia pulchella*
D12	Hooded pitcherplant	*Sarracenia minor*
D12	Little-leaf whitethorn	*Ceanothus microphyllus*
D12	Red-cockaded woodpecker	*Picoides borealis*
D12	Snowy orchis	*Platanthera nivea*
D12	Wild coco	*Eulophia ecristata*
D13	Slender glass lizard	*Ophisaurus attenuatus*
D13	Bachman's sparrow	*Aimophila aestivalis*
D13	Georgia ironweed	*Vernonia pulchella*
D13	Gopher tortoise	*Gopherus polyphemus*
D14	Bachman's sparrow	*Aimophila aestivalis*
D14	Carolina gopher frog	*Rana capito capito*
D14	Georgia ironweed	*Vernonia pulchella*
D14	Gopher tortoise	*Gopherus polyphemus*
D14	Island glass lizard	*Ophisaurus compressus*
D14	Little-leaf whitethorn	*Ceanothus microphyllus*
D14	Red-cockaded woodpecker	*Picoides borealis*
D15	Bachman's sparrow	*Aimophila aestivalis*
D15	Georgia ironweed	*Vernonia pulchella*
D15	Gopher tortoise	*Gopherus polyphemus*
D15	Little-leaf whitethorn	*Ceanothus microphyllus*
D15	Mud salamander	*Pseudotriton montanus*
D15	Mud sunfish	*Acantharchus pomotis*
D15	Red-cockaded woodpecker	*Picoides borealis*
D16	Bachman's sparrow	*Aimophila aestivalis*
D16	Eastern coral snake	*Micrurus fulvius*
D16	Florida pine snake	*Pituophis melanoleucus mugitus*
D16	Gopher tortoise	*Gopherus polyphemus*
D16	Little-leaf whitethorn	*Ceanothus microphyllus*
D16	Mole skink	*Eumeces egregius*
D16	Mud salamander	*Pseudotriton montanus*
E1	Gopher tortoise	*Gopherus polyphemus*
E1	Slender glass lizard	*Ophisaurus attenuatus*
E1	Southern hognose snake	*Heterodon simus*
E2	Buckthorn	*Bumelia thornei*
E2	Gopher tortoise	*Gopherus polyphemus*
E3	Bachman's sparrow	*Aimophila aestivalis*
E3	Carolina scalystem	*Elytraria caroliniensis*
E3	Coastal plain false-foxglove	*Agalinis aphylla*
E3	Gopher tortoise	*Gopherus polyphemus*
E4	Bachman's sparrow	*Aimophila aestivalis*
E4	Dwarf siren	*Pseudobranchus striatus*

E4	Gopher tortoise	*Gopherus polyphemus*
E4	Red-cockaded woodpecker	*Picoides borealis*
E5	Bachman's sparrow	*Aimophila aestivalis*
E5	Red-cockaded woodpecker	*Picoides borealis*
E6	Bachman's sparrow	*Aimophila aestivalis*
E6	Carolina gopher frog	*Rana capito capito*
E6	Gopher tortoise	*Gopherus polyphemus*
E6	Mud sunfish	*Acantharchus pomotis*
E6	Red-cockaded woodpecker	*Picoides borealis*
E7	Bachman's sparrow	*Aimophila aestivalis*
E7	Brown snake	*Storeria dekayi*
E7	Gopher tortoise	*Gopherus polyphemus*
E7	Red-cockaded woodpecker	*Picoides borealis*
E8	Bachman's sparrow	*Aimophila aestivalis*
E8	Gopher tortoise	*Gopherus polyphemus*
E8	Red-cockaded woodpecker	*Picoides borealis*
E8	Red-cockaded woodpecker	*Picoides borealis*
E9	Bachman's sparrow	*Aimophila aestivalis*
E9	Red-cockaded woodpecker	*Picoides borealis*
E10	Bachman's sparrow	*Aimophila aestivalis*
E10	Flatwoods salamander	*Ambystoma cingulatum*
E10	Hooded pitcherplant	*Sarracenia minor*
E10	Purple balduina	*Balduina atropurpurea*
E10	Red-cockaded woodpecker	*Picoides borealis*
E10	Wild coco	*Eulophia ecristata*
E11	Bachman's sparrow	*Aimophila aestivalis*
E11	Boykin's lobelia	*Lobelia boykinii*
E11	Carolina gopher frog	*Rana capito capito*
E11	Coastal plain false-foxglove	*Agalinis aphylla*
E11	Flatwoods salamander	*Ambystoma cingulatum*
E11	Hairy fever-tree	*Pinckneya pubens*
E11	Hooded pitcherplant	*Sarracenia minor*
E11	Purple balduina	*Balduina atropurpurea*
E11	Red-cockaded woodpecker	*Picoides borealis*
E11	Striped newt	*Notophthalmus perstriatus*
E12	Bachman's sparrow	*Aimophila aestivalis*
E12	Gopher tortoise	*Gopherus polyphemus*
E12	Pondspice	*Litsea aestivalis*
E12	Red-cockaded woodpecker	*Picoides borealis*
E12	Striped newt	*Notophthalmus perstriatus*
E13	Bachman's sparrow	*Aimophila aestivalis*
E13	Carolina gopher frog	*Rana capito capito*
E13	Eastern coral snake	*Micrurus fulvius*

E13	Georgia plume	*Elliottia racemosa*
E13	Gopher tortoise	*Gopherus polyphemus*
E13	Little-leaf whitethorn	*Ceanothus microphyllus*
E13	Red-cockaded woodpecker	*Picoides borealis*
E13	Yellow coneflower	*Rudbeckia nitida var nitida*
E14	Bachman's sparrow	*Aimophila aestivalis*
E14	Georgia ironweed	*Vernonia pulchella*
E14	Incised groovebur	*Agrimonia incisa*
E14	Red-cockaded woodpecker	*Picoides borealis*
E14	Yellow coneflower	*Rudbeckia nitida var nitida*
E15	Bachman's sparrow	*Aimophila aestivalis*
E15	Hairy fever-tree	*Pinckneya pubens*
E15	Red-cockaded woodpecker	*Picoides borealis*
E15	Yellow coneflower	*Rudbeckia nitida var nitida*
E16	Bachman's sparrow	*Aimophila aestivalis*
E16	Florida pine snake	*Pituophis melanoleucus mugitus*
E16	Gopher tortoise	*Gopherus polyphemus*
E16	Incised groovebur	*Agrimonia incisa*
E16	Purple balduina	*Balduina atropurpurea*
E16	Red-cockaded woodpecker	*Picoides borealis*
E16	Yellow coneflower	*Rudbeckia nitida var nitida*
E17	Bachman's sparrow	*Aimophila aestivalis*
E17	Few-flower gay-feather	*Liatris pauciflora*
E17	Florida pine snake	*Pituophis melanoleucus mugitus*
E17	Gopher tortoise	*Gopherus polyphemus*
E17	Hooded pitcherplant	*Sarracenia minor*
E17	Mud sunfish	*Acantharchus pomotis*
E17	Red-cockaded woodpecker	*Picoides borealis*
E17	Yellow coneflower	*Rudbeckia nitida var nitida*
E18	Bachman's sparrow	*Aimophila aestivalis*
E18	Dwarf siren	*Pseudobranchus striatus*
E18	Golden topminnow	*Fundulus chrysotus*
E18	Gopher tortoise	*Gopherus polyphemus*
E18	Incised groovebur	*Agrimonia incisa*
E18	Red-cockaded woodpecker	*Picoides borealis*
E18	Yellow coneflower	*Rudbeckia nitida var nitida*
E19	Bachman's sparrow	*Aimophila aestivalis*
E19	Coastal plain false-foxglove	*Agalinis aphylla*
E19	Gopher tortoise	*Gopherus polyphemus*
E19	Incised groovebur	*Agrimonia incisa*
E19	Purple balduina	*Balduina atropurpurea*
E19	Red-cockaded woodpecker	*Picoides borealis*
E19	Wild coco	*Eulophia ecristata*

E19	Yellow coneflower	*Rudbeckia nitida var nitida*
E20	Bachman's sparrow	*Aimophila aestivalis*
E20	Red-cockaded woodpecker	*Picoides borealis*
E20	Yellow coneflower	*Rudbeckia nitida var nitida*
E21	Bachman's sparrow	*Aimophila aestivalis*
E21	Eastern indigo snake	*Drymarchon corais couperi*
E21	Few-flower gay-feather	*Liatris pauciflora*
E21	Florida pine snake	*Pituophis melanoleucus mugitus*
E21	Georgia plume	*Elliottia racemosa*
E21	Gopher tortoise	*Gopherus polyphemus*
E21	Incised groovebur	*Agrimonia incisa*
E21	Large-stem morning-glory	*Ipomoea macrorhiza*
E21	Mud salamander	*Pseudotriton montanus*
E21	Red-cockaded woodpecker	*Picoides borealis*
E21	Yellow coneflower	*Rudbeckia nitida var nitida*
E21	Bald eagle	*Haliaeetus leucocephalus*
E22	Bachman's sparrow	*Aimophila aestivalis*
E22	Dwarf witch-alder	*Fothergilla gardenii*
E22	Few-flower gay-feather	*Liatris pauciflora*
E22	Golden topminnow	*Fundulus chrysotus*
E22	Gopher tortoise	*Gopherus polyphemus*
E22	Incised groovebur	*Agrimonia incisa*
E22	Yellow coneflower	*Rudbeckia nitida var nitida*
EOD	Bannerfin shiner	*Notropis leedsi*
EOD	Silky camellia	*Stewartia malacodendron*
F1	Bachman's sparrow	*Aimophila aestivalis*
F1	Brown snake	*Storeria dekayi*
F2	Bachman's sparrow	*Aimophila aestivalis*
F2	Brown snake	*Storeria dekayi*
F2	Gopher tortoise	*Gopherus polyphemus*
F2	Red-cockaded woodpecker	*Picoides borealis*
F3	Bachman's sparrow	*Aimophila aestivalis*
F3	Bachman's sparrow	*Aimophila aestivalis*
F3	Red-cockaded woodpecker	*Picoides borealis*
F4	Bachman's sparrow	*Aimophila aestivalis*
F4	Red-cockaded woodpecker	*Picoides borealis*
F5	Bachman's sparrow	*Aimophila aestivalis*
F5	Red-cockaded woodpecker	*Picoides borealis*
F6	Bachman's sparrow	*Aimophila aestivalis*
F6	Carpenter frog	*Rana virgatipes*
F6	Dwarf siren	*Pseudobranchus striatus*
F6	Flatwoods salamander	*Ambystoma cingulatum*
F6	Gopher tortoise	*Gopherus polyphemus*

F6	Red-cockaded woodpecker	*Picoides borealis*
F7	Bachman's sparrow	*Aimophila aestivalis*
F7	Dwarf siren	*Pseudobranchus striatus*
F7	Flatwoods salamander	*Ambystoma cingulatum*
F7	Flatwoods salamander	*Ambystoma cingulatum*
F7	Golden topminnow	*Fundulus chrysotus*
F7	Hooded pitcherplant	*Sarracenia minor*
F7	Mud sunfish	*Acantharchus pomotis*
F7	Red-cockaded woodpecker	*Picoides borealis*
F8	Bachman's sparrow	*Aimophila aestivalis*
F8	Gopher tortoise	*Gopherus polyphemus*
F9	Bachman's sparrow	*Aimophila aestivalis*
F9	Boykin's lobelia	*Lobelia boykinii*
F9	Carolina gopher frog	*Rana capito capito*
F9	Dwarf siren	*Pseudobranchus striatus*
F9	Flatwoods salamander	*Ambystoma cingulatum*
F9	Florida pine snake	*Pituophis melanoleucus mugitus*
F9	Gopher tortoise	*Gopherus polyphemus*
F9	Incised groovebur	*Agrimonia incisa*
F9	Spotted turtle	*Clemmys guttata*
F9	Striped newt	*Notophthalmus perstriatus*
F10	Bachman's sparrow	*Aimophila aestivalis*
F10	Golden topminnow	*Fundulus chrysotus*
F10	Gopher tortoise	*Gopherus polyphemus*
F10	Large-stem morning-glory	*Ipomoea macrorhiza*
F10	Mud sunfish	*Acantharchus pomotis*
F11	Bachman's sparrow	*Aimophila aestivalis*
F11	Eastern indigo snake	*Drymarchon corais couperi*
F11	Few-flower gay-feather	*Liatris pauciflora*
F11	Florida pine snake	*Pituophis melanoleucus mugitus*
F11	Georgia plume	*Elliottia racemosa*
F11	Gopher tortoise	*Gopherus polyphemus*
F11	Hairy fever-tree	*Pinckneya pubens*
F11	Incised groovebur	*Agrimonia incisa*
F11	Mole skink	*Eumeces egregius*
F11	Mud sunfish	*Acantharchus pomotis*
F11	Yellow coneflower	*Rudbeckia nitida var nitida*
F12	Bachman's sparrow	*Aimophila aestivalis*
F12	Bannerfin shiner	*Notropis leedsi*
F12	Dark green sedge	*Carex venusta*
F12	Eastern coral snake	*Micrurus fulvius*
F12	Few-flower gay-feather	*Liatris pauciflora*
F12	Georgia plume	*Elliottia racemosa*

F12	Gopher tortoise	*Gopherus polyphemus*
F12	Mole skink	*Eumeces egregius*
F12	Mud salamander	*Pseudotriton montanus*
F12	Trailing ratany	*Krameria lanceolata*
F13	Eastern indigo snake	*Drymarchon corais couperi*
F13	Florida pine snake	*Pituophis melanoleucus mugitus*
F13	Gopher tortoise	*Gopherus polyphemus*
F14	Georgia plume	*Elliottia racemosa*
F14	Gopher tortoise	*Gopherus polyphemus*
F14	Pondspice	*Litsea aestivalis*
F14	Spotted turtle	*Clemmys guttata*
F15	Bachman's sparrow	*Aimophila aestivalis*
F15	Bannerfin shiner	*Notropis leedsi*
F15	Gopher tortoise	*Gopherus polyphemus*
F16	Bachman's sparrow	*Aimophila aestivalis*
F16	Incised groovebur	*Agrimonia incisa*
F16	Red-cockaded woodpecker	*Picoides borealis*
F17	Bachman's sparrow	*Aimophila aestivalis*
F17	Gopher tortoise	*Gopherus polyphemus*
F17	Rainbow snake	*Farancia erytrogramma*
F18	Dwarf siren	*Pseudobranchus striatus*
F18	Gopher tortoise	*Gopherus polyphemus*
F18	Mole skink	*Eumeces egregius*
F18	Pondspice	*Litsea aestivalis*
F18	Red-cockaded woodpecker	*Picoides borealis*
F19	Bannerfin shiner	*Notropis leedsi*
F19	Eastern coral snake	*Micrurus fulvius*
F19	Gopher tortoise	*Gopherus polyphemus*
F19	Nuttall warea	*Warea cuneifolia*
F19	Red-cockaded woodpecker	*Picoides borealis*
F19	Slenderleaf clammy-weed	*Polanisia tenuifolia*
F20	Bachman's sparrow	*Aimophila aestivalis*
F20	Black swamp snake	*Seminatrix pygaea*
F20	Gopher tortoise	*Gopherus polyphemus*
F20	Red-cockaded woodpecker	*Picoides borealis*
F20	Slender glass lizard	*Ophisaurus attenuatus*
HAAF	Gopher tortoise	*Gopherus polyphemus*
HAAF	Red-cockaded woodpecker	*Picoides borealis*

INSERT FS REG 385-14 - Post Range Regulation

Department of the Army ***3d IN Div (Mech) & FS Reg 385-14**
Headquarters, 3d Infantry Division (Mechanized)
and Fort Stewart
Fort Stewart, Georgia 31314
09 October 1997

Safety
POST RANGE REGULATION

Supplementation of this regulation is prohibited.

Information Management Requirement (IMR). This regulation contains an IMR as defined by AR 335-15. Requirements control symbol (RCS) and/or exemption statement is placed immediately following the requirement.

History. This regulation was first published 30 November 1984 with a Change 1 published 28 August 1985; Change 2 published 5 September 1985; Change 3 published 23 January 1987; and a Change 4 published 31 August 1987. The second edition published 31 May 1988. The third edition published 24 May 1993. This is the fourth edition.

Summary. This regulation defines responsibilities of Range Control and users of Fort Stewart ranges, training areas, and facilities. This regulation provides procedures, responsibilities, and guidance on utilizing all training facilities provided at Fort Stewart.

Applicability. This regulation applies to all users of the facility, whether divisional, nondivisional, or external. During periods of mobilization, requirements of this regulation may not apply. **Requirement's Impacting on Unit Commanders:** The standards apply to all personnel, both military and civilian. Violations of the provisions regarding endangered species (paragraph (para) 14-1) and historical sites (para 14-4) are punishable under the full range statutory and regulatory sanctions, both criminal and administrative.

Proponent and Exception Authority. The proponent of this regulation is the Assistant Chief of Staff (ACofS), Director of Plans, Training and Mobilization (DPTM). Only the Chief of Staff, 3d IN Div (Mech) may approve changes to this document.

Suggested Improvements. Users are invited to send comments and suggested improvements immediately followed by: @emh5.stewart.army.mil, or a written memorandum, or on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to the Commander, 3d Infantry (IN) Division (Div) (Mechanized) (Mech) and Fort Stewart, ATTN: AFZP-GTR, Fort Stewart, Georgia 31314.

DISTRIBUTION:
This is a level 1 publication. It may be authorized for distribution to the Division staff, directorates/activities, brigades, battalions, line companies, and separate companies. See the distribution page for the exact distribution of this publication. If you are an authorized recipient of this publication, you may subscribe to it on the Publications Account Management System (PAMS).

FOR THE COMMANDER:

GENE M. LACOSTE
COL, GS
Chief of Staff

Official:

DENNIS L. O'NEIL
Asst DOIM

***This regulation supersedes 3d IN Div (Mech) & FS Reg 385-14, 24 May 1993.**

TABLE OF CONTENTS

CHAPTER 1 - GENERAL

1-1. PURPOSE.

This regulation prescribes policies, procedures, and safety requirements for the operation of facilities and utilization of training areas at Fort Stewart.

1-2. REFERENCES.

Required and related publications and prescribed and referenced forms are listed in Appendix A.

1-3. EXPLANATION OF ABBREVIATIONS AND TERMS.

Abbreviations and terms used in this regulation are explained in the glossary.

1-4. SCOPE.

This regulation is applicable to each unit, activity, and agency training on Fort Stewart.

1-5. GENERAL INSTRUCTIONS.

a. All personnel using Fort Stewart range facilities or training areas will comply with the provisions of Army Regulation (AR) 385-63 and this regulation.

b. Ranges and training areas are restricted from general access without clearance from Range Division.

c. No personnel, military or civilian, are permitted to by-pass roadblocks or barriers without authorization from Range Control. Those who do are subject to disciplinary action. Individuals who have obtained permission to enter an area or range posted with roadblocks, will replace them immediately upon entry or departure.

d. No alcoholic beverages of any kind are to be consumed or present on any range or training area by personnel engaged in training or training support.

e. Every effort will be made to protect valuable forestry plantation areas located throughout the reservation. Areas are plainly marked and will be avoided except when training requirements make entry mandatory (as determined by DPTM).

f. Pond Dams and Spillways. No tank traps, foxholes, hull downs, tent drainage, or similar excavations are permitted on dams or emergency spillways (high water run-around) of any water impoundment's. Vehicle traffic on the dams or spillways will be confined to existing roads.

g. Orchards. Every effort will be made to protect wildlife oak (acorn, mast) orchards. These areas resemble small (2-3 acre) orchards and are plainly marked. Oak orchards will be avoided except when training requirements make entry mandatory (as determined by DPTM).

h. Wildlife Clearings. Many small (1-2 acre) wildlife clearings are scattered throughout the reservation, either as isolated clearings within the forest or as cultivated areas in larger (range) openings. While these areas are not off limits, they should be protected from heavy vehicular traffic to the maximum extent possible, particularly when freshly plowed or in early development (green) stages.

i. Director of Public Works (DPW) Fire Towers are available for enhancing communications upon request and under restrictions imposed by DPW Forestry, telephone 767-2598 (S).

1-6. SUPPLY PROCEDURES.

a. Range Division Supply is located in Building (Bldg) T-8071 (S). The hours of operation are 0730-1600, Monday through Friday (except holidays). Units requiring items for weekend/holiday training, will draw those items the last duty day prior. Items must be returned immediately upon completion or the next duty day in the case of late ranges. For emergency or after duty hour requirements, contact Range Control Operations.

b. Range Supply issues range flags, red lights (limited basis), paddles and roadblock signs using DA Form 3161.

c. Units using the moving target cars on armor ranges are required to provide mogas and oil for the target cars, as well as provide transportation assets when required to replace a moving target car.

d. Issue and loan of items to units.

(1) DA Form 5977 Test: Units organic to Fort Stewart and Hunter Army Airfield (AAF) will provide Range Supply with two (2) copies of Assumption of Command Orders.

(2) Notice of Delegation of Authority, DA Form 1687. National Guard units will provide the Delegation of Authority, which list the persons authorized to request and receive supplies and equipment. ROTC and reserve units are exempt from these procedures; however, the receiving individual must be a SGT or above and process a valid Government ID Card.

(3) Request and issue of targets and materials:

(a) All wooden and thermal targets are manufactured by a civilian contractor and should be requested a minimum of 90 days before actual use. Small arms' targets can be issued upon request if available in stock.

- Items available for issue are limited.
- Equipment turn-in not later than (NLT) 72 hours after use.
- Damage on items requires a statement or a report of survey.
- Maintenance of equipment.

(b) Target devices and generators should be ordered at the same time the targets are ordered to allow for proper scheduling of the frequencies of the receivers.

(c) Units organic to Fort Stewart will request targets and equipment by submitting a memorandum to Range Division Supply. National guard units will submit a memorandum and send a Military Interdepartmental Purchase Request, DD Form 448, to Range Division Supply before picking up the targets. A memorandum is not required for safety lights, paddles, or range flags, etc. Actual issues are accomplished on a DA Form 3161 or DD Form 1150.

(4) Loans and Turn-in of Equipment and Supplies. All recoverable items, regardless of property classification (nonexpendable, durable, expendable, component of an end item) will be lent to the using units. Loans will be accomplished using DA Form 3161 or DD Form 1150, used as a Temporary Hand Receipt and will reflect a return date.

CHAPTER 2 - RESPONSIBILITIES

2-1. ACOFS, G3/DPTM.

ACofS, G3/DPTM is charged with staff responsibility for planning, coordinating and monitoring range activities.

2-2. CHIEF OF RANGE DIVISION.

a. Chief, Range Division is responsible to the ACofS, G3/DPTM, who in turn is responsible to the Commanding General for recommending range safety measures, for coordinating and scheduling ranges and range facilities when requested by units and for operating and maintaining Range Division activities.

b. Chief, Range Division is located in Bldg T-7901 (S), Georgia (GA) Highway 144, telephone: 767-8100 (S), DSN: 870-8100, COM 912-767-8100 or FAX 870-3991.

c. Chief, Range Division is assisted in the control of range activities by range inspectors, operations personnel, Range Control radio operators and air space hazard advisory operators (Marne Radio) located at Wright AAF. A mixture of civilian and military personnel, they are authorized to act for the Chief of Range Division in carrying out those assigned responsibilities. If there is a conflict, the directives of these assistants will be implemented immediately and the Chief, Range Division will be contacted to resolve the matter.

d. In addition, the Chief, Range Division is responsible for:

(1) Preparing and maintaining the Fort Stewart Range Regulation.

(2) Conducting range resource conferences in coordination with ACofS, G3 Training Officer and Director, Reserve Component Support (DRCS), to program utilization of ranges and training areas. These resource conferences will be scheduled by G3, Chief of Training.

(3) Maintaining range facilities, accomplishing minor repairs on ranges, coordinating the accomplishment of other repairs and construction as required.

(4) Preparing for publication the weekly Fort Stewart Range Bulletin.

(5) Designating danger areas and taking necessary steps to ensure that these areas are posted with appropriate signs and barriers, to include the placement of designated roadblocks to close access to any given range or combination of ranges.

(6) Conducting briefings concerning safety, range procedures and orientation. Establishing and maintaining officer in charge (OIC)/range safety officer (RSO) Safety Certification Program.

(7) Providing area status sheets (recreation, tactical training or live fire) on a daily basis to Director of Personnel and Community Activities (DPCA), Pass and Permit Office, Marne Radio, Wright AAF Operations, DPW, (Forestry, Roads and Grounds) and other agencies as needed.

(8) Disseminating airspace hazard advisory warnings through Marne Radio and providing limited flight following to aircraft operating in R3005 area in the event Marne Radio is non-operational.

(9) Planning, developing and coordinating range modifications or construction to support new weapons systems or training doctrine.

(10) Coordinating with DPW concerning all requests for live fire training sites that are not currently approved live fire facili-

ties, to ensure threatened and endangered wildlife habitats are not damaged. (11) Coordinating with Director of Contracting (DOC) for targetry and local purchase items.

2-3. UNIT COMMANDERS.

a. Commanders (Bn/Sqdn/Sep Co) are responsible for training and testing their personnel on the weapon systems organic to that organization. Unit certification should be in accordance with (IAW) appropriate weapon/gunnery manuals and is valid for one year. Once this certification is complete the commander is required to submit a memorandum to DPTM, Range Division, listing the potential OIC's, RSO's (see Figure 2-1).

Only those personnel who successfully complete the Unit Certification and the Range Control Examination will then be certified for range OIC/RSO duties and issued a wallet size certification card (see Figure 2-2). OIC/RSO will sign a certificate of responsibility (see Figure 2-3), which will remain on file at Range Control for one year. Range Control reserves the right to revoke OIC/RSO range certification when warranted.

b. Each unit using a training facility, whether dry or wet, will designate an OIC who is responsible for the safe conduct of training and proper use of the facility. OIC will appoint an RSO to oversee safety.

NOTE: OIC or RSO will have no additional duties, other than the safe operation of that facility.

c. For every action connected with Artillery, Mortar, multiple launch rocket system (MLRS) Firing (see paras 6-10 and 6-11), there is an individual responsible for performing the act and an individual responsible to ensure it is performed properly. In practically every case, this supervisory responsibility rests with the chain of command (Commanders) for a double check of these actions, to ensure this requirement is strictly enforced.

d. Battalion commanders may authorize a section chief to be responsible for safety checks in their assigned section, provided the individual is "Command Certified" as being qualified to perform these checks. Battalion commanders will establish procedures for qualifying and certifying persons in their command who are required to perform section chief safety duties under provisions of this regulation. Certification procedures will include, as a minimum, a comprehensive proficiency test covering safety duties the individual will be required to perform.

e. Division Artillery (DIVARTY) will prepare, and as needed, revise the standard Fort Stewart Artillery Written Safety Examination and the Hands-on Component Test. The tests will be administered at the battalion level for active Army and reserve components.

f. Unit Commanders will administer a hands-on component test to each Artillery and Mortar RSO/noncommissioned officer (NCO) on the type weapon the individual is to be certified for. Each RSO/NCO will take the standard Fort Stewart Artillery and Mortar Written Safety Examination. A minimum of 93 percent total score is required for certification. Personnel certified by this test must then receive the Range Control OIC/RSO briefing and certification examination.

2-4. RANGE OIC/RSO.

a. The Range OIC will:

(1) Be a commissioned, warrant or noncommissioned officer, SSG(P) in a SFC position or above, from the training/firing unit's chain of command. OIC will be weapons system qualified as determined by the commander's Command Certification Program.

NOTE: Civilians as OIC, see para 6-14, Table 6-4 (Note 1).

(2) Appoint an RSO in the rank of SGT(P), serving in a SSG position, or above, from the training/firing unit's

chain of command, to perform safety responsibilities. OIC may appoint additional safety officers as required.
NOTE: Memorandum submitted by Unit Commanders to DPTM, Range Division, must specifically state the SSG(P)'s who are in SFC positions and the SGT(P)'s who are in SSG positions that have been identified to serve as OIC/ RSO respectively (see Figure 2-1).

(3) Be certified by Range Control within the last 12 months.

(4) Will report to Range Control the day before or the day of training to receive an "on site" briefing. Units firing on ranges requiring roadblock/barrier systems will appoint a roadblock NCO. (See Section 2-6 for roadblock NCO instructions.) Failure to receive either of the above required briefings will result in unnecessary delays in training until this requirement is met.

(5) Be responsible for the overall safe conduct of training and proper use of facilities. Range firing will be IAW AR 385-63, this regulation and appropriate directives/technical manuals for weapon(s) being fired. Firing will conform to range limitations as described herein and as established by range safety panels and markers.

(6) When a unit occupies a range facility, the OIC will be present at the facility. During live firing exercises, both the OIC and RSO will be on the range and either the OIC or RSO will be on the firing line. When the unit is in an administrative status (dry), either the OIC or RSO will be readily available and in communication with Range Control. During aerial gunnery, if the OIC is in the aircraft; the RSO will be on the ground (see para 6-12).

b. Before "occupying" any range, the OIC will ensure:

(1) The range is scheduled in the weekly range schedule. If not, they will contact their S-3.

(2) The following items are present and/ or actions have been accomplished:

(a) 3d IN Div (Mech) & FS Reg 385-14, and unit SOP's.

(b) Current map of Fort Stewart, DMA Edition III, 1:50,000 scale.

(c) Compass. (If applicable)

(d) Aiming circles (live fire-Artillery/ Mortar points), local declination IAW FM's and TM's.

(e) Appropriate Field Manuals (FM's)/ Technical Manuals (TM's).

(3) FM Radio communication has been established with Range Control on FM band MHz 48.50 (primary frequency), 46:10 (alternate frequency) new squelch on.

(4) Permission has to be granted by Range Control to occupy the training area (TA)/Range.

(5) Personnel do not enter down range areas, adjoining areas or facilities. Down range areas are normally off limits, except for training missions (e.g., target details, maneuver elements). See specific guidance, para (2-4b(8)(e).

(6) Personnel are to be briefed by OIC concerning danger of dud ammunition, off limit's areas and other pertinent range restrictions and safety requirements. Personnel will be instructed not to touch duds, but to mark and report the location to the OIC/RSO and Range Control.

(7) Provisions have been made to protect and secure ammunition IAW appropriate regulations/local policies, IAW AR 190-11 and FORSCOM Suppl 1 to AR 190-11.

(8) On all live fire ranges, the following additional restrictions are observed:

(a) Provisions for the particular range being utilized have been read and are fully understood and complied with.

(b) A red range flag (day) or red blinking light (night) is attached at the top of the range flagpole. Also at night, a red light visible to all firers is hung on the left and right range limit markers. Red flags and red lights are required on firing points. On artillery firing points, 1, 2 and 16 only.

(c) Authorized targets drawn from the range warehouse are emplaced. No range may fire without targets. Units will emplace targets at the most appropriate time to eliminate unnecessary cease fire periods.

(d) No vehicle refueling on range firing lines is authorized. Units will clean up any petroleum, oil, and lubricant (POL) contamination before clearing the range, (see para 5-7).

(e) No personnel (including target details) will leave the firing line of a range without requesting permission from Range Control by telephone or FM radio. At least one responsible individual must be left in the tower with communications to personnel down range. Range Control needs to know how far down range, in meters, the detail plans to go. Units may set up targets and maneuver on ranges having maneuver limits without requesting to leave the firing line, provided the unit stays within the maneuver limits.

(f) Personnel on the range know the firing limits of the range and the limits of the authorized maneuver box on combat maneuver ranges (marked with red and white triangle boards).

c. Before firing on any range, the OIC will contact Range Control Operations, using primary means of communications (FM radio), and request permission to go into a “wet” status. Operations will then verify the following required information on file at Range Control:

(1) Unit to fire.

(2) Type of weapon(s) to fire.

(3) Ammunition to be fired.

(4) Number of personnel at the firing location.

(5) OIC’s rank, last name (spelled phonetically), and last four of social security number (SSN).

(6) RSO’s rank, last name (spelled phonetically), and last four of SSN.

(7) Roadblock NCO has installed/closed all appropriate barriers. (If applicable)

(8) Confirmation that the range flag(s) is/are flying (or red blinking lights).

(9) That OIC understands he is responsible for evacuation of wounded and injured personnel.

d. Once a range is wet, the OIC or RSO will continuously monitor the Range Control primary frequency (FM 48.50). Range Control will initiate all communications checks.

e. During the use of or while firing on any facility, OIC will ensure:

(1) Radio communications are maintained with Range Control. The OIC or RSO must be readily accessible at the location where the units primary communications with Range Control are established (this location will be the tower on ranges). If the range is in a "dry" status, there must be a responsible NCO in the tower or at the point of communications and the OIC or RSO must be readily available on the range. (This does not apply to a unit occupying in a guard status.)

(2) Effective control of firing is maintained and required safety measures are observed, to include both OIC and RSO being present on the range.

(3) No firing is directed toward historical monuments, trees or shrubs, dams, lakes, roads, light poles, signs, any form of wildlife or habitat designated as an endangered species site or other natural

or man-made objects except for prescribed targets.

(4) Report targetry malfunction or facility damage to Range Control Operations immediately.

(5) Personnel are using adequate hearing protection.

(6) Range control is notified immediately when OIC or RSO is replaced whether unit is in a wet or dry status.

(7) The unit remains within the prescribed limits or boundaries of the assigned facility, and no personnel move closer than 725 meters to the front of an occupied artillery FP when entering or exiting the facility.

(8) No alcoholic beverages or other mind altering (non-prescription) drugs, or evidence there of, are allowed on the training facility.

(9) A cease fire is ordered and/or prescribed action taken when:

(a) Communication with Range Control is lost.

(b) A weapon or ammunition malfunction occurs.

(c) A safety violation, accident or incident occurs.

(d) A fire is observed.

(e) Rounds that are suspected of landing or detonating outside the impact area or safety limits.

(f) When directed by Range Control.

(10) On all ranges the following restrictions are observed:

(a) No movement or activity occurs on or along the firing line while firing is taking place, unless authorized by the OIC.

(b) When firing a stationary table, tanks, armored personnel carriers, and other vehicles firing mounted weapons systems, will display appropriate flag(s). When firing at night, vehicles will display the appropriate colored light (green for clear; red for loaded/firing).

(c) When firing a move out scenario, flags will be used at commander's discretion. Lights are required for all phases of night firing.

(d) No ammunition is off loaded on the firing line when the firing line is in a wet status except for Artillery, Mortars and MLRS.

(e) When the unit has completed firing or at 2400 hours, the following closing data will be provided:

- Number of personnel trained, type/ amount of ammunition expended.
- Will ammunition, weapons, sensitive items, and/or vehicles and equipment remain on the range?
- Are there any rounds in the misfire pit?
- Name, rank and last four of SSN of Noncommissioned Officer in Charge (NCOIC) of guard detail and numbers of guards left on range (guard status).

f. After using any facility, the OIC will ensure:

(1) Weapons are cleared of all ammunition.

(2) Ammunition, blanks, ammunition residue, and explosives are removed from individuals.

(3) Ammunition, simulators, explosives, and pyrotechnics are removed from the range/facility and not buried/abandoned at the facility.

(4) Misfires are disposed of per regulation and local policy.

(5) Expended casings, brass, metal links, and unused ammunition are col-

lected for turn-in. Ammunition boxes and propellant charge canisters will be turned in.
(6) Packing material and trash are removed from the range/facility.

(7) A thorough police of the facility is made, to include cleaning latrines and any other structure used.

(8) Range equipment and targets are removed and turned in/stored per specific instruction for facility/range used.

g. If a unit reverts to a "guard status" on a range, an NCO must remain on the range with enough personnel to effectively secure and safeguard ammunition and/or equipment. Noncommissioned officer in charge (NCOIC) must monitor Range Control on FM radio.

NOTE: Guard status is defined as unit personnel having left the range; however, equipment and/or ammunition remains with the appropriate guards as determined by the unit.

h. Before departure from any range/ facility or training area, the OIC will contact Range Control to request inspection and clearance of area assigned.

i. Additional instructions pertaining to the operation of ranges, training areas, etc., are contained in the appropriate chapters of this regulation.

j. Units firing beyond 2400 must reoccupy that facility.

2-5. DZSO.

The Drop Zone Safety Officer (DZSO) is the airborne commander's representative on the drop zone (DZ) and is responsible for the safe and efficient operation of the DZ. For detailed information see Chapter 8.

2-6. ROADBLOCK NCO INSTRUCTIONS.

Roadblock NCO is responsible for ensuring that no unauthorized personnel are allowed down range on the live fire range being supported. This is accomplished by installing roadblocks and/or closing barrier systems per instruction received during Roadblock NCO's Brief. He is directly responsible to the OIC. He will maintain FM communications with the OIC.

a. Roadblock NCO will report to Range Control, Bldg T-7901, not later than (NLT) the last duty day prior to firing for a roadblock NCO brief. Roadblock NCOs will have a Fort Stewart map, be in duty uniform and have a military vehicle with FM radio. Roadblock NCO must be SGT or above.

b. Personnel and equipment requirements may vary, depending on unit's mission/training. Specific requirements will be determined by the unit commander; however, the following minimum requirements must be met:

(1) One NCO, SGT or above.

(2) Two guards for each post requiring physical road guards.

(3) A four-wheel drive vehicle with FM radio.

(4) A current map of Fort Stewart.

(5) Flashlight per soldier.

(6) Two red flashing lights for each manned guard post in operation during the hours of limited visibility.

(7) Uniform will be Marne Standard.

c. Special instructions for roadblock NCO:

(1) Prior to 0730 on the day of scheduled firing, the roadblock NCO will:

(a) Assemble and inspect range guards and issue range guard instructions.

(b) Post range guards and close the roadblocks designated by Range Control.

(c) Report by FM radio, telephone or in person to range OIC and Range Control Operations giving last name and last four of SSN and roadblock system being checked certifying that these tasks were accomplished.

(d) Range OIC must verify this data before requesting a wet status.

(e) OIC is responsible for roadblock emplacement.

(f) The roadblock NCO will also check his guards and/or roadblock system three (3) times daily, 0730, 1200, and 1600. Upon completion of each check, he must contact the OIC and Range Control, verifying that the area is still secured.

(2) Upon completion of firing, the roadblock NCO will:

(a) Relieve range guards and open designated roadblocks.

NOTE: Clearance must be received from Range Control before removing roadblocks/guards.

(b) Report to Range Control when all roadblocks/guards have been removed.

(c) Return all items issued by Range Control.

(d) Report any deficiencies involving guard posts and/or roadblocks to Range Control.

d. Special Instructions for range guards.

(1) Allow no one to enter a restricted area unless authorized by a special pass signed by the Chief, Range Division. This pass must be further verified by Range Control Operations either by telephone or FM Radio.

(2) One guard must remain on the road at all times, observing in all directions, to ensure complete security of the restricted area.

(3) Conduct hourly radio checks with the Roadblock NCO/Range OIC to confirm communications are fully operational.

(4) Comply with all special instructions from Range OIC/Roadblock NCO.

(5) Maintain a high standard of military courtesy and appearance.

2-7. TARGET DETAIL NCO.

Target detail NCO is responsible for emplacement of targets as directed by the OIC. Detail will not move beyond the baseline or go down range until instructed to do so by the OIC and will immediately report back to the OIC when all personnel and vehicles have safely returned from down range. NCO will remain in constant radio communications with the OIC while down range.

2-8. DIRECTOR OF PUBLIC WORKS (DPW).

The DPW has overall responsibility for:

a. Executing work requests submitted by Range Division for the design, construction and modification of ranges based on approved criteria.

b. Accomplishing recurring maintenance and repairs to ranges and other training facilities as required and/or scheduled, except for ranges where operation and maintenance services are by contract.

c. Review planned training exercises to ensure their compliance with environmental laws and regulations.

2-9. DIRECTOR OF LOGISTICS (DOL), MAINTENANCE DIVISION.

The Chief, Maintenance Division, DOL has the responsibility for inspection and repair of mechanical range equipment and items not specifically delegated to DPW IAW standard maintenance procedures.

2-10. ASSISTANT DIVISION SIGNAL OFFICE (ADSO).

The ADSO has the responsibility for dial and magneto telephone communications. Units will submit requests for telephone access for field locations (magneto (MAG) line) to the ADSO at Fort Stewart. Service must be requested 10 working days before date service is required. Service will be requested using DA Form 3938, in the following manner:

a. Must be submitted for each location and MAG line not permanently made active. Director of Information Management (DOIM) has a list of permanently activated MAG drops.

b. LSR's must be submitted for installation and removal for each line using separate DA Forms 3938.

c. Class of service will be "C", except for off-post and very important person (VIP) service when a higher class must be justified.

d. The block for "Signature of Validating Official" will be signed by TCO of unit requesting service.

e. If approved, the requesting unit will furnish, install and maintain any wire or cable used to extend the circuit to the unit location. Normally, a TA-312 telephone or SB-22 switchboard will be used to terminate the circuit. The wire and/or cable will be clearly tagged at the pedestal and along the line route. Installation will be IAW field manual (FM) 24-20. Crossing of hardtop roads is prohibited.

2-11. OTHER.
(See specific subject chapter).

AFZP- (MARKS NO) DATE:

MEMORANDUM FOR G3/DPTM, RANGE DIVISION

SUBJECT: OIC/RSO Certification

1. The following personnel are command certified on the weapon systems organic to this organization and are hereby qualified to receive the Range Control Examination:

RANK	NAME	SSN	ORGANIZATION
1LT	Alford, Terry M.	123-45-6789	B Btry, 1/52d FA
MSG	Jones, John B	234-56-7890	C Btry, 1/52d FA
SSG	Smith, Charles C	345-67-8901	HHB, 1/52d FA
SGT(P)	Doe, John B.	012-34-5678	A Btry, 1/52d FA

2. POC this unit _____, telephone _____.

****NOTE:** SGT(P) Doe is in an SSG position.

SIGNATURE BLOCK
(BN/SQDN/SEP CO CDR)

(Prepare IAW AR 25-50/3d IN Div (Mech) & FS Reg 25-1)

Figure 2-1. OIC/RSO Certification Memorandum

RANGE CERTIFICATION
(The proponent of this form is ACofS, G3/DPT)

NAME (PRINT)	GRADE
JONES, Henry B.	SSG
UNIT	**EXP DATE**
HHC,3d Inf Div	27 Feb 98
SIGNATURE	**DATE**
Henry B. Jones	28 Feb 97
CERTIFIED RANGE CONTROL, FORT STEWART, GA	

AFZP FORM 848A Previous edition will be used until supply is exhausted
1 FEB 93

Figure 2-2. Sample AFZP Form 848A

CERTIFICATE OF RESPONSIBILITY

EXP DATE 27 Feb 98 (The proponent of this form is ACofS, G3/DPT) **LAST FOUR** 7568

PRIVACY ACT STATEMENT (5 USC 552a)

AUTHORITY: E.O. 9397 and FS Reg 385-14. PRINCIPAL PURPOSE(S): To ensure that the Safety Officer or Officer-in-Charge has been briefed. ROUTINE USE(S): SSN is needed to ensure that the individual on the radio is the OIC or Safety Officer. VOLUNTARY OR MANDATORY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Mandatory. SSN must be given to ensure identification of OIC or Safety Officer.

I have been designated to function as Range OIC or Safety Officer for the purpose of conducting live firing on Fort Stewart. I have been adequately briefed by G3/DPT, Range Control Officer (or his representative) on the Fort Stewart Range Facilities and Range Regulations and I understand the extent and scope of said Range Regulations. I fully understand that it is my responsibility to observe and enforce these regulations and that it is my responsibility to ensure that all troops under my control comply with the same. I will also see that the Roadblock NCO complies with the instructions and requirements IAW Fort Stewart Regulation 385-14.

JONES, Henry B.	SSG	HHC, 3d Inf Div
NAME (Print)	GRADE	UNIT
123-45-6789	94%	28 Feb 97 Henry B. Jones
SSN	TEST SCORE	DATE/SIGNATURE

CERTIFIED RANGE CONTROL, FORT STEWART, GA

AFZP FORM 848 Previous edition dated 1 Mar 90 will be used until supply is exhausted
1 JAN 93

Figure 2-3. Sample AFZP Form 848

CHAPTER 3 - SCHEDULING

3-1. RANGE REQUESTS.

a. Requests for the use of ranges, tactical training areas, special use areas and airspace will be submitted through Range Facility Management Support System (RFMSS) or on AFZP Form 671-R (see Figure 3-1). Hard copy (AFZP Form 671-R) range requests will be approved, or disapproved and a copy of the request will be returned to the requesting unit through distribution. Requests made through RFMSS will be approved or disapproved through RFMSS, however, no hard copies will be returned to the requesting unit. Request will be accepted NLT 30 working days prior to requested date of use.

(1) The RFMSS is a set of software programs that automate the scheduling process and management functions at the Range Control Scheduling Office. The core of RFMSS is SCHEDULE, the range scheduling program that assigns units to particular training areas on requested dates. Other programs include BULLETIN to produce reports on the status of the range schedule, COMMO for real time operations, UTILIZE to print range and training area utilization reports, and RPMAD which consist of a large group of related programs. Bn/ Sqdn/Sep Co level S-3's can request for RFMSS/ONLAN installation through Range Control Scheduling office.

(2) Reserve component requests for gunnery ranges and training areas have priority during annual training; contingent on an approved plan staffed through ACofS, G3/DPTM. Request/ plans should reach ACofS, G3/DPTM NLT 7 months prior to first training date. Approval is based on special events scheduled by 3d IN Div (Mech). Inactive duty training (IDT) has priority on Small Arms ranges and training areas beginning 0001 Saturday and ending 2400 Sunday. Request should reach DRCS NLT 7 months and 15 days prior to first training date.

b. Approval of requests for use of any range, training area or other training facility will be determined by the Chief, Range Division, based upon the priorities and guidance established by ACofS, G3/DPTM.

c. Requests will be processed IAW the Priority Training/Support Cycle Circular and Calendar. The proponent agency is ACofS, G3/DPTM. Exceptions to policy will be determined by ACofS, G3/ DPTM.

d. The OIC will coordinate directly with Range Division NLT 10 working days before scheduled training/firing to ensure all aspects of the intended conduct of the range are IAW all applicable safety regulations.

e. Units are not authorized to occupy any training area or range facility without written approval from ACofS, DPTM, Range Division. Units found in violation of this policy will be instructed to depart the area by Range Control Inspectors, or in the event the area is not scheduled by another unit, and is available for scheduling, accept written responsibility (e.g. police and clearing) for the area being used until 2359 hours that night.

f. Visiting active component (AC) units planning to train at Fort Stewart must submit their request to Commander, 3d IN Div (Mech) and Fort Stewart, ATTN: AFZP-DT, Fort Stewart, Georgia 31314, through AFZP-GT (G-3) to AFZP-DTR.

g. Units desiring use of Hunter AAF Garrison Headquarters training areas/ facilities will schedule through Hunter AAF Operations.

h. Units conducting family days are required to notify Range Control (in writing) at least 10 days before scheduled event.

i. Chemical agents and smoke must be indicated on initial range request, see Chapter 13, paras 13-6 and 13-7 for specific requirements.

j. Convoy Clearance Requests.

(1) Any movement of six or more tactical and/or combat vehicles in column on Fort Stewart roads/tank trails and GA highways constitutes a convoy. Any movement of tactical and/or combat vehicles on Fort Stewart paved roads and Georgia highways requires approval from the Installation Transportation Office, for non-divisional units and the Division Transportation Office for divisional units IAW 3d IN Div (Mech) & FS Reg 55-1.

(2) Convoy notification will be submitted to Range Control by FM radio, telephone, or in person at Range Control Operations. The following information is required:

(a) Date/Time of convoy.

(b) Start point, route and destination.

(c) Type and number of vehicles.

(d) Name, rank and unit of OIC.

3-2. ASSIGNMENTS - RANGES AND TRAINING AREAS.

a. The assignment of ranges and training areas will be coordinated through Range Division IAW priorities established by ACofS, G3/DPTM.

b. The assignment of a range/training facility to a commander does not include authority to pass the assignment to another commander without the approval of Chief, Range Division. Such approval will be accomplished on an AFZP FL 1022-R (see Figure 3-2). The term "Commander" denotes commanders of battalion/squadron level units or of separate companies.

(1) Paragraph 1 - Request concurrent usage of training area, range, facility and date(s) of concurrent usage.

(2) Paragraph 2 - Reason for request.

(3) Paragraph 3 - Indicate the unit(s) that will be responsible for police and clearance of training area/range and how multiple training areas/ranges will be divided between units.

(4) Paragraph 4 - POC for requesting unit.

(5) Paragraph 5 - Concur/non-concur and signature of scheduled unit.

(6) Acknowledgment statement and signature of requesting units authorized representative.

(7) Requests received by Range Control scheduling which do not comply with the above requirements will not be processed.

c. The assignment of a training area does not include the exclusive use of roads, firing positions, ranges, drop zones or other special use training facilities/ranges within the area. Likewise, the assignment of a firing position, range, drop zone or other special use training facility/range within an area does not constitute exclusive use of the entire training area. For example, MP's, OP's and FP's only consist of a 500 meter diameter from the position marker. In addition, primary access roads (FS 1, 5, 17, 20, 43, 59, 60, 67, 129 and 144) must remain accessible to emergency personnel (as determined by Chief, Range Division). Obstacles may be emplaced on these roads, provided a safe bypass is readily available, and roadblocks are clearly marked. Prior approval is required.

3-3. CANCELLATION.

When circumstances require cancellation of a previously scheduled range or training facility, cancellation will be made through RFMSS. In the event RFMSS is not available, notice will be forwarded in writing on AFZP FL 1021-R (see Figure 3-3) through channels or submitted to Range Control Scheduling, addressed to Commander, 3d IN Div (Mech) and Fort Stewart, ATTN: AFZP-DTR. Every effort must be made to determine necessary cancellations and report them at least 30 days in advance. If Range Division does not receive writ-

ten cancellation by the scheduled day, the unit will be held responsible for clearing the area. For RC units, an information copy goes to DRCS. To cancel ranges/training areas, the following information is required:

a. Organization.

b. Range(s) and/or training area(s) to be canceled.

c. Date and time originally scheduled.

d. Name, rank and duty position of officer requesting cancellation.

3-4. FORT STEWART RANGE SCHEDULE.

The Fort Stewart range schedule is published and distributed through "E-Mail" down to company level weekly IAW AR 385-63, as a warning notice to the entire installation and to announce the assignment of range training facilities. The range schedule will contain the following information:

a. Range(s) (including firing points, if applicable).

b. Unit(s) to fire.

c. Type of weapon(s) to be fired.

d. Hours and dates of firing on each range.

e. Training areas effected by range and weapons to be fired.

f. Notice concerning danger areas, roadblocks, closing of highways, etc.

3-5. INSTRUCTIONS FOR USE OF RANGE REQUEST, AFZP FORM 671-R.

a. Heading - self-explanatory.

b. Facility requirement(s).

(1) In the first block enter the name of the live fire facility (e.g. range (RG), mortar point (MP), observation point (OP)).

(2) second block enter the inclusive date(s) and local time(s). Allow adequate time for set-up and clearing. Training days end at 2400 hours.

(3) In third block state the total number of personnel per day.

(4) Weapons designation/caliber, i.e., tank 105mm, Arty 105mm, 155mm, 8", machine gun 7.62mm.

(5) Type ammunition/fuse, i.e., HEAT-T, HE, VT, WP, TPT, Ball and Tracer.

(6) Indicate high or low angle fire and Max Ord in feet.

(7) List the desired training areas, drop zones, river landings, physical training area or special training area.

(8) List the total number of personnel per day present.

(9) List the number of vehicles, i.e., 5 wheel, 19 track.

(10) List the types of pyrotechnics to be used and amount.

c. Airspace requirements.

(1) Type of mission: i.e., CAS, photo flash/reconnaissance, bombing, strafing, paratroops training, or target area.

(2) Enter date(s), time period(s) (local), time on target (local), drop altitude and altitude requirement.

(3) Self-explanatory.

(4) Enter caliber and type ordinance, i.e., TPT, HE, Concrete filled bomb, heavy equipment, bundles.

(5) Enter type of control, i.e., FAC, flight following, ground control or leader control.

d. Concept of Operation. In space provided, state the general type of training to be conducted.

e. The original request will be returned to the requesting unit. All attached overlays must be submitted in three copies. All signatures must be original, not copies. The forms may be typed or clearly printed.

3-6. SURFACE DANGER ZONE MAP OVERLAY (REQUIRED ONLY FOR EXERCISES PREVIOUSLY MENTIONED IN THIS REGULATION).

a. Surface danger zone map overlay must include:

(1) Grid with reference marks (minimum of two) orienting to Fort Stewart composite map, DMA Edition III, 1:50,000 scale.

(2) Primary Direction of fire. (degrees or mils).
(3) Left and right limits of fire.

(4) Dispersion area, ricochet area, fragmentation area, impact area, target area, area A, area B, etc., as required by AR 385-62 and AR 385-63.

(5) Start fire line.

(6) Cease fire line.

b. Required data:

(1) Unit.

(2) Name, rank and SSN of OIC and signature.

(3) Name, rank, SSN and signature of RSO.

(4) Weapons (all weapons systems must be stipulated to include type munitions, i.e., HE/TP/Ball etc.).

(5) Date and time period (local).

(6) Brief concept of operation(s).

(7) Brief statement of control measures.

(8) Risk Assessment (see Chapter 15).

NOTE: For modification of surface danger zone diagrams in AR 385-63, (shown for point type targets) to depict zones for multiple or area targets, bisect the diagram at the azimuth of fire and place the azimuth on extreme left and right targets with the arc formed by the greatest range. For multiple firing points, depict zone for each separate zone. For further instruction and/or assistance in preparation of the appropriate overlays, Range Control will be available upon request.

c. References (AR 385-62 and AR 385-63).

(1) Ballistic Aerial Target System (BATS). Chapter 5, Table 5-1, Figure 5-1 and AR 385-62.

(2) Small Arms and Machine Gun. Chapter 6, Table 6-1, Figures 6-1, 6-2 and AR 385-63.

(3) Hand and Rifle Grenades. Chapter 7, Figures 7-1, 7-2, 7-7, and AR 385-63.

(4) Rockets. Chapter 8, Table 8-1, Figure 8-1 and AR 385-63.

(5) Recoilless Weapons. Chapter 9, Tables 9-1, 9-2 and AR 38-63.

(6) Mortars. Chapter 10, Table 10-1, Figure 10-1 and AR 38-63.

(7) Artillery. Chapter 11, Table 11-1 through 11-6, Figures 11-1 through 11-4 and AR 38-63.

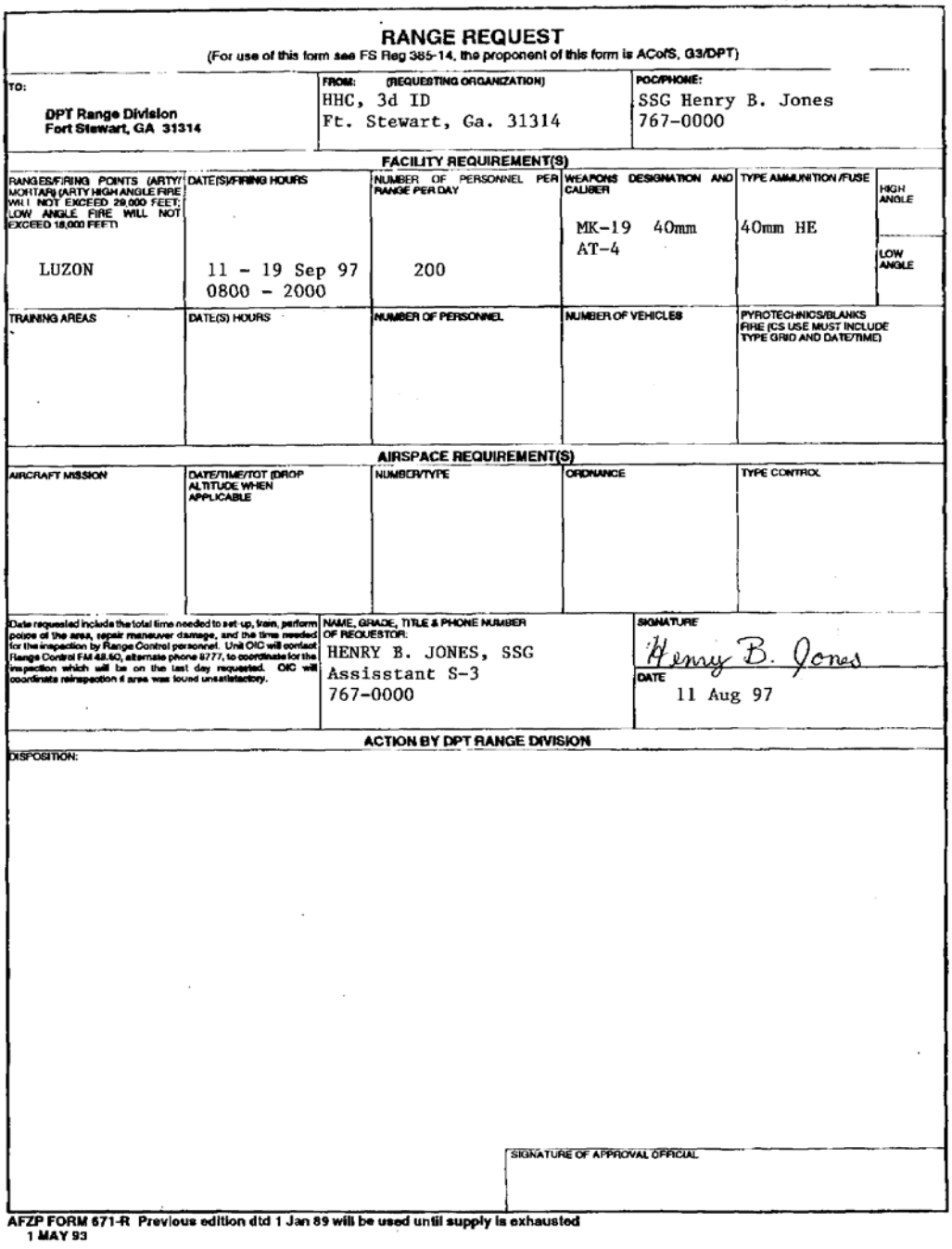
(8) Tank Cannon. Chapter 12, Table 12-1 and 12-2, Figures 12-1 through 12-3 and AR 38-63.

(9) Aerial Gunnery. Chapter 13, Table 13-1, Figures 13-1, 13-2 and AR 38-63.

(10) Air Defense Weapons. Chapter 14, Table 14-1, Figure 14-1 and AR 38-63.

(11) Flame-thrower. Chapter 15, Figure 15-1 and AR 38-63.

(12) Mines, firing devices, trip flares, simulators and explosive charges.	Chapter 18 and AR 38-63.



RANGE REQUEST

(For use of this form see FS Reg 385-14, the proponent of this form is ACofS, G3/DPT)

TO:	FROM: (REQUESTING ORGANIZATION)	POC/PHONE:
DPT Range Division Fort Stewart, GA 31314	HHC, 3d ID Ft. Stewart, Ga. 31314	SSG Henry B. Jones 767-0000

FACILITY REQUIREMENT(S)

RANGES/FIRING POINTS (ARTY/MORTAR) (ARTY HIGH ANGLE FIRE WILL NOT EXCEED 29,000 FEET; LOW ANGLE FIRE WILL NOT EXCEED 18,000 FEET)	DATE(S)/FIRING HOURS	NUMBER OF PERSONNEL PER RANGE PER DAY	WEAPONS DESIGNATION AND CALIBER	TYPE AMMUNITION /FUSE	HIGH ANGLE / LOW ANGLE
LUZON	11 - 19 Sep 97 0800 - 2000	200	MK-19 40mm AT-4	40mm HE	

TRAINING AREAS	DATE(S) HOURS	NUMBER OF PERSONNEL	NUMBER OF VEHICLES	PYROTECHNICS/BLANKS FIRE (CS USE MUST INCLUDE TYPE GRID AND DATE/TIME)

AIRSPACE REQUIREMENT(S)

AIRCRAFT MISSION	DATE/TIME/TOT (DROP ALTITUDE WHEN APPLICABLE	NUMBER/TYPE	ORDNANCE	TYPE CONTROL

Date requested include the total time needed to set up, train, perform police of the area, repair maneuver damage, and the time needed for the inspection by Range Control personnel. Unit OIC will contact Range Control FM 48.60, alternate phone 8777, to coordinate for the inspection which will be on the last day requested. OIC will coordinate reinspection if area was found unsatisfactory.

NAME, GRADE, TITLE & PHONE NUMBER OF REQUESTOR:
HENRY B. JONES, SSG
Assisstant S-3
767-0000

SIGNATURE: Henry B. Jones

DATE: 11 Aug 97

ACTION BY DPT RANGE DIVISION

DISPOSITION:

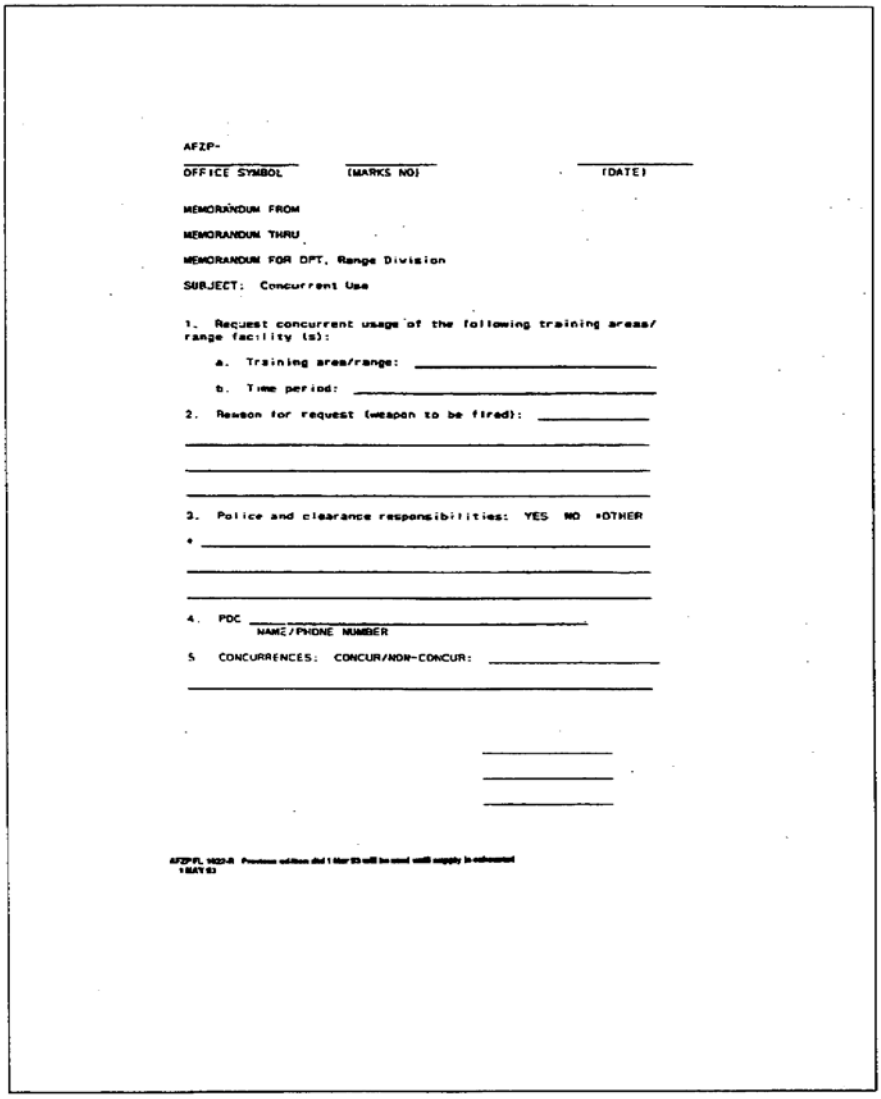
SIGNATURE OF APPROVAL OFFICIAL

AFZP FORM 671-R Previous edition dtd 1 Jan 89 will be used until supply is exhausted
1 MAY 93

Figure 3-1. Sample AFZP Form 671-R

PURPOSE/TYPE OF TRAINING:	CONCEPT OF OPERATION
MK-19 and AT-4 Qualification.	

Figure 3-1. Continued



AFZP-

OFFICE SYMBOL (MARKS NO) (DATE)

MEMORANDUM FROM

MEMORANDUM THRU

MEMORANDUM FOR DPT, Range Division

SUBJECT: Concurrent Use

1. Request concurrent usage of the following training areas/ range facility (s):

a. Training area/range: _____

b. Time period: _____

2. Reason for request (weapon to be fired): _____

3. Police and clearance responsibilities: YES NO *OTHER

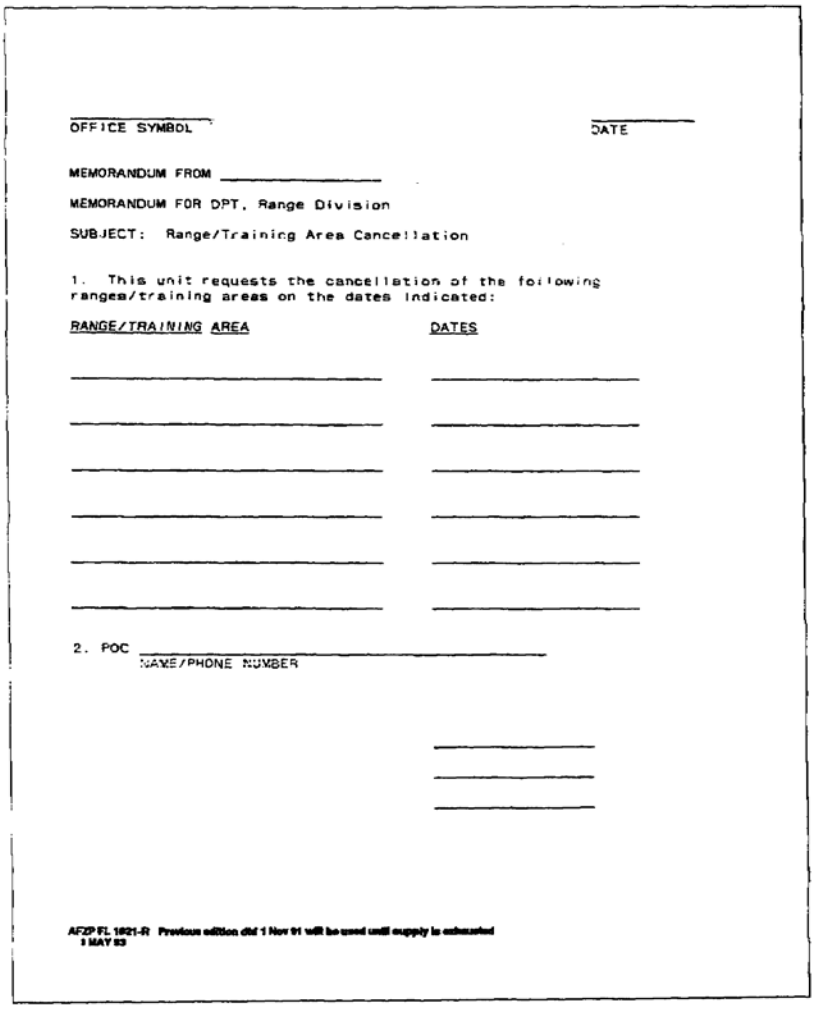
* _____

4. POC _____
NAME/PHONE NUMBER

5. CONCURRENCES: CONCUR/NON-CONCUR: _____

AFZP FL 1022-R Previous editions will be used until supply is exhausted
1 MAY 83

Figure 3-2. Sample AFZP FL 1022-R (CO-USE)



OFFICE SYMBOL _____ DATE _____

MEMORANDUM FROM _____

MEMORANDUM FOR DPT, Range Division

SUBJECT: Range/Training Area Cancellation

1. This unit requests the cancellation of the following ranges/training areas on the dates indicated:

RANGE/TRAINING AREA	DATES
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. POC _____
NAME/PHONE NUMBER

_____
_____
_____

AFZP FL 1021-R Previous edition did 1 Nov 91 will be used until supply is exhausted
1 MAY 93

Figure 3-3. Sample AFZP FL 1021-R (Cancellation)

CHAPTER 4 - COMMUNICATIONS

4-1. GENERAL.

a. Range Division operates an FM communication's net 24 hours a day. The OIC of each range and or training area is responsible for establishing FM communications with Range Control Operations, using frequency 48.50, before occupying the scheduled area. Range control also operates an alternate frequency (FM 46.10) which is used as a back-up in the event the primary frequency is non-operational. The alternate frequency will only be used when directed by Range Control, an emergency arises and/or communication with Range Control cannot be made on the primary frequency.

b. The OIC of each range/DZ must ensure that communication is maintained with Range Control operations throughout the conduct of live fire/aerial drops. The OIC will immediately call a cease fire if communication with Range Control is lost and will not resume firing until communications are restored.

Units training in non-live fire areas (training areas/facilities), for longer than a 24-hour period, are required to re-occupy these areas once every 24 hours, telephonically or by FM communications, through Range Control Operations. Although units using these non-live fire areas are not required to monitor the Range Control net, they may do so to remain abreast of weather warnings. See para 4-2 for live fire communications requirements.

c. In the event Range Control cannot establish communications with a firing unit, a Range Division inspector will be sent to the site, contact the OIC and place the unit under a “check fire” until communication is restored.

d. Units failing to maintain communications with Range Control during live firing will have one or more of the following actions taken by Range Control to ensure proper monitoring and maintaining of communications:

(1) Place the unit in “check fire”.

(2) Require unit to conduct radio checks every 30 minutes.

(3) If severe problems with communications continue, OIC will discontinue training until reliable communication is restored.

(4) If unit is found to be negligent, OIC will receive a written safety violation, a copy of which will be kept on file at Range Control, range placed in a “dry” status, and possible revocation of OIC’s range certification.

e. All live fire ranges require two means of communication. Radio (FM) will be the primary means. Telephones may be used as an alternative means of communication. For ranges not equipped with a telephone, two radios will be used.

f. Using units will establish and be responsible for the operation of adequate internal safety and fire control nets during firing exercises. Two FM radio frequencies have been permanently assigned to the following ranges: RC-A, RC-F, RC-G, RC-H, MPRC, YANKEE, ZULU, AND CALFEX Tower. See Chapter 6, appropriate range for exact frequencies.

(1) Units are authorized to continue use of internal radio frequencies per signal operation instructions (SOI) for additional command and control, however, the frequencies established for these ranges will remain active in the range towers.

(2) Units arriving on these ranges will enter the administrative (admin) net and receive all instructions and guidance from the tower (range OIC). The range OIC will instruct firing crews when to change between the firing net and the admin net.

(3) When employing single channel ground and airborne radio system (SINCGARS), use medium power on initial start-up. In the event medium power does not work, use high power.

NOTE: Since maximum distance on ranges is 2800 meters for track vehicle and medium power operates to 4 kilometers, improper

power setting could cause frequency bleed-over.

(4) To be compatible with Range Control and 12-series radios, set SINCGARS to manual, non-secure, and single channel modes.

NOTE: Range control frequency's 48.50/ 46.10 will not be used for unit internal use.

g. Units using field wire for range communications or field training will comply with the following:

(1) Existing telephone poles will not be used.

(2) All temporary communications installed will be removed prior to clearing the range/ training area.

(3) Tactical communications wire crossing dirt roads will be buried at a depth of 12 inches. Overhead lines crossing secondary trails/roads will be at least 14 feet high and marked with a 2 foot strip of white engineer tape at 1 meter intervals. Digging or excavating along state highways/roads or Fort Stewart roads must be approved by the DOIM Office.

(4) Tactical communications wire crossing hard surface roads is prohibited.

(5) Wire lines will not be laid near the approach to or across landing strips and drop zones.

h. The Range Control Communication System, both radio and telephone, is an administrative net. The call sign for Range Control Operations is “Range Control”. Users of a range/facility will use the call sign of the range/facility, i.e.: “Range Control, this is Small Arms Bravo; Red Cloud Hotel; Remagen DZ; etc.” Aviators will use aircraft tail numbers as call signs. Any other station entering the net will identify themselves by unit and training area/facility being used. At no time will units use Range Control frequencies for communications between or within units without obtaining permission.

i. Antenna’s extending above the trees or in open areas must be approved by Range Control Scheduling 72 working hours prior to erection. All antenna’s extending above surrounding trees will be equipped with light(s) at or near the top.

4-2. SPECIFIC LIVE FIRE REQUIREMENTS.

a. Field artillery and other indirect fire units will establish communications from each firing position or observation point. Personnel using OP’s to adjust fire in conjunction with a unit on a firing position will establish/maintain communications with Range Control. Use of a TOC or single element for communications with Range Control will not be permitted unless prior approval is granted.

b. Aerial gunnery range firing will be controlled by the OIC through radio communication to each aircraft. The OIC will establish communication with Range Control.

c. Communication between units and Range Control is a major factor in the safe operation of ranges/training facilities and will be maintained at all times when live fire is being conducted. Vital information such as heat categories, storm warnings, etc., is passed on to units from Range Control.

d. The following are standard calls required from all live fire ranges/facilities:

(1) Request permission to occupy.

(2) Estimated “wet” time.

(3) Request permission to go “wet”. See para 2-4c of this regulation for opening data required.

(4) First round down range and observed safe.

(5) Hourly radio checks initiated by Range Control.

(6) Request for an internal check fire. Normally used for target detail, range police, etc., (see para 4-2f).

(7) Request permission for a “dry” status (non-firing).

(8) Request permission to “clear” the range/facility. If a unit is scheduled for firing the next day, they may request permission for a guard status. Guards must have communication with their parent unit and Range Control.

e. When a unit desires to recon a scheduled range/facility the OIC will request permission to “recon” the area. When permission is granted for recon purposes, the unit is normally given a 1 hour time limit. If a “recon for Survey” status is used, the necessary time required will be granted. After completing the recon mission, permission to clear the area must be requested. Base stations and/or position area OIC may control recon parties from his location and make required calls to Range Control.

NOTE: Recon of a facility/area does not constitute unit utilization.

f. Units desiring to “leave the firing line” must request permission. This status is primarily used for target details, extensive recon mission, or range police. When permission is granted for a unit to leave the firing line, the OIC must ensure that a responsible individual remains in the tower and has communications with detail and Range Control. When a detail is sent down range, Range Control will need the detail NCOIC’s name and down range distance in meters.

NOTE: Units may install targets on ranges having maneuver limits without requesting to leave the firing line, provided the unit complies with the maneuver limitations.

4-3. RANGE DIVISION TELEPHONE NUMBERS.

a. Chief, Range Division, telephone 767-8100 (S).

b. Range Division Operations, telephone 767-8777 (S).

c. Range scheduling (requests, cancellations, coordination), telephone 767-7568 (S).

d. Range Supply (flags, lights, etc.), telephone 767-7790/5150 (S).

e. Range Control Environmental section, telephone 767-8139 (S).

f. Marne Radio, telephone 767- 8505 (S).

g. Camp Oliver Complex, telephone 767-2680 (S).

h. MEDEVAC, telephone 767-4850/5607 (S). (FM 49.65 MHz, old squelch on).

i. Pass and Permit, telephone 767-5032 (S).

j. Range Technicians, telephone 767-7807 (S).

4-4. EMERGENCY TELEPHONES (LOCATIONS, NUMBERS, COORDINATES).

There are 15 emergency phones located on Fort Stewart (see Figure 4-1). Each phone will have a blue and white sign (11” X 20”) affixed above each phone and a blue and white sign (24” X 26”) on either side of the phone on the right of way stating: “Emergency Phone - 1000 meters”.

Locations	Coordinates	Numbers
144E & Road 68	MR 565368	767-2440
144E & Evans Field	MR 514338	767-4140
144E at Outdoor Rec.	MR 468315	767-2717
144E & Road 56	MR 634376	767-2440
129 (Pass TC Cemetery)	MR 304430	767-7332
129	MR 358373	767-7332
119 (Pembroke Firetower)	MR 410520	767-2442
119 & 129	MR 390349	767-7332
119 & RC-E	MR 379406	767-2442
144W & ASP Road	MR 376306	767-8371
144W & TCDZ	MR 323336	767-2441
144W & Firetower	MR 288344	767-2441
144W & Road 5	MR 279346	767-2441
Road 5	MR 199444	767-2139
Pineview Lake	MR 199356	767-2775

Figure 4-1. Emergency Telephones

CHAPTER 5 - ACCIDENTS, INCIDENTS AND MALFUNCTIONS

5-1. GENERAL.

a. The assignment of an OIC/RSO does not relieve commanders of their responsibility to ensure that all training/firing is conducted IAW current safety policies and procedures. Safety and realistic training are compatible and equally important; one will not be sacrificed for the other.

b. The provisions of AR 385-63, this regulation and appropriate technical publications for the weapon(s) and ammunition fired, specify the general safety requirements for all range firing. Safety will be emphasized by all participants.

c. Units will give strict attention to hearing conservation. Ranges and FP's/OP's will have a "Caution - High Intensity Noise-Hearing Protection Required" sign posted either at the entrance or near the firing line. Personnel beyond this sign will be in the noise danger zone and will wear hearing protection while firing is being conducted.

d. Units will strictly adhere to map overlays depicting danger zones and lines of fire.

e. The range OIC will conduct a safety briefing for all personnel before training on a live fire facility.

f. Smoking is prohibited in towers, on the firing line, in vehicles, within 50 feet of ammunition/fuel, or range buildings. OIC will designate a smoking area behind the firing line.

g. Incidents and accidents must be reported immediately.

5-2. ACCIDENTS AND MALFUNCTIONS.

a. For corrective actions and reports required, see AR 75-1 for each weapon and Figure 5-1 for report requirements.

b. The handling of aircraft weapons malfunctions occurring on the Aerial Gunnery Ranges (see para 6-12) will be as prescribed by the unit standing operating procedure (SOP), Safety Control Plan and appropriate TM's and FM's. Defective ammunition will be identified, segregated, and turned in, as prescribed by these publications.

c. Range Control Operations will annotate the incident in the log and will use the appropriate report format. This report will be attached to the Range Control operations daily duty log.

d. The Fort Stewart Safety Manager and/or Technical Service Officer concerned will take appropriate investigative action and forward formal reports, as required. This does not preclude the responsibilities of commanders to cause an immediate investigation as prescribed in appropriate regulations.

5-3. MISFIRES, JAMMED ROUNDS AND ERRATIC FIRING.

a. In the event of misfires, jammed rounds or erratic firing, Figure 5-1 will be used to identify the local corrective actions and reporting requirements. It should be noted that the corrective actions and/or reports required by the appropriate TM's, AR 385-63 and unit SOP's are not totally incorporated in Figure 5-1. Reports and informational elements required by such publications that are not included in Figure 5-1 remain in effect.

b. Ammunition identified or suspected of being defective will be placed in its original container with felt pad to protect the primer, placed in the misfire pit and turned in to the Post Ammunition Supply Point (ASP) upon completion of firing.

5-4. DUDS AND ABANDONED AMMUNITION.

a. Areas where unexploded ordnance may be present are clearly marked: 'DANGER-FIRING RANGE-UNEXPLODED DUDS-KEEP OUT! DUDS WILL EXPLODE IF PICKED UP OR STEPPED ON! ENTRY ON OR REMOVAL OF ANY ITEM FROM RANGE IS PROHIBITED! BY ORDER OF THE COMMANDER!'

b. All personnel will be briefed/warned not to pick up or handle duds, projectiles, flares, fragments, or ammunition that may be found. It is the responsibility of all unit commanders to brief their personnel concerning the danger of handling duds.

c. Duds will be handled by Explosive Ordnance Detachment (EOD) personnel only.

d. Designated impact areas are off limits to troops, to include EOD personnel. No individual or group will enter danger or restricted areas of any range unless clearance has been obtained from the Chief, Range Division or his authorized representative (see Chapter 10).

e. If a dud is found, the site will be marked by a stake or post that will extend approximately 4 feet above ground or high enough to be visible above surrounding underbrush, and at a maximum distance from which the round is visible. The stake will be made as conspicuous as possible by the attachment of engineer tape or bright colored cloth.

f. See Figure 5-1 for reporting requirements.

g. Abandoned Small Arms ammunition will be recovered and turned into the ASP. Range Control Operations will be notified of the quantity, type and grid location. Unit will also report all lost, stolen or recovered ammunition immediately to the Provost Marshal Office (PMO) MP desk, telephone 767-2822 (S) or 95-6133 (H).

5-5. ROUNDS LANDING OUTSIDE SAFETY LIMITS.

If a round lands or detonates outside the impact area or prescribed safety limits, the Chief, Range Division will suspend the responsible unit's firing. A disinterested officer will conduct an investigation to determine the cause of the safety violation. The responsible commander at Brigade/Regiment/Division/Artillery Brigade level will be notified. Once that Commander has concurred with the measures taken to prevent a recurrence, the Chief, Range Division will be notified of the action taken. The Chief, Range Division will be the final authority to determine if the unit may resume firing.

a. Upon notification of a round impacting outside the safety limits, Range Control Operations will broadcast over the FM net, the following net call:

ALL STATIONS THIS NET, ALL STATIONS THIS NET. THIS IS RANGE CONTROL, CEASE FIRE FREEZE, CEASE FIRE FREEZE.

NOTE: All stations will then stand by to acknowledge receipt of the call. Firing crews will evacuate vehicles without disturbing last fired data.

b. On receipt of a Cease Fire message containing the word "freeze", no vehicles or weapons on any range or firing position will be moved or fired, sighting and aiming stakes will be left in place, sight settings will not be altered and personnel will move away from their weapons. Artillery and mortar firing charts, computer records, and associated data from the last fired missions will be collected and prepared for delivery or radio broadcast on range operation's request. The following information will be collected for transmission to Range Control for last fired missions:

(1) Unit, position area, FP and battery coordinates.

(2) Time last round was fired.

(3) Type round.

(4) Type fuse.

(5) Charge fired.

(6) Number of rounds fired.

(7) Numbers of rounds observed safe.

(8) Azimuth.

(9) Deflection.

(10) Quadrant.

5-6. MEDICAL EVACUATION (MEDEVAC).

a. Requirements at each range when live firing is being conducted are as follows:

(1) Commanders are responsible for the safety of personnel participating in field training, to include evacuation of injured personnel.

(2) Units are not required to have a dedicated medical evacuation vehicle or medical personnel on each range or firing point unless using flame-throwers. OIC will be responsible for determining the most expedient means of evacuation necessary in the event of an injury.

(3) Units requiring external medical support must submit a written request at least 45 days in advance through ACofS, G3/DPTM Central Tasking.

b. Non-life threatening evacuations are the units' responsibility.

c. Emergency air evacuation will be requested through Range Control only if the injury is LIFE/LIMB/EYE threatening or HEAT related.

d. Air MEDEVAC requests will be processed through Range Control operations, by FM or by telephone and will include the following information, as a minimum:

(1) Location of pick-up/unit.

(2) Unit call sign, FM frequency, and OIC name/rank.

(3) Patient category.

(4) Special equipment required.

(5) Security at pick up site.

(6) Type of wound, or injury.

(7) Method of marking pick-up site.

(8) Number of patients by type.

(9) Patient’s nationality, race.

(10) Weather at pick-up site.

(11) Brief description of terrain.

e. In the event a unit requesting MEDEVAC cannot contact Range Control Operations, the unit will make the request directly to the Air Ambulance Company (AAC) on FM Frequency 49.65 OLD SQUELCH ON using the administrative call sign “DUST OFF.” If calling “DUST OFF” telephonically, the number is 767-4850 (S). Advise them that Range Control was not notified.

f. All medical evacuations will be reported to Range Control using the Format B as shown in the OIC range book.

5-7. REPORTING POL SPILLS/CONTAMINATION HAZARDS.

Units are responsible for spills made on the reservation. Spills will be reported to Range Control Operations immediately, regardless of amount. The accepted method of neutralization is removal of all contaminated earth. All contaminated soil will be placed into plastic bags (doubled if necessary), tagged with date, time, unit, location, and type of contaminate, then taken to the land fill for disposal. Unit will then retrieve soil from other locations to replace contaminated soil. Units will take extreme precautions to prevent oil spills from contaminating ponds, rivers, and streams. If a spill occurs, the following information is required by Range Control:

a. Location of spill/accident (grid coordinate).

b. Did spill mix with any water? (wet-land/pond/river/creek).

c. Type of spill. (Oil/Fuel/Antifreeze/NBC/etc.).

d. Substance spilled/damage.

e. Amount spilled/damage.

f. Unit and date/time spill/damage occurred.

g. Reporting individual.

(1) Contaminates Nuclear, Biological, Chemical (NBC) are reported to Range Control immediately. OIC will deny access into the contaminated area until released by environmental personnel.

(2) Range Control Operations will notify the Fire Department at telephone, 767-8118/ 1711 (S).

5-8. ENDANGERED SPECIES INCIDENT AND RESPONSE PROCEDURES.

a. Soldiers will notify their company commander immediately upon becoming aware that a federally listed endangered or threatened species has been "taken" (by accident or otherwise) incidental to the conduct of mission activities. As defined by The Endangered Species Act, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Serious damage or destruction of an essential habitat component, such as a Red-Cockaded Woodpecker (RCW) nesting tree, is "harmful" and therefore meets the definition of "take". Federally listed species on Fort Stewart are the bald eagle, shortnose sturgeon, wood stork, indigo snake, and RCW. Soldiers should be made familiar with these species through the installation Environmental Awareness Program. If doubt exists regarding the identity of a species, it should be treated as a listed species until knowledgeable personnel can provide positive identification.

b. Upon notification that a "taking" has occurred, company commanders will immediately cease the specific activity that led to the taking (excavation, maneuver, live fire, etc.). Immediate notification will be made to Range Control. The company commander or his/her representative will remain available to provide information and otherwise assist Range Control with its investigation of the incident.

c. Upon notification that a "taking" has occurred, Range Control will provide notification to G3; ACofS, G3/DPTM; Staff Judge Advocate (SJA), and DPW and will immediately dispatch an inspector to the training area where the "taking" occurred to meet with the unit representative and determine:
(1) The cause of the taking.

(2) Actions necessary to prevent future such takings: Training activity may resume only after the Chief, Range Control, or his representative, is satisfied that the deficiencies which led to the taking have been corrected. Range Control will prepare a memorandum for record (MFR) identifying the nature of the taking: species, number of individuals, cause, investigating officer or NCO, and corrective action taken. The MFR will also identify any individual(s) whose violation of public law, Army Regulations, or Fort Stewart Regulations may have contributed to the taking. A copy of the MFR will be provided to DPW and SJA as soon as possible. Any perishable specimen/carcass will be promptly turned over to the DPW Fish and Wildlife Branch for delivery to the United States Fish & Wildlife Service (USFWS). Damaged habitat (RCW cavity, etc.) will not be altered or removed except as directed by DPW.

d. Upon notification that a "taking" has occurred, DPW will inform the Garrison Commander, then notify the USFWS Field Office in Brunswick, telephone (912) 265-9336. Notification of the USFWS will occur within one working day from the time of the taking. Information provided to the USFWS will include:

(1) The time, place and cause of the taking.

(2) The nature of the taking.

(3) Actions taken to prevent future such takings.

(4) Time at which training was or will be resumed. DPW will provide technical support (species identification, damage assessment, etc.) as requested by ACofS, G3/DPTM.

e. SJA will review the MFR provided by Range Control and provide advice to the command regarding appropriate action to be taken against any individual(s) whose violation of law or regulation may have contributed to the taking.

CORRECTIVE ACTIONS AND REPORT REQUIREMENTS FOR ACCIDENTS, MALFUNCTIONS, DUD MISFIRES, JAMMED ROUNDS, and ERRATIC FIRING

ACTION TO BE TAKEN	ACCI-DENTS	MAL-FUNC-TIONS	DUD WHILE FIRING	DUD FOUND	MISFIRE	JAMMED ROUND	ERRATIC FIRING	ERRATIC ROUNDS OBSERVED	ENDANGERED SPECIES HABITAT DAMAGE	ENDANGERED SPECIES TAKE INCIDENT
1. Order cease fire / stop training	M	O	O	O	O	M	M	M	M	M
2. Submit initial report to Range Control to request assistance	M	M	O	M	O	O	M	M	M	M
3. Order "TO THE REAR OF THE PIECE, FALL IN" and ensure the weapon/FDC data is preserved	O	O	O	O	O	O	M	M	O	O
4. Preserve the scene of the incident pending arrival of the investigator	M	O	O	O	O	O	M	O	M	M
5. Follow procedures IAW the TM(s) for weapon(s) and ammo being fired	O	M	M	O	M	M	O	O	O	O
6. Notify unit commander concerned.	M	O	O	O	M	O	M	M	M	M
7. Submit follow up report to Range Control operations within 30 minutes of the incident/accident	M	O	O	M	O	O	M	O	O	M
8. Determine corrective action.	M	M	M	M	M	M	M	O	M	M
9. Submit final report to Range Control Operations within 48 hours	M	M	M	M	M	M	M	O	M	M

M -- Mandatory. Requirement is applicable.

O -- Optional. If OIC/RSO determines that such action is appropriate. On incidents involving indirect fire weapons, call Range Control Operations for assistance.

Figure 5-1. Corrective Actions and Reports Requirements

CHAPTER 6 - LIVE FIRE FACILITIES

6-1. GENERAL.

Fort Stewart has the capability of accommodating most weapon systems and/or ordnance currently in the system. Facilities available are listed in this chapter to include the location and maximum caliber/weapon system that can be fired on that range.

6-2. REQUIRED BRIEFINGS.

a. OIC/RSO Certification Briefings/Examinations are conducted three times weekly at Range Control, Bldg T-7901 as follows:

(1) Monday and Friday - 1330.

(2) Wednesday - 0930.

b. Unit personnel must attend the OIC/RSO Certification and Examination briefing before assuming OIC/RSO responsibilities. Briefings will be conducted by the Chief, Range Division or an authorized representative, on the operational and safety requirements for Fort Stewart ranges/training areas. A Certificate of Responsibility signed by the OIC/RSO will be maintained on file at Range Division Operations. Certification is valid for one year from date of certification (see Figure 2-3). Personnel attending certification briefing must be in military uniform and have a commander's memorandum in their possession (see Figure 2-1).

c. On range briefings for OIC.

NOTE: The following on range briefings are given at Range Control (Bldg T-7901): RSPAC; NBC CHAMBER; SMALL ARMS HOTEL, INDIA, & MIKE; AGR's 2, & 3; OP's 1-4; MP's 1-5; OBSTACLE COURSE; LUZON; DEMOS. The prerequisites listed below remain the same.

(1) Personnel designated as OIC for a live fire range must receive an on range briefing the day prior or the morning of their scheduled training.

(2) OIC will be thoroughly briefed on the operation, safety requirements and times of scheduled "mandatory checkfire", if any, for the particular range to be fired on.

(3) OIC must be in duty uniform with Marne standards and have a military vehicle for transportation to the range, if applicable.

(4) OIC will report to Range Control Operations for coordination and link-up with a range inspector who will conduct the briefing.

6-3. AMMUNITION CARE AND HANDLING.

a. No smoking within 50 feet of ammunition storage area.

b. Units storing ammunition on the ranges must comply with AR 700-4, provisions of current 3d IN Div (Mech) & FS Reg 700-4 and as a minimum, comply with the following:

(1) Place on dunnage/pallets at least 6 inches high.

(2) Cover with a tarp to permit airspace of at least 18 inches between the tarp and ammunition.

(3) Store within compatible groups.

(4) Separate ammunition types as prescribed in TM 9-1300-206.

(5) Post "NO SMOKING" and "NO OPEN FLAME" signs.

(6) Ammunition removed from sealed containers to be fired will be removed by means of the tear strip provided and will be placed on tarpaulins and covered to protect it from the direct rays of the sun and/or precipitation. Ammunition will not be removed from sealed containers any earlier than necessary to prepare it for firing.

(7) Maintain proper security per physical security guidelines set forth by division ACofS, G2/PMO. Normally a minimum of one NCO and two guards per shift.

(8) Maintain appropriate distance from major highways/firing lines.

(9) Ammunition storage on the ranges for periods of 48 hours or more will be stored IAW TM 9-1300-206, AR 190-11 and Forces Command (FORSCOM) Suppl 1 to AR 190-11. Ammunition will not be stored on ranges for periods greater than 14 days.

(10) Have two operational Class 'A' type (water) extinguishers in the ammunition storage area. Have two operational Class '10-BC' or larger extinguishers on vehicles transporting ammunition or whenever a vehicle is parked inside the ASP area.

(11) For all Red Cloud tank ranges, main gun ammunition will be stored at the ammo storage area at Red Cloud Fox-Trot (vicinity grid MR 389397), Red Cloud Delta (vicinity grid MR 373440) or in an area designated and/or approved by Chief, Range Division. Small arms ammunition for tank ranges can be stored on each range IAW this regulation.

(12) Upon completion of firing, ammunition turn-in procedures must be IAW unit SOP and 3d IN Div (Mech) & FS Reg 700-4.

6-4. USE OF INCENDIARY TYPE ORDNANCE.

White phosphorus, red phosphorus, pyrotechnics and tracer ammunition.

a. Units must comply with 3d IN Div (Mech) & FS Reg 420-2, which restricts the use of pyrotechnics and firing tracer ammunition on the reservation during Category III, IV, and V forest fire danger ratings. The following restrictions will apply:

(1) CATEGORY III: Caution must be used when handling pyrotechnics and firing tracer ammunition. Pyrotechnics should be used only in cleared areas and tracer ammunition restricted to fire-proofed areas; i.e., Red Cloud Ranges, Artillery Impact Area (AIA) and AGR's.

(2) CATEGORY IV: Very dangerous situation exists for forest fires; tracer ammunition will be restricted to fire-proof areas and will not be used after 1200, unless approved by the Chief, Range Control. Pyrotechnics may be used for emergencies without the approval of Range Control.

(3) CATEGORY V: Critical fire danger exists for forest fires. No tracer or pyrotechnics will be used, nor any type open fires permitted, unless approved by the Chief, Range Control.

NOTE: Removing tracers from linked ammunition (de-linking) is illegal and therefore prohibited. Units should forecast ball ammunition without tracers, for periods when fire categories are anticipated to be three or higher (i.e., March through June).

b. In the event the fire danger reaches Category III or higher, Range Division will notify those major headquarters that have units training in the field by commercial telephone. It will be the responsibility of the major headquarters to notify its units of the fire category. A telephonic report will be made to Range Control Operations when all elements have been notified. Range Control will notify units conducting live fire by FM communications since communications are maintained for safety.

6-5. CONTROL OF EXPLOSIVES AND COMPONENTS.

a. Explosive items will be issued only to authorized units. Exceptions will be considered on a case-by-case basis. Such requests will be submitted to this headquarters through command channels. Explosives in this category include the family of: demolition charges (C4, TNT, shape charges, cratering charges, and dynamite); anti-personnel mines; anti-tank mines and firing systems (firing

devices, blasting caps, time fuses, igniters, primers and detonation cords). The following policy applies:

(1) The RSO will personally observe placement of charges, as well as actual detonation and certify the quantity expended.

(2) During field training exercises or any event requiring expenditure of explosives at locations other than the established range, a commissioned officer will perform the function of observing placement and detonation, as well as certification of expenditure.

(3) The total single charge will not exceed 150 pounds of explosives. Climatic conditions may force Range Division to reduce the single charge limit.

(4) Inert line charges may be fired on Red Cloud Fox-Trot, Golf and MPRC. High explosive (HE) line charges are not authorized on Fort Stewart. Recovery of rockets is not authorized. EOD must destroy all rockets in place. OIC will coordinate EOD support prior to firing date(s).

b. The following policy applies to the control of claymores, fragmentation grenades and the Light Anti-tank Weapons's (LAW/AT-4):

(1) The Range OIC will sign for and control these items while at the range.

(2) The Range OIC will certify the quantity drawn, quantity expended and quantity returned after training.

(3) When LAW's/AT-4's are used in Live Fire Exercises, a commissioned officer in the chain of command will certify the quantity expended.

c. The original copy of each certification of expenditure will be attached to the turn-in document (DA Form 581) and provided to the ASP during the turn-in/ reconciliation process. The ASP will not clear units without the required certification or a signature of the next level commander (not less than battalion) indicating investigation has been initiated IAW AR 15-6 to account for missing explosives.

6-6. SMALL ARMS RANGES.

The following additional procedures are prescribed for use on the Small Arms ranges listed in this chapter. In addition to the guidance provided in this regulation, OIC's/RSO's will be familiar with pertinent Army Regulations, FM's and TM's for weapons being fired. If it's not safe, don't do it.

a. Specific Procedures.

(1) The OIC will comply with the instructions as outlined in this regulation and special instructions received during the on site briefing.

(2) Ranges will not be entered by unit personnel until the OIC has signed for the range book and keys from Range Control Operations and has requested permission to occupy the range by FM or telephone. Range book and keys will be returned to Range Control Operations upon completion of firing.

(3) On ranges not equipped with a public address (PA) system, unit is responsible for providing a bull horn or other suitable means for communication/ control of personnel on the range.

(4) Latrine supplies will be furnished by the user.

(5) Units planning to fire incendiary or tracer type ammunition must notify Range Control Operations at the time the unit requests occupation of the range.

(6) Roadblocks are not required for Small Arms Ranges Alpha through Mike. Use of gate/entrance guards is at the unit's discretion; Range Division does not require entrance guards.

b. OIC/RSO Special Instructions.

(1) Prior to firing, the OIC will ensure that:

(a) The range has been requested and approved through Range Control Operations.

(b) The Red Range Flag (red light at night) is flying.

(c) OIC is responsible for providing means of medical evacuation.

(d) Brief personnel on actions taken during electrical storms, i.e., turn off all power in towers, evacuate towers, cease radio communication, move away from antennas, trees, and vehicles, and cease handling/firing of munitions.

(e) Weapons not in use will be on "safe" and in weapons racks (if applicable) or stacked IAW FM 22-5. Weapons not in use will be under constant surveillance by dedicated guards IAW AR 190-11 and FORSCOM Suppl 1 to AR 190- 11.

(2) During firing, the OIC will ensure that:

(a) Ear plugs are worn by personnel participating in and conducting firing, to include personnel positioned in bunkers/pits and unit control personnel.

(b) M16A1 Cartridge deflectors are used by left-handed firers, not required for M16A2's.

(c) Weapons are pointed up and down range.

(d) No one moves forward of the firing line.

(e) All targets and safety markers are plainly visible.

(f) RSO will clear all weapons before firing and before removal from the firing line.

(g) Permissible rates of fire will be IAW appropriate FM/TM. Automatic fire is prohibited on Small Arms Clifford, C, D, E, F, G, Yankee and Zulu.

(h) Only requested/authorized ammunition is fired.

(i) Firing line/lanes are policed as firing is completed.

(j) No range modifications unless approved by the Chief, Range Division.

(3) After firing is completed, the OIC will ensure that:

(a) All weapons have been cleared/ rodded by the RSO.

(b) Request to go into a "cold" status has been approved by Range Control.

(c) Range damage is repaired.

(d) All brass and ammunition are turned in and accounted for IAW 3d IN Div (Mech) & FS Reg 700-4.

(e) Range and facilities are properly policed.

(f) All unserviceable targets are removed from the range (if applicable).

(g) All serviceable targets are refaced (if applicable).

(h) Field wire installed by using unit are disconnected from cable terminals. Damaged cable/terminals and those not functioning properly are reported, along with other discrepancies (i.e., inoperative targets) to the Range Division Inspector.

(i) Tower, latrine and storage sheds are cleaned; equipment properly stored; power turned off, as applicable.

(j) Range is closed through Range Control and appropriate data submitted.

(k) A clearance inspection is requested through Range Control Operations. Once range has been inspected and cleared, lock all facilities and return the range book and keys to Range Control Operations.

c. Small Arms Alpha.

(1) Type Range: Combat Pistol Qualification/Military Police Firearms Qualification Course. (Day/Night Fire)

(2) Authorized weapons/caliber ammunition: .22 Cal, .38 Cal., 9mm, and .45 Cal; ball or match.

(3) Location: MR 444306.

(4) Number of firing points: 13.

(5) Number and type targets: Seven electrical “pop-up” silhouettes per lane at distances of 10, 13, 16, 17, 23, 27, and 31 meters: one standing silhouette at 35 meters.

(6) External communications/location: Class “C” telephone 767-2149/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios; one red flashing lights (night fire).

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired.

d. Clifford Range.

(1) Type of range: M16 Zero and Automated Record Fire Range. (Day/Night Fire)

(2) Authorized weapons/caliber ammunition: M16: 5.56mm ball and tracer.

(3) Location: MR 448309.

(4) Number of firing points: 10 zero points and 16 record fire points.

(5) Number and type targets: Seven Remote targets (RET), electrified “pop-up” silhouettes per lane at distances of 50, 100, 150, 200, 250 and 300 meters.

(6) External communications/location: Class 'C' telephone 767-2743/tower.

(7) Facilities available: Tower (with PA system & FM Radio), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: None.

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired.

e. Small Arms Charlie

(1) Type range: M16 Zero/Field fire range. (Day Fire Only)

(2) Authorized weapons/caliber ammunition: M16/5.56mm ball and tracer.

(3) Location: MR 456316.

(4) Number of firing points: 45 zero points: 35 firing points.

(5) Number and type targets: Three electrical “pop-up” silhouettes per lane at distances of 75, 175 and 300 meters: E-type silhouettes at 25 meters.

(6) External communications/location: Class 'C' telephone 767-2744/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios.

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired. Personnel will not advance more than 25 meters forward of the firing line.

f. Small Arms Delta.

(1) Type of range: M16 night record fire. Schedule 1800 hrs until daylight next morning. (Night Fire Only)

(2) Authorized weapons/caliber ammunition: M16: 5.56mm ball/tracer.

(3) Location: MR 461320.

(4) Number of firing points: 50.

(5) Number and type targets: Two electrical “pop-up” silhouettes per lane at distances of 25 and 50 meters.

(6) External communications/location: Class 'C' telephone 767-2734/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios: one red flashing light (for night fire).

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired.

g. Small Arms Echo**.**

(1) Type of range: Zero/Field fire: familiarization for Soviet weapons: Squad Assault Weapon (SAW zero) and M16. (Day/Night Fire)

(2) Authorized weapon(s)/caliber ammunition: M16, Squad Assault Weapon and AK (Soviet): 5.56 and 7.62mm ball and tracer (no match 7.62mm).

(3) Location: MR 473330.

(4) Number of firing points: 35.

(5) Number and type targets: Three electrical “pop-up” silhouettes per lane at distances of 75, 175 and 300 meters: E-type silhouettes at 25 meters.

(6) External communications/location: Class 'C' telephone 767-3752/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios and three flashing red lights.

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired. Personnel will not advance more than 25 meters forward of the firing line.

h. Small Arms Fox-trot.

(1) Type of range: M16 zero. (Day Fire Only)

(2) Authorized weapons/caliber ammunition: M16: 5.56mm ball and tracer.

(3) Location: MR 476340.

(4) Number of firing points: 110.

(5) Number and type targets: E-type silhouettes at 25 meters.

(6) External communications/location: Class 'C' telephone 767-3753/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon being fired. Personnel will not advance more than 25 meters forward of the firing line.

i. Small Arms Golf.

(1) Type of range: M16 Zero and Day Record Fire. (Day Fire Only)

(2) Authorized weapons/caliber ammunition: M16 rifle: 5.56mm ball and tracer.

(3) Location: MR 478346.

(4) Number of firing points: 10 zero points: 15 record fire points.

(5) Number and type targets: Six electrical “pop-up” silhouettes per lane at distances of 50, 100, 150, 200, 250 and 300 meters: E-type silhouettes at the 25 meter line.

(6) External communications/location: Class 'C' telephone 767-3954/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition shed, latrine and covered bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios.

(10) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired.

j. Small Arms Hotel.

(1) Type of range: Fragmentation grenade and claymore mine familiarization. (Day Fire Only)

(2) Type of ammunitions: Practice/fragmentation grenade: claymore mine.

(3) Location: MR 461351.

(4) Number of firing points: 4 bays.

(5) Number and type targets: N/A.

(6) External Communications/location: Non-available.

(7) Facilities available: Observation bunker and ammunition holding area.

(8) Special Equipment to be provided by using unit: 2 FM radios: 2 field phones w/wire: Bull horn. Range flag must be signed for from Range Division.

(9) Conduct of the range: IAW appropriate FM’s/TM’s for ammunitions being fired; Special instructions by Range Control.

k. Small Arms India.

(1) Type of range: Launcher, grenade (M203). (Day Fire Only)

(2) Type of ammunitions: M203; 40mm TPT (Training Practice) **ONLY**.

(3) Location: MR 443355.

(4) Number of firing points: 16.

(5) Number and type targets: 15 (variety).

(6) External Communications/location: Non-available.

(7) Facilities available: Tower, ammunition holding area, and bleachers.

(8) Special Equipment to be provided by using unit: 2 FM radios; 2 field phones w/wire; Bull horn. Range flag must be signed for from Range Division.

(9) Conduct of the range: IAW appropriate FM’s/TM’s for weapon(s) being fired: per OIC on site briefing from Range Control Inspector.

l. Small Arms Juliet.

(1) Type of range: M60 machine gun transition; Squad Assault Weapon Course - 100 to 800 meters. (Day/Night Fire)

(2) Authorized weapons and ammunition: M60 machine gun, SAW and Mortar Illumination; 5.56mm, 7.62mm ball and tracer; mortar illumination.

(3) Location: MR 421351.

(4) Number of firing points: 10.

(5) Number and type targets: Eight electrical “pop-up” silhouettes per lane at distances of 400, 450, 500, 550, 600, 650, 700 and 800 meters.

(6) External communications/location: Class 'C' telephone 767-3856/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios; one red flashing lights. (Night Fire Only)

(10) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired.

m. Small Arms Kilo.

(1) Type of range: M60 Machine Gun/ SAW Assault Course, Pistols and Shotguns. (Day/Night Fire)

(2) Authorized weapons and ammunition: M60 machine gun, SAW, M203, and shotgun; 9mm, 5.56mm, and 7.62 ball and tracer, 40mm buckshot/flares, and up to 12 gauge shotgun.

(3) Location: MR 413341.

(4) Number of firing points: 5.

(5) Number and type targets: E-type silhouettes placed by unit for desired scenario.

(6) External communications/location: Class 'C' telephone, 767-3651/tower.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Fire Extinguishers; paddles.

(9) Special equipment provided by using unit: FM radios; targets through Range Control Supply and three flashing red lights.

(10) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired: personnel will not advance more than 10 meters forward of the firing line.

n. Small Arms Lima.

(1) Type of range: M60 machine gun 10 Meter Zero; Squad Assault Weapon Zero. (Day Fire Only)

(2) Authorized weapons and ammunition: M60 machine gun, SAW; 5.56mm, 7.62mm ball and tracer.

(3) Location: MR 410331.

(4) Number of firing points: 28.

(5) Number and type targets: 3' x 5' panels.

(6) External communications/location: none available.

(7) Facilities available: Tower (with PA system), target shed, ammunition holding area, latrine and bleachers.

(8) Equipment provided: Targets.

(9) Special equipment to be provided by using unit: FM radios.

(10) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired.

o. Small Arms Mike.

(1) Type of range: Light Anti-Armor Weapons. (Day Fire Only)

(2) Authorized weapons and ammunition: AT-4 sub-caliber.

(3) Location: MR 458361.

(4) Number of firing points: 12.

(5) Number and type of targets: Seven M47 Tanks.

(6) External communications/location: Non-available.

(7) Facilities available: Tower, ammunition holding area and bleachers.

(8) Special equipment provided by using unit: FM radios, bull horn and red range flag (signed for from Range Control Supply).

(9) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired: sub-caliber ammunition only: per OIC on

site briefing from Range Control Inspector.

p. Sniper Range.

(1) Type of range: Sniper training. (Day/ Night Fire)

(2) Authorized weapons and ammunition: Sniper rifle: 5.56mm/7.62mm ball and tracer/match.

(3) Location: Vicinity of MR 308329.

(4) Number of firing points: 10.

(5) Number and type targets: RETS, 10 per lane at distances of 50, 100, 200, 300, 350, 400, 500, 600, 700, 800 and 900 meters.

(6) External communications/location: Class 'C' telephone, 767-3327/tower.

(7) Facilities available: Range Tower (with PA system: computer operated target system), target shed, bleachers, and Sniper Tower.

(a) Sniper Tower will be used for test fire/zero, field fire, qualification, and simulated building marksmanship training, pending approval of concept by Range Control and Post Safety.

(8) Equipment provided: Targets: RETS Computer System.

(9) Special equipment to be provided by using unit: two FM radios.

(10) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired: pre-programmed scenario.

(11) Roadblock NCO required.

q. Luzon Range.

(1) Location: East of the AIA and north of GA Highway 144 east, along FS 68 in the vicinity of MR 558386.

(2) Authorized weapons/ammunition: 40mm HE or TPT, 84mm HE or TP, LAW HE or Sub-cal: 90mm recoilless rifle: 60mm mortars (position approved by Range Control), AT-4 HE or Sub-cal, RAAWS HE, MK-19, and Dragon.

(3) Brief description: LUZON is a flat, open area approximately 300 meters wide and 3000 meters long. Targets are wheel and track vehicles, placed 200 to 800 meters down range.

(4) Facilities: Tower; targets and firing positions for M203 and LAW.

(5) Communications: Unit must provide 2 FM radios.

(6) Conduct of range: IAW this regulation, pertinent safety directives, FM's/ TM's for weapon being fired and other appropriate publications.

(7) Special Instructions:

(a) No personnel will be allowed forward of the asphalt pad

(b) The area forward of the pad is heavily duded with HE ammunition

(c) Limits: Left - 37 degrees; Right - 37 degrees.

(d) Unspecified Weapons Systems/Live Fire Training. For special use weapons, ammunition not specifically mentioned in this regulation, or for special unit requirements, the following action must be taken:

(e) Submit AFZP Form 671-R identifying weapons system, ammunition, or specific type training to be conducted, with appropriate supporting documents (e.g., danger zone diagrams, etc.) if applicable. Request will be reviewed by Range Division for approval.

(f) Request will be submitted IAW Chapter 3, this regulation.

(8) Roadblock NCO Required.

6-7. DEMOLITION RANGE.

a. Type of range: Demolition training.

b. Type of ammunitions: Demolition's organic to a unit: maximum charge - 150 pounds per detonation (weather permitting).

c. Location: MR 495354.

d. Number firing points/targets: Not applicable.

e. External communications/locations: None available.

f. Facilities available: 2 bunkers, observation bays, ammunition holding area and bleachers.

g. Special equipment provided by using unit: FM radios: 2 Field Phones: Red range flag, red flashing lights (signed for from Range Control Supply).

h. Special instructions for OIC/RSO: Be familiar with AR 385-63, Chapter 18: comply with instructions received during OIC on site briefing by Range Control Representative.

i. Conduct of the range: IAW appropriate FM's/TM's and safety directives for demolition's being used.

j. Roadblock NCO required.

k. Demolition Training Conducted in Training Areas.

(1) Demolition training is not confined to the Demolition Range. Units may conduct demolition training in one of the Training Areas (TA's). This may be done by submitting a request with appropriate overlays (5 copies) indicating desired TA and specific information regarding surface danger area, type demolition's, basic scenario, etc., through command channels to the Chief, Range Division for approval NLT 60 days before requested training date.

(2) Charges for timber, metal and concrete will be IAW AR 385-63.

(3) OIC responsibilities are the same for any live fire range/exercise, in addition to specific instructions issued by Range Division upon approval of request.

6-8. LIVE FIRE ASSAULT COURSES.

a. Rifle Squad/Platoon Assault Course (RSPAC).

(1) Type of range: Squad/Platoon Assault course (dismounted).

(2) Authorized weapons and ammunition: M60 machine gun, M16, M203 (TP only), AT-4 (sub-caliber only), Claymore mine: 5.56mm and 7.62mm ball and tracer.

(3) Location: MR 276339.

(4) Number of firing points: Not applicable.

(5) Number and type targets: As determined by unit scenario.

(6) External communications/location: None available.

(7) Facilities available: Tower, ammunition holding area and latrine.

(8) Special equipment provided by using unit: FM radios, red flashing lights (for night fire), red range flag signed for at Range Control Supply.

(9) Conduct of the range: IAW appropriate FM's/TM's for weapon(s) being fired: per approved scenario/concept of operation submitted to Range Control Scheduling: special instructions provided to the OIC when briefed by Range Control representative.

(10) Roadblock NCO required.

b. Tirehouse.

(1) Type of range: Urban training facility, squad size military operations.

(2) Authorized weapons and ammunitions: M16, fragmentation grenades: 5.56mm ball and tracer, shotgun, submachine gun, .38 caliber pistol.

(3) Location: Vicinity of MR 513481.

(4) External communications/location: None available.

(5) Facilities: Mock urban area: obstacles: tower.

(6) Special equipment to be provided by using unit: FM radios, red range flag (signed for from Range Control Supply), red flashing lights (for night fire) and other items based upon unit's approved scenario. Bullet proof vest required, available through Range Control Supply.

(7) Conduct of the range: IAW appropriate FM's/TM's for weapons/ammunitions being used: per approved scenario/concept of operation submitted to Range Control: special instructions issued by Range Control representative during conduct of OIC on site briefing.

(8) Roadblock NCO required.

c. Close Quarter Battle Complex (CQB).

(1) The CQB consist of three separate facilities: Shootinghouse, Marksmanship and Breaching Range.

(2) Specific requirements for training:

(a) Unit SOP's/Scenarios approved by Range Control.

(b) Overlays and Control measures approved by Range Control.

(c) Facility coordinated through Range Scheduling.

(d) Roadblock NCO required.

6-9. ARMOR/MECHANIZED INFANTRY RANGES.

a. General. Policies and procedures prescribed by AR 385-63 and this regulation applies to the operation of all Armor/Mechanized ranges. Safety precautions are prescribed in this regulation, pertinent AR's, FM's, TM's, and sound safety practices will be observed by units firing on these facilities.

b. Specific requirements. The OIC will ensure that the instructions as outlined in this chapter and appropriate chapters of this regulation, as well as references listed in 1 above, are complied with. Basic requirements are:

(1) The maximum elevation while firing tank main gun will not exceed 89 mils (5 degrees). The maximum elevation for the CEV M278 is 267 mils (15 degrees). The maximum elevation for the M2/M3 will not exceed 177 mils (10 degrees).

(2) The use of incendiary or tracer ammunition must be cleared through the Chief, Range Division or an authorized representative, on a daily basis.

(3) At no time will troops be allowed forward of the firing line until all guns have been cleared, verified, and elevated and clearance to go down range is obtained from Range Control Operations. Target Operators will not be down range during firing.

(4) A red flag (day) or red light (night) will be displayed on each vehicle when its weapons are loaded and during firing, from the stationary position. During daylight hours only, this safety precaution may be waived when the unit is firing a tactical move-out scenario. Red lights must be used at night, regardless of the scenario, in the best interest of safety and command and control.

(5) Night firing exercises require maximum control and strict adherence to all safety measures. In addition to the use of red lights, additional safety personnel should be considered. All personnel on the range will be familiar with the course layout.

(6) There will be no smoking allowed in vehicles, or tower, smoking is authorized in a designated (marked) smoking area. No smoking within 50 feet of any ammunition storage area or firing position on the range.

(7) Entrance guards are not required on ranges where the entrance is visible from the tower.

(8) Maneuvering on firing lines and ranges. On ranges where vehicle mounted weapons are fired, vehicles will back out of firing position. Vehicles will not execute a turning movement until they are passed the ready lines, target mechanisms, lines of communication and other range facilities. Vehicles will not be allowed forward of the firing line except when approved and under direct supervision of the OIC.

(9) OIC will ensure that no POV's are on the range.

c. Ammunition Storage And Handling. No main gun ammunition will be stored on the ranges listed in this chapter other than training practice ammunition (TPT), which can be stored at the Red Cloud Delta and Fox-Trot field ASP, unless a temporary field ASP location is approved by the Chief, Range Division, with the exception of the MPRC. This restriction is required IAW TM 9-1300-206, which specifies the minimum distance from public highways that main gun ammunition may be stored. Small arms' ammunition will be stored on ammunition pads/platforms when provided, or IAW Chapter 5, this regulation, appropriate supply regulations, AR 190-11 and FORSCOM Suppl 1 to AR 190-11. Ammunition will not be stored within 100 feet of the firing line or refueling point.

d. Moving Target Car Operations And Maintenance (Conventional Movers).

(1) Range Division range technicians (RANGE TECHS) are responsible for providing moving target cars on ranges so equipped. The RANGE TECHS will transport the movers to and from the range and with using unit's assistance and place the mover(s) on the track. When available, spare movers will be placed in proximity, as a "back-up" system. Range Operation Section will be notified immediately when a mover becomes inoperative. OIC will coordinate an internal check fire through Range Control Operations.

(2) OIC will provide a six person detail (one NCO and five personnel) with a military vehicle large enough to transport the entire detail. This detail will be under the control of the tower/target operator. Under no circumstances will a unit representative attempt repairs or alterations to any range equipment. OIC's firing log will indicate shutdown times for maintenance and will indicate any range deficiencies. When a mover or target lifter becomes inoperative or the unit has completed training, the RANGE TECHS will inspect all range equipment. Any damage noted that indicates misuse and/or neglect by that unit requires a damage statement by the OIC before being repaired.

(3) Moving target cars will be service IAW on Range instructions.

(4) DOL provides direct and general support for moving target cars as requested IAW standard maintenance procedures.

e. Operation Of The Range.

(1) Unit scheduled for firing will ensure the following is accomplished prior to the first scheduled day of occupation:

(a) The OIC and RSO have valid Safety Briefing Certificates on file at Range Control Operations.

(b) The last duty day prior to or the day of occupation the OIC with military vehicle, reports to the MPRC COR. The COR will then direct the OIC to the appropriate range for the on-site briefing.

(c) The Roadblock NCO reports to Range Control the last duty day prior to occupation.

(2) Prior to firing, the OIC will ensure that:

(a) The range is occupied IAW this regulation.

(b) Safety briefing is conducted for all personnel on the range.

(c) Personnel are in appropriate uniform.

(d) OIC is responsible for medical evacuation.

(e) Communication is established with each firing vehicle.

(f) Range fan markers are visible and can be identified by OIC/RSO and firing vehicle.

(g) OIC and RSO are familiar with misfire procedures for weapons and ammunition being fired: location of the misfire pit is known.

(h) Uncrated projectile ammunition and weapon systems are pointed down range. Main guns are elevated and appropriate safety flags (if applicable) are displayed.

(i) All personnel are briefed on range facilities/areas such as parking area, concurrent training area, ASP (if applicable), smoking area, etc. Each area is readily identifiable and special equipment (if required: i.e., fire extinguishers) is present.

(3) During firing the OIC will ensure that:

(a) Appropriate uniform and individual equipment is worn/used.

(b) Weapons on the firing line are pointed down range.

(c) No one moves forward on the firing line.

(d) All safety markers are clearly visible. OIC will cease fire immediately if safety markers cannot be identified.

(e) Communication is maintained with firing vehicles.

(f) Vehicles display the proper flags (if applicable) or lights.
(g) Communications are maintained with Range Control Operations.

(4) After firing is completed, OIC will ensure that:

(a) All weapons are cleared and breach is open/bolts are locked to the rear.

(b) Proper safety markings are displayed by each vehicle.

(c) All brass and ammunition are turned in IAW 3d IN Div (Mech) & FS Reg 700-4.

(d) Targets are removed and disposed of IAW instructions received during OIC briefing by Range Control Inspector.

(e) Range is thoroughly policed and facilities cleaned.

(f) Damaged and/or unserviceable range equipment is reported to the appropriate section of Range Control.

(g) Unit equipment is removed from the range.

(h) Excessive ruts caused by maneuvering of track vehicles is leveled.

(i) Range is closed IAW this regulation.

(j) Request for clearance is coordinated with Range Control.

f. Facilities. Listed below are mechanized gunnery ranges (M1 and M2/M3) with a brief description of each. Schedule through G-3 Training.

(1) Multi-Purpose Range Complex (MPRC).

(a) The MPRC is operated under civilian contract. In the event there is a conflict of responsibilities between this regulation and the MPRC contract, the contract will take precedence.

(b) Range will be scheduled through Director, G-3 Training.

(c) Any suggestions for improvements/ changes, or conflicts between using unit and contractor personnel arise, the POC

will be the contracting officer's representative (COR) who is co-located on the range, telephone 767-2872.

(d) Specific guidance for use and capabilities will be provided through the ACofS, G3/DPTM and/or Chief, Range Division.

(e) Red Cloud Delta, Training areas F3, F4, and F17 are also included when scheduling the MPRC. These are available for staging areas.

(f) Using unit will clear the MPRC upon completion of firing with the Civilian Contractor. Red Cloud Delta and F17 will be cleared through Range Control.

(g) In addition to safety requirements previously stated, units will comply with additional safety requirements issued during on-site brief.

(h) Facilities available: Latrine, tower with VIP level, electric power, mess area, ASP, tent pads and potable water supply.

(i) Communications: Class 'C' telephone 767-8644, five FM radios and FM frequencies.

(j) Red Cloud Delta mortar point will be used to fire illumination only for the MPRC and requires an OIC and RSO.

(k) Roadblock NCO required.

(2) RC-F, RC-G, And RC-H Ranges.

(a) RC-F, G, and H are “Roll on, Roll off” ranges. Target devices, targets, heat blankets, radio’s, generators/ batteries, red flag/lights, tower, PA system, used oil containers, are furnished by Range Control, eliminating the need to requisition supplies from the Range Control Warehouse. Two radio’s and frequencies 55.15, 45.40 (FIRE), 58.30, 67.30 (JUMP) provided by the contractor.

(b) Ammunition may be stored on the MPRC at the ammunition pad (1 day's issue).

(c) Each firing unit is required to provide one (1) vehicle and a six (6) soldier detail (1 NCO & 5 EM) to set up scenario, and maintain range equipment. Ranges are scheduled IAW 3d IN Div (Mech) & FS Reg 385-14 and 3d IN Div (Mech) & FS Reg 350-1. Forty-eight hours mandatory Range Maintenance is required between battalion size units.

(d) Scenarios: Unit master gunner will coordinate with Chief, Range Branch; two weeks before scheduled training and submit scenario.

(e) Mandatory shutdown: Mandatory shutdown periods are designed to allow sufficient time for targetry maintenance, scenario preparations and operator shift change. Unit will coordinate any change with the on duty operator. Operator will request adjusted times through Range Control operations. Mandatory shutdown times are 0600-0830 year round, 1730-1900 during fall/winter, and 1930-2100 during spring/summer.

(f) Firing unit is responsible for supplying fuel (mogas/diesel) to operate targetry, power plant and movers, heating blankets, and targets.

The following equipment is on the range: Generators, THM/TG, transmitters, receivers, 12v mover batteries, battery boxes, target movers, heating blankets, and targets.

(g) Upon completion of firing, each unit will be required to police bivouac area, course road, firing points, parking area, and target positions. Any generated refuse will be taken to landfill. All brass and links will be disposed of IAW 3d IN Div (Mech) & FS Reg 700-4.

(h) Range must be cleared within twelve (12) hours after completion of firing. Range OIC is responsible for clearance. Failure to clear the facility is considered a range violation.

(i) Red Cloud Fox-trot.

- Description: Stationary and move out gunnery course: Tank or Brad-

ley Tables V through VIII. Special use: Engineer, Aviation, .50 cal Qualification, and Dismounted operations.

- Location: MR 388394.
- Weapons/ammunition authorized: 165mm (TPT), 120mm, 105mm, and 25mm TPT, .50 cal, 7.62mm, and 5.56mm ball and tracer: 2.75 inch rocket, TOW/Dragon (insert).
- Communications: Class “C” telephone 767-4728 (S).
- Facilities available: Tower, latrine, AAR facility, and ASP.
- Miscellaneous: Synch ramp located on FS 25A.
- Roadblock NCO required.

(j) Red Cloud Golf.

- Description: Tank or Bradley Tables V thru VIII. Special use: Engineer, Aviation and Dismounted operations.
- Location: MR 408372.
- Weapons/ammunition authorized: 165mm, 120mm, 105mm, 25mm, and 20mm (all TPT only): Inert DRAGON, TOW and 2.75 inch rocket: 7.62mm and 5.56mm ball and tracer: .50 cal ball and tracer.
- Communications: Class “C” telephone 767-4825 (S).
- Facilities available: Tower only.
- Roadblock NCO not required.

(k) Red Cloud Hotel.

- Description: Tank or Bradley Tables V, VI, VII, through VIII. Special use: Engineer, Aviation and Dismounted operations.
- Location: MR 395477.
- Weapons/ammunition authorized: 165mm, 120mm, 105mm, 25mm, and 20mm (all TPT only), 7.62mm and 5.56mm ball and tracer: .50 cal ball and tracer.
- Communications: Class “C” telephone 767-4825 (S).
- Facilities available: Tower and latrine.
- Roadblock NCO required.

(3) Red Cloud Alpha. Schedule through Division G-3 Training.

(a) Description: Crew Proficiency Course: Tank Tables V and VI: TCPC. Special use: Engineer, Aviation, .50 cal Qualification, and Dismounted operations.

(b) Location: MR 383457.

(c) Weapons/ammunition authorized: 165mm, 120mm, 25mm, 105mm (TPT only): .50 caliber, 7.62mm and 5.56mm ball and tracer: LASER.

(d) Communications: Class 'C' telephone 767-4823, 2 FM radios and FM frequencies 43.70 (ADMIN NET), 66.50 (FIRE NET) provided.

(e) Facilities available: Tower, AAR facility, and latrine.

(f) Miscellaneous: M724 ammunition will be fired no further down range than 400 meters from the tower.

(g) Roadblock NCO required.

(4) Red Cloud Bravo. Schedule through Range Control scheduling.

(a) Description: MK-19 Qualification.

(b) Location: MR 370446.

(c) Weapons/ammunition authorized: .50 caliber and 40MM TP only.

(d) Communications: Class 'C' telephone 767-2019 provided: unit must provide two FM radios.

(e) Facilities available: Tower and latrines.

(f) No roadblock NCO required.

(5) Red Cloud Echo. Schedule through Division G-3 Training.

(a) Description: Dismounted Live Fire Complex.

(b) Location: MR 373412.

(c) Weapons/ammunitions authorized: Dismount assault course 7.62/5.56 M203 TP.

(d) Communications: Class 'C' telephone 767-2422 provided: unit must provide two FM radios.

(e) Facilities available: Tower, AAR facility, and latrine.

(f) Roadblock NCO not required.

(6) Yankee (Sub-Caliber FCX Range). Schedule through Division G-3 Training.

(a) Description: Tank/Bradley subcaliber range.

(b) Weapons/ammunition authorized: 7.62mm, 5.56mm. (Single Shot Only)

(c) Location: MR 352318.

(d) Number of firing points: 8 hull down (stationary range).

(e) Number and type targets: 56 M31A1's, with scaled silhouettes.

(f) Communications: Class "C" phone 2873 (S) and FM frequencies, 31.90 (ADMIN.), 54.40 (FIRE) provided.

(g) Facilities: Tower, latrine, ammunition holding area.
(h) Equipment provided by unit: Two FM radios.

(i) Conduct of range: Per unit scenario; IAW appropriate FM's/TM's for weapons being fired; and instructions given during OIC on site brief.

(j) Roadblock NCO required.

(7) Zulu (Move Out Range). Schedule through Division G-3 Training.

(a) Description: Tank and Bradley subcaliber move-out range.

(b) Weapons/ammunition authorized: Tank mounted M240/Brewster Devices: 7.62mm and 5.56mm ball and tracer. (Single Shot Only)

(c) Location: MR 343320.

(d) Number of firing points: per scenario along course road.

(e) Number and type targets: 38 electrical M31A1's with scaled silhouettes.

(f) Communications: Class "C" telephone 767-2247 (S) and FM frequencies 39.30 (ADMIN), 49.15 (FIRE) provided.

(g) Facilities available: Tower, target shed, ammunition holding areas, bleachers, AAR facility, and latrine.

(h) Equipment provided by using unit: Two FM radios.

(i) Conduct of the range: Per unit scenario; IAW appropriate FM's/TM's for weapons being fired; and instructions issued by Range Control during OIC on site brief.

(j) Roadblock NCO required.

6-10. ARTILLERY FIRING POINTS, MOR-TAR POINTS, AND OBSERVATION POINTS.

a. General.

Policies and procedures as prescribed by this chapter apply to the use and operation of the AIA and all firing positions and observation points on the Fort

Stewart reservation. Safety precautions as prescribed by this regulation and pertinent publications (AR 385-63, appropriate FM's/TM's for weapon being fired) will be strictly adhered to by all units firing from the areas listed in this chapter. Specific requirements for M109A6 (Paladin) Howitzer are outlined in para 6-10n.

b. Additional safety restrictions may be issued by subordinate commanders, but will conform to the provisions of this regulation, AR 385-63 and other pertinent directives. Unit commanders will ensure that officers and noncommissioned officers detailed as OIC/RSO are thoroughly qualified with the weapon system being fired and have a valid Certificate of Responsibility card on file at Range Division Operations.

c. While safety in any firing position is the primary responsibility of the OIC, any person observing an unsafe act or condition must take immediate action to correct the situation. This includes ordering a "cease fire", should the situation dictate such action.

d. Definitions used in this chapter are as follows:

(1) Artillery Impact Area (AIA): AIA is located on the eastern side of the reservation, includes both the impact area and buffer zone, and is the primary impact area for large caliber munitions fired on Fort Stewart. The area is heavily duded and is off limits to unauthorized personnel. There are a large variety of hard targets located throughout the impact area.

(2) Impact Area: Is defined as that area encompassed by the inner boundary where all rounds are planned to impact.

(3) Buffer Zone: Is the outer area of the AIA, 1000 meters horizontal distance from the impact area perimeter, which when added to the impact area, will give the desired assurance that no rounds will fall out side the AIA. Fires will not be directed into any body of water or planned to impact in the buffer zone, unless approved by the Chief, Range Division.

(4) Firing Point: Includes all artillery firing points and mortar firing points used for live firing.

(5) LASER Firing: LASER firing is considered live fire and will be conducted IAW this regulation.

e. Overhead and Close Support Fire. Overhead and close support fires will be accomplished with strict compliance to the requirements of AR 385-63, and requires approval from Chief, Range Division prior to initiating. No proximity time (VT) or mechanical time fuses will be fired from within the area extending one kilometer west along GA Highway 119 and from within an area one kilometer south along GA Highway 144. The minimum arming time of the proximity (VT) fuse will be the fuse setting needed to reach the near limit of the AIA, plus 5.5 seconds.

f. Direct Fire.

(1) Area D, Figure 13-1, AR 385-63, will not be occupied under any conditions during direct fire.

(2) Direct fire into the AIA of Fort Stewart will be conducted from OP's 1 through 4, bordering the southwest edge of the AIA only. Concept of operation, 1:50,000 overlay, and risk assessment is required NLT 30 days prior to first scheduled day of firing.

(3) Weapons will be boresighted and fired from stationary positions only.

(4) Communications (wire and/or radio) will be established between OIC and the weapons prior to firing, and will be maintained during all firing.

g. Indirect Fire.

(1) Approved surveyed firing positions will be used for indirect fire. Request to establish unit firing points must be submitted 10 working days prior to firing,

with survey data and range limits as indicated in para 6-10i(3)(b) below.

(2) Unless the safety card indicates otherwise, all weapons will be located within 250 meters of the firing marker or surveyed location. Units desiring to fire from a distance farther than 250 meters from the surveyed firing positions will submit a range safety overlay to Range Control for approval. The overlay will include left and right limits in mils, minimum/maximum ranges of "Dog Legs", weapon(s), ammunition(s) and charges to be fired.

(3) When firing over Fort Stewart roads/ highways, minimum ordinate MUST BE 2500 feet.

h. High and Low Angle Fire. All high angle firing will be computed for maximum ordinate.

i. Safety Card.

(1) Safety cards will be prepared by 3d IN Div (Mech) Artillery and submitted to Range Control for approval. Ammunition, fuse, weapon, type of fire or charge not specified on the card will not be used. The minimum and maximum ranges established on the safety card will not provide for vertical interval. Safety data is available at Range Control for Mortar Points 1 through 5, and all Artillery Firing Points.

(2) The officer responsible for the operation of the Fire Direction Center (FDC) will have the safety card data drawn on the primary and back-up firing charts. Data required to be drawn on charts are the lateral azimuth limits and the minimum/maximum ranges, to include "doglegs".

(3) Ammunition care, handling and safety.

(a) Care and control of ammunition will be complied with IAW Chapter 5 of this regulation and appropriate publications.

(b) Safety precautions contained in FM 6-50, TM 9-1300-206, AR 385-63 and appropriate TM's for weapon(s) being used will apply to all firing units.

(c) No smoking authorized within 50 feet of the firing line or ammunition storage areas. "NO SMOKING" signs will be posted to provide clear visibility from all angles of approach. Units will provide signs.

(d) Units storing ammunition on ranges must comply with TM 9-1300-206.

j. Propellant Disposal.

(1) The OIC of the firing position will ensure that all excess powder from the firing position is disposed of properly. Unused bags or propellant increments will not be carried from one firing point to another with the unit. Any open sandy area, recently graded road or prepared pit, may be used to burn powder. When the forest fire danger rating is IV or V (see 3d IN Div (Mech) & FS Reg 420-2, para 6-4a), Range Division will be contacted before burning unused propellant.

(2) Burning will be supervised by the unit Executive Officer/RSO.

(3) All personnel and equipment (except a two-man burning detail) will be at least 100 meters from the burning site.

(4) Burning site will be effectively blocked off during burning. If propellant is burned on a road, road guards will be posted no less than 500 meters from the burning site on all approaches.

(5) Before burning, all propellant will be spread in a single layer and will not exceed 12 inches in width.

(6) Exposed materials will be ignited from the windward side using a train of flammable material approximately 25 feet long.
(7) Fire extinguishers and unit firefighting personnel will be available for assistance near the burning site.

k. Firing Of Smoke (HC) And White/Red Phosphorus (WP). Range Operations will approve the firing of HC and WP on

each firing day. If such firing would interfere with the training of other units, Range Operations will restrict its use. Firing of smoke (HC), rocket propelled (RP), and WP will be only into open ground in the impact area. During dry weather, it may be necessary to discontinue this type of firing, to prevent range fires. Units will request clearance to fire HC, RP and WP using Range Control Operations net before firing these types of rounds.

l. Illumination Firing. Artillery and mortar illumination firing into the impact area is authorized at any time except when a restriction is published in the weekly Range Schedule. When this type of firing interferes with other training activities, Range Control Operations is authorized to cancel the firing immediately. Unit will request permission to fire illumination rounds on the Range Safety Net before firing this type of rounds. Dry weather may require discontinuing this type of firing to prevent range fires.

m. Firing in Limited Visibility.

(1) No firing will be conducted when weather prevents target visibility and observation of rounds unless radar is being used for targeting.

(2) When more than one unit is firing radar missions simultaneously, each unit must ensure its radar is oriented on the proper target to prevent misidentification of rounds. Rounds must be fired in at least one-second intervals to ensure positive identification on radar. Radar team must maintain communications with Range Control.

(3) Priority for adjusting fire in limited visibility will go to units undergoing formal Army Readiness Training and Evaluation Program (ARTEP).
(4) Units will ensure they have a forward observer (FO) on an OP to confirm the impact of rounds in the impact area in the event of a malfunction or if the radar becomes misoriented.

n. Danger Area Echo.

(1) The area immediately forward of an artillery piece may not be occupied except as noted in para n(3) below. The size of this area varies according to the caliber of the weapon: 550 meters from the gun, in the direction of fire, for the 105mm howitzer: 725 meters for the 155 mm and 830 meters for the 8 inch howitzers.

(2) The original unit scheduling a position area or firing point is responsible for ensuring any facility falling inside Danger Area Echo is not used or occupied. Access roads or tank trails passing through Area Echo will be controlled by the firing point.

(3) During the conduct of live fire artillery training using tactical configurations (e.g., terrain positioning box, circle, star), military personnel may be inside area Echo during firing as long as they are working on firing duties requiring their presence at that location. These duties include laying the weapons, completing ammunition preparations, and performing safety functions. Commanders will ensure these people use earplugs and Kevlars and in the case of M109 Howitzers, remain inside the cab as much as possible during firing.

o. Duties and Responsibilities of the OIC.

(1) Prior to firing, the OIC will ensure that:

(a) OIC/RSO have a current Certificate of Responsibility Card on file at Range Control Operations.

(b) The impact area has been visually scanned by observers to ensure no unauthorized entry has been made and all road guards, if required, have been instructed on their responsibilities. Also, the roadblock NCO has physically inspected appropriate roadblocks and reported completion of mission (or problems), either by FM radio or in person to the OIC before 0730.

(c) The range flag(s) is (are) flying (mortar points, FP's 1, 2 and 16, and OP's).

(d) Flags must be emplaced in such a way as to be readily visible from the access roads into the OP's at any time live fire is being conducted from a position.

(e) Red flashing lights will be substituted for range flags if firing after end of evening nautical twilight (EENT) and must be emplaced in such a way as to be visible from the air and all access roads.

(f) OIC/RSO know the location of all the misfire and powder pits. The RSO has a copy of the safety data for that position, and FDC has the safety diagram drawn on the firing chart(s).

(g) All weapons are boresighted after occupying a position and at first light each day.

(h) Safety stakes/tape are emplaced on all guns/howitzers: safety tape on survey points (SP's).

(i) Section chiefs are informed of all minimal quadrants, left and right deflection limits, and minimum fuse settings.

(j) Ensure firing point is occupied through Range Control, and communications with Range Control are established IAW Chapter 4 of this regulation. Also permission to go to a "Wet" status has been given by Range Control.

(2) During firing the OIC is responsible for ensuring:

(a) Lost and/or short rounds are reported immediately to Range Division and a cease fire freeze order is instituted until all requirements in Table 5-1 are complied with.

(b) Firing is being conducted within the specific limits outlined on the range safety card.

(c) Communications with Range Control and firing vehicles/guns are maintained.

(3) After firing is completed, the OIC will ensure that:

(a) All weapons are cleared.

(b) All excess powder is accounted for and is properly disposed of IAW this regulation.

(c) Request to go to a "Dry" status has been granted by Range Control.

(4) Before the termination of training and/or departing the FP/MP/OP, the OIC will ensure the area is policed (500 meter diameter of point marker), foxholes/excavations are filled in, wire, obstacles, etc., are removed, and a request for clearance from Range Control initiated. When units are firing multiple firing points, in an effort to expedite clearing, units should clear each point when the training is completed rather than at the end of the scheduled cycle.

p. Duties and Responsibilities of the RSO.

(1) Before assuming duties as RSO on a FP, MP, or OP, the designated RSO will:

(a) Read, understand and comply with the following publications:

- AR 385-62, AR 385-63 and this regulation.
- FM 6-50, Chapter 15.
- Appropriate FM and TM for weapon and ammunition and approved local SOP's.
- Appropriate Divarty policy letters.

(b) Produce the following equipment:

- Authorized Safety Card.
- Applicable graphical firing table.
- Applicable graphical sight table.
- Map of area.
- Locally declinated aiming circles.

(c) Ensure that one serviceable gunner's quadrant is available at each firing point.

(2) The RSO will take the following action before firing:

(a) Verify that the safety card applies to the unit, exercise date and that changes to the schedule, if any, are confirmed/approved with Range Division.

(b) Verify that the battery is in position as specified on the safety card.

(c) Prepare safety diagram. When more than one RSO is assigned, the senior RSO will have copies of ALL safety cards in their possession. All assigned RSO's will have copies of the safety diagrams. Diagrams will be verified by independent computation. FM 6-50 will be the reference for the safety diagram.

(d) Verify bore sighting of each weapon.

(e) Verify laying of the battery by using a second declinated aiming circle. There should be a distance of at least 10 meters between the primary circle and the safety circle. Both aiming circles will be oriented using the same data and the lay will be verified by referring sight to sight on the aiming circles. To take into account magnetic variation, a maximum variation of plus or minus 10 mils will be allowed between the two circles. The RSO will then orient the primary aiming circle on the direction of fire, and require each weapon to refer. An identical mil variation (if any) must exist in the readings between weapons and the primary circle. The RSO will ensure that the same referred deflection of the weapons is used in computing the safety diagram. The RSO will then verify that the aiming posts, or collimate, are laid on the specified referred deflection by sighting through the weapon sight.

(f) Verify minimum quadrant elevation (MQE) determined by the executive officer/firing platoon commander. The RSO will compare the MQE of the executive officer/firing platoon commander with the elevation of minimum range on the safety diagram, using the larger of the two as the minimum quadrant elevation.

(g) Personally check the sight settings to include the slipping azimuth scale and placement of safety stakes or safety tapes (SP weapon). If a deflection difference or special corrections are sent to the guns, the RSO must ensure that the total of the announced deflection and the deflection on the gunner's aid will be within lateral safety limits.

(h) Verify that ammunition and the charge to be fired is the type specified on the safety card.

(i) Ensure that section chiefs are informed of right and left deflection limits, maximum and minimum quadrant elevations and minimum fuse settings for each authorized charge.

(j) Visually check for parallel laying.

(k) Verify that the range opening has been accomplished.

(l) Ensure that visible portions of applicable danger areas are cleared of personnel (check with observation post).

(3) The RSO will take the following action during firing:

(a) Verify serviceability of ammunition.

(b) Ensure that charge/increment, projectile, and fuse being fired are authorized on the safety card.

(c) Ensure that rounds are not fired below minimum quadrant elevation or above maximum quadrant elevation.

(d) Ensure that rounds are not fired outside the lateral azimuth limits specified on the safety card.

(e) Visually check for parallel laying.

(f) Ensure that time fused rounds are not fired with fuse settings below minimum time prescribed on the safety card.

(g) Instruct the Executive Officer not to fire until the RSO has given positive indication that it is safe to fire by making a positive visible sign and announcing "safe". Increments will be physically counted on mortar rounds before firing.

(h) On all commands that are unsafe to fire, command check fire and give reason. Example: 3 MILS OUTSIDE RIGHT SAFETY LIMIT AND 20 MILS ABOVE MAXIMUM QUADRANT ELEVATION, or 5 MILS ABOVE MAXIMUM QUADRANT ELEVATION, or 5 MILS BELOW MINIMUM QUAD-RANT ELEVATIONS.

(i) Verify and apply registration corrections to safety limits immediately after receiving registration corrections from the OIC, remembering to include site to obtain minimum and maximum quadrant elevation.

(l) Report all accidents and malfunctions of ammunition to the OIC of firing.

NOTE: Gun tubes are not brought down to loading elevation or corrections for aiming post displacement made, until initial rounds have been determined to have impacted safely in the impact area.

(m) Command "check fire," if the RSO observes any unsafe condition, report the unsafe condition to the OIC and keep the checkfire in effect until the condition is corrected. Some unsafe conditions are:

- Safety features of weapon not operative.
- Powder bags exposed to fire.
- Personnel smoking near pieces.
- Improper handling of ammunition.
- For ammunition other than that issued with fuses and projectiles assembled, fuses and projectiles stored separately.
- Time fuses previously set and not reset to safe.
- With separate loading ammunition, primer inserted before breech is closed.
- Failure of cannoneer to inspect powder chamber and bore after each round.
- Failure to swab powder chamber after each round for weapons using separate loading ammunition.

q. Paladin (M109A6) Howitzer:

(1) The OIC will ensure that prior to firing:

(a) The correct firing point is occupied.

(b) The impact area is clear and safety measures directed by the installation commander are implemented.

(c) Required communications to include Range Control are established and operative.

(d) Only authorized ammunition, including proper charges and fuses, is used.

(e) Ammunition to be fired is within prescribed safe temperature limits.

(f) All firing precautions have been taken.

(g) Clearance to fire has been obtained from Range Control.
(h) Appropriate manuals and safety regulations are on hand.

(i) The safety officer has a copy of the safety limits for the position and the FDC has the safety map posted.

(j) Will check the data base on each howitzer. The data base check can be done with the HOW; REQUEST format. Specific items to verify are sector limits and MIN QE.

(k) Will check the POC data base to insure the Paladin impact area has been incorporated as a fire zone.

(l) Adequate medical coverage is present (medic in the battery area and combat lifesavers on every active firing point).

(2) During firing:

(a) The overall safe conduct of training and proper use of facilities.

(b) The surface danger zone is monitored to insure it remains clear.

(c) Rounds are observed to insure projectiles impact within the prescribed impact area.

(d) Misfires are removed from the weapon only on command of the OIC IAW procedures established for the weapon.

(e) Weapons are cleared and checked during temporary suspensions of firing.

(f) Records are maintained on the type of ammunition fired and the number of rounds fired.

(g) Firing is stopped promptly when any unsafe act is observed or reported.

(h) Radio communications are maintained with Range Control and All firing elements.

(i) Effective control of firing is maintained with Range Control and all firing elements.
(j) Command cease fire if communications with Range Control or a firing element are lost.

(3) After firing:

(a) All weapons are cleared.

(b) All excess powder is accounted for and is properly disposed of.

(c) Ensure Range Control is informed of completed firing status.

(4) The safety officer will:

(a) Prior to firing:

- Read, understand, and comply with all appropriate manuals and safety regulations.
- Verify that the firing element is in the specified firing position.
- Ensure that howitzer chief of sections are informed of safety limits.
- Ensure that visible portions of applicable danger areas are clear.
- Verify that the range has been opened.

(b) During firing:

- Verify serviceability of ammunition.
- Only authorized ammunition is fired.
- Will verify firing data by checking for parallel lay.
- Report all accidents and malfunctions of ammunition to the OIC.
- Command “check firing,” if the RSO observes any unsafe act.
- Will ensure that fires are delivered only into the authorized impact area.
- Monitor danger area Echo for the assigned firing point. Post road guards as required.

(c) After firing:

Verify weapons are clear to the OIC.

(5) The XO/Platoon Leader:

(a) Is responsible for the safety practices of the firing battery or platoon.

(b) Will ensure that all leaders provide appropriate supervision of safety.

(c) Is responsible for checking XO's minimum QE IAW FM 6-50.

(6) The FDO will:

(a) Compute the sector limits (safety limits) for each active fire point. The charge will be forced to compute MIN QE and MIN TI.

(b) Compute left limit, right limit, MIN QE, MAX QE, and MIN TI for shell illumination. Illumination safety will use the same procedures as with M109A2/A3.

(c) Ensure that safety limits are updated after any change in the five requirements of accurate predicted fire to include registrations and meteorological data.

(d) Conduct a map check to ensure all target locations are within the buffered impact area.

(e) Ensure firing data are within safety limits prior to transmission to the firing sections (if conducting technical data computation).

(f)Plot all FSCMs and the Paladin impact area on the safety map to ensure violations do not occur. Inputs the Paladin impact area into IFSAS as a restrictive fire area.

(g) Transmit move order to howitzers with left and right safety limits in the form of sector limits along with the azimuth of fire. The move order will stipulate a radius of 200 meters. The MIN QE and MIN time will be transmitted to the guns in a PTM.

(h) Conducts a dry fire verification mission with each gun upon completion of a tactical move. The FDC will specify a converged sheaf and will initialize the LCU with a SYS;SETUP of GUNORD;X. This will produce firing data at the LCU. The POC records this data. Next, the POC removes the X from the GUNORD and re-executes the mission to all the howitzers. The AFCS at each howitzer will compute firing data. The chiefs will report this data to the POC. The POC will compare the data computed by the AFCS with data computed by the BCS. The data must agree within the following tolerances:

DEFLECTION	1 MIL FUSE VT	1 SEC
QUADRANT	1 MIL FUSE TIME	0.1 SEC

(i) Ensure the firing platoon completes the following to be safe and ready-to-fire after a tactical move into a new position:

- Verbally verify with the COS that the digital move order to the new position is entered into the AFCS.
- Verbally verify with the COS that all pre-fire checks are completed.
- Verify sight data (using BCS).
- Verify Paladin grid (using BCS).
- Verify that a tube to tube or compass verification has been conducted within tolerance.

(j) The Paladin Impact Area is defined by the following boundary: MR 438414; MR 447383; MR 476373; MR 497376; MR 497395; MR 484398; MR 481414.

(k) Manage the safety limits to ensure that the area formed by the azimuth limits and the MIN QE does not include training areas outside the buffer.

(l) Compute max. QE for all projectile types if occupying firing points north of the 43000 northing grid line. High angle safety limits will be computed separately from low angle limits if units occupy firing points north of the 43000 northing grid line.

(m) As a part of position improvement, will verify with the COS that the manual move order to the present position is entered into the AFCS correctly and will send a digital move order with the same data to the present position.

(n) Ensure the firing platoon completes the following after receiving an emergency mission outside position area to become safe and ready to fire:

- Tube to tube verification within tolerance (using BCS and orally) or M2 compass (+/- 100 mils).

- Verbally verify with the COS the azimuth of fire to the howitzer.

CAUTION: Upon completion of emergency mission, if Paladin remains in a new position area and fires subsequent missions, then the FDO must ensure that the conditions of para 6-10q(7)(c) are met.

(7) The howitzer section chief:

(a) Prior to occupation and subsequent live fire:

- Will be safety certified and will strictly enforce safety at or near his weapon.

- Is responsible for the construction of the AFCS data base during initialization and any subsequent corrections to the original database. When initializing the AFCS, a second crew member must read back and verify all data being entered into the AFCS. At any time when conducting a survey update with an error greater than 26 meters the AFCS will give a warning error message of "position update north/east excessive". After receiving this error message, use PLGR to verify the SCP. If an error still exists, do not do not update the AFCS and notify the chain of command for instructions.

- Will ensure that all navigational data input into the AFCS is correct and all entries are checked by the gunner.

(b) Prior to displacement to new position area:

- Will plot new position on map.

- Will record the left, right, and center sectors of fire on his gunner reference card from move order.

(c) Upon completion of a tactical move, each Paladin howitzer section chief will conduct the following as part of occupation:

- Press the arrive key on the AFCS before removing the cannon tube from the travel lock position. The arrive key should not be pressed until after 30 seconds from stopping. This automatically transmits a HOW; UPDATE message to the FDC (REPORT:X should always be specified in the HOE; MOVE format).

- Verify direction of the weapon system by one of the following methods. Methods (2) through (4) should only be used during nonstandard conditions; for example, lack of intervisibility between howitzers in a fire team. If direction cannot be verified, Paladin howitzers will only be fired in degraded operations.

◊ (Method 1) Tube to tube verification is the preferred method. The tolerance for this method is +/- 10 mils.

◊ (Method 2) Verify with a M2 compass. The tolerance for this method is +/- 10 mils.

◊ (Method 3) Verify with DAP. The tolerance for this method is +/- 10 mils.

◊ (Method 4) Verify with a SCP and EOL. The tolerance for this method is +/-10 mils.

- Verify the howitzers location either by GPS, map spot, or another Paladin howitzer.

- Conduct a dry fire or DNL verification mission. This will ensure that the MET and MVV's are properly applied.

- Use left and right sectors of the move order as left and right safety limits. The center sector will be the azimuth of fire. Minimum quadrant will be determined by the FDC. The maximum tube elevation will be the maximum quadrant determined by the FDC (MAX QE is for illum and firing points north of the 43000 northing grid line only). Minimum quadrant will be entered into the AFCS as the loading elevation.

- Ensure that all pre-fire checks are completed prior to live firing.

- Verifies orally with the POC the correct left, center, right sectors of fire, and the correct grid from the digital move order.

- Must confirm the data is correctly displayed in the mask data screen prior to the section becoming safe to fire.

- Will record the grid and the sector of fire (left, center, right) data on the gunners reference card.

- Verify the serviceability of all ammunition prior to firing.

- Verify to the FDC/FDO the following has been completed in order for the section to become safe and ready to fire following a tactical move to a new position area:

◊ Verify orally with the FDC/FDO that the digital move order to the new position is entered into the AFCS.

◊ Verify that the pre-fire checks are completed.

◊ Verify sight data.

◊ Verify Paladin grid.

◊ Tube to tube verification is within tolerance (+/- 10 mils) or M2 compass (+/- 100 mils).

- As part of position improvement, enters manual move order to the present position and updates sectors of fire limits in the sight definition screen.

- Will notify the POC when the manual move order and site definition data to the present position are entered into the AFCS and will request a digital move order to present position.

(d) Upon completing a survivability move, the section chief will NOT enter a manual move order into the AFCS within the position area.

(e) Upon receiving an “EMERGENCY MISSION OUTSIDE POSITION AREA” message, COS will conduct the following as part of occupation:

- Tube to tube verification is within tolerance (+/- 10 mils) or M2 compass (+/- 100 mils).

- Verify verbally the azimuth of fire to the FDC.

NOTE: Upon completion of emergency mission, if Paladin remains in a new position area and fires subsequent missions, then the COS must ensure that the conditions of para 6-10q(7)(c) are met.

(f) In the event of digital communication failure, COS will conduct the following as part of ready to fire:

- Enters manual move order to the present position and updates sector of fire limits in the sight definition screen.

- Will notify the POC orally when the manual move order and site definition data to the present position are entered into the AFCS.

NOTE: Upon completion of a tactical move, if Paladin remains unable to receive digital communications to the new position area, then the COS must en-

sure that the conditions of para 6-10q(7)(c) are met.

(g) During firing operations:

- Is directly responsible for the safe firing of his howitzer.
- Will verify that the announced and proper data are applied to his howitzer and that the data is within safety limits.
- Will ensure that the proper charge, fuse, fuse setting, and projectiles are fired and will allow no more than one pre-cut charge per priority mission.
- Will ensure that the announced firing data is recorded on DA Form 4513.
- Is responsible for checking danger area Echo: 725 meters toward the impact area and extending to each side at a 45 degree angle.
- Will manually depress the tube below 299 to load the cannon. The section chief will then press the LAY KEY to return to lay data.
- Ensures that three sets of data on the AFCS fire mission screen are properly displayed and the data is verified by the gunner.
- The prompt, "WARNING; TUBE NOT IN LAY POSITION," no longer appears on the AFCS screen.
- The AFCS actual data matches the AFCS command data.
- The "LAY" prompt at the top of the AFCS screen is backlit.
- Will then command the #1 man to prime and hookup.
- Verify the AFCS actual data (deflection and quadrant) matches the AFCS command data (deflection and quadrant) within one mil.
- The section chief will be the only person who can command the #1 man to fire.
- Ensure that all excess powder increments are stored properly in sealed powder canister prior to firing of round.
- Ensure that all ammunition series fuses are handled IAW the appropriate TM.
- Will never have pre-cut charges other than one for each priority mission.

(h) Will verify with the FDC that the Paladin sight data upon losing power either by total catastrophe or normal shutdown procedures.

r. Special Instructions.

(1) When firing on points located near GA Highways 119 and 144, units will not be closer to the highway than 250 meters; e.g., FP1 and FP2.

(2) For use of mortar points co-located on other ranges (i.e., Red Cloud Foxtrot), schedule through Range Division per standard procedures on AFZP Form 671-R.

s. Artillery firing points.

(1) Communications (provided by unit): 2 FM radios.

(2) Ammunition authorized: All types except Flechette. WP will not be fired into wetlands.

(3) Miscellaneous. The area scheduled as part of the firing point includes the surface danger area "ECHO" of the weapon system (500 meters toward impact area and extending to each side at a 45 degree angle) and a 500 meter diameter around survey marker (sides and rear).

(4) Firing point data. See Table 6-5 for the firing points (FP) currently available at Fort Stewart, including location and weapons/guns authorized to fire from each firing point.

t. Observation Points.

(1) Communications to be provided by unit: FM radios.

(2) Ammunition authorized: All types except Flechette. WP will not be fired into the wetlands. Ammunition/weapons authorized other than Artillery related as indicated below.

(3) Limit boundaries: per approved Range Safety Danger Diagrams.

(4) OP's available are listed in Table 6-1 below, to include location:

Table 6-1. Observation Point Locations

OBSERVATION POINT NUMBER	COORDINATES	WEAPONS/AMMUNITION
1	MR 4682 3600	LASER
2	MR 4625 3627	LASER
3	MR 4537 3672	LASER
4	MR 4498 3695	LASER

(5) Heavy weapons firing, to include direct fire, TOW and DRAGON firing, Small Arms firing, and special use weapons firing must be submitted on AFZP Form 671-R, with appropriate supporting data, to Range Control for approval/disapproval.

u. Mortar Firing Points.

(1) Communications (provided by unit): 2 FM radios.

(2) Ammunition authorized: HE, ILLUM, and WP. WP will not be fired into wetlands.

(3) Miscellaneous. The area scheduled as part of the firing point includes the surface danger area of the weapon system (over head firing not authorized).

(4) Firing point data. Listed below in Table 6-2 are the firing points (FP) currently available at Fort Stewart, indicating location and weapons/guns authorized to be fired from each firing point.

Table 6-2. Mortar Point Locations and Authorized Weapons

MORTAR POINT NUMBER	**COORDINATES**	**WEAPON/GUN**
1	MR 4648 3602	60mm, 81mm, 4.2". 120mm
2	MR 4575 3641	60mm, 81mm, 4.2", 120mm

3	MR 4562 3651	60mm, 81mm, 4.2”, 120mm
4	MR 4522 3672	60mm, 81mm, 4.2”, 120mm
5	MR 4815 3503	81mm, 4.2”, 120mm

6-11. MISSILE SYSTEMS.

a. General. A MICOM Logistics Assistant Representative must be notified before firing any rocket or missile. MICOM office hours are 0800-1600 Monday through Friday, telephone 767-2925/2926 (S).

b. Multiple Launch Rocket System (MLRS).

(1) MLRS firing will be coordinated through Range Control scheduling on AFZP Form 671-R, with appropriate supporting documents. All firing will be IAW AR 385-62, AR 385-63, this regulation, FM 6-60, and approved SOP’s (SOP’s are approved by Division Arty and submitted to Range Control for review and concurrence, before firing).

(2) Instructions for computing the MLRS surface danger zone are as follows:

(a) The Surface Danger Zone for the MLRS M28 LP/C practice (smoke) rocket and the M26 LP/C tactical DPICM rocket is shown in Figure 12-1, C1, FM 6-60. It consists of a 150 meter radius firing area; an impact area; areas A, B, C, E and F; and the danger area. The tactical rocket also requires a fin release failure impact area, which is not required for the practice rocket because of the additional fin release devices used in the practice rocket. At the present, the entire surface danger area must be clear of all personnel before any rockets are fired. Since the practice rocket does not produce a dud, the impact area can be any military-owned area into which access can be controlled. The site of impact of a monolithic rocket will require an explosive ordnance disposal (EOD) team to clear the military-owned area before occupation by troops.

(b) The impact area consists of a rectangle around the target point (or target area for multiple aim points) and the corresponding flight corridor extending back towards the launcher. The rectangle extends from 2,200 meters short of the target (toward the launcher), X meters (from Table 12-1, C1, FM 6-60) beyond the target and W meters to either side of the target. The impact area is designed to contain debris payload, warhead skin and rocket motor) from normally functioning rounds. The dimension X is adequate to contain rockets when the fuse fails to function. The impact area is expected to contain debris from rockets with single point failures.

(c) Area A (lateral danger area) is an area 320 meters in wide that parallels each side of the (impact area) surface danger zone. Personnel are not authorized to be in this area during live firing.

(d) Area B (far secondary danger area) is an extension of the impact area and area A to a distance of 1,300 meters beyond those areas. Area B is considered adequate to contain the debris from a rocket impacting at the far edge of the impact area. Personnel are not authorized to be in this area during live firing.

(e) Area C (Near Secondary Danger Area) is an area 1,800 meters deep on the up range side of the impact area. It is parallel to area B. Area C is designed to contain fragments from early functioning warheads or items exploding at the near edge of the impact area. Personnel are not authorized to be in this area during live firing.

(f) The danger area is located between the danger areas C and E. The size of the danger area varies with range to target. The entire surface danger zone must be clear of all personnel unless a waiver has been approved IAW para 1-4 in AR 385-62.

(g) Area E (Launcher Forward Danger Area) is that area of the surface danger zone that is within 4,700 meters of the downrange edge of the firing area. It is endangered by premature fuse function or failure of the rocket motor during the boost phase. Personnel are not authorized to be in this area during live firing.

(h) Area F (launcher danger area) is the area immediately to the rear of the launcher that is directly exposed to blast and debris. Area F extends 350 meters to either side of the firing area and 400 meters to the rear of the firing area. Personnel are prohibited from occupying this 400 meter blast area during firing. A noise hazard area may be occupied only by personnel wearing hearing protection and having an operational need to be in that area.

(i) The double fin release failure impact area is required for tactical rockets with M77 warhead but not for the practice rocket, which has an additional fin restraint and release device. The fin impact area originates at the launcher, has a radius of 12,500 meters and includes a total angle of 114 degrees centered on the intended launch azimuth. It is designed to contain rounds whose fins fail to open. Personnel are not authorized to be in this area during live firing.

(3) Scheduled unit is responsible for providing roadblock personnel with communications, in addition to the standard live fire requirements. Other instructions per coordination meeting with Range Control.

(4) Launch Points are listed in Table 6-3 below:

Additional MLRS points are listed in Table 6-5.

Table 6-3. MLRS Launch Point Locations

LAUNCH POINT	COORDINATE
1	MR 18916 33911
2	MR 21316 44211
3	MR 21016 44311
4	MR 27916 39011
5	MR 31156 34991
6	MR 32416 33911
7	MR 34216 51311
8	MR 59716 41711
9	MR 22816 461 11
10	MR 30316 51011

c. Copperhead Missile Firing.

(1) Approved Range request submitted by unit with appropriate data.

(2) Fired IAW pertinent safety regulations, and approved firing data, and IAW this regulation.

d. Chaparral/Redeye/Stinger Missiles:

(1) Approved Range request submitted by unit with appropriate data.

(2) Fired IAW pertinent safety regulation, per approved firing data and IAW AR 385-62, AR 385-63, local regulations, SOP's, Federal Aviation Reg, and FAA letters of agreement.

e. Launch Pads/Firing Points. To be determined based on the system being fired.

6-12. AERIAL GUNNERY RANGE (AGR).

a. General. This chapter addresses the procedures for the conduct of attack helicopter live fire training and live fire of any helicopter mounted weapon system, including Lasers.

b. Definitions.

(1) Instructor Pilot (IP). A qualified commissioned or warrant officer assigned the duties as an IP on official military orders with the responsibility for the safe operation of assigned aircraft and weapons system.

(2) Weapons Instructor (WI). A qualified individual who is placed on military orders and who is assigned the responsibility for the safe operation of door gun weapons systems. The orders include designated systems for which the WI is qualified as an instructor.

(3) Ready Line. The line on which an aircraft is positioned while its armament systems are being loaded/unloaded with ammunition. The ready line will be easily identifiable from the air, will afford direct line of sight down range and will have both telephone and radio communications with the control tower/obser-vation post. Aircraft will be pointed down range or toward revetment when on the ready line.

(4) Start Firing Line (SFL). A point on the ground, easily identifiable from the air and used to designate the point of arming and firing of weapons on aircraft.

(5) Cease Fire Line/Disarming Line (CFL/DL). A point on the ground, readily identifiable from the air, and used to designate the termination of firing and disarming of weapons on aircraft.

(6) Firing Lane (FL). The area within which an aircraft mounted weapon may be fired. The firing line will consist of the SFL, CFL/DL and the left and right limits of fire.

(7) Hover Fire (HF). Fire conducted from a stationary helicopter. During hover fire the SFL and CFL are the firing positions on the left and right limits will be designated by compass headings.

(8) Roadblock NCO required.

c. Range Procedures.

(1) General. All live firing is controlled through DPTM, Range Division and requires two means of communications. The aerial gunnery ranges and their safety fans are IAW AR 385-63, Chapter 13. If intended training does not conform with those limits in AR 385-63, the unit will submit an overlay and concept of operation to Range Division, along with the Range Request to ensure firing will be contained within the aerial gunnery range (AGR) complex. Applicable safety measures, as specified in AR 385-63, this regulation, FM's, technical publications and command directives, will be incorporated into the concept of operations and strictly adhered to.

(2) The OIC will control all firing aircraft.

(3) In the event a weapons pod is inadvertently dropped from an aircraft, and cannot be recovered, Range Control will be notified immediately. The following information is required: grid coordinates, type weapon involved, type and quantity of ammunition.

(4) All misfired ammunition, to include small arm's ammunition, will be removed from the range upon completion of range firing and returned to the ASP IAW appropriate regulations/directives.

(5) The OIC will ensure that all firing on the range complies with the following limits:

(a) When firing fixed weapons systems, aircraft must maintain a directional heading of within 5 degrees left and right of range center line. When firing flexible weapons systems, firing must be controlled to ensure that all round's impact in the designated target area.

(b) Firing will be conducted IAW this regulation, AR 385-63, and applicable FM's/TM's and safety directives.

(6) Communications will be maintained at all times between aircraft and the control tower. Firing will be suspended immediately upon loss of communications. If maintenance repair time required to correct a communication failure would hinder effective training, the OIC may continue to fire provided that:

(a) Adequate visual and radio controls are maintained from an airborne control station (OIC from helicopter).

(b) Continuous radio/telephone communication is maintained with Range Control Operations.

(7) White phosphorous (WP) ammunition will not be fired into the wetlands.

d. Specific Duties.

(1) OIC.

(a) Prior to firing, the OIC will:

- Obtain both present and forecasted weather reports for the period of firing.
- Ensure that required armament personnel and equipment are present.
- Brief pilots on safety and other range details.
- Verify with the IP or pilot in command (PIC) as to exact ammunition

loading by type and amount.

- Verify that communications are established with Range Control Operations and the control tower, and Range Control has granted permission to go into a “hot” status.

- Coordinate with senior instructors when supporting observed fire exercises.

(b) During firing, the OIC will:

- Ensure that the IP or PIC is present in each aircraft when gunnery firing is being conducted.

- Supervise flight operations and safety procedures.

- Maintain positive radio contact with the senior instructor pilot when supporting observed fire exercises.

- Maintain positive radio control of all helicopters operating on the range in support of the exercise.

(c) After firing, the OIC will:

- Verify completion of range closure and submit reports as required by current range regulations.

- Debrief personnel as necessary.

- Ensure that the area is policed, equipment is returned to the proper location and a clearance inspection has been requested/coordinated with Range Control.

(2) The OIC, IP and PIC will:

(a) Be thoroughly familiar with applicable SOP’s, range procedures and pertinent regulations.

(b) Ensure operation of assigned helicopter and weapons systems are IAW prescribed procedures and safety regulations.

(c) Be qualified in the applicable weapons sub-systems.

(d) Be completely familiar with the impact area, firing limits, danger zones and other applicable safety criteria for each firing range.

(e) Ensure that firing is conducted only when aircraft are on course and weapons are aimed within the safety limits.

(f) Be responsible for arming and disarming the firing circuit by either manual manipulation or monitoring of applicable panel lights.

(g) Supervise the preparation, loading/unloading of rockets, boresighting, and stray-voltage check before each firing phase and before loading of ammunition.

- With system circuit breaker “in”, power on, and system armed, the firing circuit will be activated to each launch tube. A multi-meter will be used to verify the proper voltage to the appropriate tube.

- While the firing circuit is active to each tube, the adjoining tubes will be checked with a multi-meter to ensure that no stray voltage is present.

- With all switches off and the circuit breakers out, all tubes will be checked for stray or residual voltage. If any voltage is discovered, the system will be neither loaded nor fired until the fault is corrected.

(h) Check weapons system electrical firing circuits before each firing phase and prior to loading the ammunition.

(i) Ensure that the aircraft is oriented down range or pointed toward a revetment prior to loading/unloading.

(j) Ensure that the aircraft is grounded by a Y-type cable between the aircraft and the launcher to a ground rod.

(k) Ensure that the aircraft engine is shut down, the rotor/propeller is com-

pletely stopped and stray-voltage check is made prior to loading/unloading.

(l) Ensure that during and after rockets are loaded in launchers, no external or portable radio communications equipment will be permitted to transmit within 16 meters of loaded aircraft.

(m) Ensure that the weapons firing circuit is armed only after reaching the SFL and is disarmed before reaching the CFL/DL.

(n) Verify that communications are established with ground control tower/observation post before launching rockets.

(o) Verify that upon completion of the firing phase, launcher pads are cleared of all rockets.

(p) Ensure that no rockets impact closer than a 300 meter slant range to the aircraft to prevent collision with rocket fragments.

(q) Ensure that the consequence of accidental firing at any point during the exercise will present minimal risk to life and property.

e. Safety.

(1) Aircraft and Armament Emergency.

(a) The aircraft and armament emergency (pre-accident) plan prescribes the procedures to be followed in the event of an aircraft accident, incident, or inadvertent firing during the conduct of range firing.

(b) In the event of a misfire, malfunction, or emergency condition, the emergency holding course is designated at the appropriate section. When, due to an emergency, an aircraft proceeds to the holding area, the range will be checkfired until the emergency is resolved.

(c) OIC/IP Checklist. Any emergency will be reported immediately by any individual on the range as directed below:

- Location of the accident.
- Time the accident occurred.
- Type of aircraft involved.
- Injuries to personnel, if any.
- Other pertinent facts available.

(d) Dispatch an ambulance and a crash rescue team to the site simultaneously with the report required by para c6a(3) above. (Exception: If crash occurs inside the AIA, EOD must accompany the rescue team).

(e) Notify the Range Division by telephone or FM radio.

(f) As soon as possible, report by telephone to one of the following in the order listed:

- Immediate supervisor.
- Commander.
- Operations Officer.

(g) Armament sub-systems are considered safe for range traffic operations patter under “switches cold” conditions.

(h) Armament sub-system will go “switches hot” only if all the following conditions are satisfied.

- The helicopter is passed the SFL, and is pointed down range in the firing lane.
- No other aircraft are down range.

NOTE: This does not include other adjacent aircraft participating in the same exercise.

- Clearance to fire is received from Range Control.

(i) The IP or designated safety observer is responsible for all required radio calls pertaining to range operations.

(j) Helicopter crew members will not enter or leave rocket loaded helicopters until the rocket sub-system is electrically disconnected from helicopters.

(k) On helicopters equipped with cargo doors, the doors will be closed during firing, unless door gunner training coincides with aerial gunnery training.

(l) The rocket sub-system will not be energized until inbound on the firing run. The sub-system will go “switches hot” passed the SFL.

(m) System switches will be placed in the safe position before reaching the CFL.

(2) Air Safety.

(a) Weather.

- Minimum visibility for range firing is 1 nautical mile.
- Minimum ceiling for range firing is clear of clouds (i.e., below cloud levels).
- Wind limitations depend upon local flying regulations, aircraft flight limitations, and judgment of the OIC and IP.

(b) When firing rockets, the effects of air density, propellant burning time, and wind may be relevant at the time of firing. The rocket is sensitive to wind conditions and significant changes in range and deflection can occur even with moderate winds. Troop operations in connection with rocket firing from helicopters will be closely scrutinized to ensure no possibility of hazard front occurrence. Ground troops, observers, or spectators must be located outside the range fan while aerial weapons are being fired.

(c) Helicopters: Operational helicopters must maintain two-way radio communications with the control tower or observation post.

(3) Crash rescue plan (to be provided by the crash crew).

f. Range Facilities And Use. Range facilities will not be utilized unless the following requirements have been met:

(1) Range flags, road guards and range markers are emplaced as prescribed in this regulation.

(2) Roads will be closed and road guards posted as necessary by the firing unit during the period of actual firing.

(3) An additional radio will be available as a back-up for the range wire system.

(4) During major demonstrations, when a centralized control facility is operating for the demonstration, all communications required above will be located within that facility.

(5) Other requirements as directed by Range Control based on requested scenario.

g. Laser Firing Points.

All existing procedures for safety and movement of aircraft on the Fort Stewart reservation remain in effect. Use of LFP’s are on a first come, first serve basis, and approved by Range Control Operations. Unit and section SOP’s will conform to this chapter and be developed IAW applicable references. Personnel conducting laser training will be familiar with and conform to procedures established in AR 385-9, AR 385-63, 3d IN Div (Mech) & FS Reg 385-14, and unit SOP’s. The following procedures will be used:

(1) The PIC and pilot/aerial observer of the aircraft will be Fort Stewart Range Officer qualified. A range OIC and Safety Officer are required on each aircraft. Both crew member names must be on file at Range Control as being certified within the last 12 months.

(2) The following aircraft requirements will be met prior to LASER firing:

(a) AH-64 - A TADS Out front Boresight will be accomplished IAW TM-55-1520-238-10 if the TADS FLIR is used.

(b) AH-1 - No special requirements.

(c) OH-58D - All required boresighting and system checks must be satisfactorily completed prior to lasing. Laser will not be fired if a "RE-BORESIGHT" message is displayed on the MFD, or if there is any doubt as to the accuracy of the laser hit spot.

(3) Before takeoff, PIC's will contact Range Control telephonically to confirm Laser Firing Point availability.

(4) Training aircraft will contact Range Control for permission to occupy a LFP and send the opening data IAW, para 2-4, this regulation. Permission to go "hot" and a range open time will be given by Range Control. Lasers may only be armed after clearance is given by Range Control and the PIC's have verified azimuth limits. Once in the firing point, aircraft will monitor Range Control net.

(5) All Laser targets will be positively identified and within the specified range fan for each point. It is the responsibility of the PIC (OIC) to ensure safe laser operations are being conducted within the AIA. Firing a laser toward standing water, shiny objects, above the tree line, or at personnel and equipment are examples of unsafe laser operations.

(6) The OIC, at the conclusion of training, will send closing data IAW, para 2-4, this regulation, and will request clearance from Range Control to go cold.

(7) Multiple Laser Firing Points may be occupied at the same time, if each point is supervised by an OIC and Safety Officer IAW para 2e.

(8) Multiple aircraft laser operations are allowed at LFP # 1 and LFP # 2 to facilitate training operations.

h. Laser Firing Point (LFP) Locations And Uses.

(1) LFP # 1 (Landing - 7).

(a) Area of Operation: Grid MR 51213606 and 200 meters either side.

(b) Altitude: Minimum - 165' above ground level (AGL) Maximum - 300' AGL.

(c) Azimuth: 290 to 315 degrees.

(d) Maximum Number of A/C: 3.

(e) Enter via Laser Transition Route 1.

(2) LFP # 2.

(a) Area of Operation: Grid MR 47883602 to MR 48213602.

(b) Altitude: Minimum - 100' AGL Maximum - 300' AGL.

(c) Azimuth: 290 to 315 degrees.

(d) Maximum number of A/C: 3.

(e) Occupy via Laser Transition Route 2.

(f) LFP # 2 is closed when MP-5 is hot.

(3) LFP # 3.

(a) Area of Operation: Grid MR 44213741 +/- 200 meters East, West, and South. Do not go North of Canoochee River.

(b) Altitude: Minimum - 50' AGL Maximum - 300' AGL.

(c) Azimuth: 040 to 085 degrees.

(d) Maximum number of A/C: 1.

(e) Occupy via Laser Transition Route 3 or 4.

(f) LFP # 3 is closed when EOD Range is hot.

i. Laser Transition Routes (LTR).

(1) LTR # 1 proceed from the white route, turn onto dirt road (FS 102), beginning at MR 513343 (Vic KP 10) and North along road (FS 102) to LFP # 1 (center of mass MR 512360).

(2) LTR # 2 proceed from the white route, turn onto FS road 144, beginning at MR 500335, continue Northwest to intersection of FS 107, then North Northwest to LFP # 2 (center of mass MR 478360).

(3) LTR # 3 proceed from the white route onto FS road 144, beginning at MR 500335, then West Northwest to trail intersection at MR 445355, proceed North to vicinity of OP-4 (MR 450370), turn to a heading of 295 to the Canoochee River, and follow the river West to LFP # 3 (MR 442374).

(4) LTR # 4 (Direct transition between LFP's) proceed from LFP # 1, West along Canoochee River to LFP # 2, then West on a general heading of 290, but to the rear of OP's 1 through 4 to LFP # 3 (or reverse from LFP # 3 to LFP # 1).

CAUTION: LTR # 4 is closed when MP-5 and OP Line is hot.

NOTE: Laser Transition Routes 2 and 3 utilize "Corridor 1" as described in 3d IN Div (Mech) & FS Reg 95-1.

j. These instructions concern the use of LFP's only. Laser training may also be conducted at standard ranges on FSGA. When scheduled ranges are occupied for laser operations, procedures for that range must be adhered too.

k. The crew will ensure switches are "COLD" before requesting clearance out of the firing point.

6-13. LIVE FIRE EXERCISES AND CALFEX (COMBINED ARMS LIVE FIRE EXERCISE).

a. Purpose.

(1) The purpose of this section is to facilitate planning and execution of live fire exercises on the Fort Stewart reservation.

(2) The requirements outlined below are not inclusive, but are to be used as a guide when planning or conducting live fire maneuver training.

b. Responsibilities.

(1) Commanders, controllers, and safety personnel will adhere to this regulation, AR 385-63, AR 385-62 for the safe conduct of the exercise. Additionally, personnel participating in the exercise will be reminded of the safety requirements and their role/responsibility for complying with the above regulations.

(2) Minimum safe distances for weapons/ammunitions being fired will be based on AR 385-62, AR 385-63, and appropriate publications for each weapon/ammunition being used.

c. Specific OIC Responsibilities.

(1) Ensure each soldier has been familiarized with their individual weapon before participation in the exercise. Gunners on crew served weapons must have fired a qualification course prior to the exercise, for the weapon to which they are assigned for the exercise.

(2) Safety personnel and controllers will be "walked" through the area and thoroughly briefed before the exercise. Boundaries, control measures, phase lines, panel markers, etc., will be pointed out and identified. After this briefing and walk through, no changes will be made to the visual control measures listed herein.

(3) Conduct a "safety" sweep of the maneuver area prior to the exercise, if required by Range Control. Mark duds with engineer tape per instructions of Chapter 10, this regulation.

(4) Arrange for and/or construct and employ large, easily identifiable panels and/or markers to identify left and right limits of fire.

(5) Register organic mortars and any other indirect fire weapons before any rehearsals and the actual exercise. Conduct safety checks on all indirect fire weapons before actual exercise. Re-

quest exceptions for any special operations IAW this regulation.

(6) Ensure lead elements of each unit/element have sufficient colored smoke to identify their location to controller(s) safety personnel, as required.

(7) Ensure communications required are established and maintained.

(8) Comply with special instructions received from Range Control based on approved scenario and additional restrictions/requirements for that particular exercise.

(9) Roadblock NCO required.

d. Required Planning and Coordination.

(1) Units desiring to conduct a live fire exercise will submit a AFZP Form 671-R, to DPTM, Range Division IAW Chapter 3 of this regulation.

(2) As enclosures to the AFZP Form 671-R, will be a brief description of the exercise scenario, appropriate overlays and safety diagrams, and other pertinent supporting documents.

(3) Once approved, requesting unit is responsible for coordinating the following through Range Control:

(a) Left and right limits of fire markers/panels, where applicable.

(b) Type and quantity of targets required, if any.

(c) Roadblock system for exercise area.

(d) Additional safety requirements that may be identified.

e. Location(s) For Live Fire Exercises.

(1) Current live fire areas consist of the following:

(a) AGR's 1, 2, and 3.

(b) B-18/B-22 Training area.

(c) Luzon.

(d) Tire House.

(e) RSPAC.

(2) Other areas only upon approval from Chief, Range Division.

f. Suggested LFX planning guide, see Table 6-6.

NOTES:

1. OIC/RSO GTA 7-1-30 is available through Training Support Center (TSC) and is an Excellent Guide.

2. Assistance is available through Range Control.

6-14. MINIMUM REQUIREMENTS.

Table 6-4 below indicates the minimum requirements for range OIC and RSO for type training being conducted. Commanders have overall responsibility for their soldiers; therefore, commanders may increase, but not decrease the minimum grade requirements of this table.

Table 6-4 Officer In Charge and Range Safety Officer Requirements

WEAPON SYSTEM	OFFICER IN CHARGE	RANGE SAFETY
Practice hand grenades; rifle, grenades, subcaliber training devices; LASER ranges; simulators; firing devices; trip flares, small arms and machine guns:	SFC or Above	SSG or Above (7)
Chemical agents and smoke:	SFC or Above (3)	SSG or Above (3)
Aerial gunnery; air defense	SFC or Above	SSG or Above
Artillery":	SFC or Above (4)	SSG or Above (5)
Live fire exercises using organic weapons, squad thru company, battery, troop:	SFC or Above	SSG or Above
Combined Arms live fire exercises using outside fire support: Squad, Section-Platoon, Company, Battery; Troop, Battalion, Squadron or larger:	SFC or Above (6)	SSG or Above (6)

NOTE:

1. DOD civilians and Law Enforcement officials may act as OIC/RSO (AR 385-63, para 4-3c).

2. Complexity of exercise, number of participants and physical separation of OIC from firing points may indicate need for additional RSO's (i.e., lane safety's on small arms ranges).

3. When Nuclear, Biological, Chemical (NBC) training is being conducted, OIC must be NBC qualified: If RSO is used, RSO also must be NBC qualified.

4. SFC and above are authorized to act as OIC of an artillery firing point only when approved by the Installation Commander. RSO's must be Command Certified by 3d IN Div (Mech) DivArty, IAW Chapter 2, this regulation, in addition to requirements listed in Table 6-12-1. SGT's serving in SSG duty positions may serve as RSO for LASER firing IAW Note 7, this table.

5. The duties of artillery firing point RSO are normally performed by the battery executive officer.

6. OIC will be field grade officer for battalion and larger size units: RSO will be company grade officer or higher.

7. Personnel in the rank SGT(P) assigned to a SSG duty position may be used as RSO, provided the following minimum requirements are met:

a. Must be assigned to a SSG duty position within the unit.

b. Be command certified on unit's organic weapons.

c. Be safety certified by Range Control and have a valid certificate of responsibility on file at Range Control Operations. See Chapter 2, this regulation, for further information.

8. Commander's may request an exception to policy to allow a SSG(P) assigned to a SFC position to perform OIC duties, minus the availability of SFC or above. Successful completion of the Range Certification is required.

6-15. PROJECTED NEW RANGES/ TRAINING FACILITIES.

a. Battalion maneuver lanes in the western corridor.

b. Conversion of Small Arms ranges to the RETS system.

c. Close-in Training Facilities.

d. Multipurpose Training Range (MPTR) Red Cloud, Alpha, Foxtrot, Golf, and Hotel.

e. Multipurpose Machine Gun Range.

Table 6-5. Artillery Firing Point Locations and Authorized Weapons

FP NUMBER	GRID COORDINATE	WEAPON/GUN
1	MR 49246 33651	8",155,105
2	MR 48676 33341	8",155,105
3	MR 47816 34071	8",155,105
5	MR 48006 35091	8",155,105
13	MR 45006 35511	8",155,105
17	MR 43166 36341	8",155,105
19	MR 42806 36441	8",155,105
20	MR 42706 36941	8",155,105
24	MR 40786 34811	8",155,105
29	MR 39796 36151	8",155,105
30	MR 39416 35201	8",155,105
31	MR 39396 35841	8",155,105
35	MR 37446 34941	8",155,105
40	MR 36136 35711	8",155,105
41	MR 35856 36321	8",155,105
42	MR 34776 33891	8",155,105
43	MR 34516 32611	8",155,105
47	MR 30056 34061	8" Only
48	MR 29376 36481	8" Only
49	MR 30386 36911	8", MLRS
50	MR 29186 36011	8" Only
74	MR 53416 39111	8",155,105
78	MR 52116 44711	8",155,105
84	MR 52816 42011	8",155,105
101	MR 40406 33771	8",155,105

Table 6-5 continued

FP NUMBER	GRID COORDINATE	WEAPON/GUN
104	MR 33156 34421	8” Only
105	MR 32006 23571	8",155, MLRS
106	MR 32516 35411	8",155, MLRS
107	MR 32386 34951	8",155, MLRS
108	MR 32216 34391	8”,155, MLRS
109	MR 32076 33871	8”,155, MLRS
110	MR 31916 33391	8",155 only
111	MR 31156 36691	8" Only
112	MR 31056 34811	8" Only
141	MR 51296 48411	8”,155 only
142	MR 50336 46141	8”,155 only
143	MR 49896 45601	8”,155 only
144	MR 33766 36041	155 only
145	MR 33466 45981	155, MLRS
146	MR 33306 47171	155 only
211	MR 35576 40781	8",155 only
212	MR 35256 40261	8”,155 only
213	MR 34016 41651	8”,155 only
214	MR 31126 41931	8” Only
215	MR 36156 37131	8”,155,105
216	MR 36126 37491	8”,155,105
231	MR 31366 38331	8",155, MLRS
232	MR 31376 38561	8",155, MLRS
233	MR 30826 40331	8",155 only
236	MR 36316 45791	8”,155,105
237	MR 35306 48921	8”,155, MLRS
238	MR 36046 49471	8”,155 only
252	MR 40956 32601	8”,155 only
253	MR 36216 40951	8",155 only
254	MR 36456 41811	8”,155 only
255	MR 34756 39911	8”,155, MLRS

Table 6-5 continued

FP NUMBER	GRID COORDINATE	WEAPON/GUN
256	MR 34686 41681	8”.155 only
300	MR 47016 51331	8”,155 only
301	MR 42316 49161	8",155 only
302	MR 42006 49851	8",155 only
303	MR 32066 44061	8”,155, MLRS
304	MR 57376 41601	8”,155 only
305	MR 50096 48631	8",155 only
306	MR 51536 47291	8",155 only
307	MR 56526 45901	8”,155 only
308	MR 56936 45821	8”,155 only
309	MR 56656 43981	8",155 only
310	MR 55926 45901	8”,155 only
311	MR 55296 45771	8",155 only
312	MR 54756 44751	8”,155 only
313	MR 54526 44911	8”,155 only
314	MR 53726 44521	8”,155 only
315	MR 53116 44111	8", 155 only
317	MR 34436 41261	8",155, MLRS
318	MR 32956 41961	8",155, MLRS
319	MR 31606 41761	8”,155 only
320	MR 33236 44411	8”,155 only
321	MR 47526 50111	8”,155 only
322	MR 42236 49011	8”,155 only
323	MR 41906 49751	8”,155 only
324	MR 32066 44601	8", MLRS
325	MR 32456 45441	8” only
326	MR 47566 49901	8”,155 only
327	MR 42236 49661	8" only

Table 6-6. LFX Planning Guide

MILESTONES	ACTION	RESPONSIBILITY
100	INITIAL CONCEPT BRIEFING	UNIT
90	SUBMIT RANGE REQUEST SUBMIT BID ASSESSMENT	UNIT
80	SUBMIT BID ASSESSMENT	UNIT
70	SUBMIT/VERIFY AMMO FORECAST	UNIT
70	PUBLISH CALFEX LETTER	UNIT
70	SELECT OVERALL OIC/SO	UNIT
50	1ST IPR	OIC/SO
35	DETAIL BRIEF RANGE SAFETY CONTROL PROCEDURES	OIC/SO
30	REQUEST FM FREQUENCIES AND MAG DROPS	UNIT
20	2D IPR	OIC
15	FINAL CONCEPT/OVERLAYS TO RANGE CONTROL	OIC
10	REQUEST AMMO AND PUBLISH OPORD	OIC
8	CONDUCT RANGE WALK	RANGE CONTROL/OIC/CDR
7	FINAL IPR	OIC
2	PLACE AMMO IN FIELD ASP CONDUCT REHEARSALS REGISTRATION OF WEAPONS	UNIT OIC OIC
1	ESTABLISH COMMO	OIC
LFX+	AAR	OIC
	AREA CLEARANCE	UNIT/RANGE CONTROL

CHAPTER 7 - VEHICLE MOVEMENT

7-1. USE OF FORT STEWART ROADS BY TRACK/WHEELED VEHICLES.

a. Movement of all vehicles to and from ranges and training areas will be confined to established tank trails or temporary tank trails, as outlined on the current Fort Stewart map. Use authorized crossing points only.

b. Track vehicles will not operate on paved roads or be driven beyond the reservation boundary, except for approved exercises.

c. When moving within tactical training areas, vehicles are not restricted to tank trails. However, when maneuvering off trails, sharp turns will be avoided, to protect the environment. Every effort will be made to avoid damage to drainage ditches, road shoulders and forestry without detracting from the tactical play of the unit. Track vehicles will not maneuver on range complexes except when specific permission is granted by the Chief, Range Division. Damage to firing positions or roads by vehicles that cannot be repaired by the unit will be reported to Range Division.

d. To prevent damage to improved roads on the Fort Stewart reservation and for safety purposes, the following rules will apply to crossing of paved roads:

(1) Only established tank crossings will be used.

(2) Crossovers have been constructed for this purpose. These crossings are listed on the Fort Stewart composite map (Edition 3).

(3) Crossovers will be cleaned by using unit immediately after use.

e. Movement across active portion of drop zones is prohibited, unless specifically approved (in writing) by the Chief, Range Division. If maneuver on a drop zone is approved, the unit will coordinate with supporting engineers to repair any damage caused to the drop zone prior to area clearance.

f. Commanders will ensure that vehicle operators are qualified and licensed. Operators and passengers will use seat belts, safety straps, or nets on vehicles so equipped at all times.

g. Maximum speed limit for tactical wheeled vehicles operating on paved roads and GA highways is 40 mph.

h. Any deviation from these instructions must be approved by the ACofS, G3/ DPTM.

7-2. TANK TRAILS, FORT STEWART ROADS, PAVED CROSSINGS, AND BRIDGES.

a. The primary purpose of establishing tank trails is to control movement of track vehicles. These tank trails are considered off limits to civilian type traffic except when specifically authorized by Range Division. In such cases, the driver of the civilian vehicle will be issued a special pass that indicates route of travel and authorized time period. Driver will be instructed to exercise extreme caution, particularly when approaching or passing track vehicles.

b. Speed limits on Fort Stewart tank trails/unpaved roads are as follows:

(1) Wheel Vehicles (tactical/non-tactical): 30 miles per hour.

(2) Track Vehicles: 25 miles per hour.

(3) Vehicles in convoy: 25 miles per hour.

(4) Vehicles in cantonment area/cantonment tank trails: 10 miles per hour.

(5) For safety reasons, speeds on tank trails will be reduced when crossing timber bridges to 15 miles per hour daytime and 5 miles per hour at night.

c. The following precautions will be taken when military vehicles cross paved roads:

(1) Road guards with amber lights will be posted 100 meters on each side of the crossing point. Road guards will wear reflector vests and use baton type flashlights (white only). Road guards will not stand on the road but will stand on the shoulder and wave the traffic to a stop. Road guards must be facing the on-coming traffic at all times.

(2) One ground controller, located at the crossing site, will post road guards and direct vehicles safely across. Controller will direct vehicles across using hand and arm signals. For single vehicle crossing (track or oversized wheeled vehicle), a soldier will dismount and physically ground guide vehicle across. Two or more vehicles require road guards be posted.

(3) Crossing of paved highways will be “administrative”. Service drive lights will be used during period of limited visibility. This requirement can be waived north of the “Light Line” (see para 7-5), when state highways are closed for major exercises (coordinate through DPTM). Vehicles will close to a 25 meter interval before the lead vehicle negotiates the crossing.

(4) During peak traffic periods (0600 - 0730; 1115 - 1245; 1600 - 1730) commanders will ensure that traffic is not delayed more than 5 minutes. Other time periods, no more than 10 civilian vehicles traveling in the same direction will be halted at any one time.

(5) Crossing units will clear paved roads of mud and/or dirt after the crossing is completed.

(6) Track vehicles will only cross paved roads at specified locations to prevent damage to pavement.

d. Track vehicles must be led by a wheel vehicle with flashing lights under the following conditions:

(1) On Paved Surfaces. (Only when movement of track vehicles on paved roads is approved by Commanding General, Fort Stewart.)

(2) In the cantonment area and perimeter of cantonment area.

e. Commanders will ensure bridge classification limits are not exceeded. Report any bridge missing a military classification marking to Range Control.

7-3. TRACKED VEHICLE COMMUNICATION.

a. During the movement of track vehicles, except M548 Cargo Carrier and M667 Lance Prime Mover, the driver must be in direct contact by intercom with the vehicle commander.

b. A ground guide or wheel vehicle will be used to lead track vehicles if communication between driver and vehicle commander is lost. Movement in this manner will be for a minimum distance only. A vehicle not equipped with or has loss of intercom capabilities will not be placed in a convoy for movement.

7-4. VEHICLE MOVEMENT ON RANGES.

Military vehicles are permitted on ranges for the purpose of loading, unloading and range maintenance, unless the range is designed for mounted exercises. On small arm's ranges, vehicles will park in designated parking areas. Aid vehicles should be parked near range tower, unless specific parking area is designated. Privately owned vehicles (POV) will not be parked on, or near any Fort Stewart range or training area.

7-5. DIVISION LIGHT LINE/NIGHT MOVEMENT.

a. Operations in blackout areas:

(1) The dedicated blackout training areas of Fort Stewart are designated as follows:
(a) Fox-Trot and Echo training areas, excluding GA Highways 144 and 119.

(b) All ranges (beginning at the entrance to the range).

(c) All unpaved roads and trails contained in (a) above.

(2) During the hours of darkness all combat/tactical vehicles will use blackout drive/blackout markers when operating in dedicated blackout training areas. Units desiring to use thermal or infrared night vision devices for blackout movement must have vehicles clearly identifiable such as chemical light markings or other visible means. Commercial vehicles operated by Government agencies and contractors will remain clear. Darkness is defined as the time between end of evening nautical twilight (EENT) and beginning of morning nautical twilight (BMNT).

(3) Privately owned vehicles (POV's) are prohibited from entering any dedicated blackout training area that is scheduled for training. POV's may be operated on authorized routes designated in the Fort Stewart Access Policy as listed in Table 7-1 below:

Table 7-1. Authorized POV routes to ponds

AREA	AUTHORIZED ROUTE
POND 1, PINEVIEW LAKE	GA 144 TO FS 2 TO LAKE
POND 2, GLISSON'S POND	GA 129 TO POND (FROM NORTHERN BOUNDARY ONLY)
POND 3, HOLBROOK POND	FS 48B TO LAKE
POND 4, CANOOCHEE CREEK DAM	GA 119 TO FS 144 TO DAM
POND 5, BORROW PIT	GA 144 TO PIT
POND 7, BORROW PIT	GA 144 TO PIT
POND 19, E. EVANS FIELD POND	GA 144 TO FS 102 TO POND
POND 20, W. EVANS FIELD POND	GA 144 TO FS 102 TO POND
POND 21, RICHMOND HILL POND	GA 144 TO FS 58 TO POND
POND 22, RICHMOND HILL POND	GA 144 TO FS 58 TO POND
POND 23, RICHMOND HILL POND	GA 144 TO FS 58 TO POND
POND 28, DOGWOOD LAKE	GA 144 TO FS 47 TO FS 144 TO POND
LANDINGS, 1B, 2, 3, 3B, 4, 5, 6 and 7	GA 144 TO LANDING ROAD

POV's will use headlights when using these authorized routes. Commanders may elect to close entire routes under the provisions of para 7-6 when the presence of POV's degrades safety or effectiveness of operations.

(4) Emergency, Range Control, Military Police and Game Warden vehicles are exempted from blackout procedures when responding to an emergency, otherwise they will use parking lights.

(5) Units using infrared drive or passive drive (no lights) must have a lead and trail vehicle using blackout drive. These vehicles are to stop and warn any other vehicles met that a convoy using no lights is following/ahead.

(6) Night speed limits on unpaved roads and trails:

(a) All vehicles 15 miles per hour maximum.

(b) Speed will be reduced according to road conditions to ensure safe operation during hours of reduced visibility.

b. Operations in Non-Blackout Areas (Alpha, Bravo, Charlie, and Delta Training Areas).

(1) All combat, tactical, commercial, or privately owned vehicles will use service drive/headlights when operating on any paved road within the non-blackout drive areas. Vehicles crossing a paved road (whose primary route of travel is an unpaved road) are required to have highly visible road guards IAW para 7-2 of this regulation.

(2) The use of either blackout or service drive/headlights is optional in the Alpha through Delta areas. If a commander elects to operate under blackout procedures, he must so state on his training area request. He must also take appropriate steps described in paras 7-5 and 7-6 of this regulation to close the training area(s) to POV traffic and enforce blackout procedures.

(3) POV's are prohibited from entering any Alpha through Delta area that is scheduled for training. This does not include roads and trails adjacent to the training areas unless blocked under the provisions of b(2) above.

(4) Fort Stewart Road 48 between Wright AAF and GA Highway 144 East will not be blocked. All vehicles using FS 48 will use either service drive or headlights during the hours of darkness.

(5) Night speed limits.

(a) Unpaved roads and trails while using service drive/headlights: 20 miles per hour, catch-up speed, 25 miles per hour.

(b) Unpaved roads and trails while using blackout or parking lights: 15 miles per hour.

(c) Paved roads while using service drive/headlights: as posted.

(d) Speed will be reduced according to road conditions to ensure safe operation during hours of limited visibility.

7-6. TACTICAL ROADBLOCKS AND/OR OBSTACLES.

a. Use of tactical roadblocks and/or obstacles on Fort Stewart roads and trails must be approved by Range Division. Request for approval will be submitted to Range Division Scheduling NLT 72 working hours before intended emplacement. The buried cable on the western corridor that supports the MAG Drops and Camp Oliver will not be tampered with or damaged. Cable locations are marked with signs indicating "Buried Cable" and a copy of the overlay pinpointing the location is available to units upon request, from Range Control Scheduling. Requests to emplace roadblocks/obstacles will include the following information:

(1) Unit identification.

(2) Responsible individual (unit POC).

(3) Location(s) of roadblock/obstacle.

(4) Description of obstacle(s) to be used.

(5) Additional safety measures required (if applicable).

(6) Date/time group obstacle/roadblock will be emplaced and removed.

(7) Overlay depicting barrier plan (submit in 5 copies).

b. In the interest of safety, tactical roadblocks and obstacles must be clearly marked (e.g., signs white engineer tape, reflectors, etc.) and located so that a driver, traveling within the speed limit, has ample time to take notice and safely stop.

c. Tactical roadblocks/obstacles will be manned at all times, unless approved by Chief, Range Division.

d. Tactical roadblocks and obstacles must be located in a place and/or constructed in a manner to permit passage of non-tactical vehicles, i.e., fire trucks, ambulances, Range Division Inspectors, etc. Adequate passage can be an alternative route in proximity to road where roadblock/barrier is emplaced, except as indicated in para 3-2c, this regulation.

e. All evidence of tactical roadblocks and obstacles will be removed and the road/trail will be returned to its original condition before the unit departs the training area.

f. Storm drain culverts, bridges and road fills in swampy areas will not be used as part of the scenario of any exercises.

CHAPTER 8 - DROP ZONES/LANDING ZONES

8-1. GENERAL.

a. Drop Zones/Landing Zones (DZ's/LZ's) are special use facilities and must be requested on an individual basis. Units desiring to use DZ's in conjunction with the surrounding training area, must submit a request for each facility. Exceptions to this policy are ST LO, METZ, and Kasserine, which are no longer active drop zones, and are considered part of the training area. (**NOTE:** During special exercises, these former DZ's may be scheduled for heavy Equipment Drops independent of the training area.) Active DZ's will not be used for track vehicle maneuver training.

b. Personnel acting as Drop Zone Safety Officer (DZSO) for routine proficiency operations of no more than four C-130's or two C-141's will:

(1) Be SGT or above.

(2) Current qualified parachutist.

(3) Have assisted as DZSO at least twice before performing DZSO duties for the first time.

c. For operations involving more than four C-130's or two C-141's, DZSO will be SSG or above and meet the criteria of paragraphs (2) and (3) above.

d. Personnel acting as DZSO/Combat Control Team (CCT) will be briefed by a representative of Range Division and will have a current DZSO Certificate of Responsibility on file at Range Division Operations, validated within the last 12 months (see Figure 2-3).

e. DZSO will notify Plans, Training, Mobilization & Security (PTMS), telephone 767-6768 or DSN 870-6768, 2 working days before a troop drop, giving times of drop, DZ that will be used, and number of personnel to be dropped.

8-2. OPERATIONAL PROCEDURES.

a. The aircraft commander or flight leader will contact Marne Radio and request permission to enter the restricted area. Marne Radio frequencies are UHF 247.0, VHF 127.35 and FM 41.30. Call at least ten (10) minutes prior to desired entry time.

b. The DZSO must contact Range Control a minimum of 30 minutes before scheduled airborne operations to include scheduled use of field landing strip accompanying airborne operations. DZSO/CCT must contact Range Control Operations on FM 48.50 and provide the following information to open the DZ:

(1) Name, rank, SSN and unit of DZSO/CCT.

(2) DZ, type of aircraft, number of passes and type of drop(s) (e.g., personnel, equipment, etc.).

(3) Time of first drop and last drop or landing.

(4) Time that field landing strip will be used if required as a part of the airborne operations.

(5) Internal radio frequency (aircraft frequency).

c. DZSO/CCT will call Range Control when aircraft are 5 minutes out from the DZ. Range Control will assure the DZSO/CCT that high trajectory firing along the aircraft's line of flight has ceased. The cease fire will remain in effect until Range Control has been notified by Marne Radio that all aircraft are cleared of the reservation. The DZSO/CCT will call Range Control when the aircraft have cleared the DZ. DZSO/CCT will notify Range Control immediately of any change to the schedule.

d. The DZSO/CCT will maintain positive communications with Range Control during airborne operations to effect cease-fire of artillery/mortars in the event of emergency departure from approved flight plan. Aircraft being used in the operation must have capability of communications with Marne Radio. The DZSO/CCT will establish a go/no go signal with drop aircraft.

e. The DZSO/CCT will not change the flight pattern or route of the aircraft while the aircraft is within restricted airspace R-3005.

f. When using Victory DZ, the DZSO/CCT is responsible for ensuring that power is turned off before the drop and that power is restored upon completion. DZSO/CCT will coordinate with DPW/Wright AAF for power shut off/turn on.

g. Only vehicles required for operational control purposes will be permitted on DZ's/LZ's immediately preceding or during an airborne operation. DZSO's/CCT's will ensure that DZ's/LZ's are cleared of all other vehicles well before a scheduled drop and that the DZ remains clear until all parachutists have landed. Heavy drop recovery vehicles and/or ambulance(s) will not be permitted on DZ until all personnel and equipment have landed.

h. DZSO/CCT is responsible for spectator control on or in immediate vicinity of the DZ.

i. DZSO/CCT will be responsible for requesting clearance of DZ/LZ and reporting of all accidents/incidents to Range Control. DZSO/CCT is also responsible for the police of the DZ and spectator area, to include removal of all air-delivery items such as platforms, bundles, webbing, trash, etc. before closing the DZ.

j. For night airborne operations the DZSO/CCT party equipment kit will include at least one night observation device (NOD).

k. It is imperative that DZSO's/CCT's follow procedures as outlined in this regulation. There are numerous activities that can occur simultaneously during an airborne operation. Failure to maintain communications with Range Control and/or failure to make the drop during prescribed time could result in the mission being canceled in the interest of safety. For personnel drops, the DZSO/CCT will determine both surface winds and winds aloft IAW FM 57-220, FM 57-230 immediately before the operation.

8-3. DZ'S/LZ'S CURRENTLY AVAILABLE.

a. The following DZ's/LZ's are available for scheduling: TAYLORS CREEK DZ, REMAGEN, CANOOCHEE, JAECK, TARO STAGEFIELD, GALAHAD, and VICTORY (WRIGHT AAF).

b. Paragraph's 8-4 through 8-9 provide guidance to/description of each drop

zone and type training that can be scheduled on each.

8-4. TAYLORS CREEK DROP ZONE (TCDZ).

a. Capabilities. Training events authorized: Battalion size drops; heavy equipment drops; CDS drops; Battalion size air assaults.

b. Location. TCDZ is located in Training Area E3 and is bounded on four corners by the following coordinates: SW - MR 32033372; SE - MR 32663355; NE - MR 33213548; NW - MR 32583566.

c. Description. TCDZ has a length of 2100 yards and a width of 700 yards. The terrain consists of mostly open grassy area with approximately 10 percent clay. The highest point of elevation on the DZ is 80 feet MSL. The prevailing winds are westerly. Run-in: Northeast; escape: west or south, left turns only, remain south of 39 gridline.

d. Unit Requirements.

(1) Personnel. DZSO/CCT (Required for any air drop and air assault mission.)

NOTE: OIC is responsible for means of evacuation of injured personnel.

(2) Equipment. FM communication.

e. Range Utilization.

(1) Airborne Operations.

(a) Schedule IAW this regulation.

(b) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(c) DZSO/CCT must open/close drop zone per para 8-2, this regulation.

(d) DZSO/CCT will ensure that aircraft contact Marne Radio 10 minutes prior to entering the reservation.

(e) DZSO/CCT will maintain communications with Range Control; inform Range Control of any accidents/incidents.

(2) Other training.

(a) Schedule IAW this regulation.

(b) Open and close DZ.

(c) Maintain communications with Range Control Operations.

(d) OIC must verify with Range Control that appropriate roadblock/barrier system is in place.

(e) Clear area upon completion IAW this regulation.

8-5. REMAGEN DZ/LZ.

a. Capabilities.

(1) Training events authorized. Battalion sized personnel drops; heavy equipment drops; CDS drops; landing airstrip for helicopters and fixed wing aircraft up to and including C130's.

(2) Location. Remagen is located in training area F9 and is bounded on four corners by the following coordinates: SW - MR 23984517; SE - MR 24645040; NE - MR 24275144; NW - MR 23665122.

b. Description. Remagen DZ has a length of 1200 yards and a width of 700 yards. The terrain consists of approximately 80 percent brush and 20 percent sand. The highest point of elevation on the drop zone is 166 feet MSL. Run-in: Remain west of the 30 grid line and north of the 41 grid line. Escape: Remain west of the 30 grid line and north of the 41 grid line. (Telephone 767-8325)

c. Unit Requirements.

(1) Personnel. Provide DZSO/CCT. Road guards at the entrance to the DZ.

NOTE: OIC is responsible for means of evacuation of injured personnel.

(2) Equipment. FM radio communications; other equipment per unit SOP.

d. Range Utilization.

(1) Schedule IAW this regulation.

(2) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(3) DZSO/CCT must open/close DZ, IAW para 8-2, this regulation.

(4) DZSO/CCT will ensure that aircraft makes contact with Marne Radio 10 minutes prior to entering the reservation.

(5) DZSO/CCT will maintain communications with Range Control and report all damage, accidents and incidents before closing DZ.

8-6. CANOOCHEE DROP ZONE.

a. Capabilities.

(1) Training events authorized: forward refuel point for attack helicopters, stagefield, and company size personnel drops.

(2) Location. Canoochee DZ is located in training area B1, adjacent to GA Highway 144. It is bounded on four corners by the following coordinates: SW - MR 54753658; SE - MR 55933669; NE - MR 55873732; NW - MR 54693735.

b. Description. Canoochee DZ has a length of 1188 yards and a width of 640 yards. Terrain consists of sand, rocks, brush and asphalt. The highest point of elevation on the drop zone is 29 feet MSL. Run-in and exit must be coordinated through Range Scheduling.

c. Unit Requirements.

(1) Personnel. Provide DZSO/CCT. Road guards at the entrance to the DZ.

(2) Equipment. FM radio communications; other equipment per unit SOP.

NOTE: OIC is responsible for means of evacuation of injured personnel.

d. Range Utilization.

(1) Schedule IAW this regulation.

(2) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(3) DZSO/CCT must open/close DZ, IAW para 8-2, this regulation.

(4) DZSO/CCT will ensure that aircraft makes contact with Marne Radio 10 minutes prior to entering the reservation.

(5) DZSO/CCT will maintain communications with Range Control and report all damage, accidents and incidents prior to closing the DZ.

8-7. JAECK DROP ZONE.

a. Capabilities.

(1) Training events authorized. Company sized personnel drops; CDS drops; airstrip for helicopters; other activities approved by the Chief, Range Division.

(2) Location. Jaeck DZ is located in the eastern side of training area E22 and is bounded on four corners by the following coordinates: SW - MR 18553379; SE - MR 18763442; NE - MR 19833403; NW - MR 19633341.

b. Description. Jaeck DZ has a length of 1100 yards and a width of 700 yards. Approximately 40 percent of the DZ is concrete runway; the remainder is flat, open, grassy area. The highest point of elevation on the DZ is 60 feet MSL. Run-in: Southeast and northwest. Escape: Northwest and southeast remain, south of grid line 35.

c. Unit Requirements.

(1) Personnel. Provide DZSO/CCT. Road guards at the entrance of the DZ.

(2) Equipment. FM radio communications; other equipment per unit SOP.

NOTE: OIC is responsible for means of evacuation of injured personnel.

d. Range Utilization.

(1) Schedule IAW this regulation.

(2) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(3) DZSO/CCT must open/close DZ IAW para 8-2, this regulation.

(4) DZSO/CCT will ensure that aircraft contact Marne Radio 10 minutes prior to entering the reservation.

(5) DZSO/CCT will maintain communications with Range Control and report all damage, accidents, and incidents before closing the DZ.

8-8. TARO/ROD STAGE FIELD/DROP ZONE.

a. Capabilities.

(1) Training events authorized. Personnel drops; aviation training; EDRE assembly area.

(2) Location. Taro DZ is located on the far eastern side of the reservation in training area A1 and is bounded on four corners by the following coordinates: SE - MR 65123518; SW - MR 63563520; NW - MR 63533621; NE - MR 65143620.

b. Description. Taro DZ has a length of 1300 yards and a width of 700 yards. Asphalt runways cover approximately 25 percent of the surveyed DZ Approximately 40 percent of the DZ is covered with small brush; run-in east or west and remain south of highway 144; Escape: south or east.

NOTE: For ROD DZ (located adjacent to Taro) Run-in: north; Escape: east, turn at or prior to the Canoochee River.

c. Unit Requirements.

(1) Personnel. Provide DZSO/CCT. Road guards at the entrance(s) to the DZ.

(2) Equipment. FM radio communications; other equipment per unit SOP.

NOTE: OIC is responsible for means of evacuation of injured personnel.

d. Range Utilization.

(1) Schedule IAW this regulation.

(2) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(3) DZSO/CCT must open/close DZ IAW para 8-2, this regulation.

(4) DZSO/CCT will ensure that aircraft makes contact with Marne Radio 10 minutes prior to entering the reservation.

(5) DZSO/CCT will maintain communications with Range Control and report all damage, accidents, and incidents prior to closing the DZ

8-9. GALAHAD DROP ZONE.

a. Capabilities.

(1) Battalion size personnel drops (static line only); Heavy equipment drops; CDS; Training bundles; LZ for helicopters.

(2) Location: Galahad DZ is located training areas B17-18 and is bounded on four corners by the following coordinates: SW - MR 51344133; SE - MR 52264133; NW - MR 51344362; NE - MR 52264362.

b. Description: Galahad DZ has a length of 2500 yards and a width of 1000 yards. The terrain consists of 90 percent sand and 10 percent brush. The highest point of elevation on drop zone is 82 feet MSL. Run-in: South to north, remain east of 51 gridline. Escape: North to reservation boundary. Reverse run-in and escape authorized, remain east of 51 gridline.

c. Unit Requirements.

(1) Personnel: Provide DZSO/CCT. Road guards at the entrance(s) to the DZ.

(2) Equipment. FM radio communications; other equipment per unit SOP.

NOTE: OIC is responsible for means of evacuation of injured personnel.

d. Range Utilization.

(1) Schedule IAW this regulation.

(2) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(3) DZSO/CCT must open/close DZ IAW para 8-2, this regulation.

(4) DZSO/CCT will ensure that aircraft makes contact with Marne Radio 10 minutes prior to entering the reservation.

(5) DZSO/CCT will maintain communications with Range Control and report all damage, accidents, and incidents before closing the DZ.

8-10. VICTORY DROP ZONE.

a. Capabilities.

(1) Training events authorized. Personnel drops; CDS drops and airland up to C-130.

(2) Location. Victory DZ is located adjacent to Wright AAF, approximately two miles from the Main Cantonment area. The DZ is bounded on four corners by the following coordinates: SE -MR 47602865; SW - MR 45912725; NW - MR 45512775; NE - MR 47252915.
b. Description. Victory DZ has a length of 2200 yards and a width of 200 yards. The DZ is relatively flat, open area, interspersed with small brush, excluding the runway areas. Approximately 40 percent of the DZ is concrete runway. Run-in: northeast; Escape: south and remain south of highway 144.

c. Unit Requirements.

(1) Personnel. Provide DZSO/CCT. Road guards at the entrance(s) to DZ.

(2) Equipment. FM radio communications; other equipment per unit SOP.

NOTE: OIC is responsible for means of evacuation of injured personnel.

d. Range Utilization.

(1) Schedule through Wright AAF.

(2) DZSO/CCT will coordinate with DPW/Wright AAF for turning electric power off and on.

(3) Conduct operations IAW this regulation and appropriate safety regulations/ directives.

(4) DZSO/CCT must open/close DZ IAW this regulation and additional instructions from Wright AAF and/or DPTM Plans Division, if any.

(5) DZSO/CCT will ensure that aircraft makes contact with Marne Radio/Wright Tower for control purposes 10 minutes prior to entering the reservation.

(6) DZSO/CCT will maintain communications with Range Control and report all damage, accidents and incidents before closing the DZ.

8-11. SPECIAL OPERATIONAL REQUIREMENTS FOR PERSONNEL DROPS.

a. For static line jumps, the DZSO must meet the following qualifications:

(1) Be in grade SGT or above and be Jump Master qualified (current).

(2) Have performed duties as assistant DZSO at least twice, as well as (1) above.

b. For HAHO/HALO jumps, the DZSO must:

(1) Meet criteria in paras a(1) and a(2) above.

(2) Additionally, be qualified/certified for HAHO/HALO, as applicable.

c. Meet other requirements per unit SOP.

8-12. TRAINING ON DZ'S OTHER THAN AIRBORNE OPERATIONS.

a. If training on DZ's other than airborne operations are approved, units will provide OIC IAW this regulation. Specific instructions will be issued at time of approval of training request.

b. Unit is responsible for repairing damage (if any) to DZ's/LZ's before receiving a clearance from Range Control.

CHAPTER 9 - SPECIAL USE TRAINING FACILITIES/RANGES

9-1. GENERAL.

a. The following special use facilities, listed in Table 9-1 below, do not come under the direct jurisdiction of Range Division. Requests to use these facilities must be approved through the appropriate responsible agency.

Table 9-1. Special Use Facilities

AREA	AGENCY
Victory DZ	Wright AAF Operations
Hunter Ranges Operations	Hunter Garrison HQ
Hunter Training Areas Operations	Hunter Garrison HQ
Dean Field, F13, F14, F18, F19 & F20 Training Areas	NCO Academy/Range Control
Recreational Firing Range	DPCA

****NOTE**: All managed, numbered ponds, are not on the current map. Before using a pond, units must coordinate with Range Control and Fish and Wildlife to determine pond status.

b. Special use facilities/ranges that come under the jurisdiction of Range Division are listed below in Table 9-2.

These areas must be requested (see Chapter 3).

Table 9-2. Special Use Facilities/ Ranges

FACILITY	LOCATION
Weaponeer	SA-F
Camp Oliver Airstrip (AS)	Training Area (TA) E-18
Fero AS	TA E-21
Bastogne AS	TA E-12
Taylor Creek AS	TA D-12
Burton AS	TA A-17
NBC Chamber	Bldg T-4999
Rappel Tower	Contrell Field
Camp Oliver	Vicinity (Vic) F9/F1O
Compass Course/ Orienteering	TA's A6-10/TA's A9-14
Taylor's Creek Maint Area	TA D-12
Mech Vehicle Swim Site	Pond 28 (TA B8)
Confidence Course	TA D3 (15th Street)
Bayonet Course	TA D3 (behind Confidence Course)
Tow Tracking Range (TTR)	TA A-18
Taylor Creek DZ	TA's E-3 & 6
Remagen DZ	TA's F-9 & 10

Table 9-2. Continued

FACILITY	LOCATION
Taro DZ	TA A-1
Jaeck DZ	TA's E-21 & 22
Canoochee DZ	TA B-1

9-2. SPECIAL OPERATIONAL INSTRUCTIONS/RESTRICTIONS.

a. Camp Oliver.

(1) Schedule through Range Control Scheduling Office.

(2) Facilities include: dining facility, billets (360 personnel), latrines/showers (7), aid station, VIP quarters (2 bedroom trailer), maintenance shop, chapel, classroom, and rappel tower.

(3) Restrictions.

(a) Camp Oliver will not be used for MOUT training.

(b) Pyrotechnics, blank ammunition, or any type of explosive/flame producing munitions are prohibited within the Camp Oliver Complex due to the safety hazards that could result because of bulk liquid propane tanks in the cantonment area. Additionally, these munitions will not be used within 200 meters of the caretakers' quarters. This restriction includes use of smoke and/or chemical agents.

(c) The above restriction does not apply to FS Roads 5 and 129 that encircle the Camp Oliver Complex, provided discretion is used to protect Camp Oliver residents and structures.

(d) Although the complex is scheduled by Range Control, the caretaker will control occupation and clearance of facilities.

(e) Units will comply with off limit's areas as posted. Violators will be instructed to depart the off limit's area immediately, unit commander and/or OIC will be contacted by the caretaker.

(f) Caretaker's duty hours are 0700-1700, telephone 767-2680 (S). In case of emergency notify the caretaker. If caretaker is not available, notify Range Control by FM or by telephone.

b. Confidence Course. OIC will:

(1) Sign for key at Range Control prior to occupying the site.

(2) Maintain FM communication with Range Control Operation.

(3) Open and close facility IAW this regulation.

(4) Visually and physically inspect all obstacles prior to course utilization. OIC will report any damaged and/or safety hazard noted.

(5) Ensure that a means of evacuation is available.

(6) Conduct a "walk through" of all obstacles with participants prior to negotiating the course, fully explaining the requirements of each obstacle.

(7) Course should be conducted using the buddy system, preferably mixing stronger/weaker soldiers together.

(8) Units should refrain from using obstacles during or immediately after rainfall.

(9) Clear the site IAW this regulation. Key will be turned back in to Range Control immediately upon clearing of site.

c. Bayonet Assault Course.

(1) Conduct IAW with appropriate FM's.

(2) Same safety requirements/operational procedures as for the Confidence Course.

d. Mechanized Vehicle Swim Site (Pond 28).
(1) Located at Pond 28 in the B8 training area.

(2) Schedule IAW this regulation.

(3) Safety/operational requirements: per unit SOP; appropriate FM's/TM's (see para 13-8).

e. Compass Course/Orienteering.

(1) Schedule IAW this regulation.

(2) Operational/safety requirements: per appropriate FM's; Range Control Handout (course layout); unit SOP.

(3) Compass Course located in A6 through A10 training areas; Orienteering Course located in A9 through A14 training areas.

f. Mine Plow/Target Determination and Tow Tracking Range.

(1) Schedule IAW this regulation.

(2) Operational/safety requirements: per unit SOP, appropriate FM's/TM's.

(3) Located A-18 Training Area.

g. Taylor's Creek Maintenance Area.

(1) Schedule IAW this regulation.

(2) Operational/safety requirements: per unit SOP and schedule training guidance.

(3) Located adjacent to D7 training area.

h. NBC Chamber.

(1) Schedule IAW this regulation.

(2) OIC will sign for key at Range Control prior to occupying the site.

(3) Operate IAW appropriate FM's/TM's.

(4) Located adjacent to National Guard Training Center.

i. Drop Zones and Airstrips.

(1) Schedule IAW this regulation.

(2) Operational/safety requirements: per this regulation, appropriate FM's/TM's and unit SOP's (see Chapter 8).

j. Firing Points, Mortar Points, Launch Points, and Observation Points.

(1) Schedule IAW this regulation.

(2) Operational/safety requirements: per this regulation, appropriate FM's/TM's and unit SOP's (see Chapter 6).

k. Weaponeer.

(1) Schedule IAW this regulation.

(2) OIC will sign for key at Range Control prior to occupying the site.

(3) Operate IAW appropriate FM's/TM's.

(4) Located on Small Arms Fox-trot. To avoid conflicts, different units will not be scheduled to use SA-F and the Weaponeer simultaneously. However, concurrent use, IAW this regulation is authorized.

(5) Operator will be TASC certified to run the weaponeer and must show card at Range Control before signing for key.

9-3. MARNE CENTRALIZED WASH FACILITY.

a. Purpose: The Marne Centralized Wash Facility (MCWF) is a specialized facility designed for the high speed washing of all types of tactical vehicles. It is primarily used for the initial cleaning of vehicles after a field training exercise. It greatly reduces the time and personnel expended on performing this function, when compared with conventional wash system.

b. Responsibilities: Chief Range Division has overall responsibility for management and operation of the facility.

c. Unit responsibilities: Each unit will be required to provide command and control personnel, staffing various areas of the operation. Personnel detailed to perform operational functions (1 NCOIC and 29 personnel) will be under the control of the Centralized Wash Facility personnel. Detail personnel must receive a detailed briefing of required duties 30 minutes prior to the facility being occupied. The OIC/NCOIC must sign for the facility and receive the initial briefing. The OIC/NCOIC is responsible for unit

detail briefing, and must be present during the units complete wash cycle.

(1) The unit OIC/NCOIC is responsible for clearance of the facility, to include the refueling/off-loading area.

(2) Brigade or higher task forces should establish a relief plan for detail personnel.

(3) Vehicle operators are responsible for the removal of munitions, Miles equipment, TA 50, petroleum, oils, lubricants (POL), trash and all loose items before entry into the MCWF.

d. Scheduling: Scheduling of the MCWF maybe accomplished telephonically, 767-3422/3532, DSN 870-3422/3532, by the unit S3. The hours of operation for the MCWF are 0730-1700 hours, Monday through Friday. The MCWF is closed holidays. Scheduling will be done on a first come first serve basis. Brigade task forces, and satellite units should schedule in advance to avoid conflicts with scheduled unit's. "No Notice" exercises are excluded. POC is the Division EOC.

(1) To schedule other than normal operational hours, a memorandum must be submitted by the unit S3 to the MCWF for approval three (3) working days prior to the requested date. Request will include the unit, point of contact, phone number, time period required, and the number and type of vehicles to be washed.

(2) To schedule the MCWF in conjunction with another element, a concurrent usage memorandum, approved by the scheduled unit must be submitted to and approved by the MCWF, 72 hours prior to the required usage date. Unit's in non-compliance with concurrent usage requirements may be denied access to the MCWF, should a conflict arise.

(3) Unit's should consider their unit requirements before authorizing concurrent usage. It is recommended that only one concurrent usage request per unit be authorized when scheduling. Unit's should consider unit train-up and clean-up time, to determine actual wash time.

(4) Unscheduled units/vehicles will be denied access to the facility.

(5) Brigade task force size elements should set vehicle time limits to maintain a constant flow of vehicles through out the wash facility. The facility is designed for the initial cleaning of vehicles only. Unit's requiring additional time should consider this when scheduling the facility.

e. Cancellations/Emergency Shutdowns: Unit cancellations must be accomplished as soon as possible to allow the facility to meet additional requirements. Cancellations may be accomplished telephonically.

(1) The MCWF Supervisor/operator will immediately terminate normal operations during electrical storms to prevent injury to personnel or vehicle damage, when temperatures drop below safe operating conditions 35 degrees, and/or when damage to mechanical and electrical components occurs.

(2) Unit's will be re-scheduled on the next available day requested by the unit if the MCWF is closed due to operating hazards indicated in para 9-3e(1).

f. Safety: Safety is a Chain of Command responsibility. Each individual must be aware of the safety hazards that exist at this type of facility. Safety violations will result in the immediate shutdown of wash operations until violations are resolved.

(1) Ground guides will be used throughout the facility for vehicles 2½ ton and larger. Front and rear ground guides are required when backing vehicles. Proper intervals must be maintained between all vehicles.

(2) Uniform requirements and protective equipment for detail personnel will conform with unit SOP's.

g. Environmental: All personnel must be in strict compliance with environmental regulations. Hazardous waste materials must be identified and properly disposed of by the unit.

(1) The use of solvents, detergents, or fuels as cleaning agents are not authorized.

(2) The MCWF will not be used for POL disposal or vehicle maintenance.

9-4. RAPPEL TOWERS.

a. The rappelling tower's are approximately 40 feet in height and consists of two face system and helicopter skid. The main face and helicopter skid are used for training in advance rappelling, the face is a straight vertical wall that culminates into a saw dust pit. The second face is used for fundamental teaching and climbing techniques, this face starts with a platform for rigging and tying off, then slopes down in a 10 degree angle to a saw dust pit. The structure is anchored by four (4) 70-foot poles and consists of two platforms, one for each face.

b. Safety Inspection Procedures. All equipment is to be inspected before the beginning of each training phase and upon the completion of the training. All inspections will be performed by a qualified instructor or under their direct supervision.

(1) Ropes are inspected and their serviceability determined in the following manner:

(a) The rope is visually checked throughout its length. It is removed from service if it has been cut by a sharp object to any degree, or if fraying on rough surfaces has caused the rope to take a furry appearance. The fusing of material so that it takes on a glossy appearance. If the rope bulges in any one place, or if any of the three layers are pulled away from the other two, it is remove from service.

(b) The rope is checked throughout its length by feel. If any soft places are detected, (caused by cutting from within the layers by a sharp particle) the rope is removed from service.

(c) If none of the above deficiencies are noted, yet the rope has become very stiff and unworkable because of age, or repeated soaking and drying, it is removed from service.

(d) If the whipping on the end has become loose so that the rope unravels, it is measured to determine if it can still be sued for rappelling. If so, it is cut and retaped. If not, it is removed from service.

(2) Snap links are inspected and their serviceability determined in the following manner:

(a) A finger is passed lightly around the entire surface of the snap link. If sharp edges are detected, they must be sanded smooth. If these edges are too large to be removed in this manner, the snap link is removed from service.

(b) A visual check is made of the snap link. If there are grooves worn into the snap link that noticeably reduce its diameter, it is removed from service.

(c) The function of the gate is checked by opening the gate and allowing it to spring shut. If the spring is too weak to close the gate, the snap link is removed from service.

(3) The tower will be inspected annually by Fort Stewart Safety personnel.

c. Safety briefings will be given prior to the start of all training.

d. Equipment and Materials: Only nylon rope is used for training, the same rope can be used for rappelling, climbing, and rope bridge installations.

(1) Manilla or hemp type rope may be used for certain types of training as prescribed by the TM's.

(2) All equipment will be inspected IAW para b, Safety Inspection Requirements/ Procedures.

(3) Only solid steel snap links will be used, except on concrete pads.

(4) All climbing ropes should be 120 ft and measure 7/16” in diameter.

9-5. BRADLEY CREW PROFICIENCY COURSE/TANK CREW PROFICIENCY COURSE (BCPC/TCPC).

a. Purpose: The purpose of this section is to prescribe policies, procedures and safety requirements for training on the BCPC/TCPC Course.

b. Scope: This is applicable to all military personnel utilizing the BCPC/TCPC Complex.

c. Range Layout:

(1) The BCPC/TCPC Course encompasses approximately 4 kilometers. The course can support an array of 50 targets. The course configuration will allow for multiple range scenarios based on training requirements.

(2) The standard target array is a mix of new standardized Armor and Infantry target devices. The targets can be engaged by Multiple Integrated Engagement System (MILES) using daylight or thermal sights. The BCPC/TCPC is ideally suited for stabilized as well as newly formed crews firing on the move by either Bradley Fighting Vehicle or M1A1 Tanks.

(3) Adjacent to the starting point on the east side of the BCPC/TCPC Course is a platoon staging area.

(4) There is an 800 meter area available for boresighting from the staging pads.

d. Vehicle movement on the BCPC/ TCPC.

(1) Tracked vehicles will not deviate from the designated course route.

(2) All vehicle movement must be conducted on the designated course route. Vehicles will never attempt to cross berms or drainage ditches.

(3) Neutral steering is prohibited on course road and staging areas.

e. Scheduling Training on the BCPC/ TCPC course is scheduled through G3 Training and is incorporated into the gunline.

f. Range Safety.

(1) The OIC will ensure that all personnel on the range complex have been given a safety brief prior to the course becoming operational.

(2) Operation during the hours of darkness will require an additional safety brief to include vehicle marking and the use of ground guides.

(3) Ground guides will be utilized at all times while operating inside the assembly area.

(4) Laser range finders are not authorized for use on this range in other than eye safe mode.

g. Required Briefing:

(1) OIC briefing conducted at Range Control.

(2) Roadblock briefing conducted at Range Control the day prior to scheduled training.

CHAPTER 10 - EXPLOSIVE ORDNANCE RECONNAISSANCE AND TARGET INSERTIONS

10-1. PURPOSE.

To outline procedures that must be followed when any organization on Fort Stewart/Hunter AAF requires EOD support for target insertion into an impact area, or to clear a range of unexploded ordnance (UXO).

10-2. REFERENCES.

a. AR 75-15.

b. AR 385-63.

c. FM 9-15.

d. Other safety directives as published/ appropriate.

10-3. TERMS.

a. CLEARANCE. As the term pertains to ranges and impact areas. A visual sweep and elimination of explosive hazards and/or scrap encountered in the area of concern. For the purpose of this chapter, a “range clearance” and a “range sweep” will mean the same thing. Range clearances will involve surface sweeps only. The authority to clear subsurface areas rests with Department of the Army (DA). Requests for sub- surface clearance should be sent to the Commander, 547th Ordnance Detachment (EODC), Fort Gillem, Georgia 30050-5000. The request will be forwarded through the Forces Command EOD Staff Officer to Department of the Army for evaluation.

b. COLLECTION POINT. A central location where salvageable material is collected and inspected before it is moved to property disposal.

c. CONTAMINATION. Unexploded ordinance, residue, scrap, or like materials located on an active or inactive range or impact area.

d. DPW. Responsible for the coordination of all engineering operations involving Fort Stewart ranges. Point of contact (POC) between post engineers and EOD personnel concerning EOD support to the engineers for range construction and/or clearance projects.

e. DISPOSAL PROCEDURES. The final disposal of explosive ordnance by EOD personnel, which may include demolition or burning in place, removal to a disposal area, or other appropriate means.

f. DUD. A munition that has failed to function after firing. As a result, it is hazardous or unpredictable. This does not include misfires.

g. EXPLOSIVE ORDNANCE (EO). All munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents. This includes bombs and warheads, guided and ballistic missiles, artillery, mortar, rocket and small arms ammunition; all mines, torpedoes, and depth charges; demolition charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electron-explosive devices; clandestine and improvised explosive devices; improvised nuclear devices; and all similar or related items or components explosive in nature.

h. EXPLOSIVE ORDNANCE DISPOSAL (EOD). Personnel school-trained and qualified to locate, identify, field evaluate, render safe, recover, and dispose of unexploded ordnance or materials. This may include the rendering safe and/or disposal of explosive ordnance that has become hazardous by damage or deterioration. When the disposal of such explosive ordnance is beyond the capabilities of personnel normally assigned the responsibility for routine disposal, the 38th EOD is a tenant Forces Command Deputy Chief of Staff for Operations and Plans (DCSOPS) Field Operating Activity, assigned to Fort Stewart for this purpose. Unit operations include expertise in US and for-

eign conventional, chemical, biological and nuclear ordnance; improvised explosive devices (IED's); dedicated US Secret Service and US State Department support to VIP's; and to military, federal, state, and local law enforcement activities within a three state area. The 38th EOD is a detachment comprised of nine personnel, eight of whom are EOD technicians. Telephone numbers during duty hours are 767-8717/ 8718, and after duty hours (912) 368-6529.

i. EOD INCIDENT. The suspected or detected presence of unexploded ordnance or damaged explosive ordnance that constitutes a hazard to operations, installations, personnel, or material.

j. EOD PROCEDURES. Those particular courses of action for accessing, rendering safe, recovering, and final disposal of explosive ordnance or hazardous material associated with an EOD incident.

k. EOD TEAM. An EOD team is comprised of at least two individuals, one in the rank (SSG) or higher, and each EOD qualified. An EOD team is the basic response element on all EOD incidents, target insertions, and range clearances.

l. EXPLOSIVE ORDNANCE DISPOSAL CONTROL CENTER (EODCC). The main headquarters element for an EOD unit. For the 38th EOD, the 547th Ordnance Detachment (EODCC), Fort Gillem, Georgia 30050-5000, (DSN) 797-3293/3294/5255/5226, is the headquarters providing command, control, planning and administrative services relating to EOD unit operations. Requests for EOD support must be coordinated with the EODCC so that external requirements on the 38th EOD can be eliminated. There may be periods when the EOD unit cannot meet the needs of an activity requesting support (based on higher priorities). In this case, coordination with the EODCC will be provided by EOD support external to the 38th EOD.

m. FORSCOM EOD STAFF OFFICER. Provides command, operational control, and has staff responsibility for all Continental US (CONUS) FORSCOM EODCC's and EOD detachments. Works for FORSCOM DCSOPS in Current Operations.

n. LARGE SCALE RANGE CLEARANCE. Any range clearance project or operation requiring continuous EOD support in excess of one duty day.

o. NCOIC. Noncommissioned Officer-in-Charge.

p. OIC. Officer in Charge.

q. RSP - RENDER-SAFE PROCEDURE. The portion of the explosive ordnance disposal procedure involving the application of special explosive ordnance disposal methods and tools to provide for the interruption of functions or separation of essential components of unexploded ordnance to prevent an unacceptable detonation from occurring.

r. SALVAGEABLE MATERIALS. Salvageable metals or residue found during range clearance operations that can be safely reclaimed.

s. SMALL SCALE RANGE CLEARANCE. Any range clearance project or operation requiring continuous EOD support for one duty day or less.

t. STAKER. A person responsible for searching for, locating, and marking all ordnance in an assigned area. The staker notifies EOD personnel of any ordnance found. EOD personnel identify, classify, and dispose of the ordnance.

u. STAKING PARTY. Generally, one OIC, one NCOIC, three to five supervisory NCO's, 30 to 50 stakers, and 3-5 EOD technicians. The general ratio to follow is one Staking Party NCO and one EOD technician for 10 stakers. The stakers must have an internal chain of command during the operation and discipline must be enforced to the highest standards. The actual number of stakers and EOD personnel will depend on the kind and level of contamination on the

range, available time, and the type clearance desired.

v. TARGET INSERTION. Placing or moving targets on an active or inactive range or impact area. Targets can be brought in by foot, vehicle, or helicopter. EOD assistance includes finding or clearing a safe pathway through the range to the target point, clearing the target point as necessary and leading the target insertion team back out of the area.

w. UXO. Unexploded Ordnance.

10-4. GENERAL.

a. Due to the serious safety factors relating to entering and working in or on an active or inactive range or impact area, only authorized personnel should perform this task. The only activities routinely authorized to do so on Fort Stewart are Range Control and EOD. Areas stated as "cleared" have only been surface swept of UXO and explosive hazards; therefore, the likelihood of contamination is still present. The presence of thick vegetation, standing water, wildlife, and human error are all factors that could cause the staking party to miss ordnance during a clearance project. Additionally, UXO buried beneath the soil tends to work itself toward the surface over a period of time. Maneuver over terrain that is sub-surface contaminated will speed up this process. Any terrain over which ordnance has been fired and a one-for-one count has not been established should be considered surface and sub-surface contaminated. As stated previously, the authority to sub-surface clear rests with the Department of the Army.

b. Large scale range clearance (EOD support for more than one duty day) requires an extensive commitment of resources and time. The 38th EOD has limited personnel assets and an extensive real-world mission, in addition to normal training and administrative requirements. Any unit/activity that is requesting EOD range clearance support must contact the parent EODCC in writing 60 days before the proposed starting date. The request should list:

(1) The size of the range to be cleared.

(2) The number of stakers and supervisors to be used.

(3) The proposed clearance dates.

NOTE: The EOD can assist the requesting agency in determining these requirements through coordination with the unit and reconnaissance of the area in question.

c. Small scale range clearances (EOD support for one day or less) still require a significant commitment of resources and time. The 60 day notice indicated in above reference still applies; however, the 38th EOD can usually comply with a 30 day notice. Coordination should be very comprehensive as time approaches the desired clearance date, and the requesting unit should pay particular attention to the resource requirements identified in the responsibilities paragraph of this chapter.

d. Target insertions generally require the support of only one EOD team. The goal is not necessarily to clear an area, but to safely gain entry, put up or take down a target, and to exit the range. The EOD team performs more of an escort duty than range clearance support. The 60 day notice indicated in reference still applies (see para 10-10).

e. It should be stressed that prior coordination and extensive communication is required when requesting EOD support. The 60 day notice period outlined in para 10-4b above allows the EODCC to clear the 38th EOD's calendar of other activities of lesser priority and to "lock-in" EOD support for the requesting agency. It also allows the requester time to coordinate the assets required for the clearance project (see Chapter 2). If the 38th EOD cannot meet the provisions of the request, then the 547th EODCC can program other EOD assets to assist with the project. Emergency requests (those not meeting the adequate notice periods

outlined above) will be evaluated on a case-by-case basis; however, the organization must be aware that failure to coordinate does not constitute an emergency for EOD.

f. Safety is most important in any range clearance operation. All participants must be fully familiar with the prescribed safety procedures to be followed during range clearance operations. The ranking EOD representative will be responsible for providing a safety briefing before the start of each range clearance. This briefing will be repeated each day of the project. He will state his requirements for safe conduct of the operation, to include:

(1) IAW MSG 1714232 Dec 87, Subject: EOD Protective Clothing, Kevlar Helmet, body armor, and safety glasses/ goggles will be worn by all personnel participating in range clearance activities. Removal of any of this safety equipment will be at the discretion of the senior EOD representative. Provisions should be made for individuals to carry canteens.

(2) EOD personnel engaged in range operations will wear an orange safety vest. This facilitates immediate recognition of EOD trained personnel and, therefore, increases safety. The hot weather sun hat is organizational issued to EOD personnel and is worn on the range during clearance operations.

(3) The senior EOD representative is responsible for range safety during a range clearance. He will direct all observed unsafe acts by anyone in the Staking Party to the Staking Party OIC. This may occur after an EOD soldier has taken direct action to prevent injury or death by an individual committing an unsafe act. If the act is serious enough, or if minor repeated infractions by one or several individual(s) indicates a poor attitude, then the senior EOD representative will recommend to the Staking Party OIC to remove those personnel or to halt operations if there is a serious degradation to range safety. Operations will remain halted until the situation is resolved. If the Staking Party OIC chooses not to follow EOD direction on the range, then EOD participation will halt until the entire matter can be resolved.

g. Range clearance operations must receive full command support and emphasis. Participants, especially key supervisors, should not be rotated throughout the range clearance. Specific responsibilities should be prescribed for all staff and troop participants. Plan early and in detail to ensure the most efficient use of time and resources.

10-5. RESPONSIBILITIES.

a. IAW reference para 10-4c, the Installation Commander (or activity requesting EOD support) must:

(1) Provide overall planning, command and control over the conduct of range clearance operations.

(2) Provide all installation personnel required to perform range clearance operations.

(3) Identify the specific range area(s) to be cleared during the operation.

(4) Ensure the availability of supplies, equipment, medical support, transportation, communications, demolition materials, as well as lodging and mess facilities for all external temporary duty (TDY) EOD range clearance personnel.

(5) Request necessary EOD support from 547th EODCC within the required planning periods stated previously.

(6) Maintain after-action reports and clearance records.

(7) Provide the necessary funding for completion of the range clearance, as required.

b. Staff Responsibilities.

(1) S-1 will:

(a) Arrange lodging for TDY EOD personnel augmenting the local EOD unit, as required.

(b) Arrange group transpiration for personnel from billets to vehicle assembly areas.

(c) Maintain accountability of all personnel in the range clearance.

(d) Provide schedules and facilities to conduct safety and explosive's recognition classes, as needed. This is usually done on the range.

(e) Provide drivers for committed vehicles.

(2) S-2/S-3 will:

(a) Act as project OIC (should be a field grade officer). Provide Staking Party OIC as main POC.

(b) Determine range areas to be cleared.

(c) Ensure strict command and control of Staking Party personnel.

(d) Prepare operation orders tasking units for personnel, equipment, vehicles and helicopters (if required).

(e) Coordinate with the EOD officer who will determine the sequence of the clearing operation.

(f) Provide maps and other materials, as required.

(3) S-4 will:

(a) Request and maintain all supplies required to support the operation.

(b)Provide ammunition storage area for demolition materials. The 38th EOD may be able to store small quantities, based upon mission and operational constraints. This must be coordinated before the start of the project.

(c) Coordinate with Defense Reutilization and Marketing Office (DRMO) for disposition of salvageable materials.

(d) Maintain records on salvageable material collected during the range clearance.

(e) Exercises control over collection points.

(f) Provide additional vehicles for EOD personnel and the storage and maintenance for these vehicles, as required.

c. The Commander, 38th EOD will:

(1) Serve as the safety advisor on all matters dealing with explosive ordnance.

(2) Certify the disposition of explosive ordnance found during the range clearance.

(3) Exercise command and control over all EOD assets committed to the range clearance operation.

(4) Assist installation personnel in the survey of the contaminated area and contribute technical advice during the initial planning phases.

(5) Determine the quantity of demolition materials required for the operation. Provide safe storage, as available, and accountability of small amounts of demolition materials issued to the requesting organization by the ASP for the clearance project. Storage of explosive items in the EOD magazine will only be authorized for the duration of the operation. At the end of the project, these materials may be turned in to EOD for destruction.

10-6. PLANNING SEQUENCE FOR RANGE CLEARANCE.

a. Sixty days before the proposed start date of the clearance.

(1) Appoint a project officer.

(2) Determine and define areas to be cleared.

(3) Research range regulations and data to determine quantity and type of ordnance fired into the defined area(s).

(4) Coordinate with 38th EOD. Provide primary and alternative dates for the proposed clearance. Request a reconnaissance of the area by EOD. This will be used to determine information for the formal request for EOD support to be sent to the 547th EODCC.

(5) Perform map, ground and aerial reconnaissance, as necessary to determine vegetation, terrain and extent of UXO contamination.

(6) Determine personnel, funding, equipment and time requirements to accomplish the clearance.

(7) Prepare a final plan for the range clearance operation.

(8) Request operational explosives from Fort Stewart ASP as identified by the EOD reconnaissance of the area(s).

(9) Request in writing from the 547th EODCC for the 38th EOD support and any additional personnel, as required, to augment the local EOD unit.

b. Thirty to forty-five days before the clearance:

(1) Prepare and forward operation orders to participating units for required personnel, equipment, administrative, logistic and medical support.

(2) Arrange for the range area to be burned off to expose any dud ordnance that may be hidden by dense vegetation. This must be coordinated with Range Control.

c. Seven to fifteen days before the clearance:

(1) Hold planning sessions with the project OIC and staff, Staking Party OIC and NCOIC, DRMO (as required) and EOD representatives.

(2) Reconnoiter assigned areas and check the status of the range. This should be done with the Staking Party OIC and NCOIC, and an EOD element. The range should have been burned off by this time.

d. One to three day(s) before the clearance:

(1) Ensure all materials that have been requested are available; primarily personnel, vehicles, POL, messing, water and demolition materials.

(2) Coordinate all last minute changes with the 38th EOD.

10-7. RANGE CLEARANCE OPERATIONS.

a. Responsibilities.

(1) The Staking Party OIC will:

(a) Conduct general safety classes for all members of the staking party. Topics should include information on snakes, poisonous plants, safe driving, general first aid, weather precautions, etc. Particular emphasis must be placed on range discipline.

(b) Understand the assigned areas of clearance and know the terrain and clearance procedures.

(c) Account for all personnel in the staking party.

(d) Make sure safety procedures are followed. Do not allow personnel not in top condition to be members of the staking party, and remove personnel unable or unwilling to comply with range safety procedures.

(e) Ensure that transportation, water and messing are available and provided.

(f) Evacuate salvageable scrap to the collection point, as required.

(2) The Staking Party NCOIC. Assist the OIC in the operation of the staking party. Enforce discipline and supervise the additional safety NCO's.

(3) The stakers search and mark each item of ordnance located.

(4) Medical personnel provide immediate on-site medical assistance and arrange for evacuation of casualties to medical facilities.

(5) The EOD Team will:

(a) Ensure the safety of the operation.

(b) Inspect and dispose of all items of ordnance found by the stakers.

(c) Coordinate with Range Control before starting demolition procedures.

(d) Conduct daily safety briefings before starting operations.

(e) Maintain an inventory of UXO's destroyed and demolition materials consumed.

b. Operations.

(1) Considering numerous factors, the 38th EOD has determined that the optimum number and composition of range clearance personnel to be:

(a) One Staking Party OIC.

(b) One Staking Party NCOIC.

(c) Three to five supervisory (safety) NCO's.

(d) Three to five EOD technicians.

(e) Thirty to fifty stakers. These numbers are flexible based upon the situation; however, there should be one supervisory NCO in charge of every 10 stakers. The staking party lines up side-by-side at double-arm-intervals across area to be covered. On signal from the senior EOD representative, the line moves forward. EOD personnel rove behind the stakers to be readily available to inspect located ordnance anywhere on the line. The Staking Party OIC and NCOIC supervise the line formation and keep the line straight. For planning purposes, a staking party of 50 stakers can clear a 500 meter square in one duty day, depending upon the weather, undergrowth, terrain, type and level contamination, and range discipline.

(2) When clearing an impact area or range of only explosive hazard (not concerned with scrap collection) and an item of ordnance is discovered, the following actions take place:

(a) The staker places a stake or flag (supplied by the 38th EOD, as available) in the ground not closer to the ordnance than the length of the stake.

(b) The staker yells "DUD," raises his hand, then continues walking forward, avoiding the UXO.

(c) The NCOIC blows a whistle to signal the entire line to halt.

(d) The nearest EOD technician inspects the located item to make positive identification. Then one of the following happens:

- If the item is inert and free of explosive hazards, the staker is told by EOD to place the item in a sack or put it on the scrap truck.
- If the item is explosive, the EOD technician clearly marks the item for later destruction.
- When the all-clear signal is given, the line of stakers resumes the search.
- The staker neither touches nor disturbs any item found until authorized to do so by the accompanying EOD team.
- During breaks, or as required, the scrap truck hauls all collected scrap back to the designated collection point.

- All items located, whether intact ordnance, components, fuses, or assemblies, should be inspected and removed or destroyed.

- At the end of the search day, the staking party OIC accounts for all personnel and informs the EOD team before leaving the range.

- The EOD team stays on the range to dispose of all hazardous items discovered during the day's search. All demolition operations are coordinated with Range Control.

c. Collection Point.

(1) The Collection Point is the step in the evacuation of scrap between the range and the DRMO yard. It is the responsibility of the unit requesting EOD support to run the collection point, load and unload vehicles, and to handle any administrative paperwork.

(2) All scrap is sorted, re-inspected by an EOD technician, and hauled to the DRMO yard.

(3) Scrap is separated into categories before transporting to DRMO. This should be coordinated beforehand with DRMO.

d. DRMO.

(1) All salvageable scrap is turned in to DRMO. It is the responsibility of the unit requesting EOD support to handle all administrative paperwork associated with DRMO turn-ins.

(2) EOD will, upon request, re-inspect all incoming scrap for explosive components and remove them as necessary.

10-8. AFTER ACTIONS.

a. The 38th EOD will maintain an inventory of all explosive items destroyed during the range clearance. This organization will not issue a statement to any activity certifying that the range is "Clear" of explosive hazards. A statement will be issued, upon request, listing the ordnance destroyed and the date of the range sweep.

b. The 38th EOD will accept, for later destruction, operational demolition materials not consumed during the clearance.

c. This organization discourages all activities from maneuvering through active or inactive impact areas or ranges, even though they have been "Cleared". Reference "b" allows maneuver on a limited scope; however, as stated previously, range clearance entails only a surface sweep. There can be no assurance that the areas in question are completely safe for maneuvering troops or vehicles and; therefore, should be avoided as much as possible.

10-9. EXPLOSIVE ORDNANCE RECONNAISSANCE.

a. Conduct of Range Firing. When conduct of range firing requires entering an impact area (i.e., to emplace targets), an explosive ordnance reconnaissance (EOR) must be accomplished. An EOR consists of a controlled sweep of the trespassed zone of an impact area, searching for surface duds that could be hazardous to personnel in the zone.

b. Clearance from Range Division. Before the conduct of an EOR, clearance from Range Division must be obtained. The following information must be provided with the request for clearance:

(1) Area in which EOR is to be conducted.

(2) Date/time of EOR.

(3) Name, rank, last four digits of SSN on the OIC, RSO and EOR Team OIC.

(4) Number of personnel in the EOR Team.

(5) 38th EOD Briefing Certification (see para 10-4c).

c. The EOR Team OIC and all NCO's will report to the 38th EOD Detachment prior to conducting the EOR to receive a briefing. EOD will certify in writing that the individuals have been briefed and this certification will be submitted to Range Division by the EOR Team OIC.

d. Clearance to conduct an EOR does not grant clearance for entry into the impact area. This will be requested by way of FM radio prior to the time the EOR is to be conducted.

e. EOR Team. The EOR Team will consist of an EOR Team OIC (SFC or above), certified as OIC/RSO and an adequate number of personnel under NCO supervision to intensely sweep the area. Additionally:

(1) All personnel in the EOR Team will be briefed as to procedures and safety precautions by the OIC/RSO.

(2) The EOR Team will clearly mark the area. The area outside the marked area will remain off limits.

(3) If a dud is found, the site will be marked by a stake or post that will extend approximately four feet AGL or high enough to be visible above surrounding underbrush and at the maximum distance from which the round is visible. The stake will be made as conspicuous as possible by the attachment of engineer tape or a bright colored cloth.

f. OIC will maintain communications with Range Control Operations at all times.

g. Completion of the EOR. Upon completion of the EOR, the OIC will report by FM radio to Range Control Operations to certify that the area is either clear of surface duds, e.g., none found, or that all suspected duds have been properly marked and all personnel have been briefed to avoid them. At this time the location and description of each dud will be reported to Range Division, who will subsequently notify EOD.

h. When satisfied that the EOR has been accomplished, Range Division will grant the unit clearance to allow supervised personnel into the area. Permission from Range Control must be obtained before each occurrence of personnel entering the area.

i. When the unit has completed firing and the range has been closed, the area will return to its previous status as part of the impact area and will be off limits.

10-10. TARGET INSERTIONS.

a. General. Target upgrade is required in the AIA two or three times a year. Divisional and non-divisional units are tasked to accomplish this mission. The ACofS, G3/DPTM is the focal point for this mission and will notify all participating units 45 days prior to execution.

b. Concept. The operation will take place in three phases. See Table 10-1 below.

Table 10-1. Target Insertions Concept

D-45	Phase I (Notification)	ACofS, G3/DPTM
D-21	Phase II (IPR)	Aviation Bde POC
D-2	IPR	Aviation Bde POC
D-1	Phase III (Target area cleared by EOD)	All Ranges in Dry Status
D-Day	Phase III (Target insertion)	All Ranges in Dry Status
D+1	Back-up Day	All Ranges in Dry Status

The execution phase will be accomplished over a two day period. During day 1, EOD must be airlifted into the AIA to secure ground for the target placement (EOD personnel must have control personnel on an Observation Point (OP) to observe the operation).

(1) On day two, EOD will again be airlifted in to the AIA to check the target area and to control the target emplacement. The targets will be sling loaded and moved to the target area by CH-47D aircraft. Upon completion of the operation, EOD personnel will recover slings and be extracted from the AIA.

(2) Range Control must coordinate and ensure that the AIA is dry for the operation.

(3) An inclement weather day must always be planned.

c. Responsibilities.

(1) Cdr, Avn Bde will:

(a) Provide command and control OIC for the operation.

(b) Provide aviation support as required.

(2) Cdr, Div Arty will:

(a) Be responsible for Pick-up Zone (PZ) operations, to include painting (if necessary), rigging, and hook-up of targets.

(b) Provide qualified observer with radio on selected OP during target emplacement to ensure that the targets are visible from the OP.

(3) Cdr, B Co, 2d Bn, 159th Avn Regt will:

(a) Provide CH-47D lift assets to transport targets into the AIA.

(b) Provide the slings necessary to rig the targets.

(4) Cdr, 38th EOD will mark and clear target area(s) of duds and FOD (parachutes, etc.).

(5) Cdr, HQ CMD will provide qualified rigger support to Div Arty to inspect target rigging.
(6) DPTM Range Control will check fire all ranges during the operation.

d. Coordinating Instructions.

(1) Avn Bde is responsible for coordinating all the elements required to accomplish the mission.

(2) A back-up day will be planned for the target insertion in case of bad weather.

(3) Signal instructions and operational frequencies to be passed during Phase II.

e. Reference.

(1) FM 55-450-1.

(2) 3d IN Div (Mech) and FS Reg 385-14.

CHAPTER 11 - USE OF LIGHT AMPLIFICATION BY STIMULATED EMISSION OF RADIATION SYSTEMS (LASERS)

11-1. BASIC REFERENCES.

a. AR 40-46.

b. DA Technical Bulletin, Medical 524.

c. MIL-HDBK 828.

d. AR 40-5.

e. AR 385-63.

f. Current safety policies/publications as appropriate.

11-2. PURPOSE.

Provide guidance and direction for the safe conduct of live fire exercises using Class 3 and 4 LASERS as defined in 3d IN Div (Mech) & FS Reg 385-16 and Technical Bulletin (TB 524).

11-3. APPLICABILITY.

a. This chapter applies to all personnel who use, repair, or are involved in the use of LASER designators as described in para 11-2.

b. Does not apply to sub-caliber devices that use LASER beams, or experimental activities.

11-4. EXPLANATION OF TERMS.

a. Interbeam viewing. Looking directly into the LASER beam.

b. LASER. A device capable of producing a narrow beam of intense light.

c. LASER Designator. A designator employing a LASER device to emit a shortpulse LASER beam aimed at the target. The range is determined by electronically measuring the time it takes for the light beam to travel from the LASER to the target, reflect on the target, and return to the designator, while knowing the constant speed at which the light travels. This function is automatically performed by the designator. The beam does not visibly affect the target.

d. LASER Buffer Zone. A safety margin on each side, above and below the approved target area, extending to a distance at which the beam is terminated by a backstop extending across the target zone.

e. Safety Eye wear. Eye wear that allows the user to be exposed to either the direct or reflected LASER beam without eye injury.

f. Specular. Mirror-like.

g. LASER Range Safety Officer (LRSO). A designated officer or NCO of the firing unit who is familiar with the Range Control procedures required for LASER operations.

11-5. RESPONSIBILITIES.

a. The Surgeon General, Department of the Army will:
(1) Provide technical guidance and assistance in establishing firing ranges where LASER designators can be used safely.

(2) Assign firing ranges for use of LASER designators.

b. Commanders at all levels are responsible for ensuring compliance with the procedures in this chapter.

c. Command safety managers will serve as principal staff advisors for ensuring the safe use of LASER designators and providing guidance for the selection of lasing areas IAW this chapter.

d. LRSO appointed by firing unit commanders will:

(1) Become familiar with the contents of this chapter.

(2) Provide a LASER safety orientation to unit personnel who work with LASER designators, to include an explanation of hazards and safety requirements.

(3) Become familiar with azimuth and elevation of each range, firing position, and target in lasing area.

(4) Ensure use of protective eye wear, when and if required.

(5) Ensure adequate communications between all personnel in target area and range safety officer.

(6) Report any case of suspected eye exposure to LASER radiation to appropriate medical authority within 24 hours for disposition IAW TB Med 524.

(7) Ensure that safety SOP's are developed and implemented.

(8) Ensure that adequate surveillance of target area is provided to prevent entrance of unauthorized personnel into eye hazard area for LASER being fired.

(9) Supervise the emplacement of temporary or permanent signs to warn personnel that lasing operations are taking place and a hazard exists.

11-6. LASER SAFETY.

a. Optical safety requirements and laser safety restrictions will be strictly adhered to. Lasers may be used in conjunction with live fire weapons, as a single item on a separate range. With the proper filters, it may be utilized in training areas.

b. Lasers used in conjunction with live fire require no additional support or reporting requirements; e.g., use of lasers on Red Cloud Complex during live fire exercises.

c. Lasers used as a separate or single hazard requires the appropriate surface danger zone and restricted down range area IAW AR 385-63; e.g., conducting TCPC training on the Red Cloud Complex requires the same roadblock system as a live fire range. Artillery lasers utilized on the OP's will be directed a minimum of 20 miles below the backstop and not directly at the river or specular objects.

d. Filters are available for certain lasers that reduce the eye hazard distance. Lasers properly filtered to a distance of not more than 25 meters may be utilized. The operator will ensure the immediate area is clear of personnel.

e. Range control will post notice to airmen (NOTAMS) for all Laser Ranges.

f. Units with tanks properly modified with the Eye Safe Laser Designator Device (ESLD) IAW TM 9-6920-704-10, are permitted to have personnel located in the down range areas during the conduct of TCPC, after clearance is obtained from Range Control. Exception to this rule is when units are using the AN/GVS-5 Hand held Laser Designator (HHLD). When using the HHLD, the Range Safety Officer will ensure the down range area forward of the firing line is completely clear of personnel.

g. Aviation laser operations, see para 6-12g.

11-7. LASER HAZARDS.

a. The hazards from LASER designators are limited to exposure to the unprotected eyes of individuals within the direct LASER beam or a LASER beam reflected from specular surfaces. Serious eye damage with permanent impairment of vision can result from unprotected personnel exposed to the LASER beam. Eye injury can be detected by an eye examination as described in TB Med 524, para 5.

b. The beam from the AN/VVS-1 designator is hazardous to the unaided eye (i.e., without the use of telescope or binoculars) up to 20 kilometers and the AS/VVG-1 is hazardous up to 10 kilometers under most atmospheric conditions. The AN/TVQ-2 is hazardous up to 25 kilometers to the unaided eye. This hazardous area is increased significantly when telescopes or binoculars are used. The AN/GVS-5 hand held LASER designator is hazardous to the unaided eye up to 1100 meters without filter. This distance is reduced to 200 meters with the red filter and 20 meters with the yellow filter.

c. Permanent skin injury will not occur. Needless exposure, however, should be avoided.

11-8. PERSONAL PROTECTION EQUIPMENT.

This equipment consists of appropriate safety eye wear for individuals and filters for optical instruments such as binoculars, telescopes and periscopes.

a. All eye wear and filters will be marked with their optical density (i.e., a measure of the attenuation afforded) at the specific wavelength for which they are to be used.

b. Selection will be IAW guidance provided in TB Med 524 for the particular LASER in use.

c. Eye wear and filters will be inspected for scratches, chips and cracks, maintained in a clean condition and replaced when inspection shows them to be no longer serviceable.

11-9. GENERAL SAFETY REQUIREMENTS.

a. The LASER safety orientation will be given to all personnel who use or work with LASER designators, to include an explanation of hazards and safety requirements.

b. To prevent injury to persons who do not have eye protection, the LASER designator will not be fired at any surface at a range of 20 meters or less. Precautions, such as the removal of brush and trees, will be taken.

c. Personnel who must be in the target area will wear LASER protective eye wear with curved protective lenses during LASER firing. Such eye wear must be approved for the specific model of LASER device being fired (e.g., AN/VVS-1, AN/VVG-1). A LASER filter designated for protection against one type of LASER may not afford protection from another.

d. The filters and protective goggles that have been developed for use with LASERS are not required for training exercises when all personnel outside the target area comply with previous provisions of this chapter.

e. The LASER designator will not be operated or experimented with when removed from the vehicle, unless specifically authorized by the appropriate maintenance manual.

f. Precautions, other than as previously stated, are not required at night, or during rain, snow or fog.

11-10. RANGE USAGE.

The LASER designator will be used only on those ranges that have been approved and established for such use.

a. Practice in lasing (e.g., use of only the LASER designator) during non-live fire exercises in Local Training Area (LTA) may be conducted only at those LTA's that meet or exceed safety requirements and have been approved by Chief, Range Division. Ranges presently approved are:

(1) Red Cloud Complex (includes MPRC).

(2) OP's 1, 2, 3 and 4.

(3) Tank/Bradley Sub-caliber Ranges (Yankee/Zulu).

(4) Aviation Laser Firing Points.

(5) Luzon/AGR's.

(6) B18 LFA.

b. An adequate margin of 5 miles on either side of and above the beam extending out to a physical backstop is required.

(1) LASER safety stakes ordinarily will not be required because existing markers designating right and left limits of fire provide an adequate margin of safety. If required, however, safety stakes will be emplaced under the direction and control of the Chief, Range Division.

(2) Warning signs and barricades used to prevent personnel from entering firing areas will also be used in conjunction with LASER firing for the AN/VSS-1 and AN/VVG-1. Additionally, notice must be provided at the entrance to the range that LASER operations are being conducted.

(3) Units using the AN/GVS-5 will ensure that access to range/training area is restricted to prevent personnel being in the eye hazard area. The AN/GVS-5 will only be used with protective filters. The yellow filter will be used for DRAGON training; the red filter for Tube Launched, Optically Tracked, Wire Guided (TOW) training.

c. Unprotected personnel will not be permitted in the established impact area as shown in the Surface Danger Area Diagram for the range.

d. The LASER designator will not be used in two-sided tactical exercises except for Class 1 LASERS, nor are tracking/engagement exercises permitted which incorporate firing LASER designators, without the use of eye safe filters and eye protection as required. Specifically, the employment of LASER designators in TOW/DRAGON tracking exercises, where the target is towed by a manned vehicle, is prohibited. This system may be used for force-on-force exercises within the restrictions set forth in this regulation and as approved by Chief, Range Division.

e. Flat specular objects having a vertical or near vertical surface will be removed from the target area between 0 and 1,000 meters to prevent eye damage from reflected LASER beams. On moving tank ranges, objects must be cleared to 1,000 meters from the firing point farthest downrange. Generally, those surfaces in which an image can be seen must be removed. Beyond the 1,000 meter range, reflective objects need not be removed. The LASER designator, however, should not be intentionally fired at highly reflective surfaces at any range. Flat specular objects in the sense of this provision are:

(1) Mirrors/panes of glass.

(2) Chrome-plated metal.

(3) Bodies of water.

(4) Retro-reflective target material, such as Scotch-like.

f. The target material may be of any surface that does not meet the description in e, above. Cloth, cardboard, wood and lusterless metal of any size and color are acceptable as targets for LASER firing.

11-11. OPERATION AND MOVEMENT.

a. Unless the LASER designator is in use, it will be physically blocked by the protective cover. LASER controls will be switched off. On the AN/VVS-1 and AN/VVG-1 designator, switching the power supplies to the off or test position will accomplish this control.

b. When firing on the move, extreme caution will be exercised to ensure provision of an adequate backstop for the LASER beam.

c. No unprotected personnel will be permitted in the LASER buffer zone or target area, except target operators in defilade bunkers. Personnel in these areas will be protected by eye wear specified for the particular LASER in use. For the AN/VVS-1 and AN/VVG-1 designator, lenses of an optical density of at least 6 at 694.3 mm are required.

d. Measures will be taken to require personnel within the beam not to view the LASER at any range with binoculars and telescopes, unless these devices are equipped with appropriate optical filters for the LASER in use.

e. The inadvertent or intentional tracking of non-target vehicular traffic or aircraft is prohibited. Airspace will be controlled to a distance of 9 kilometers from the firing line/point. At this distance, the LASER should not present a serious hazard to occupants of aircraft because of movement of the aircraft, meteorological conditions and atmospheric turbulence.

11-12. BACKGROUND INFORMATION FOR UNIT LRSO.

a. Introduction.

(1) LASER is an acronym meaning Light Amplification by Stimulated Emission of Radiation. The effects of LASER radiation are essentially the same as optical radiation generated by more conventional ultraviolet, infrared, and visible light sources. The unique biological implications attributed to LASER radiation result from the very high beam collimation, beam intensities and single color (monochromaticity) of many LASERS. The increased directional intensity of the optical radiation generated by a LASER results in a concentrated optical beam that can travel considerable distances.

(2) Developments in LASER technology have resulted in an increase in the use of these devices by the military, both for research and field use. Field military LASERS are used principally for target acquisition and fire control. The widespread use of these systems increase the possibility of personnel exposure to injurious levels of LASER emissions that are potentially hazardous; with adequate safeguards, the risk to personnel can be minimized.

b. GENERAL. The LASER system, except for its inability to penetrate targets, can be treated as a direct-fire, line-of-sight weapon, such as a rifle or machine gun. Thus, the hazard control precautions taken regarding the rifle or machine gun will provide most aspects of the safe environment required for LASER use. Special control measures for LASER are discussed in (1) through (6) below.

(1) The hazard from LASER devices is limited to exposure to the unprotected eyes of individuals within the direct LASER beam or a LASER beam reflected from specular surfaces. Serious eye damage with permanent impairment of vision can result from unprotected personnel being exposed to the LASER beams.

(2) Essentially, the LASER beam travels in a straight line, so it is necessary to provide a backstop, such as a hill behind the target during LASER firing. Calculated nominal hazardous ranges often extend even beyond 8 kilometers, and the use of optical viewing instructions within the beam could extend this hazardous range considerably. For these reasons, and because of atmospheric effects on the beam, the designation of a single hazardous range for firing range safety purposes is not feasible for most testing and training purposes.

(3) Every object that the LASER beam strikes will reflect some energy back towards the LASER. In most cases, this energy is a diffuse reflection and is not hazardous. Certain shiny reflecting surfaces, however, must be avoided as targets to prevent reflection of a hazardous amount of radiation.

(4) The use of optical devices to observe the target during LASER operations will not be permitted unless flat specular surfaces have been removed from the target area or unless appropriate LASER safety filters are placed in the optical train of the binoculars or telescope.

(5) Specular reflections from standing snow or water do not present a hazardous situation to ground personnel that are not located along the azimuth of the beam path. These reflections do not present a hazard to personnel in aircraft outside the restricted airspace above the range.

(6) Evaluation of each anticipated operating condition should include consideration and development of procedures for ensuring proper placing of warning signs for the operation. Local SOP's should provide for the placement of temporary or permanent signs during such periods of operation.

c. Additional Safety Requirements.

(1) When using LASER systems, the requirements for certified OIC/RSO, roadblock NCO/system, and medical personnel/equipment remain the same as for live-fire ranges.

(2) See AR 385-63, Chapter 19 for safety diagrams/safety data.

(3) Natural backstop is a requirement at Fort Stewart (e.g., no lasing above the tree line).

CHAPTER 12 - TACTICAL FIGHTER OPERATIONS

12-1. GENERAL.

a. This section prescribes policies, procedures, and safety requirements for tactical fighter operations on the Fort Stewart Range Complex (R-3005).

b. Additional information concerning USAF use of the Fort Stewart Range Complex can be found in Air Force Instruction (AFI) 13-212, Volume I/ACC Sup 1, Fort Stewart Annex A, 28 February 1997.

c. Fort Stewart Range Control is responsible for scheduling all activities on the Fort Stewart Range Complex. However, all tactical fighter units desiring to use the Fort Stewart Range should coordinate through the 15th ASOS. Exception to this requirement is with operations conducted by OL-A/17 ASOS and 165 ACF. OL-A/17 ASOS and 165 ACF will inform the 15th ASOS to avoid conflicts. Contact 15th ASOS at DSN 870-5353/2831/8105 (fax DSN 870-4099).

d. Requests for use of the Fort Stewart Range Complex will be submitted no earlier than 120 days and no later than 30 days prior to the requested date of use. Submit requests to Range Control through 15th ASOS. In the event 15th ASOS is deployed or cannot be contacted, contact Range Control scheduling directly, DSN 870-7568/8777.

e. Dry attacks and weapons employment are IAW MACOM directives as applicable to type aircraft. Range safety procedures are as prescribed by pertinent regulations and appropriate technical publications. The flight lead/FAC of attack or support aircraft and ground forward air controller (GFAC) are responsible for ensuring that all training/firing is conducted consistent with current safety procedures to prevent injury to personnel or damage to property. Safety and realistic training are compatible and equally important; one may not be sacrificed for the other.

f. Aircrew must have at least 1,500' ceilings and 3NM visibility to operate on the Fort Stewart Range Complex. Aircrew will maintain VMC at all times. When MACOM directives for weather minimums are in conflict, the more restrictive minimums apply.

12-2. AIRSPACE/TRAINING AREAS.

a. For tactical fighter operations, the Fort Stewart Range complex offers three general areas: the AIA, the Western Tactical Training Area, and the Eastern Tactical Training Area. Generally, range airspace is from 800 feet AGL to FL 290 or as directed. Lower altitudes may be coordinated on a case by case basis through Range Control.

(1) Artillery Impact Area (AIA). Located approximately in the middle of R-3005C and centered on the SAV 250/25 (CH 74). The AIA contains numerous artillery and tank targets (truck convoys, tank formations, APC's, etc.) and within the constraints outlined in Section 12-5, aircraft ordnance expenditure is authorized. Airspace within the AIA extends to the surface to facilitate weapons delivery.

(2) Western Tactical Training Area. Described as training areas E and F (or R-3005A and B inclusive). This area of the range is available for dry runs only and is the primary dry CAS operations area.

(3) Eastern Tactical Training Area. That part of training areas A, B, and C east of the MR52 grid line (or R-3005C east of the MR52 grid line and all of R-3005D). The same constraints apply to this area as outlined in the Western area above.

b. Military Operating Areas (MOAs). The Fort Stewart MOAs provide additional airspace for fighter operations to the west and southeast of the range complex. They are divided into four sections: B1/2 and C1/2. B1 is adjacent to the west side of R-3005 A and E from 500 AGL to 4,999 MSL. B2 sits on top of B1 and includes the airspace from 5,000 to 10,000 MSL. C1 is adjacent to the south side of R-3005 C and D from 500 AGL to 2999 MSL. C2 sits on top of C1 and includes the airspace from 3000 to 10000 MSL

c. Other areas affecting tactical fighter use. Users must be aware that clearance into Fort Stewart airspace does not imply that all other range operations have ceased. Upon check in, Range Control, Marne Radio, or your terminal

attack controller will brief you of any specific airspace restrictions affecting your range period.

(1) Red Cloud Range Complex. Located in the western portion of R-3005C between GA Hwy. 119 and the AIA, the Red Cloud Ranges are a high intensity ground weapons range complex. Overflight requires Range Control approval that will usually be granted with a "no lower than" altitude restriction.

(2) Drop Zones (DZ's). There are seven DZ's in the Fort Stewart training area. In the event these areas are in use, flights will remain clear.

(a) Taro DZ. In R-3005D.

(b) Canoochee DZ and Galahad DZ. In R-3005C.

(c) Victory DZ. Located on Wright AAF in C1 MOA.

(d) Taylor Creek DZ. In R-3005B.

(e) Remagen DZ and Jaeck DZ. In R-3005A.

d. Pilots should be aware of numerous helicopter movements in the Fort Stewart restricted area. Normally, helicopters should not operate above 500 feet AGL or in the assigned target area. Fixed wing aircraft will remain above 800 feet AGL unless lower altitude has been coordinated.

12-3. COMMUNICATIONS.

a. Air Traffic Control (ATC). Savannah Approach is responsible for ATC in and around the Fort Stewart Range complex. Frequency: UHF 354.0 or VHF 118.4. Telephone number: Commercial (912) 964-7928

b. Flight Service Station (FSS). Flight service is provide by Marne Radio located at Wright AAF. Frequency: UHF 247.0, VHF 127.35 or FM 41.30. Telephone number: DSN 870-8505.

c. Range Control. Range Control is located on Fort Stewart and can be contacted on UHF 280.8, VHF 149.6 or FM 48.50/46.10. Telephone: DSN 870-8777.

d. Forward Air Control. All forward air control (and range air-ground) operations are conducted on strike frequency UHF 280.8/271.1/300.7/349.3, VHF 141.8 or FM 46.95/40.15.

e. The GFAC and all aircraft will maintain continuous radio contact on the strike frequency. Additionally, aircraft will monitor GUARD. Additionally, GFAC's will maintain continuous radio contact with Range Control. If unable due to transmitter limitations, they will ensure that contact is made available through other means (land lines, cell phone, MSE, etc.). In this case, Range Control must be briefed and made aware of the radio limitation.

f. In the event the 15th ASOS has been deployed or cannot support with GFAC's, the flight lead will maintain contact with Marne Radio and Range Control at all times. Flight lead must call Marne Radio 10 minutes prior to scheduled mission and request permission to enter airspace.

12-4. ENTRY/EXIT PROCEDURES.

a. The 15th ASOS will notify Range Control that fighter aircraft will be operating over the range complex at least 30 minutes prior to, and not more than 3 hours before, the scheduled range period. If this notification is not made, flights cannot enter restricted airspace until conflicting firing is shut down.

b. Entry procedures.

(1) Before entering Fort Stewart airspace, flight lead or the airborne forward air controller (AFAC) will:

(a) Activate the appropriate Fort Stewart MOAs through Savannah Approach.

(b) Contact Marne Radio or Range Control to obtain clearance into the restrict-

ed area. If unable, attempt contact with the GFAC on the planned strike frequency for assistance. Aircraft will not enter the restricted area until clearance is received from Marne Radio/Range Control.

(2) After obtaining clearance into the restricted area, the flight lead or the AFAC will contact the GFAC on established strike frequency. GFAC's will brief flights on required information or unique operating procedures before commencement of the range mission. When no other frequency is specified in the ATO, use UHF 280.8 or VHF 141.8.

(3) Entry Points. Primary entry points to the Fort Stewart restricted areas are:

(a) Tippins Lake (32 06 27N 81 50 32W or MR 205527).

(b) Pineview Lake (31 57 00N 81 52 04W or MR 180352).

(c) Taro DZ (31 56 24N 81 22 32W or MR 645357). This entry will be used only for entrance to the AIA or if using the eastern area of the range.

(4) Holding Areas. Generally, plan on holding within the Bravo or Charlie MOAs at 5000 feet MSL (weather permitting), avoiding overflight of all towns. Occasionally, GFAC's may direct alternate holding based on mission requirements.

(5) After range entry, proceed no lower than 800 feet AGL to the prescribed initial point (IP) or contact point (CP), or as directed by the FAC. Contact 15th ASOS for IPs and CPs.

c. Exit procedures.

(1) Flights exiting the range will check out first with the FAC and then with Marne Radio or Range Control. A bomb check will be accomplished if anyone in the flight had a no spot, or experienced any type of release malfunction.

(2) If departing under IFR, climb above the target area not exceeding 10,000 feet and contact Savannah Approach for an IFR clearance.

(3) If departing under VFR, exit by way of one of the entry points. Coordinate with the FAC and/or Marne Radio for deconfliction with inbound traffic. Contact Savannah Approach to deactivate MOAs then proceed VFR once clear of Fort Stewart airspace.

12-5. WEAPONS DELIVERY PROCEDURES.

a. Simulated Delivery Procedures. Simulated ("Dry CAS") deliveries are permitted throughout the reservation and are only limited by aircraft/unit training rules and airspace restrictions as defined in this regulation.

b. Live Ordnance Delivery Procedures. Live ordnance is defined as any object that can be expended from an aircraft. Delivery of live ordnance is authorized on Fort Stewart Range only within the AIA IAW the constraints outlined below.

c. Air-to-Ground Target Area (AGTA). The AGTA is located approximately in the center on the AIA and is defined as a 1 km x 1 km box cornered with the following UTM grid coordinates: MR 465395, MR 475395, MR 475385, MR 465385. Due to weapon footprint constraints, aircrew may expend ordnance only on targets located within these boundaries using the guidelines found in Table 12-1. This target area applies to all aircraft except AC-130s. It contains various target arrays and types and is subject to no notice refurbishment.

d. Authorized Ordnance and Deliveries. All authorized ordnance and deliveries are described in Table 12-1. Parameters in this table are based on current USAF weapon footprint data. Any questions concerning this table as well as any requests for deliveries not outlined in this table, call 15th ASOS Weapons and Tactics at DSN 870-3295/2831/8501 for clarification. Delivery of inert/live PGM and cluster munitions is not authorized.

e. Explosive Ordnance. Explosive ordnance is currently limited to General Purpose Bombs (500 lb. class only), 20mm/30mm/40mm/105mm HEI/API and 2.75 WP/HE Rockets. Due to noise control issues, General Purpose Bombs are further limited as follows (15th ASOS will coordinate with Fort Stewart Range Control who has final approval authority for dates, times, and amount of ordnance expended):

(1) Deliveries authorized only between 1 May and 31 October.

(2) Delivery time window is from 1 hr after sunrise until 1 hr before sunset.

(3) Weather requirements: ceiling > 2000 ft; winds > 2 kts; relative humidity > 30%.

(4) Due to weapon footprint constraints, explosive GP deliveries will be planned only on targets located within the area bounded by the following coordinates: MR468392, MR475390, MR475385, and MR470385

f. Flares. Flares are authorized only within the boundaries of the AIA and require coordination with Range Control on the day of planned delivery due to the local fire hazard potential. Aircrew are responsible for insuring that flares land after expiration of burn time and within the confines of the AIA. Winds must be factored into the equation.

g. Due to the joint use nature of Fort Stewart Range, aircrews must accomplish a clearing pass over the target area prior to beginning any actual expenditure of ordnance. The GFAC will ensure that the aircrew has cleared the target area and identified the location of ground personnel. The GFAC will not permit aircrew to expend ordnance if there is any doubt as to personnel locations. Laser designation will not be used as the sole means of target identification.

h. Observation Points (Ops). When utilizing the AGTA for ordnance delivery, GFACs will normally be located on at least one of the Ops listed at the UTM grid coordinates below. Aircrews may be assured that least one OP will be manned by personnel and must ensure that they know the exact location of all ground personnel prior to expending ordnance.

OP 1	MR468359
OP 2	MR463363
OP 3	MR453368
OP 4	MR450369

i. GFACs will brief and mark the OP by smoke, mirror flash, marker panel, strobe, IR pointer, or any combination of the above. The FAC will not clear aircraft for munitions release until he is sure that all flight elements have correctly identified the FAC position and cleared the target area.

j. All weapon deliveries (simulated or live) require final clearance from a qualified (or supervised upgrading) GFAC or AFAC. Terminology will be IAW Joint Pub 3-09.3 ("Continue Dry" for simulated deliveries, "Cleared Hot" for live deliveries). If AFACs are being used, a GFAC will maintain radio contact and act as a safety observer. Waivers to this requirements may be obtained on a case by case basis from 15th ASOS with prior coordination.

k. Weapons System Arming. Bomb master arming switches are authorized to be on only when within the confines of R-3005 C and intending to expend ordnance. Furthermore, gun and rocket master arm switches will only be turned on when established on final with the AGTA positively identified. AC-130 aircraft will safe armament switches anytime the aircraft orbit takes the aircraft outside the boundaries of R-3005C. All arming switches wil be confirmed off and safe prior to departing the range.

12-6. RESTRICTIONS.

a. No-fly Areas. The following areas are no fly areas and, when active, will not be overflown. (On initial contact, Marne Radio (247.0) will advise the pilot if any of the areas listed below are active. They will also advise the pilot of the

route to follow into the range to prevent overflight.)

(1) Ammunition Storage Area at grid MR 8321 4041, (near Hunter AAF).

(2) ASP at grid MR 3751 3201.

(3) EOD Site at grid MR 4386 3720.

(4) Active ranges in the Red Cloud Complex, Artillery and Small Arms Impact area.

(5) “Hot” Firing Points, OP and Mortar Points.

(6) Avoid the gun-target line of an MLRS firing point when within 4,700 meters of the firing point.

(7) Other areas as published in NOTAMS or provided by Marne Radio.

b. Noise Avoidance Areas. The following areas are noise sensitive areas (coordinates are the approximate center of mass). Aircrew will avoid flight operations:

(1) Within 300 meters of the chicken farms at coordinates:

(a) MR 1800 5321.

(b) MR 1951 5071.

(c) MR 2201 5221.

(d) MR 1751 4171.

(e) MR 1751 3791.

(f) MR 1701 3221.

(g) MR 1801 2721.

(h) MR 5101 2621.

(i) MR 3451 5571.

(2) Over the fish hatchery at coordinates MR 7020 3520 below 750 feet MSL.

(3) Over the pig farm at coordinates MR 7501 3621 below 250 feet MSL.

(4) Over the community of Georgetown at coordinates MR 7851 3821 below 750 feet MSL.

(5) Over the city of Savannah (the entire city is a noise sensitive area). Overflight below 1,000 feet MSL is not permitted without authorization by the appropriate air traffic control facility.

(6) Over the Wassau National Wildlife, Tybee National Wildlife, Fort Pulaski and Savannah Wildlife Refuges, will not be overflown less than 2,000 feet MSL, vertically or horizontally. These refuges are located in the vicinity of Hunter AAF (N32°00.6’ W81°08.8’).

12-7. EMERGENCY PROCEDURES.

a. General. In the event an aircraft crashes near or on the range, the GFAC, flight lead, or wingman will notify Range Control or Marne Radio with location, type aircraft, number of personnel, number of parachutes and requested assistance, and continue with search and rescue operations. Helicopter Medical Evacuation (MEDEVAC) units are on 24-hour alert at Wright AAF.

b. Radio Failure (Nordo) or Emergency With Radio Failure. If an aircraft in a flight has a radio failure, the flight will cease expending ordnance immediately and flight lead will take control. The FAC will provide any assistance possible. If single ship, the pilot will attempt to notify the GFAC by flying overhead and rocking his wings if conditions permit. The GFAC will relay the situation to Marne Radio and Savannah Approach. The aircraft will depart the restricted area IAW Savannah Approach Control instructions. If radios are lost with a compounding emergency, attempt an overhead pass of the GFAC rocking wings before departing if conditions permit.

c. Runaway Gun. If a runaway gun occurs, continue on the final attack heading until the gun ceases to fire. On any

other heading, point the gun toward an uninhabited area until the gun ceases to fire.

d. Hung Ordnance. In the event of hung ordnance, every effort will be made to release the ordnance before departing the range. If necessary, jettison the ordnance within the AGTA. That aircraft may not continue air-to-surface weapons training until the problem is resolved.

e. Emergency Recovery Bases. There are four emergency airfields within approximately 50 NM of the AIA. Flights should consult current FLIP/NOTAMS for the latest airfield information.

(1) Wright AAF. Heading 180 degrees/7NM from center of the restricted area two 5,000 foot runways with no arresting gear.
(2) Hunter AAF. Heading 090 degrees/23NM from center of the restricted area. Runway 09/27 is 11,400 feet long with no arresting gear.

(3) Savannah International Airport. Heading 070 degrees/24NM from center of the restricted area. Runway 09/27 is 9,000 feet long and is equipped with BAK 9's. Approach and capability on runway 27 only. Runway 18/36 is 7,000 feet.

(4) Beaufort MCAS. Heading 055 degrees/52NM. Approach and departure arresting gear available (BAK-13's). Main runway is 12,200 feet long.

f. Emergency Jettison Areas.

(1) Primary: Aircraft will jettison ordnance within the AGTA.

(2) Secondary: Savannah jettison area - Notify Savannah Approach Control of intentions to utilize the Savannah jettison area. Fly the SAV 150 degree radial outbound and jettison ordnance at 25NM DME.

Table 12-1. Authorized Ordnance and Deliveries

WEAPON	DELIVERY (See note 1&4)	AUTHORIZED RELEASE HEADINGS (All headings are magnetic)
BDU-33	level dive dive toss loft	260 thru 360 degrees and 070 thru 130 degrees
General Purpose Inert	level (≤ 2000 ft) dive dive toss loft	310 degrees only
General Purpose Live (max 150 lbs explosive weight)	level (≤ 2000 ft) dive	310 degrees only
20mm/30mm	LAS HAS	265 thru 335 degrees and 075 thru 130 degrees
20,25,30, 40, and 105mm	AC-130	**restrictions in para 12-5d apply*
2.75 in Rockets	dive	300 thru 335 deg

NOTE:

1. Delivery airspeeds will not exceed .95M.

2. Use of 2.75 in WP Rockets require coordination with Range Control on the day of planned delivery due to the local fire hazard potential.

3. Aircraft dive angle will be no shallower than 10 degrees during strafing and rocket events.

4. Aircrews will not overfly any OP listed in para .3.7.1.4. above with their weapons system armed. Aircrew will not point their aircraft at an OP with forward firing ordnance armed.

CHAPTER 13 - SPECIAL ACTIVITIES

13-1. AIR TRAFFIC PROCEDURES.

a. Limited flight following/advisory service is provided by Marne Radio as prescribed in appropriate Department of Defense (DOD) flight information publications and 3d IN Div (Mech) & FS Reg 95-1. Frequencies for Marne Radio are: FM 41.30, UHF 247.0 or VHF 127.35. Marne Radio is located on Wright AAF, telephone 767-8505 (S).

b. Range Division determines the use of airspace over the reservation. In the event that Marne Radio is not operational, Range Control Operations will operate the advisory, if contact cannot be made with the Wright AAF tower/ operations. Frequencies for Range Control Operations are: FM 48.50, FM 46.10, VHF 149.60 or UHF 280.80.

c. Requests submitted for aviation usage or training will not be accepted later than 30 working days before the event. This does not include normal travel along established aviation routes and corridors.

d. In the event of an aircraft emergency, instrument approaches, or medical evacuation, Range Division will direct a cease fire for appropriate ranges.

e. Exceptions to (a) through (d) of this paragraph will be made IAW Official Letter of Agreement approved by the Command Aviation Standardization Board and appropriate command representatives.

13-2. AIRSTRIPS.

Personnel/units will not use designated airstrips for assembly areas or bivouac areas. Vehicles will remain clear of airstrips and airfield boundaries. Driving of vehicles across airstrips, except when specifically authorized, is strictly prohibited. Slit trenches, foxholes, sumps, gun positions or other type of holes will not be dug within 25 meters of designated boundaries of airstrips. Field communication wire will not cross airstrips, either on the ground or overhead crossings. Wire lines around airstrips will be buried or placed a minimum distance of 300 meters from airstrip boundaries to eliminate hazard to operating aircraft.

a. Canoochee, Jaeck, Taylor's Creek and Taro DZ's are designed for aviation training.

b. The Camp Oliver cantonment area and Remagen DZ are off limits to all track vehicles. Victory DZ is off limits to both track and wheel vehicles.

13-3. RECREATION AREAS.

a. The use of designated recreational areas is authorized, provided use conforms with current 3d IN Div (Mech) & FS Reg 420-4. Entry into any training and range area or any other facility/area on the reservation is prohibited without a specific clearance and area access pass issued by either Range Division or the Pass and Permit Office, Recreation Services Branch. Persons traveling through the reservation must remain on the primary state GA Highways 144 and 119, and may not depart from them without authorization.

b. All persons utilizing the recreational facilities are warned to avoid danger areas and restricted areas. Handling and/or tampering with dud ammunition is prohibited.

13-4. HUNTING AND FISHING.

a. Hunting and fishing regulations, policies, and procedures are published in 3d IN Div (Mech) & FS Reg 420-4. For information, contact Directorate of Personnel and Community Activities (DPCA), Pass and Permit Office, telephone 767- 5032 (S).

b. Survival training does not require purchase of Federal, State, or local hunting and fishing licenses/permits. Survival training is defined to mean those times that a unit is required to "live off the land" during the conduct of the training

exercise. A roster of all personnel involved in this type of training will be furnished to Range Division and the Provost Marshal.

13-5. RANGE FIRES.

a. Anyone observing a fire in the Fort Stewart range area, will report it immediately to Range Division, giving the location by military coordinates when possible. If Range Control cannot be notified, the Fort Stewart Forestry Officer, telephone 767-8736 (S) or the Fire Department, telephone 767-1711 (S), will be notified.

b. Commanders of units using ranges or training areas will extinguish any small fires observed in their area, providing it can be done safely. If a range contains dud ammunition, the fighting of fires will be done by forestry personnel only. Weapons firing on ranges may continue if the fire is contained and there is no hazard to persons or property.

c. The Fort Stewart Fire Marshal is responsible for the direction of fire fighting. The commanders of units using ranges or training areas and/or the OIC will render all possible assistance to the Fire Marshall/Forestry, if required, to assist in fighting forest fires.

d. Due to fire hazards, clearance to fire tracers, detonate demolitions, or fire of any type incendiary munitions, will be obtained from the Range Control Operations on the day of scheduled firing.

e. Warming or cooking fires are prohibited except when specifically authorized by Range Control.

13-6. CHEMICAL AGENTS.

a. Field use of CS agent on Fort Stewart and Hunter AAF will be limited to CS grenades. Proposals for bulk application of CS will require separate Biological and Environmental Assessments on a case by case basis. Units planning to use CS grenades during training will annotate on training area request. Information provided to Range Control will include the date and grid coordinates (plus or minus 200 meters) for the proposed CS use, and the number of grenades to be used per day.

b. DPW Fish and Wildlife Branch will provide Range Control with a map depicting all known active RCW colonies plus a 400 meter buffer from the colony center (or nest tree if known). The map will be updated as necessary, but not less than once per year. Range Control will check proposed CS locations to ensure that CS is not likely to drift within 400 meters of an active RCW colony.

c. At the conclusion of training, units that use CS will notify DPTM, Range Control of unit, number of personnel trained, coordinates where CS was used, number of grenades used, and name of OIC. This data will provide useful information on the effectiveness of this control plan. Range Control will submit a monthly report to DPW for consideration during the annual review of the Fish and Wildlife Management Plan.

d. Proposed CS missions that cannot be conducted IAW with this policy will require a separate biological assessment. Assessment request must be submitted NLT 60 days before scheduled training. Requests are sent to Range Division and will include the following:

(1) Unit.

(2) Date/times and type agent to be used.

(3) Location(s) (8 digit grid coordinate) and amount of agent to be used.

(4) One map overlay depicting each site. (1:50,000 scale)

(5) OIC name/unit/phone.

e. Civilian traffic routes and safety must be considered for the safe employment of chemical agents and smoke along with restrictions outlined in 3d IN Div (Mech) & FS Reg 420-2.

f. Units will ensure that no smoke affects civilian traffic or drifts off the Fort Stewart reservation. This applies to smoke emanating from any source.

g. Bulk use of riot control agents will not be used within 1500 meters (500 meters for CS grenades) of GA Highways 144 and 119, and Fort Stewart Roads 1, 5, 48, or any airstrip, active range, housing area, Camp Oliver Cantonment area/ Caretaker's Quarters, Recreation areas, and reservation boundary.

13-7. SMOKE OPERATIONS.

a. Tactical vehicles (tank, Bradley IFV, etc.) will not produce transient smoke within a RCW colony. All types of non-transient smoke production (smoke generator, smoke pot, smoke grenade, etc.) will be carried out IAW paras (b) through (f) below. Use of tactical vehicle (tank, Bradley IFV, etc.) to generate a sustained or wide area screen is not considered "transient" smoke.

b. The production of smoke will be sited and conducted to prevent significant reduction of visibility in the RCW colonies. All units producing non-transient smoke will consult the RCW overlay when planning/siting smoke missions. Smoke generator units will be limited to "Haze" or "Curtain" type missions. No smoke curtain type mission will be conducted closer than 3 km of an active RCW colony. FM 3-5, defines a "smoke haze" as "a light concentration of obscuration of personnel and equipment from 50 to 150 meters." The FM defines a "smoke curtain" as "a dense, vertical development of smoke".

c. Whenever smoke production at a site exceeds 1 hour in duration, unit personnel will periodically monitor RCW colony sites in the vicinity where smoke has been/is being produced. They will immediately notify their commander if smoke is drifting into an RCW colony in concentrations equaling or exceeding a smoke haze. Upon such notification, a commander will immediately cease the production of smoke at the site(s) from which smoke is drifting into the RCW colonies.

d. At the conclusion of training, units that produce smoke (other than transitory smoke) will notify Range Control of unit, number of personal trained, date, time, grid coordinates, and amount/type of smoke used. Instances in which smoke generation had to be halted to maintain compliance with para 3 above will be reported immediately. This data will provide useful information on the effectiveness of this control plan. Range Control will provide a monthly report to DPW for consideration during the annual review of the Fish and Wildlife Management Plan.

e. Company commanders and training planners should seek to incorporate RCW colonies and other "No Smoke" areas into the training plan and enhance realism by designating them as hospital areas, LZ's, or other such areas where smoke would not be desirable in a combat situation.

f. Proposed smoke missions which cannot be conducted IAW with this policy will require a separate biological assessment, IAW para 13-6a.

13-8. WATERBORNE OPERATION OF TRACKED VEHICLES.

a. General. This paragraph, and appropriate technical publications for type vehicle(s) participating in the exercise, and current safety regulations and safety messages will be strictly adhered to when conducting water-borne training. Commanders conducting waterborne training will incorporate the provisions of this regulation, and other pertinent safety publications into the unit SOP, SOP's will include checklists to be used by instructors/safety personnel involved in training.

b. The Bradley Swim Training Site (Pond 28).

(1) The swim channel between the concrete pads is very narrow. Care must be taken to try to swim within the channel

limits as there are shallow flats on either side of the channel. The dam, emergency spillway, and perimeter road are not designed to handle tracked vehicle traffic. Confine all tracked vehicle traffic to the designated route in Figure 13-1.

c. Pre-operation procedures will include:

(1) Instructions in the appropriate operator's manual, unit checklists, and this regulation will be complied with in preparing for water borne training.

(2) An on-site safety briefing will be conducted by the OIC.

(3) A safety officer and safety NCO will be appointed for the operation.

(4) Only inflatable life preservers (type B-7) will be used by personnel inside tracked vehicles. A visual check to ensure proper fit and serviceability of these life vests will be made. The life jacket should never be inflated inside the vehicle! It should be inflated only when the soldier is free of the vehicle.

(5) An abandon-vehicle drill will be conducted on land with the vehicle configured and occupied as it will be during the training operation. Special emphasis will be placed on the importance of not inflating individual life vests until clear of the vehicle.

(6) Planning will include consideration of the effects of cold water and wind chill in inducing hypothermia and the actions to be taken to avoid it.

(7) Vehicle will be checked for leaks by pre-dipping in shallow water to ensure vehicle is water tight and properly balanced.

(8) To facilitate rapid recovery of a submerged vehicle, an empty, airtight floating device (plastic jug), will be attached to the vehicle by a rope at least 50 feet long.

d. Water Operations.

(1) Once a vehicle has been pre-dip checked for leaks, the ramp doors, hatches, drain plugs, etc., will not be moved unless another check for water tightness is made before swimming the vehicle.

(2) Seat belts will not be used during water-borne training and combat doors will not be locked.

(3) Hearing protection will be worn by crew and passengers when the vehicle is in operation.

(4) A powered rescue boat will be in the water close by the swimming vehicle. A boat operator and medic will be in the boat. Both should be strong swimmers and must wear life preservers. The boat will carry the following rescue equipment:

(a) Life ring with 50 feet of ¼ inch nylon rope attached to the boat.

(b) Anchor with line attached to the boat.

(c) Two paddles/oars.

(d) Radio and powered megaphone.

(e) Searchlight and running lights during night operations.

(f) Resuscitator.

(g) Qualified and equipped scuba diver (if available).

(5) Trouser legs will be un-bloused while on the water. No web equipment or other items that may impede evacuation from the vehicle will be worn.

(6) When training inexperienced drivers, only one vehicle will be in the water at any given time.

(7) Qualified medical recovery vehicle personnel and equipment will be positioned to provide immediate rescue and recovery operations.

(8) Radio contact will be maintained between the OIC, rescue boat, swimming

vehicle(s), and Range Control Operations.

(9) Intercom communication between driver and track commander will be maintained.

(10) In the event of electrical storm, all vehicles, boats, and personnel will leave the water until the weather clears.

(11) Competent personnel will be stationed at the water exit points and will be equipped with flags or other eye-catching means for directing the swimming vehicles to the exact exit point. At night, directional lights will be placed at the exit points.

(12) All personnel except the driver and TC will ride inside the vehicles during actual water crossings. This consideration may be waived by the unit commander, in his opinion, the danger of personnel being thrown from the vehicle upon entering or exiting the water is greater than being trapped inside if sinking should occur.

(13) Allow for slower control responses in the water.

(14) Make sure vehicle is properly loaded. An unbalanced load could make the vehicle sink.

e. Vehicle Preparation and Operation. IAW appropriate TM's and other pertinent publications designed for this purpose.

f. Vehicle Sinking. Rescue personnel will immediately:

(1) Render first aid as needed.

(2) Clear the water of personnel and account for all personnel.

(3) Notify Range Control of the incident/accident.

(4) Recover and impound the vehicle for accident investigation purposes.

g. Emergency Escape Actions. The following emergency escape actions are to be taken if the vehicle begins to sink:

(1) The TC alerts all personnel of the vehicles sinking.

(2) Personnel begin to leave through their designated hatches. Once free of the vehicle, they inflate their vests.

(3) If for any reason personnel cannot get out through the hatches, they can escape through the ramp door, provide they wait unit water fills the troop compartment, equalizing the water pressure, and allowing the ramp door to open.

h. Other safety/emergency instructions per unit SOP and current safety messages.

i. Current swim site available: Pond number 28, (MR 417355).

j. Measures to be taken by using units to protect the swim sites include:

(1) Enter and exit swim site at designated locations (concrete ramps).

(2) Operate powered rescue boats at speeds that minimize damage to the shore line caused from the wake.

(3) Minimize soil erosion by repairing of site damage incurred during use.

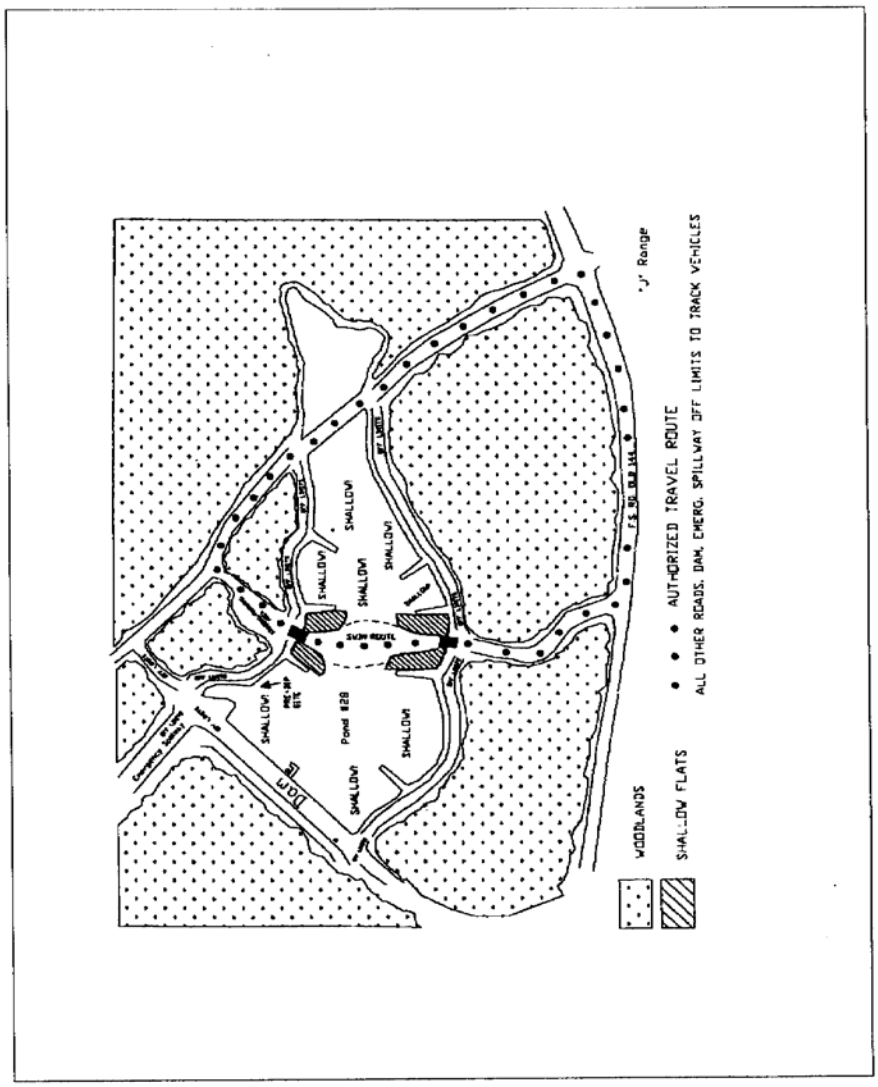


Figure 13-1. Authorized Travel Route, Swim Site

CHAPTER 14 - ENVIRONMENTAL AND HISTORICAL PRESERVATION

14-1. ENDANGERED SPECIES.

Passage of the endangered species act of 1973 gave the United States one of the most far-reaching laws ever enacted by any country to prevent the extinction of imperiled animals and plants. Many of these species are found in the southeast United States and several have been identified on the Fort Stewart reservation. Most visible are the Eastern Indigo Snake and the Red Cockaded Woodpecker (RCW). Taking of any endangered or protected species is prohibited.

a. The Eastern Indigo Snake, is closely associated with the sand ridges, where it also inhabits the edges of clearings and stream bottom thickets, during the summer. Gopher tortoise burrows are protected since these burrows are used as denning and egg laying sites by the Indigo Snake.

b. The RCW is found in numerous locations throughout the reservation, in excess of 200 colonies have been identified and marked to date. To achieve compliance with Federal Law that requires the installation to protect the species, DPW Fish and Wildlife has banded each cavity tree with two white 4 inch wide bands of tape approximately 5 feet AGL. The 200 foot buffer zone is marked with metal signs (see Figure 14-1). The following activities are prohibited within 200 feet of a RCW cavity tree:

(1) Bivouac sites or rest areas.

(2) Disturb or damage pine trees or their root system.

(3) Excavation other than hand dug individual fighting positions.

(4) Smoke operations other than haze (see para 13-7).

(5) Vehicle maintenance over two hours in duration..

(6) Re-supply operations or use of generators.

(7) CS usage (see para 13-6).

(8)Use of high concentrate smoke or trip flares.

(9) Transient foot traffic and on-road vehicle movement within the 200 foot buffer zone are authorized.

(10) In addition to the above, felling of trees within 800 meters (1/2 mile/2650 feet) of a RCW colony tree must be approved by DPW, Fish and Wildlife section.

(11) All personnel assigned, attached or involved in field training must understand the prohibitions listed above. This regulation applies to all personnel, both military and civilian. Personnel subject to UCMJ who fail to comply with para 14-1 are subject to punishment for violation of a lawful general regulation under Article 92, UCMJ. All personnel who fail to comply with para 14-1 are subject to adverse action authorized by applicable sections of the United States Code or Federal regulations.

c. Incidents involving an endangered species will be reported immediately. Commander will:

(1) Cease training immediately.

(2) Notify Range Control immediately.

(3) Seal off and preserve the area.

(4) Begin internal investigation.

(5) Cooperate/assist installation investigation team when they arrive.

(6) Training will not resume until cleared by Chief, Range Division.

(7) See para 5-8 for additional procedures.

14-2. EXCAVATION/DIGGING TRAINING.

a. No personnel, military or civilian, are permitted to dig on Fort Stewart without prior permission from Range Control. Latrines and foxholes do not require prior permission providing guidance outlined in this chapter are followed.

b. Excavation request should reach Range Control NLT 60 days before scheduled training and include the following:

(1) An overlay (1:50,000 scale) depicting each site and eight digit grids to each site.

(2) Description of excavation (e.g., tank ditch, 50 feet long, 10 feet deep, etc.)

(3) Dates to be used.

(4) Date area will be restored to original configuration.

(5) Unit's point of contact/phone.

NOTE: Excavation site(s) should not be left unattended and will be clearly marked for day and night visibility.

14-3. FIELD SANITATION

a. Commanders are responsible for sanitation of training facilities scheduled and/or used on the Fort Stewart reservation.

b. Field Latrines (cat-holes, straddle trench, deep pit, bored hole, mound, burn-out and pail) are environmentally sound. FM 21-10, FM 21-10-1 and FM 8-250 provide guidelines for operation, maintenance, closing and marking latrines. Additional requirements are listed below:

(1) Where ground water table is too high or ground is unsuitable for digging, use mound, pail or burn-out latrines.

(2) When using burn-out latrine, commanders will ensure the below listed requirements are met.

(a) Clear out area 10 feet around the burn can. Use only 55 gallon drum cut in half.

(b) Unit representative remains at the burn site until fire is completely out. Burn ONLY during daylight hours.

(c) Have 10 lb. ABC type fire extinguisher on hand to combat fuel fires and a water type fire extinguisher to combat brush fires.

(d) Use only diesel fuel (no mixed fuels).

(e) Contact Range Control and request permission to burn and be prepared to furnish a grid coordinate and time burn will begin.

(f) Maintain radio contact with Range Control and report any accident/incident immediately.

(g) Contact Range Control when burn is completed.

c. All refuse will be discarded at Post Sanitary Land Fill. Sanitary Land Fill is located north of main post, vicinity of coordinates MR 395281.

d. Water purification equipment will not be operated in Fort Stewart managed ponds (numbered fish ponds), nor will movable shower/laundry units be operated near these ponds.

e. Field showers will be located at least 50 feet from roadside ditches, wetlands or surface water areas. Insure all gray water is

14-4. HISTORIC PRESERVATION.

a. The National Historic Preservation Act of 1966, as amended, the Archaeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, 32 CFR Part 229, 32 CFR Part 800, and AR 420-40 (reference f) charge Fort Stewart with protecting cultural resources from impacts and damage that could compromise their integrity.

b. There are currently 98 sites on Fort Stewart that have been determined eligible or potentially eligible for the National Register (not counting cemeteries). These sites encompass a land area total of approximately 450 acres. All sites are entered in the ITAM GIS.

c. To achieve compliance with Federal laws that require the installation to protect significant natural and cultural resources, DPW personnel have marked the perimeter of each location with green paint and orange bands approximately 4 feet AGL. Signs and siber stakes are posted around each protected location, to assist units in identification (see Figures 14-2 & 14-3). The following activities are prohibited within or on significant properties, within or on significant structures, or within 200 feet of marked cemeteries or human burials:

(1) Construction including, demolition, excavation, grading and related activities, alterations, additions, and creation or use of borrow pits and staging areas.

(2) The construction of utility trenches, berms, tank traps, weapon and target emplacements, training areas, launch sites, individual fighting positions (foxholes), tank obstacles, latrines, bivouac and recreation areas, and other facilities.

(3) Paving, landscaping, removal of plant material, removal or disturbance of ground cover or surface soil, dumping, in-fill, plowing, and planting.

(4) Drive track or wheel vehicles, except on improved roads.

(5) Park vehicles and/or perform vehicle maintenance.

(6) Conduct mounted maneuver training.

(7) Any maintenance and repair activities including planting, cleaning, repainting, painting, and exterior or interior changes that may reduce or alter the significance of the property in whole or part.

(8) All personnel assigned, attached, or involved in field training must understand the prohibitions listed above. This regulation applies to all personnel, both military and civilian. Violations are punishable under the full range of statutory and regulatory sanctions both criminal and administrative. Adhere to these prohibitions and avoid legal actions. Commanders must inform their soldiers of his/her obligations to abide by these prohibitions, our training areas are adequate to both afford protection to our historical resources while conducting quality training.

e. Incidents involving protected resources will be reported immediately. Commanders will:

(1) Cease training or other activity immediately.

(2) Notify Range Control immediately.

(3) Seal off and preserve the area (leave vehicles in place if practical and safe).

(4) Begin internal investigations.

(5) Cooperate/assist installation investigation team when they arrive.

(6) Training will not resume until cleared by Chief, Range Division.

f. If DPW Environmental Branch personnel are not available, Range Division personnel will document the incident as follows:

(1) Name/Number of unit involved.

(2) Unit Environmental Compliance Officer or Training Officer with telephone and building/office number.

(3) Date and time of incident.

(4) Description of incident (including but not limited to the number and type of vehicles, number/depth/volume of holes excavated, etc.).

(5) Photographs of vehicles in place. If it is necessary to remove vehicles, they

should be backed out of the protected area to prevent further damage. Range Division will then notify the DPW Environmental Branch ASAP.

d. Intentional looting, artifact collecting, destruction, defacement, or other disturbance of historical/cultural sites anywhere on Fort Stewart is prohibited.

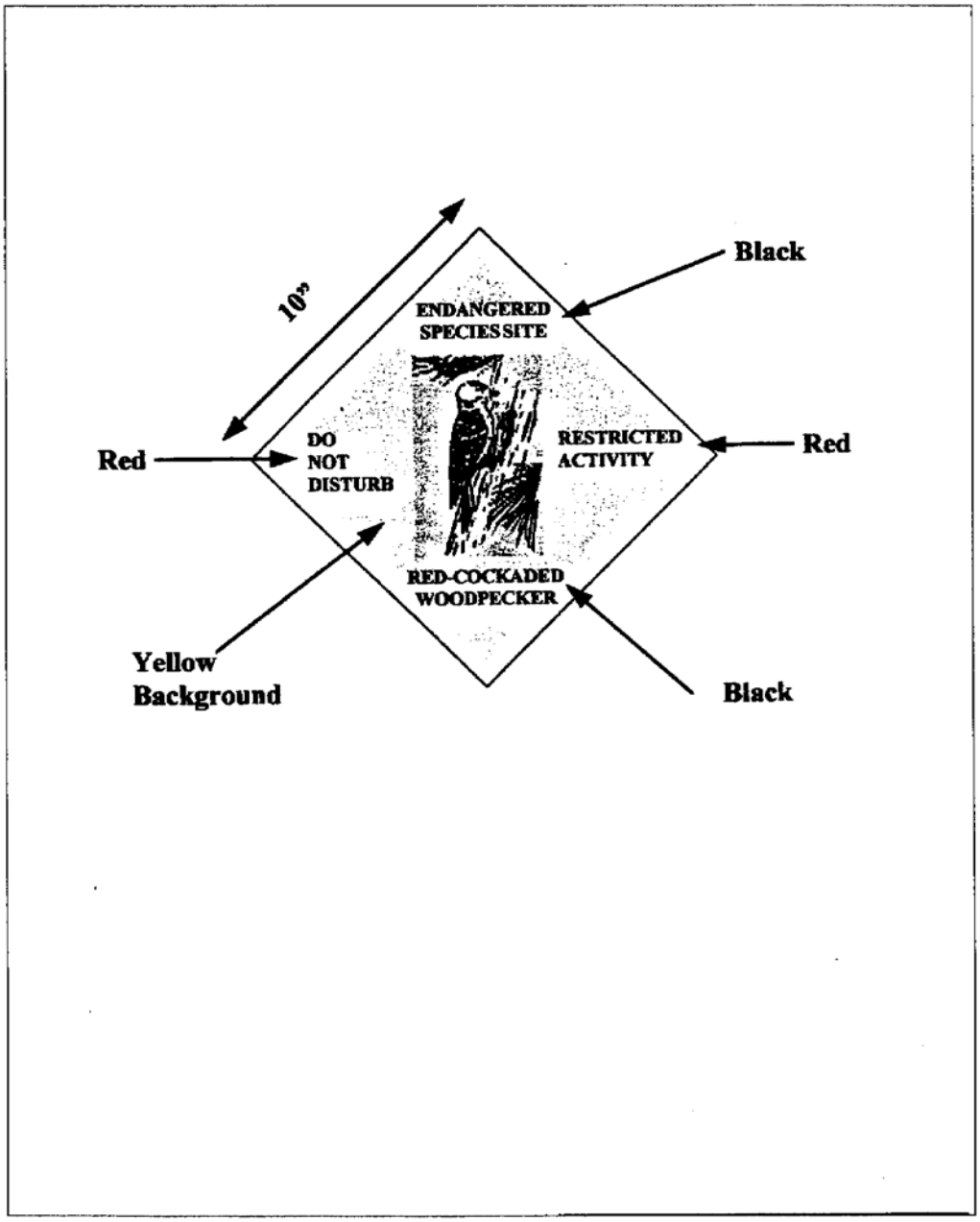


Figure 14-1. Endangered Species (RCW) Sign

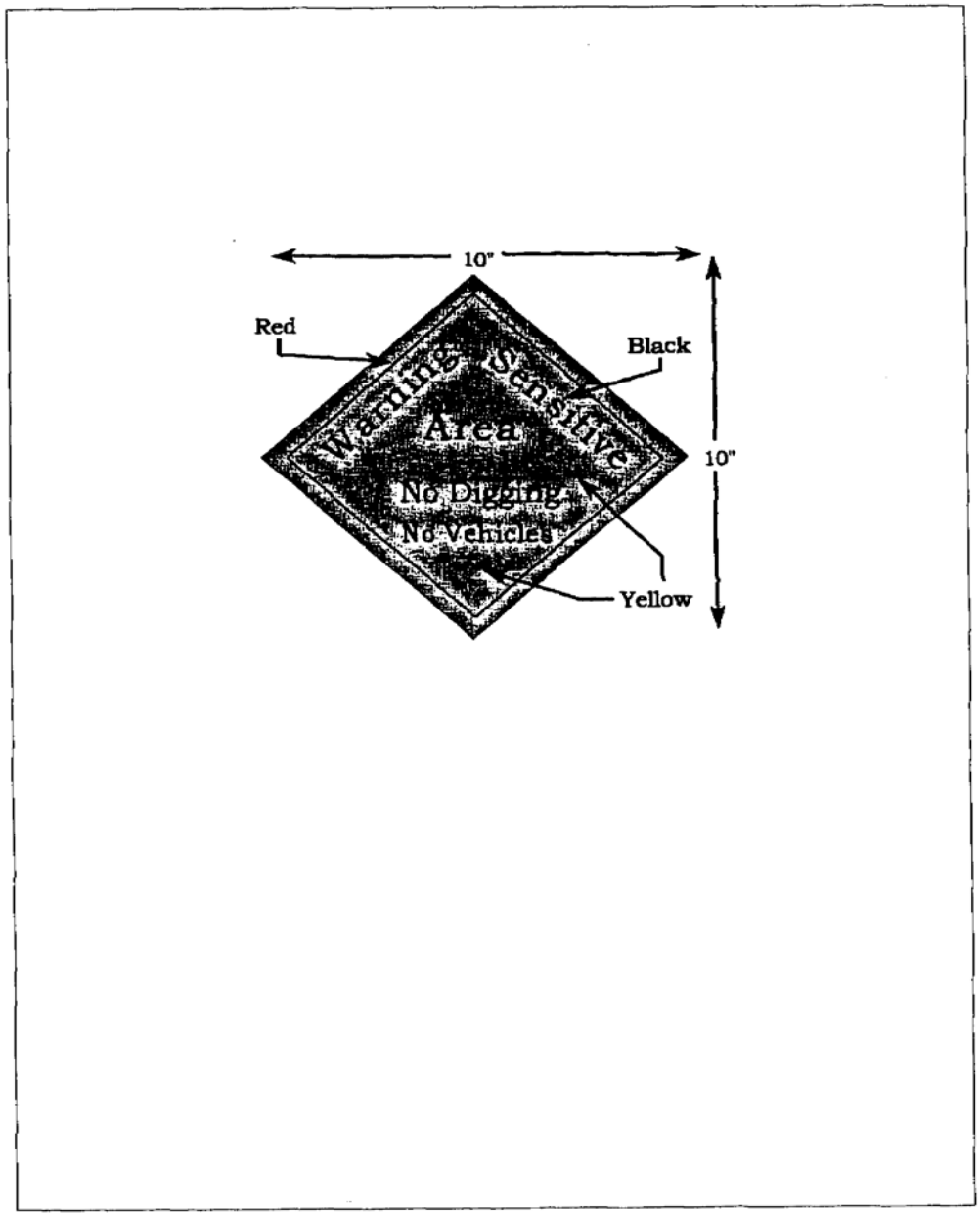


Figure 14-2. Warning Sensitive Area Sign

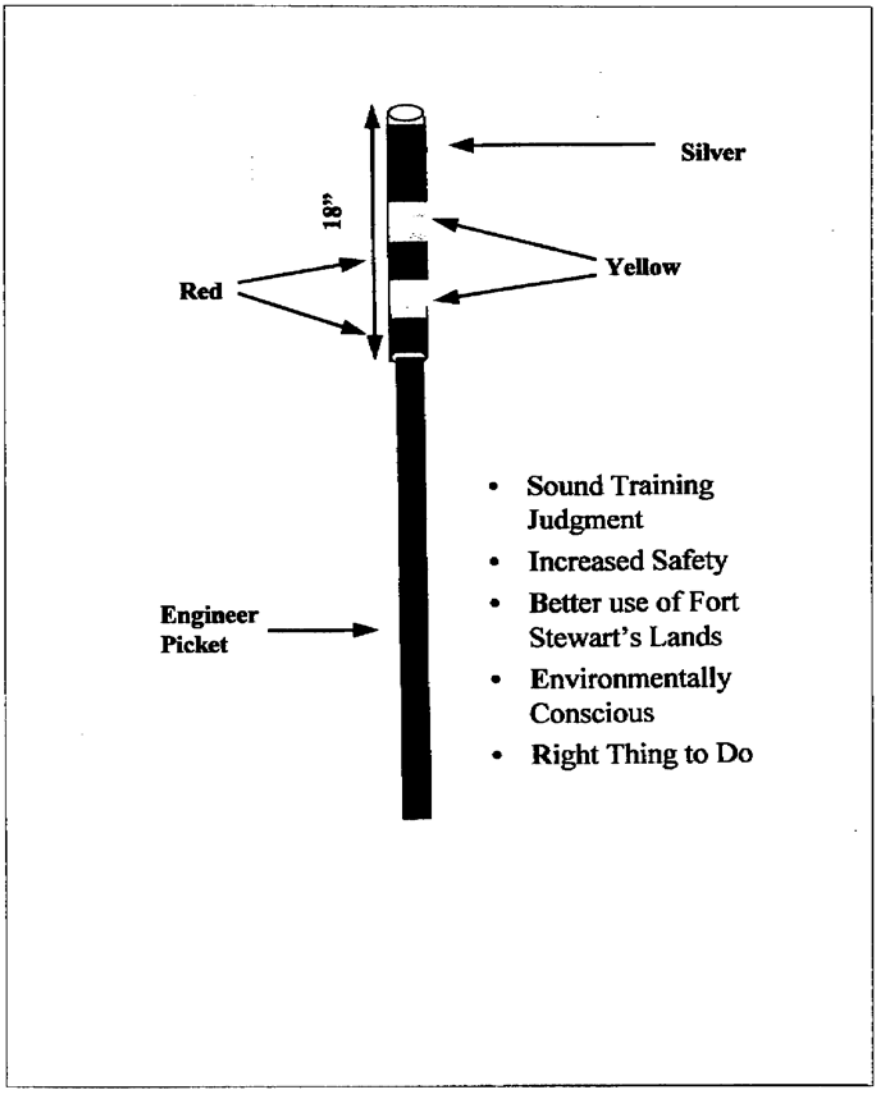


Figure 14-3. Sensitive Area Warning - Siber Stake

CHAPTER 15 - RISK MANAGEMENT

15-1. GENERAL.

Risk management (RM) is the systematic process that identifies hazards in operations, to include training, weighs the risk of accidents against benefits, and eliminates unnecessary risk. The aim is to achieve the mission while maintaining the highest level of safety possible.

15-2. RESPONSIBILITIES.

a. Commanders will:

(1) Plan for safety; integrate proper safety procedures from start to finish during an operation.

(2) Set and enforce safety standards.

(3) Conduct operations within the proficiency level of personnel.

(4) Provide the resources necessary to accomplish the mission safely.

(5) Determine the level of RM for an operation (see para 15-2d below).

(6) Determine the acceptable level of risk for an operation.

(7) Maintain a command climate of safety awareness.

(8) Ensure all subordinate leaders are trained in risk management.

(9) Refer decision making for operations to appropriate command echelon consistent with risk level identified.

b. Leaders will:

(1) Emphasize adherence to safety standards.

(2) Continuously assess and balance risks against operational requirements.

(3) Recognize and minimize health and safety hazards.

(4) Supervise execution to ensure correct safety procedures are being followed.

c. All Personnel will:

(1) Understand individual safety responsibilities.

(2) Recognize unsafe conditions and acts; take the necessary steps to correct them.

(3) Perform tasks to standard.

(4) Use correct technical and field manuals.

d. Levels of Risk Management. The three levels of RM are hasty, deliberate, and in-depth. These levels all follow the same basic process, differing mainly in the amount of detailed analysis during planning. All three levels require use of controls to minimize risk.

(1) Hasty RM. This is the routine but conscious consideration of hazards and safety. Hasty RM follows the same procedures as Deliberate RM, but with less detailed analysis. All operations planning will, at a minimum, include Hasty RM.

(2) Deliberate RM. This is the basic RM procedure. It is done step-by-step using a work sheet and charts to identify and assess risk, to identify ways to control risk, and to assist risk decision making (see para 15-3).

(3) In-Depth RM. This is like Deliberate RM but with greater detail. Working groups will often form to perform In-Depth RM using a variety of techniques. In-Depth RM will not usually be part of normal division operations planning. For help in performing In-Depth RM, consult the Installation Safety Office.

e. RM procedures. Within the Division, RM will be done during concept, planning, and execution of operations. RM will also be addressed during after action reviews. The normal levels of RM are hasty and deliberate; in-depth RM will be performed only under exceptional circumstances. Hasty RM is authorized when a hazard has little chance of causing an accident, if the accident would not have severe consequences, or if normal

precautions suffice. Deliberate RM will be used under all other conditions.

f. Decision Levels. Risk assessment will identify the overall risk level associated with an operation. The decision authority to execute an operation, given its level of risk, is delegated as follows:

Risk Level	Decision Authority
High	CG
Caution	Bde Cdrs
Medium	Bn Cdrs
Low	Co Cdrs

g. Fratricide. Fratricide poses a significant hazard to friendly forces within the division. While fratricide cannot be eliminated, continuous assessment and prudent measures will minimize its occurrence.

(1) Assessment. To reduce fratricide, assessment of hazards will include the following:

(a) Fire and maneuver Control. Density of forces, clarity of the situation, precise concept of operations and orders, clear graphical control measures, liaison.

(b) Fire Distribution Plan. Preparation time, rehearsals, dissemination, collective proficiency.

(c) Land Navigation. Extent of reconnaissance and intelligence preparation of the battlefield (IPB), visibility, navigation difficulties, distribution and functioning of global positioning system (GPS).

(d) Fire Control and Battle Tracking. Clearance of fires, state of communications, extent of cross-talk.

(e) Munitions. Employment of dud-producing munitions, location and marking of friendly and enemy minefields.

(f) Combat Identification. Engagement ranges and fields of fire, use of thermal sights, proficiency of thermal systems, visibility, similarities in opposing forces' equipment.

(g) Fire Control Discipline. Rules of engagement, procedures for initiating, shifting, and terminating fires.

(2) Control Measures. Whenever possible, units will implement the following risk control measures to reduce the chance of fratricide:

(a) Mission.

(b) Complete and concise orders.

(c) Tactically sound and simple scheme of maneuver.

(d) Doctrinally correct clearance of fires.

(e) CP's accurately track the battle and render timely, accurate reports.

(f) Coordinate with adjacent units and track their battle.

(g) Anticipate/assess fratricide risk during planning.

15-3. DELIBERATE RISK MANAGEMENT PROCEDURES.

a. General. This section describes the procedures for deliberate RM that can be applied to any type operation. For repeated operations at lower echelons, such as vehicle dispatching, tailored decision matrices specific to the task can be developed to speed the risk assessment. Such RM aids should be incorporated into unit administrative and field SOP's.

b. Procedure.

(1) Step 1 -- Analyze the Operation. Define and clearly understand what will happen during the operations. Break down the operation into each of its separate events. List the events in order. Use a time line if appropriate.

(2) Step 2 -- Identify Hazards. Look for risks or sources of danger associated with the operation. List each hazard under column A (HAZARDS) of the Deliberate Risk Management Work Sheet.

(3) Step 3 -- Assess Hazards.

(a) Note beside each hazard the type of accident under column B (EFFECTS) and what would cause the accident to occur under column C (CAUSAL FACTORS) of the work sheet.

(b) Determine the chance of a hazard becoming an accident and how severe the accident would be. Refer to the Risk Assessment Matrix. Cross-index the hazard severity with the subjective probability that the accident could occur. Find the resulting level of risk (coded H, C, M, or L).

(c) Under column D (I-RAC) of the work sheet, enter the codes for hazard severity, probability of occurrence, and level of risk.

(d) Identify the highest level of risk code under column D; this becomes the overall initial risk assessment code (I-RAC) for the entire operation. Note this initial RAC in the space provided at the bottom of the work sheet.

(4) Step 4 -- Develop Risk Control Options.

(a) Identify ways to reduce each hazard's severity or probability and list them beside each hazard under column E (CONTROLS).

(b) Again look at the Risk Assessment Matrix. Based on the risk controls identified (at column E) change the ratings for hazard severity and probability of occurrence as appropriate.

(c) Cross-index these changed ratings on the matrix to find the residual level of risk.
(d) Under column F (R-RAC) of the work sheet, enter the codes for revised codes for hazard severity, probability of occurrence, and level of risk.

(e) Identify the highest level R-RAC under column F; this is the overall residual risk assessment code for the entire operation.

(f) Note this residual RAC in the space provided at the bottom of the work sheet.

(g) The person assigning the residual overall RAC should sign the bottom of the sheet. Cdrs should verify the risk assessment to ensure it was performed properly and may wish to note this verification on the work sheet.

(5) Step 5 -- Risk Assessment Decision. Decide whether to go ahead with the operation as planned. The commander must weigh the risks against the benefits of the operation. The decision authority to execute an operation is reserved based on the overall risk assessment as described above.

(6) Step 6 -- Implement the Approved Risk Decision. Self-explanatory.

(7) Step 7 -- Evaluate Results. Determine the effectiveness of the RM process. Continuously evaluate the plan, revise as necessary during the operation, and capture lesson's learned during the after-action review.

CHAPTER 16 - AIRSPACE MANAGEMENT

16-1. AIRSPACE.

a. Purpose. To establish policies and procedures for administrative airspace control of aircraft operating over the Fort Stewart military reservation. Prescribed requirements must be met by aviation units and aviators before conducting aerial flights over the Fort Stewart Reservation (excludes Wright AAF Control zones).

b. Applicability. The procedures outlined herein are applicable to all aviators and aviation units conducting aerial training.

c. General. The policies and procedures set forth in the 3d IN Div (Mech) & FS Reg 95-1 will govern flight following procedures and issuance of hazard area advisories by Marne Radio. This regulation is designed to allow aircraft to operate in and around live fire training areas safely with minimum disruption to training.

d. Restricted Area/Military Operations Area (MOA's).

(1) The Fort Stewart reservation airspace (R-3005) is subdivided into five restricted areas: R-3005 A, B, C, D and E.

(2) Any subdivision can be activated (surface to 29,000 feet) dependent upon scheduled activity.

(3) Range Control will request through Jacksonville Center, activation of restricted areas at least 60 minutes prior to scheduled use, on a daily basis (see DOD Flight INFO PUB AP/1A).

(4) Scheduling of MOA's B1, B2, C1 and C2 must be received by Range Control Scheduling NLT 10 working days prior to intended use. Pilots will activate/deactivate all MOA's through Savannah Approach.

(5) Danger Areas. The installation danger (restricted) areas include: Small Arms Impact Area, AIA, and Demolitions areas (B-1 Demo and EOD). Pilots are required to read local NOTAMS before flying in R3005 (Fort Stewart Airspace).

16-2. NOTAMS.

a. Reviewing AFZP Form 671-R and identifying potential hazardous flight conditions is the responsibility of Range Division. NOTAMS will be obtained from Range Division by Command Aviation daily, for dissemination.

b. The requirements outlined in STAN Bulletin 82-5 apply to blacked out NVG training. Black out NVG training will be scheduled through Range Control a minimum of 72 hours prior.

16-3. RANGE OFFICER.

The Range Officer will notify Marne Radio (or Wright AAF Ops) of the airspace restrictions (hot areas) within R-3005 and will notify Marne Radio when the status is changed (e.g., a firing point changes status "hot" to "cold").

16-4. MARNE RADIO.

a. Marne Radio, located at Wright AAF, is established as a VFR flight following advisory agency/advisor service. Marne Radio frequencies are: UHF-247.00, VHF- 127.35, and FM-41.30.

b. Marne Radio's duties and responsibilities are:

(1) Provide radar flight following and flight advisory service to include hazards to flights within R-3005.

(2) Coordinate the use of airspace within R-3005 as directed by the Range Officer.

(a) Broadcast updated information on hazards to flight to include active impact areas and the range(s), firing point(s) or observation point(s), initiating fires and active demolition training.

(b) Relay check-fire requests.

(c) Advise Range Control of unforeseen hazards to flight reported to Marne Radio.

c. Flight Following.

(1) Marne Radio is operational 0730-2300 Monday-Thursday and 0730-1800 Friday. Closed weekends and holidays. Other times must be coordinated through Aviation Division a minimum of 72 hours in advance.

(2) Range Control Operations provides advisories when Marne Radio is not operational.

d. Miscellaneous.

(1) In the event there is a conflict of information between this chapter and 3d IN Div (Mech) & FS Reg 95-1, then 3d IN Div (Mech) & FS Reg 95-1 will take precedence.

(2) Rotary wing flight paths/corridors and other flight information will be provided by appropriate agencies (Range Control; Command Aviation; Hunter AAF Ops; Wright AAF Ops) as requested.

(3) The mixing of piloted and unmanned aircraft is unauthorized.

CHAPTER 17 - POLICE AND CLEARANCE OF FACILITIES/RANGES/TRAINING AREAS

17-1. PURPOSE.

To identify polices and procedures for the clearance of facilities, ranges, and training areas on the Fort Stewart Reservation. Commanders are responsible for the police of training facilities scheduled and/or used on the Fort Stewart Reservation.

17-2. POLICE.

a. Upon completion of training, commanders and/or OIC's of training areas, ranges, drop zones, or other scheduled facility will coordinate with Range Control for a clearance inspection of the assigned area(s). When planning training, units must include sufficient time to properly conduct police of the facility for clearance. When multiple areas are scheduled, areas will be inspected on a first-come, first-serve basis. Failure to effect timely coordination may result in a delay in obtaining a clearance and delay or otherwise interfere with another unit's scheduled use of the facility.

b. To expedite final clearance of FP's/ OP's/MP's, artillery units are encouraged to effect coordination with Range Control for clearance of firing positions when they are vacated and no longer required for the unit's scheduled firing period.

c. In all cases, when a unit schedules a training area/range facility, that unit is responsible for obtaining clearance. Failure to occupy a scheduled area/facility, or allowing another unit use of the area, does not relieve the scheduled unit from the responsibility to clear the area.

d. When approved (through Range Division) concurrent usage is coordinated between a scheduled unit and a unit desiring to use the same facility, clearance of that facility will remain the responsibility of the initial user, unless the concurrent usage agreement specifically states otherwise.

e. Foxholes, emplacements, ditches, etc., will be filled in before requesting clearance. The area/facility will be thoroughly policed, communications, concertina wire or other obstacles, unit signs, and equipment must be removed before final clearance. Burying of trash in training areas is strictly prohibited.

f. If an area is found to be in a poor state of police, Range Control will notify the last known unit scheduled for the area (providing the unit was not properly cleared), and the unit will be required to properly clear the area.

g. If it is impossible for an inspection to be conducted prior to a unit's departure (training areas only) or if inspection conducted is unsatisfactory, the commander will designate a responsible individual, preferably one who participated in the training, to accompany Range Division personnel on a subsequent inspection within 24 hours.

h. Failure to clear an area/facility on time will result in the scheduled unit's S3 being notified of the non-compliance with this regulation. If no action is taken by the unit and/or S3, then follow-up action will be submitted through the ACofS, G3/DPTM for corrective action.

CHAPTER 18 - OFF LIMITS/ RESTRICTED AREAS

18-1. PURPOSE.

Identify areas off limits to training/recreation do to hazards to personnel and equipment. Only qualified Explosive Ordnance Disposal (EOD) personnel may enter a permanent dedicated impact area used for HE munitions.

18-2. OFF LIMIT AREAS.

a. Artillery Impact Area (AIA).

b. Small Arms Impact Area.

c. EOD area.

d. Demolitions (DEMO) Area.

e. Aerial Gunnery Range (AGR) 1-3.

f. Luzon Range.

g. Any area marked off limits on the Fort Stewart composite map (DMA Edition 3).

18-3. LIMITED ACCESS AREAS.

a. Posted endangered species areas.

b. Posted historical preservation sites.

c Within 100 meters of authorized recreation areas, managed ponds and landings.

d. Within 200 ft of a cemetery.

e. Live fire ranges.

f. Drop zones, airstrips and special use facilities.

NOTE: Access approved by Chief, Range Division.

18-4. AREAS NOT MANAGED BY RANGE CONTROL.

a. Evans Field (BBS and SIMNET).

b. Wright AAF.

c. Noncommissioned Officer Academy areas (F-13-14 and 18-20).

d. Cottrell and Donovan fields.

e. Recreation Range.

f. Main post and housing areas.

g. Fire towers.

APPENDIX A - REFERENCES

SECTION I - REQUIRED PUBLICATIONS

AR 15-6
Procedures For Investigating Officers And Boards Of Officers

AR 25-50
Preparing And Managing Correspondence

AR 40-5
Preventive Medicine

AR 40-46
Control Of Health Hazards From Lasers And Other High Intensity Optical Sources

AR 75-1
Malfunctions Involving Ammunition And Explosives

AR 75-15
Responsibilities And Procedures For Explosive Ordnance Disposal

AR 190-11
Physical Security Of Arms, Ammunition, And Explosives

AR 335-15
Management Information Control System

AR 385-9
Safety Requirements For Military Lasers

AR 385-62
Regulations For Firing Guided Missiles And Heavy Rockets For Training, Target Practice, And Combat

AR 385-63
Policies And Procedures For Firing Ammunition For Training, Target Practice, And Combat

AR 420-40
Historic Preservation

AR 700-4
The Logistics Assistance Guide

FM 3-5
Nuclear, Biological, And Chemical Decontamination

FM 6-50
Tactics, Techniques, And Procedures For The Field Artillery Cannon Battery

FM 6-60
Tactics, Techniques, And Procedures For The Multiple Launch Rocket System Operations

FM 8-250
Preventive Medicine Specialist

FM 9-15
Explosive Ordnance Disposal Service And Unit Operations

FM 21-10
Field Hygiene And Sanitation

FM 21-10-1
Unit Field Sanitation Team

FM 22-5
Drill And Ceremonies

FM 24-20
Tactical Wire And Cable Techniques

FM 55-450-1
Army Helicopter External Load Operations

FM 57-220
Static Line Parachuting Techniques And Training

FM 57-230
Advanced Parachuting Techniques And Training

TM 9-1300-206
Ammunition And Explosives Standards

TM 9-6920-704-10
Operators Manual For Eye Safe System For AN/VVG-2 Laser Designator

TM 55-1520-238-10
Operators Manual For Army Model AH-64A Helicopter

3d IN Div (Mech) & FS Reg 25-1
DOIM Services Guide

3d IN Div (Mech) & FS Reg 55-1
Movement Of Military Convoys And Oversize/Overweight Loads Over Public Roads

3d IN Div (Mech) & FS Reg 95-1
General Provisions and Local Flying Rules

3d IN Div (Mech) & FS Reg 350-1
Active Component Training

3d IN Div (Mech) & FS Reg 385-16
Radiation Protection Program

3d IN Div (Mech) & FS Reg 420-2
Use of Pyrotechnics and Tracer Ammunition on Ranges and Wooded Areas

3d IN Div (Mech) & FS Reg 420-4
Hunting, Fishing, And Recreational Use

3d IN Div (Mech) & FS Reg 700-4
Ammunition

SECTION II - RELATED PUBLICATIONS

AR 190-5
Motor Vehicle Traffic Supervision

AR 200-1
Environmental Protection and Enhancement

AR 210-21
Ranges and Training Areas

AR 385-55
Prevention of Motor Vehicle Accidents

AR 420-47
Solid and Hazardous Waste Management

AR 702-5
Missile Firing Data Reports

AR 735-5
Policies and Procedures for Property Accountability

FM 5-25
Explosives and Demolitions

FM 5-34
Engineer Field Data

FM 5-104
General Engineering

FM 6-40
Tactics, Techniques, and Procedures for Field Artillery Manual Cannon Gunnery

FM 17-12-1
Tank Combat Tables M1/M1A1

FM 20-32
Mine/Countermine Operations

FM 20-33
Combat Flame Operations

FM 21-11
First Aid for Soldiers

FM 23-1
Bradley Gunnery

FM 23-9
M16A1 and M16A2 Rifle Marksmanship

FM 23-11
90mm Recoilless Rifle

FM 23-14
M249 Light Machine Gun in the Automatic Rifle Role

FM 23-30
Grenades and Pyrotechnic Signals

FM 23-31
40mm Grenade Launcher, M203

FM 23-33
66mm HEAT Rocket, M72A1, M72A2 (Light Anti-tank Weapon)

FM 23-35
Combat Training With Pistols and Revolvers

FM 23-41
Sub-machine Guns, Caliber .45, M3 and M3A1

FM 23-65
Browning Machine Gun, Caliber .50 HB, M2

FM 23-67
Machine Gun, 7.62mm, M60

FM 23-90
Mortars

FM 23-91
Mortar Gunnery

FM 24-18
Tactical Single Channel Radio Communications Techniques

FM 25-7
Training Ranges

FM 44-4
Operations and Training, Chaparral

FM 44-5
Operations and Training, Vulcan

FM 57-38
Pathfinder Operations

TC 6-60
Multiple Launch Rocket System (MLRS) Operations

TC 23-23
TOW Heavy Antitank Weapon System

TC 23-24
DRAGON Medium Antitank/Assault Weapon System

TC 57-1
The Jumpmaster

TC 90-6-1
Military Mountaineering

TM 9-1300-203
Artillery Ammunition for Guns, Howitzers, Mortars, and Recoilless Rifles

TM 9-1340-886-14
Operators Organizational, Direct Support, and General Support Maintenance Manual for Launcher and Cartridge 84mm: M136 (AT-4)

TB Med 279
Control of Hazards to Health from Laser Radiation

SECTION III - PRESCRIBED FORMS

AFZP Form 671-R
Range Request

AFZP Form 848
Certificate of Responsibility

AFZP Form 848A
Range Certification

AFZP FL 1021-R
Range/Training Area Cancellation

AFZP FL 1022-R
Concurrent Use

DA Form 581
Request for Issue and Turn-in of Ammunition

DA Form 1687
Notice of Delegation of Authority

DA Form 2028
Record Changes to Publications and Blank Forms

DA Form 3161
Request for Issue or Turn-in

DA Form 3938
Local Service Request (LSR)

DA Form 4513
Record of Missions Fired

DA Form 5977
Authorization Card

DD Form 448
Military Interdepartmental Purchase Request

DD Form 1150
Request for Issue or Turn-in

GLOSSARY

SECTION I - ABBREVIATIONS

AAC
Air Ambulance Company

AAF
Army Airfield

AFAC
Airborne Foward Air Controller

ALCE
Airlift Control Element

AC
Active Component

ADSO
Assistant Division Signal Office

AR
Army Regulation

ACofS
Assistant Chief Of Staff

ASP
Ammunition Supply Point

AGL
Above Ground Level

AT
Anti-Tank

AGR
Aerial Gunnery Range

AIA
Artillery Impact Area

ARTEP
Army Readiness Training and Evaluation Program

BATS
Ballistic Aerial Target System

BCPC
Bradley Crew Proficiency Course

Bldg
Building

BMNT
Beginning of Morning Nautical Twilight

BN
Battalion

CAL
Caliber

CALFEX
Combined Arms Live Fire Exercise

CAS
Close Air Support

CCT
Combat Control Team

CFL
Cease Fire Line

CO
Company; Commanding Officer

COR
Contracting Officer's Representative

CQB
Close Quarter Battle

DA
Department of the Army

DCSOPS
Deputy Chief of Staff for Operations and Plans

DEMO
Demolition

DIV
Division

DOC
Director of Contracting

DL
Disarming Line

DOD
Department of Defense

DOL
Director of Logistics

DOIM
Director of Information Management

DPCA
Director of Personnel Community Activity

DPW
Director of Public Works

DRCS
Director of Reserve Component Scheduling

DRMO
Defense Reutilization & Marketing Office

DPTM
Director of Plans and Training Management

DZ
Drop Zone

DZSO
Drop Zone Safety Officer

EENT
End of Evening Nautical Twilight

EO
Explosive Ordnance

EOD
Explosive Ordnance Disposal

EODCC
Explosive Ordnance Disposal Control Center

EOR
Explosive Ordnance Reconnaissance

ESLR
Eye Safe Laser Rangefinder

FAC
Facility; Forward Air Controller

FL
Firing Line

FM
Field Manual; Frequency Modulation

FO
Forward Observer

FORSCOM
Forces Command

FP
Firing Point

FTX
Field Training Exercise

GA
Georgia

GFAC
Ground Forward Air Controller

HAHO
High Altitude High Opening

HALO
High Altitude Low Opening

HE
High Explosive

HF
Hover Fire

HHLR
Hand Held Laser Rangefinder

HTF
How To Fight

IAW
In Accordance With

ID
Identification

IDT
Inactive Duty Training

IED
Improvised Explosive Devices

IFR
Instrument Flight Rules

IN

Infantry

IP
Instructor Pilot

JAX
Jacksonville Air Traffic Control Center

LASER
Light Amplification by Stimulated Emission of Radiation

LAW
Light Anti-tank Weapon

LD
Line of Departure

LFX
Live Fire Exercise

LP
Launch Point

LRSO
Laser Range Safety Officer

LSR
Local Service Request

LZ
Landing Zone

MACOM
Major Command

MEDEVAC
Medical Evacuation

MECH
Mechanized

MFR
Memorandum for Record

MLRS
Multiple Launch Rocket System

mm
Millimeter

MOUT
Military Operations on Urban Terrain

MOS
Military Occupation Specialty

MP
Mortar Point; Military Police

MPRC
Multi-Purpose Range Complex

MQE
Minimum Quadrant Elevation

MSL
Mean Sea Level

NBC
Nuclear Biological Chemical

NCO
Noncommissioned Officer

NCOIC
Noncommissioned Officer in Charge

NE
Northeast

NLT
Not Later Than

NOD
Night Observation Device

NOTAM
Notice to Airmen

NW
Northwest

OIC
Officer in Charge

OP
Observation Point

OPS
Operations

PA
Public Address

PIC
Pilot in Command

PMO

Provost Marshal Office

POC
Point of Contact

POL
Petroleum, Oil, Lubricants

POV
Privately Owned Vehicle

RAAWS
Ranger Anti-Armor/Anti-Personnel Weapons System

RC
Reserve Component; Red Cloud

RC-A
Red Cloud Alpha

RC-B
Red Cloud Bravo

RC-D
Red Cloud Delta

RC-E
Red Cloud Echo

RC-F
Red Cloud Fox-trot

RC-G
Red Cloud Golf

RC-H
Red Cloud Hotel

RCW
Red Cockaded Woodpecker

RETS
Remote Electronic Target System

RFMSS
Range Facility Management Support System

RG
Range

ROTC
Reserve Officers Training Course

RSO
Range Safety Officer

RSPAC
Rifle Squad/Platoon Assault Course

SA
Small Arms

SAV
Savannah Approach

SAW
Squad Assault Weapon

SE
Southeast

SFC
Sergeant First Class

SFL
Start Firing Line

SGT
Sergeant

SINGARS
Single Channel Ground and Airborne Radio System

SJA
Staff Judge Advocate

SOI
Signal Operating Instructions

SOP
Standard Operating Procedures

SQDN
Squadron

SP
Survey Point

SSG
Staff Sergeant

SSN
Social Security Number

SUB-CAL
Sub-Caliber

SUF

Special Use Facility

SW
Southwest

TA
Training Area

TAMMS
The Army Maintenance Management System

TCPC
Tank Crew Proficiency Course

TDY
Temporary Duty

TI
Technical Inspection

TM
Technical Manual

TP
Training Practice Ammunition

TPT
Training Practice Tracer

TSC
Training Support Center

UHF
Ultra High Frequency

UXO
Unexploded Ordnance

VHF
Very High Frequency

VIP
Very Important Person

VMC
Visual Meteorological Condition

VT
Variable Time

WI
Weapon Instructor

WP
White Phosphorus

SECTION II - TERMS

CALFEX
A company team or larger maneuver element employing combat formations using supporting mortar, artillery, army aviation and/or close air support (CAS) fires.

Cease Fire Freeze
A command broadcasted over the Range Control net that means all live fire facilities will cease firing immediately without changing or disturbing any data.

Cease Firing
A command to immediately discontinue firing. The command may be given by the OIC, RSO or any other person observing an unsafe condition at the firing location. This term is also used as a control measure during training.

NOTE: Regarding terminology defined above, the use of either term will be accepted as a command to stop firing and when used will be relayed by voice or any means required to all firing positions in the area affected.

Check Fire
A cease fire imposed by Range Control for safety reasons or by the unit for administrative reasons (i.e., target maintenance, etc.).

Controller
A qualified commissioned officer, warrant officer or NCO (SSG or above who is directly responsible to the RSO for the coordination and control of maneuver elements, organic and supporting fires in strict accordance with safety regulations.

Drop Zone Safety Officer (DZSO)
The DZSO is responsible for complete safety on the drop zone and air space immediately in and around the drop areas. He ensures the drop zone is safe, wind speeds are within proper limits and medical coverage is available. He will make the final GO or NO GO decision.

Dry Facility
A facility or range that is in use but, no ammunition is being fired.

Dud
Ammunition that was fired but failed to function properly on impact.

Guard Status
A facility or range where personnel and equipment will remain over night, in a non-training status.

Maintenance
Includes routine, periodic inspections and repairs to, or replacement of, existing facilities/items.

Malfunction
Weapon fails to function in usual manner.

Misfire
Primer is struck, round fails to fire.

Occupy
A unit is physically located on a range, SUF or training area and has established communications with Range Control.

Officer-In-Charge (OIC)
The designated commissioned officer, warrant officer, or NCO, who is responsible for all aspects of a range facility (see para 2-4).

Ordnance
All types of ammunition exploded or unexploded and most training ammo (pyro).

Post Range Regulation
3d IN Div (Mech) & FS Reg 385-14 is referred to as the Post Range Regulation in various places throughout this regulation. The two are synonymous.

Range
Any facility normally used for the firing of weapons or designated for a special purpose, e.g., target detection or laser ranges. Each range is identified by a proper name or number.

Range Development
Those activities pertaining to any permanent or semi-permanent changes or development of ranges, training areas or special use facilities. This does not include maintenance or single-use construction.

Range Division or Range Control
Both names are synonymous.

Range Safety Officer (RSO/SO)
A qualified commissioned officer, warrant officer or NCO who is directly responsible to the OIC for safety on the range (see para 2-4).

Restricted Area
Specific areas of the Fort Stewart reservation that are restricted from entry by personnel except under circumstances prescribed herein. Restricted areas include danger zones (firing areas, impact areas and dud areas), cemeteries (including that area within 200 feet of cemeteries), forestry plantations, red Cockaded woodpecker (RCW), cavity trees, airstrips/heliports, EOD area, ASP, Forestry Fire Towers, MarneCentralized Wash Facility (MCWF) and any other posted areas.

Roadblock
Obstacle emplaced on roads and trails to deny access into an area. Passing a roadblock without Range Control permission is prohibited.

Roadblock NCO
A sergeant or above responsible for a system of roadblocks (gates, cables, portable sawhorse or white engineer tape) designed to deny access to surface danger or duded area.

Single-use Construction
Any work on a range/training area by a using unit, and authorized by Chief, Range Division, for the sole purpose of supporting that unit's training during a specified period and removed by the using unit once training is complete.

Special Use Facilities

Are scheduled separately from the training areas they are located in. They are designated in gray on the Fort Stewart Composite Map, 1:50,000 sheet, Fort Stewart Series V745S, Edition 3-DMA.

Take (Taking)
To harass, harm, pursue, hurt, shoot, wound, kill, trap, capture, collect any listed endangered/threatened species, or to attempt to engage in any such conduct. Also includes damage or destruction of essential habitat component.

Training Area
An area on the reservation designated for tactical training. Training areas are normally used for non-live fire tactical training exercises. Each training area is identified by an alphabetical and number designation (A1).

Wet Facility
A facility or range that is in use and ammunition is being fired.

INDEX

This index is arranged alphabetically by topic and subtopic within a topic. Topics and subtopics are identified by paragraph number.

Appendix G. RCW cavity tree data sheet.

Red-Cockaded Woodpecker Site Survey

Cluster #_____ Basal Area Pine _____ Nest T / F

Tree #_____ Basal Area Hdwd_____ Nest Years _____

Species _____ Dead T / F NRMU_____

Discovery DBH_____ Cause_____ Initials _____

Current DBH_____ GPSed T / F Discovery Date / /

Total Height _____ Cavity Type NC / IC / NS / CS Update Date / /

Rot Present T / F Cavity Date (only on cavities) / /

Tree Catfaced T / F Cavity Height_____ Remarks:

Raking Needed T / F Cavity Aspect_____

Mowing Needed T / F Cavity Size N / E / O

Chainsaw Needed T / F Active T / F

Tree is located _____ chains from tree #_____ at _____ degrees.

Cluster #_____ Basal Area Pine _____ Nest T / F

Tree #_____ Basal Area Hdwd_____ Nest Years _____

Species _____ Dead T / F NRMU_____

Discovery DBH_____ Cause_____ Initials _____

Current DBH_____ GPSed T / F Discovery Date / /

Total Height _____ Cavity Type NC / IC / NS / CS Update Date / /

Rot Present T / F Cavity Date (only on cavities) / /

Tree Catfaced T / F Cavity Height_____ Remarks:

Raking Needed T / F Cavity Aspect_____

Mowing Needed T / F Cavity Size N / E / O

Chainsaw Needed T / F Active T / F

Tree is located _____ chains from tree #_____ at _____ degrees.

Appendix H. Research plan to evaluate the relationship between maneuver training activities and RCW populations and habitats on Fort Stewart, Georgia.

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Background

The purpose of this research plan is to develop and implement protocols to evaluate the relationship between maneuver training activities and RCW populations and habitats on Ft. Stewart, Georgia. This research plan meets requirements of the 1996 "Management Guidelines for the Red-cockaded Woodpecker on Army installations" (hereafter referred to as the 1996 Army guidelines) and the U.S. Fish and Wildlife Service (USFWS) October 1996 biological opinion to develop and implement a peer-reviewed monitoring program to evaluate potential training effects on RCWs. It is anticipated that the 1996 Army guidelines will be implemented on Fort Stewart prior to the 1998 RCW breeding season pending completion and approval of the installation Endangered Species Management Plan (ESMP).

A draft of this plan was submitted by the U.S. Army Construction Engineering Research Laboratories on behalf of Ft. Stewart to the USFWS for peer-review on April 8, 1997. USFWS subsequently submitted this draft plan to three independent experts for their review. USFWS forwarded reviewer comments to USACERL during June 1997. Concurrent with this review process, preliminary research studies were initiated on Ft. Stewart during the 1997 RCW breeding season in accordance with protocols of the draft research plan submitted to USFWS. Reviewer's comments and lessons-learned from preliminary research activities are incorporated as changes in this final plan, which is incorporated in the Ft. Stewart ESMP by reference.

This research will be conducted as a coordinated effort of Ft. Stewart, USACERL, and Headquarters, Forces Command (FORSCOM). Ft. Stewart is providing extensive data collection support and installation access for USACERL researchers. FORSCOM is providing project review and logistical and funding support. USACERL is responsible for project oversight, analyses, and reporting under a U.S. Army Corps of Engineers (USACE) direct funded work unit titled "Threshold Disturbance of Maneuver Training on TES". This plan has been developed in coordination with Fort Stewart G3 (Director of Training) and Fish and Wildlife Branch, FORSCOM, and Region 4 USFWS.

Objectives

The objectives of this research are to:

- Develop and implement an approach to meet monitoring and reporting requirement of 1996 Army RCW management guidelines and October 1996 USFWS biological opinion.
- Determine if there is any relationship between training activity and RCW population and habitat parameters.
- Develop an approach to characterize training activity in endangered species habitats with minimal disturbance of mission activities.
- Provide generic approaches for evaluating training effects that could be widely implemented on Army installations in compliance with the 1996 Army RCW guidelines.

Scope

The scope of this research plan is limited to evaluating activities allowed under the 1996 Army guidelines associated with maneuver training activities occurring in primary RCW clusters and supplemental recruitment clusters on Ft. Stewart, Georgia. These activities include transient troop and vehicle movements, firing of individual and crew-served weapons and weapons simulators, and excavation of hasty fighting positions. In supplemental recruitment clusters, training activities may include fixed activities exceeding two hours duration (1996 Army guidelines). Results of this research will apply specifically to Ft. Stewart; however, results will be evaluated for application to other installations with RCWs in the southeastern U.S.

This plan will not address effects of military training in non-maneuver areas such as direct fire ranges and impact areas, and does not address effects of aircraft overflights. This plan also does not specifically address potential noise effects except to the extent that it is an integral characteristic of transient maneuver training. Specific evaluation of potential training-related noise such as blast noise will be conducted under a separate research effort funded by the DoD Strategic Environmental Research and Development Program (SERDP). Noise impacts research is scheduled for initiation in FY98.

Research Plan Considerations and Limitations

Installation Selection

Ft. Stewart was selected as the host installation for this research based on a number of factors. First, it is the only Army installation in the southeastern U.S. that supports training for a “heavy” mechanized division, the 3rd Infantry Division (Mechanized). This division trains with a full complement of tracked vehicles including the M1Abrams main battle tank and the Bradley armored fighting vehicle. Military units

on Ft. Stewart conduct the full spectrum of training events that are required to maintain readiness for combat and associated support functions.

Second, Ft. Stewart supports a significant population of RCWs and is designated as a recovery population. In 1996, 168 active clusters were documented on Ft. Stewart. Ft. Stewart has a mature program for management of RCWs on the installation and has been conducting comprehensive population monitoring since 1994. Finally, the installation training and natural resource management staff have provided key and necessary support for implementing this research on Ft. Stewart.

Research design and approach

A primary challenge in evaluating potential impacts of maneuver training on RCW populations and habitats is characterizing and quantifying maneuver training in an environmental context. "Maneuver training" is not a specific entity that can be easily quantified and described, but rather is a complex interaction of events, participants, and equipment that is highly dynamic and variable both spatially and temporally. Another major challenge of any study implemented at the landscape scale is quantifying the temporal and spatial variability and stochasticity of the natural system under consideration.

This high degree of dynamic variability both in the natural system (RCW populations and habitats) and the factors (maneuver training and RCW management) potentially affecting these systems presents several difficulties in developing approaches to evaluate potential impacts of maneuver training on populations or habitats. First, the spatial and temporal variability of maneuver training as it is conducted under actual conditions has not been well documented and currently cannot be easily predicted at the site specific level - there is no baseline data to establish experimental levels for training that reflect predicted or anticipated levels of training activity. Second, given the inherent complexity in the characteristics of maneuver training, extreme care must be given to constructing appropriate hypotheses that can be evaluated given the complexity of the system and factors under consideration.

Data necessary to test established hypotheses can be derived from either of two fundamental research approaches - experimental designs and/or observational studies. The resulting inferences and conclusions drawn from analyses of the data will depend on the approach selected. The advantages and limitations of experimental and observational studies as they relate to objectives of this study and alternatives considered in this study design are discussed below.

Experimental design

The advantage of implementing an experimental design is that experimental factors (treatments) and response (outcome) can be identified and analyzed in a manner that can establish causal relationships between the experimental factor(s) of concern and the observed response or outcome. The primary limitation is that all sources of variance in the results must be accounted for to establish this causal relationship. A multifactorial experimental design incorporating all aspects and potential levels of maneuver training activity would be hopelessly complex and expensive to implement. This also doesn't consider that it is often difficult to account for or control all sources of variance in field experiments conducted in a natural system on a landscape scale, as would be required to meet objectives of this study.

However, hypotheses can be formulated and tested that address relevant questions regarding effects of implementing the 1996 Army guidelines and effects of maneuver training. Two hypotheses amenable to experimental design and their implementation requirements and limitations are discussed below.

(1) A reduction in training restrictions on maneuver training activities in cluster sites under the 1996 guidelines has no effect on RCW demographic or habitat parameters of concern

The experimental factor under this hypothesis would be training restrictions in RCW cluster in ranges used for maneuver training. Experimental levels would be "maneuver training restrictions under the 1994 Army guidelines" and "maneuver training restrictions under the 1996 Army guidelines."

To minimize variance in observed results due to demographic, spatial, or temporal variability, and to establish causal relationships (i.e. reduction in restrictions caused some observed result), samples for each experimental level would need to be randomly selected from the same population and data collected concurrently for each sample population. This requirement precludes spatially segregated sample populations (e.g. populations on west side of installation under 1994 guidelines and populations on east side under 1996 guidelines) or comparisons between years (e.g. first year of data under 1994 Army guidelines and second year of data under 1996 Army guidelines).

Such an experimental design, would require troops to train under two different sets of training guidelines simultaneously. One of the primary objectives in developing Army-level guidelines for RCW management agreed upon by both the Army and USFWS was to establish one Army-wide standard for training in RCW habitats. It is highly unlikely that troops in the field could be adequately trained to recognize and adequately adhere, for experimental validity, to two different, concurrent standards for training activity in cluster sites.

Also note that this design in itself does not directly address effects of training since level of training activity is unknown for either experimental level - the only conclusion that can be drawn is whether the level of training restriction has any effect on RCW populations or habitats. Some measure of training activity in each sample population would be required to assess differences in training activity in cluster sites as a result of reduced training restrictions. Without these data for example, failure to reject the hypothesis could imply that restrictions are irrelevant merely because no training is occurring in clusters regardless of the level of training restrictions.

(2) Training restrictions have no effect on RCW demographic or population parameters.

Although the statement of this hypothesis appears to be only a slight rewording of hypothesis (1), it has significant implications for implementing an experimental design on a military installation. To test this hypothesis the experimental factor is training restrictions. The experimental levels would be "training restrictions implemented" and "no training restrictions implemented." "Training restrictions implemented" could be in accordance with any restriction standard but any restriction standard implemented would have to be consistent for the entire sample population for the experimental level with training restrictions.

This design would meet logistical requirements to implement one training restriction for troops to recognize and follow. This would likely increase the chance of compliance with requirements of the experimental design. The sample population for the experimental level with no restrictions would essentially be "invisible" to troops for training purposes and thus would have no compliance requirements for troops from an experimental perspective.

Again note the same limitations on conclusions drawn from this design without concurrent data on the level of training activity in cluster sites. Without data to characterize training activity in cluster sites, failure to reject the hypothesis could imply only that the level of restriction implemented is inadequate to limit training activity in restricted clusters relative to unrestricted clusters.

Also, while such a design could be implemented immediately, implementation could be problematic from a conservation perspective. Analyses of available data from Fort Bragg indicate sample populations in excess of 25 would be required to achieve adequate statistical power (Kryzsik, unpublished data). This would mean that protective restrictions would have to be removed from a fairly large proportion of the known population on an installation such as Ft. Stewart, with the risk of potentially increased negative effects in this sample population.

Although supplemental recruitment clusters will eventually provide a sample of unprotected clusters on some installations, they do not represent a random sample from the population. Causal interpretations of analyses based on comparison of supplemental recruitment clusters (no training restrictions) with primary recruitment clusters (training restrictions implemented) may not be valid.

Observational Studies

Observational studies are based on data derived from sources beyond the control of the investigator (although the investigator has control over how these data are collected). Observational data can be used to identify trends and test hypotheses of association between independent (predictor) variables and dependent (response) variables.

However, the greatest limitation and misuse of observational data is that it cannot be used to establish causal relationships. At best, causation can only be inferred from results of observational studies based on examination of all conceivable alternative hypotheses and cannot be inferred based on results of statistical analyses alone.

In a conservation context, the danger due to inappropriately inferring causal relationships from observational data, is that management decisions based on spurious determination of causal relationships can at worst lead to catastrophic effects on populations of concern and at the least lead to inefficient use of fiscal and personnel resources. Management decisions and policies based on observational data should only be implemented after careful consideration of all available alternative data sources, expert knowledge, and potential costs of implementing incorrect policies.

The use of observational data to address objectives of this study will require careful interpretation of statistical measures of association among training activity, RCW demographic and habitat variables based on expert knowledge and concurrent management practices. The implications for evaluating and potentially modifying protective measures under the 1996 Army guidelines based on observational data depends on whether or not there is an observed association between maneuver training and RCW populations. Given that management practices under the 1996 Army guidelines are intended to maximize RCW population growth on installations, failure to reject null hypotheses of association between training and RCW populations would indicate that maneuver training activities at the level observed are not limiting factor for RCW populations. Any observed negative relationship between maneuver training and RCW populations likely would lead the USFWS to maintain or increase protective measures. If the latter outcome were based on an incorrect inference of causal relationship between training and RCW populations, the cost (maintaining or increasing training restrictions), although likely undesirable from the military perspective, would be benign from a conservation standpoint. The monetary costs (in terms of dollars available for conservation management versus research) of this potential outcome would be a

reasonable trade-off with the monetary costs associated with implementing an experimental design to unequivocally establish causal relationships.

Approach

Based on the research design considerations discussed above, this approach relies primarily on observational data to investigate the relationship of maneuver training activities and RCW demographic and habitat parameters. The null hypotheses below are formulated based on the availability of observational data to test measures of association. This approach in general will not establish cause-and-effect relationships between maneuver training activity and RCW demographic and habitat parameters. However, this approach is designed to provide adequate information to make informed evaluations and decisions regarding protective requirements for RCW populations and habitats.

Null hypotheses:

The following null hypotheses will guide data collection, summary, and statistical analyses to characterize maneuver training activity in RCW clusters and evaluate relationship between maneuver training activity and RCW populations and habitats.

- Ho: There is no relationship between RCW demographic parameters and frequency, duration, or intensity of maneuver training activity conducted in accordance with the 1996 Army guidelines.

- Ho: There is no relationship between habitat / site characteristics and frequency, duration, or intensity of training activity conducted in accordance with the 1996 Army guidelines.

- Ho: There is no difference between RCW demographic parameters in monitored primary clusters versus supplemental recruitment sites.

- Ho: There is no difference in frequency, duration, or intensity of training activity between monitored primary clusters versus supplemental recruitment clusters.

Sample Plot Location

All training, demographic and habitat data will be collected at the following RCW cluster sites. Sample clusters will be randomly selected from RCW primary clusters in that demographic monitoring of RCW populations is conducted by Ft. Stewart biologists and in all supplemental recruitment clusters identified by installation biologists. Sample clusters are limited to maneuver ranges in training areas A, B, C, E and F due to

prevalence of maneuver training activities in these areas. No sample clusters will be located in designated firing ranges or impact areas.

- A minimum of 50 monitored cluster sites will be selected for data collection and analysis. A minimum of 30 sites will represent breeding pairs. The number of supplemental clusters monitored will be dependent on the rate of installation initiation of these sites.

- A sample plot will be established in randomly selected cluster sites with full population monitoring. One sample plot will be established in each selected primary cluster centered on the last known nest cavity tree or a randomly selected active cavity tree or cavity tree suitable for occupation within the cluster if no nest cavity tree has been identified previously. Initial sample plot will be relocated if/when the monitored RCW group initiates a nest in a new or different cavity tree in the cluster. Only one sample plot per cluster will be established to ensure independence of samples.

- A sample plot will be established in all sites identified as potential supplemental recruitment clusters.

Training Data Collection

The approach is a point sample of training activity in association with monitored RCW primary clusters and supplemental recruitment clusters. This protocol requires minimal interaction with training units. The advantages of this approach are that it (1) characterizes training activity under actual conditions, (2) provides data that are easily statistically manipulated and analyzed, and (3) requires minimal interaction with unit training so that the training "behavior" is not influenced by researcher observation.

Sample Period

- At each sample site, a 10 minute observation period will be conducted. This time period was selected as the median of the expected maximum duration of training activities (20 minute) in clusters based on information provided in the biological assessment of the 1996 Army guidelines.

- Any observed training activity exceeding 10 minutes in duration within 200 feet of cavity trees will be observed up to a total of two hours of continuous observation. The two hour time limit was selected based on the two hour limit (1996 Army guidelines) on training activity in cluster sites. Training activity may exceed two hours and will be documented, but would not be considered transient under the 1996 Army guidelines. Sites where training in excess of two hours is observed will be visited in subsequent 24 hour periods to document

continued occupation of the cluster site by training activity.

- All activity in proximity or adjacent to the cluster site but outside 200 feet of cavity trees will be recorded and monitored as described above.

Sample Size

- Training data will be collected at a minimum of 50 primary clusters during FY98-00. A minimum of 30 of these sites will represent breeding pairs.
- Conservatively, a total of 680 (approx. 14 / cluster) 10-minute observation periods per month will be conducted in the 50 primary cluster sites based on 20 days of sampling effort per month during the period 1 April through 31 July. Total observation period for this level effort would be 108 hours per month (exclusive of training events exceeding two hours).
- Training data will be collected in all supplemental recruitment clusters as they are established by installation biologists.

Sampling Protocol

The following protocol was developed to balance sampling efficiency with temporal and spatial randomization and representation of sampling observations.

- Sample clusters will be allocated into sample groups to increase travel efficiency between cluster sites.
- Observations in sample groups will be conducted in one of three diurnal periods. Morning: Sunrise to 4 hours post-sunrise. Mid-Day: 4 hours post-sunrise to 4 hours before sunset. Evening: 4 hours before sunset to sunset.
- Observations in sample groups will be rotated among diurnal periods. for example on day one of sampling sample group “A” will be conducted during the “Morning” period and sample group “B” will be sampled during the “Mid-Day” period. On day two, sample group “A” will be conducted during the “Mid-Day” period and sample group “C” will be conducted during the “Evening” period, etc.
- Within each sample group the initial cluster sampled in a sampling period will be selected by a random draw.
- A sampling rotation will be completed prior to resampling of any individual sample plot.

Training Data Recorded at Sample Sites

See sample data table (Table 1) for training data fields recorded during sample periods. For each event observed further details and narrative description will be recorded in event description logs (see sample data sheet, Table 2).

- Unit type: (M) = military, (C) = civilian, (FW) = installation Fish & Wildlife Branch personnel, (DPW) = installation Director of Public Works personnel, (F) = installation Forestry Branch personnel. Additional details recorded in event description log.
- Activity description: Recorded in event description log.
- Vehicle type and number: Number of vehicles and type in 200 foot proximity to cavity tree; (M1) = M1A1 main battle tank, (MBT) = main battle tank - other, (B) = Bradley armored fighting vehicle, (APV) = armored personnel carrier and variants other than Bradleys, (SPA) = self-propelled artillery, (HV) = HMMWV and variants, (PU) = wheeled pickup 4X4 and utility vehicles other than HMMWV, (HW), heavy wheeled vehicles, larger gross tonnage than HMMWV. Additional detail recorded in event description log.
- Personnel number: number of dismounted soldiers and civilians in 200 foot proximity to cavity tree. Additional detail recorded in event description log.
- Duration of activity within 200 feet of cavity trees. Recorded from beginning of sample period up to two hours total observation. For purposes of statistical summary and analysis, the beginning of the sample period will be considered the median point for duration of the observed training event. Average event duration will be estimated by 2*(sum of observed events duration) / total number of events observed.
- Description of any fixed activity in visible range of cavity trees regardless of distance.
- Type and duration of weapons firing within 200 feet of cavity trees. Recorded in event description log.
- Type of weapons firing audible at sample site regardless of distance (e.g. artillery, simulators, small arms, machine guns, M1/Bradley firing).

Training Data from Range Scheduling Records (G3) for ranges in that sample clusters are located.

These data will be used to correlate scheduled training activity with field observations of training frequency, duration, and intensity.

- Unit type scheduled: e.g. armored, mech infantry, infantry, artillery, combat support, command and control, etc.

- Unit size scheduled: e.g. battalion, company, platoon
- Activity type scheduled.
- Duration of scheduled activity: Dates/days activity scheduled.
- Ranges scheduled.

RCW Demographic Data

RCW demographic data for monitored primary clusters and supplemental clusters will be collected in accordance with methods established and implemented by the Ft. Stewart Fish and Wildlife Branch, DPW. These data have been collected in monitored clusters since 1994. Data collection methods follow standard methodologies documented elsewhere and will not be further elaborated here. However, demographic parameters that can be derived from baseline monitoring data collected on Ft. Stewart include:

- Cluster activity status: Active = occupation by one or more RCWs. This parameter provides a measure of recruitment rate in cluster sites.
- Mated status: Presence of adult male and female RCW. This parameter provides a measure of adults ability to attract and retain mates.
- Group size: Total number of mated adults and auxiliaries occupying cluster site. Provides a potential covariate for reproductive success
- Nesting attempt: Provides a measure of breeding adults capacity to initiate nesting attempts
- Number of young fledged: Provides a measure of fecundity.
- Site tenacity: Turnover of adults and auxiliaries of each sex in cluster sites based on observations of banded birds. This parameter provides a measure of a cluster sites ability to retain RCWs, particularly potential breeders.

Habitat / Site Characterization Data

Vegetation and site data will be collected at sample plots during July-August.

Vegetation data collected at each sample plot:

- Stand data: Basal area, pine species, and stem counts by DBH class. Data will be collected by point sampling using wedge prism. DBH will be recorded to 1.0 cm.
- Ground, midstory and canopy cover. Data collected at 100 points along transects associated with cavity trees. Midstory and canopy cover estimated for hardwood and conifer. Ground cover will be recorded as bare soil, litter, grass, wiregrass, or forb.

Site data collected at each sample plot:

- Distance to nearest neighboring active cluster.
- Sample plot location: cluster site, sample plot cavity tree number, UTM coordinate, training area.
- Management history: Including available record of prescribed burns, mechanical or herbicide midstory control, cavity inserts or drilling, timber harvest.
- Soil type.
- Elevation and slope
- Measures of access for training activity: Distance to nearest road/trail. Location and distance relative to wetland/aquatic landscape features (i.e. available access for training activity).

Data Summary and Analyses

Summary Statistics:

Appropriate summary statistics will be reported for the following data.

- Training data collected at sample sites.
- Training scheduling data.
- RCW demographic data at sample sites.
- Vegetation / site data.

Statistical Analyses and Tests

Appropriate parametric and nonparametric analyses and tests to evaluate null hypotheses will be selected pending results of preliminary examination and summary of data. Due to the observational nature of the sample data analyses will rely primarily on techniques of regression and correlation. Dependent variables of interest will include population and habitat measures as identified under "Population Data" and "Habitat / Site Characterization Data", above. Independent variables and covariates will be those measures identified under "Training Data" and "Habitat / Site Characterization Data", above. Tests of effects will emphasize effects on breeding pairs. However, parameters for abandoned and single male clusters will be examined for effects due to training activity. The main comparison of interest in these latter two groups will be between supplemental recruitment sites and primary recruitment sites. Exploratory analyses of abandoned, single male, and initially inactive sites may be limited during the period of this study by low sample size. To reject a null hypothesis for all tests, an □ = 0.10 and a power = 0.80 will be required. A statistical power = 0.80 will be required to accept a null hypothesis. An □□= 0.10 is selected to improve statistical power of tests and because it is a conservative value from a conservation standpoint.

Performers / Cooperators

USACERL:	Mr. Tim Hayden, Project Leader, training characterization Dr. Bob Melton, population modeling and analysis Ms. Leslie Jette, population biology Dr. Tony Kryzik, statistical analysis and study design
Ft. Stewart:	Mr. Tim Beaty, Endangered Species Biologist Mr. Howard Bullard, G3
FORSCOM:	Dr. Bert Bivings, Biologist
USFWS:	Mr. Ralph Costa, RCW Recovery Coordinator

Table 1. Sample data form for training events.

Cluster	Tree	Date	Start Time	Event Time	Unit Type	# Troops	# Vehicles	Duration

Table 2. Sample narrative descriptive log for training events.

Cluster/site _____ **Date** _____ **Tree #** _____
DESCRIPTION

Cluster/site _____ **Date** _____ **Tree #** _____
DESCRIPTION

Appendix I Training Effects Assessment and Reporting for installations Implementing the 1996 "Management Guidelines for RCWs on Army installations."

Prepared by: Mr. Tim Hayden, USACERL-LL-N

21 November 1997

BACKGROUND AND REQUIREMENT

In 1996, the U.S. Army initiated consultation with the U.S. Fish and Wildlife Service (USFWS) to implement revised Army policy for the management of the Red-cockaded Woodpecker (*Picoides borealis*) on Army installations. The "1996 Management Guidelines for the Red-cockaded Woodpecker (RCW) on Army installations" and resulting biological opinion required installations, as a condition for implementation, to develop and consult on individual installation endangered species management plans (ESMP) that include enhanced monitoring and reporting requirements for training activity and effects on RCWs.

The guidelines and biological opinion requires submission of the installation ESMP monitoring plan for peer review prior to implementation. With regard to evaluating effects of training activity on RCW populations and habitats, installations are required to report the following training data for all areas containing active and recruitment clusters:

(1) Type of training that took place.
(2) Duration of training.
(3) Date of training.
(4) Units and approximate numbers of soldiers involved in the training.
(5) Approximate number and types of vehicles and equipment involved in the training.
(6) Other relevant information that would contribute to an understanding of the effects of military training upon RCW habitat.

In addition to the reporting requirements above, the Army is required to annually report population data for all monitored clusters including all primary and supplemental recruitment clusters and evaluate these data for any observed trends in relation to military training and implementation of the proposed guidelines.

OBJECTIVE

The purpose of this document is to outline data summary and analysis approaches for training and RCW population monitoring in compliance with requirements of the 1996 Army RCW management guidelines and USFWS biological opinion. This outline, with appropriate revision pending peer review, will be incorporated in installation ESMPs by reference or addendum.

DATA SOURCES

All installations implementing the 1996 Army RCW management guidelines will submit training and population summary data to the USFWS in accordance with data fields shown in **Appendix 1**. These data are required under the 1996 Army guidelines. These data will be provided annually by all implementing installations during the initial 5-year implementation period of each installation's ESMP. installations eligible to implement the 1996 Army guidelines and that currently have RCW populations include Fort Benning, Fort Bragg, Fort Gordon, Fort Jackson, Fort Polk, Fort Stewart, and Sunny Point Military Ocean Terminal.

Training Data

Installation training data will be obtained from written records and/or from the Range Facility Management Support System (RFMSS). Typically, the installation G3, Director of Plans, Training, and Mobilization is directly responsible for maintaining range scheduling records. installation scheduling records will provide data, by training area, on (1) type of scheduled training activity, (3) date and duration of scheduled training activity (3) type of unit conducting scheduled training activities.

Major Commands (MACOMs) will provide standard unit staffing and vehicle requirements for all unit types and training activity for incorporation in installation reports to USFWS. These data will be provided in the Army Training and Testing Area Carrying Capacity (ATTACC) module for the installation RFMSS. The Army is developing ATTACC to provide standard measures of training activity and evaluate its relationship to erosion status of installations. The proponent for ATTACC is the Army Deputy Chief of Staff for Operations and Plans (DCSOP). Although currently focused on installation erosion status, ATTACC's standardized approach to calculating training loads and impacts may in the future prove useful in reporting standardized measures of training activity in relation to RCW populations and habitats.

RCW Population and Habitat Data

Installation Natural Resource Branch, Director of Public Works (or equivalent organization element) typically is responsible for collecting population and habitat data specific to RCWs. In accordance with the Army guidelines, RCW demographic data collected includes cluster activity, number of adults and fledglings, sex of birds, number of breeding groups, number of nests, and identification of color-banded birds. Habitat data required for cluster sites includes density and height of hardwood encroachment, height of RCW cavities, condition of cavity trees and cavities, and assessment of any training damage.

Forestry surveys are required on a 10 year cycle and are required under the Army guidelines to quantify foraging and nesting habitat availability. Forest surveys typically are the responsibility of the installation Forestry Branch, Director of Public Works (or equivalent organization element).

Other Potential Data Sources and Supplemental Research Projects

Department of Army and other installation special research projects will provide additional relevant information on effects of training on RCW populations and habitats. A 3-year Army direct funded research project has been initiated by the U.S. Army Construction Engineering Research Laboratories (USACERL) on Fort Stewart, Georgia will provide site-specific data on maneuver training intensity and effects on RCWs.

Another Army direct funded research effort potentially relevant for evaluating training effects on RCWs is development of training use distribution models. This is a spatially explicit predictive model for training disturbance. Training event schedules and independent variables affecting training distribution (vegetation, roads, slope, etc.) are incorporated in the model to produce a spatially predictive model of training disturbance on an installation. This research is currently being conducted on installations in Texas, but if the models are validated they may have applications on installations with RCWs.

Vegetation data is collected on installations as part of the Army's Integrated Training Area Management Program (ITAM). These data may be useful to evaluate habitat conditions in RCW foraging habitat on an annual basis.

On Fort Polk real-time training data will be obtained from telemtred vehicles and units conducting Joint Readiness and Training Command (JTRC) exercises. Real-time data for vehicle and unit location are obtained remotely by electronic positioning systems. This effort is sponsored by U.S. Army Forces Command (FORSCOM).

DATA SUMMARY AND ANALYSES

Training Data Summary

Standard definitions for all installation will be developed and reported with concurrence of Army trainers for the following training characteristics:

(1) Event type; e.g. Command Field Exercise, Field Training Exercise
(2) Unit echelons (size); e.g. Battalion, Company
(3) Unit type; e.g. Combat Engineer, Mechanized Infantry

Approximate number of soldiers and vehicles associated with each event type, echelon, and unit type will be reported.

Tabular summaries of scheduled events and units by training area and dates will be compiled from RFMSS and hardcopy records provided by the installation G3. These summaries will be provided for the entire year and subsetted for the peak RCW nesting season, March through July. While informative, these tabular summaries will be difficult to interpret for evaluating effects of training activity in relation to RCW populations or habitats. Totals of troops, vehicles, or training days will not likely reflect the diversity of training load and resulting effects on the landscape. For example, what is the relative training intensity or effect of a mechanized infantry company versus an armor company?

One of the objectives of the USACERL training effects research is to derive a standardized "index" of training load that can be tested for association with potential effects on RCW populations and habitats. The objective is to derive a standardized value(s) for training load from range scheduling data. The intent is to follow as closely as possible standardized training load factors being developed under ATTACC (Event Severity Factor, Vehicle Severity Factor, Vehicle Conversion Factor, and Vehicle Offroad Factor). The advantages of standardized training load factors and compatibility with the ATTACC approach are:

(1) Provides standard units of measure for training load across training areas, among installations, and through time.
(2) Provides a relatively straightforward independent variable(s) for analysis of effects on RCW populations and habitats.
(3) ATTACC factors will be incorporated in future versions of RFMSS that will significantly ease data generation and reporting requirements.
(4) Comparability among installations with different training missions (e.g. Fort Stewart - heavy mechanized versus Fort Bragg - light infantry versus Fort Jackson - TRADOC activities).

Table 1 shows an example of "Event Severity Factors" derived by ATTTACC for a matrix of training event types by unit types. In this example, impact factors are normalized to a standard unit in a standard training event - in this case, an armor battalion conducting a battalion field training exercise (FTX). Note the variability in the estimated impact (in terms of erosion status) across unit and exercise types. This variability illustrates why a standardized index of training load is useful for analytical purposes beyond a simple tally of units or training events.

Tabular summaries of range scheduling data and derived training load factors will provide information on variability of training intensity spatially across the installation and over time.

Event Type	Armor BN (M1A2)	Mechanized Infantry (M2/M3)	Division Cavalry Squadron	Direct Support Field Artillery BN (155SP)	Combat Engineer BN	Forward Support BN	Support Field Artillery BN	Air Defense Artillery BN
BN FTX	1.00	**1.23**	**1.23**	**0.70**	**1.50**	**1.15**	**0.40**	**0.30**
BN CFX	**0.35**	**0.43**	**0.43**	**0.25**	**0.52**	**0.00**	**0.14**	**0.11**
EN MAP/CPX/TWT	**0.09**	**0.11**	**0.11**	**0.06**	**0.13**	**0.11**	**0.03**	**0.03**
BN FCX	**0.20**	**0.25**	**0.25**	**0.00**	**0.13**	**0.13**	**0.08**	**0.06**
BN LFX	**0.70**	**0.88**	**0.86**	**0.25**	**1.05**	**0.46**	**0.28**	**0.21**
BN/DEPEX/ALERT	**0.03**	**0.03**	**0.03**	**0.02**	**0.03**	**0.03**	**0.01**	**0.01**
CO FTX	**0.23**	**0.27**	**0.27**	**0.16**	**0.32**	**0.27**	**0.08**	**0.07**
CO CFX	**0.06**	**0.07**	**0.07**	**0.04**	**0.08**	**0.00**	**0.02**	**0.02**
CO MAP/CPX/TWT	**0.02**	**0.03**	**0.03**	**0.02**	**0.03**	**0.03**	**0.01**	**0.01**
CO FCX	**0.06**	**0.07**	**0.07**	**0.04**	**0.04**	**0.04**	**0.02**	**0.02**
CO LFX	**0.18**	**0.22**	**0.22**	**0.13**	**0.26**	**0.14**	**0.07**	**0.05**
CO DEPEX/ALERT	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**
CREW WPNS SUST	0.01	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**
INDV WPNS QUAL	**0.01**	**0.01**	**0.01**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**
INDV COM ML TNG	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
INDV DVR TNG/MNT	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00

Table 1. From Anderson et al. (1996)[1]. ATTACC Event Severity Factors.

RCW Population and Habitat Data

Tabular summaries of RCW demographic and habitat data will be provided. In accordance with the Army guidelines, data summaries for monitored clusters will include number of active and inactive clusters, nest success, number of young fledged, group size, adult turnover, and recruitment. Quantitative and

[1] Anderson, A, L. Chenkin, L. Winters, R.P. Hunt, C.L. Couvillon, D. McFerren, S. Sekscienski, T. Shirnia, and P. Sydleko. 1996. Army Training and Testing Area Carrying Capacity (ATTAC) and Evaluation of Land Value Study (ELVS) *in* 1996 Integrated Training Area Management Workshop, LaCrosse WI, pp 8-17.

qualitative habitat data and observed training impacts on habitat will be summarized. Most Army installations with RCWs have mature programs for collecting, analyzing, and reporting population monitoring data on their respective installations. Army-level summaries will report these data in formats suitable for comparison among installations. installation methods and sampling design for collection of RCW population are found in (**INSTALLATIONS PROVIDE METHODS OR REFERENCE TO METHODS HERE, e.g. Ft. Bragg Appendix I).**

Data Analysis

Evaluation of training effects on RCW populations under the 1996 Army guidelines will primarily test association between standardized measures of training load and RCW demographic measures. Statistical approaches and tests will depend on spccific hypotheses tested and variable type. Due to the hypotheses of primary concern and the nature of the available data, most statistical analysis will rely primarily on appropriate correlation and regression methodologies. Initial analyses will test the following general null hypotheses:

(1) There is no association of standardized measures of training load with measures of RCW demographic variables - both within year and across years (as data become available).
(2) There is no association of standardized measures training load with measures or ranking of RCW habitat quality and disturbance - both within year and across years (as data become available).
(3) There is no difference in RCW recruitment between supplement recruitment clusters and primary recruitment clusters (as data become available).
(4) There is no difference in RCW reproductive success and group composition between supplemental recruitment clusters (as they become active) and currently active and primary recruitment clusters.

Primary dependent variables of concern for RCW populations will include cluster activity status, measures of reproductive success, recruitment, group composition, and adult site fidelity. Independent variables will include measures of training load, management history, and habitat quality and disturbance. Time series data across years will be analyzed as these data become available in future years from annual monitoring programs. Incidence of observed training disturbance and habitat damage will be tested for association with measures of training load. Appropriate analyses will be performed to identify significant sources of variance in dependent variables of concern.

Type II errors (failure to detect an effect when in fact it exists) in statistical hypothesis tests are often of most concern in management of protected species (see Steidl et al. 1997[2] for recent discussion of statistical power in wildlife research). From a conservation perspective, decisions resulting from Type II errors are more costly (potential loss of species) than incorrectly rejecting a null hypothesis (Type I error) of no effect (possibly resulting, in the case of training, in unnecessary application of training restrictions). To increase statistical power (probability of correctly rejecting a null hypothesis that is false) to detect effects of training load on RCWs, acceptable level of significance for rejecting null hypotheses will be alpha = 0.10 (Type I error) for most tests. Statistical power should be presented for all tests reported to USFWS.

Table 2 shows a simulation of statistical power at alpha = 0.10 as a function of effect size and sample size (A. Krzysik, USACERL, unpublished data). The range of effects sizes presented in Table 2 represent the majority of observed effects size from an analysis of 1981-90 Ft. Bragg RCW population data by Mobley et al. (North Carolina State University, unpublished data). The complete results of the simulations performed by A Krzysik are provided in **Appendix 2.** installations can use these simulation results as a priori estimates of statistical power for the purpose of identifying sample size requirements for monitoring and research.

[2] Steidl, R.J., J.P. Hayes, and E. Schauber. 1997. Statistical Power Analysis in Wildlife Research. J. Wildl. Manage. 61(2):270-279.

N \ f	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
5	0.158	0.193	0.236	0.286	0.342	0.403	0.466	0.529
10	0.235	0.330	0.439	0.553	0.664	0.761	0.840	0.900
15	0.311	0.451	0.596	0.729	0.835	0.910	0.956	0.981
20	0.383	0.553	0.714	0.840	0.923	0.968	0.989	0.996
25	0.448	0.639	0.800	0.907	0.965	0.989	0.997	0.999
30	0.507	0.711	0.861	0.948	0.984	0.996	0.999	1.000
35	0.562	0.769	0.905	0.971	0.993	0.999	1.000	1.000
40	0.611	0.816	0.936	0.984	0.997	0.999	1.000	1.000
45	0.655	0.855	0.957	0.991	0.999	1.000	1.000	1.000
50	0.695	0.886	0.972	0.995	0.999	1.000	1.000	1.000
55	0.731	0.911	0.981	0.997	0.001	1.000	1.000	1.000
60	0.763	0.931	0.988	0.998	0.001	1.000	1.000	1.000

Table 2. Simulation of statistical power as a function of sample size and effect size (f = effect size - SD between groups / SD within groups). □ = 0.10. Analysis by A. Krzysik (unpublished data).

Baseline data for RCW habitat availability will be reported from available forest surveys. Trends in forestry survey data will be evaluated as areas are resurveyed in future years. Changes in survey data will be assessed in the context of habitat management and training loads in surveyed areas during the period between surveys.

Baseline installation monitoring programs to evaluate training effects will incorporate results of related research efforts and installation projects to evaluate effects of military training on sensitive or protected natural resources. The FORSCOM sponsored effort on Fort Polk will provide information from telemetred vehicles and units that can be used to evaluate the relationship of scheduled training events to actual level of unit activity and land use in the field. USACERL research on effects of maneuver training on Fort Stewart will analyze range scheduling data to quantify temporal and spatial variance of training loads. This analysis will also include an assessment of that measures or index of training activity best predict any observed effects on RCW populations or habitats. Both the Fort Polk and Fort Stewart research efforts will provide information on the probability of occurrence and duration of training activities in cluster sites under the 1996 Army guidelines. These results will be useful in determining trends in training loads on installations over time and supplement baseline installation monitoring of training effects.

Simulation modeling is being performed to evaluate sensitivity of RCW populations to potential training effects on different demographic parameters. For example, activities that result in adult turnover may be more detrimental to populations than activities affecting annual reproductive success.

Assessment of RCW population trend data (biologically significant population change over time) is not necessarily a straightforward exercise. Much recent work in avian populations - note the recent literature on analysis of trends in breeding bird survey data (e.g. Sauer et al. 1996[3]) - have attempted to evaluate appropriate methods for determining and defining biologically significant population change. Interpretation and analysis of observed population change must take into account normal environmental and demographic stochasticity, generational life span of the species, and independent factors affecting populations stability such as potential military training effects. The Army guidelines requires analysis of population trends on a five year cycle. Analyses of these population trend data will incorporate state-of-the-art approaches in consultation with the USFWS. Army-wide reporting of standard measures of RCW

[3] Sauer, J.R., G.W. Pendleton, and B.G. Peterjohn. 1996. Evaluating Causes of Population Change in North American Insectivorous Songbirds. Conservation Biology 7:76-86.

population data will provide a unique opportunity to evaluate regional population trends for an endangered species.

1996 "Management Guidelines for the Red-cockaded Woodpecker on Army installations"

APPENDIX 1

Red-Cockaded Woodpecker (RCW) Data Update - FY ___

INSTALLATION: _____ DATE: _____

RCW Population: _____ POC: _____

DSN #:_____

A. RCW Cluster Survey and Inspection Results.

1. Number of clusters managed _____

2. Number of active clusters _____
   a. Number of active supplemental recruitment clusters _____
   b. Number of active clusters with training restrictions _____

3. Total acres of suitable acreage _____

4. Acres 100% surveyed for "new" RCW clusters in this FY _____

5. Number clusters inspected once per year for training impacts _____
   a. Number of clusters checked with damage to cavity trees _____
   b. Number of clusters checked with soil disturbance requiring remedial measures _____
   c. Number of clusters checked with habitat disturbance requiring remedial measures _____

6. Number recruitment clusters inspected twice per year for training impacts _____
   a. Number of clusters checked with damage to cavity trees _____
   b. Number of clusters checked with soil disturbance requiring remedial measures _____
   c. Number of clusters checked with other habitat disturbance requiring remedial measures _____

B. Monitoring Results

	Active	Primary Recruitment	Supplemental Recruitment	Total
1. Number of clusters where monitoring was completed	_____	_____	_____	_____
1a. Number found active	_____	_____	_____	_____
1b. Number of breeding groups	_____	_____	_____	_____
1c. Number of nests found	_____	_____	_____	_____
1d. Number of cavity tress	_____	_____	_____	_____

C. Unit Reports

1. Number of unit reports to range control of tree damage _____
1a. Number of reprovisioning actions taken in response (synopsis enclosed) _____

2. Number of unit reports of extensive soil disturbance _____
2a. Number of remedial actions taken in response (synopsis enclosed) _____

D. Affirmative RCW Habitat Improvement Measures Carried Out This FY

	Active	Primary Recruitment	Supplemental Recruitment	Total
1. Number of clusters sites needing burning this year	_____	_____	_____	_____
1a. Number burned	_____	_____	_____	_____
2. Number of cluster sites needing midstory treatment	_____	_____	_____	_____
2a. Number treated	_____	_____	_____	_____
3. Number of foraging acres needing to be burned _____	_____	_____	_____	
3a. Number acres burned	_____	_____	_____	_____
4. Number of foraging acres needing midstory treatment	_____	_____	_____	_____
4a. Number acres treated	_____	_____	_____	_____
5. Number of cluster sites needing cavity restrictors	_____	_____	_____	_____

D. Affirmative RCW Habitat Improvement Measures Carried Out This FY (Cont'd)

	Active	Primary Recruitment	Supplemental Recruitment	Total
5a. Number clusters receiving restrictors				
5b. Number of cavity trees receiving restrictors				
6. Number of cavity trees needing to be marked				
6a. Number marked				
7. Number of buffer zones needing to be marked			0	
7a. Number marked			0	
8. Number of translocations scheduled				
8a. Number of translocations received				
9. Number of clusters needing artificial cavities				
9a. Number receiving inserts				
9b. Number receiving drilled cavities				
9c. Number receiving drilled starts				
9d. Total number of cavities treated				
9e. Number treated cavities with RCW use				
(1) ocular sign of use				
(2) confirmed roosting				
(3) nesting attempted				
(4) young fledged				

APPENDIX 1a

Recruitment Cluster Inspection, Monitoring & Training Data

Type Recruitment Cluster: _____ Cluster Number:_____
(Primary or Supplemental)

A. Results of inspections and monitoring. Yes/No

Spring inspection and monitoring:

1. Visual, from ground, sign of use _____
2. Cavity inspected confirmed roosting _____
3. Nesting attempted _____
4. Fledged young _____
5. Habitat assessment/general condition:
    5a. Damage to cavity or cavity start tree _____
    5b. Soil disturbance requiring remedial measures _____
    5c. Other habitat disturbance requiring remedial measures _____
6. Number of adults: _____
7. Number of fledglings: _____
8. Sex of birds: _____

Fall inspection:

1. Visual, from ground, sign of use _____
2. Cavity inspected confirmed roosting _____
3. Nesting attempted _____
4. Fledged young _____
5. Habitat assessment/general condition:
    5a. Damage to cavity or cavity start tree _____
    5b. Soil disturbance requiring remedial measures _____
    5c. Other habitat disturbance requiring remedial measures _____

B. Training Data:

Number of Unit Training Events
(Recorded at Range Control/Conducted at Recruitment Cluster location) _____

For each training event:

1. Date of training
2. Approximate duration of training
3. Type of training
4. Training activities (list activities conducted contained in Appendix 1)
5. Approximate number of soldiers involved
6. Approximate number and type of vehicles involved
7. Misc.

APPENDIX 1b

Active Cluster Inspection, & Monitoring Data

Cluster Number: _____

A. Results of inspection and monitoring.	Yes/No
1. Visual, from ground, sign of use	_____
2. Cavity inspected confirmed roosting	_____
3. Nesting attempted	_____
4. Fledged young	_____
5. Habitat assessment/general condition:	
5a. Damage to cavity or cavity start tree	_____
5b. Soil disturbance requiring remedial measures	_____
5c. Other habitat disturbance requiring remedial measures	_____
6. Number of adults: _____	
7. Number of fledglings: _____	
8. Sex of birds: _____	

B. Training Data (if the installation has recruitment clusters):

Number of Unit Training Events
(Recorded at Range Control/Conducted at Recruitment Cluster location) _____

For each training event:

1. Date of training
2. Approximate duration of training
3. Type of training
4. Training activities (list activities conducted contained in Appendix 1)
5. Approximate number of soldiers involved
6. Approximate number and type of vehicles involved
7. Misc.

APPENDIX 2

TONY KRZYSIK'S ANALYSIS GOES HERE

ESMP Appendix J. Training Area Acreages and RCW Carrying Capacity

ESMP Appendix J. Training Area Acreages and RCW Carrying Capacity

ESMP Appendix J. Training Area Acreages and RCW Carrying Capacity

ESMP Appendix K. Random List of Numbers for Addition to 25% Sample of Clusters Monitored for Productivity

69	635	481	143	124	423	270	480	503	397
368	251	460	500	612	590	183	470	346	350
458	568	410	345	275	510	172	485	539	690
417	578	656	348	35	129	188	318	673	512
196	372	58	426	525	459	177	660	204	301
545	664	565	442	630	343	640	225	272	511
341	37	135	553	692	33	683	123	353	236
319	484	296	522	420	610	321	373	41	487
521	98	688	579	205	374	60	418	336	693
283	119	27	606	292	680	160	455	304	464
92	187	7	327	694	334	94	532	360	524
247	490	708	90	392	674	357	63	163	180
715	219	443	286	351	30	253	141	342	454
540	264	466	667	147	198	352	684	297	390
699	363	416	430	661	389	514	29	112	
628	223	702	493	51	419	312	465	290	
56	249	330	113	72	258	623	365	595	
428	651	546	306	633	671	548	148	197	
284	277	461	550	322	298	53	309	165	
448	449	399	20	714	248	294	241	273	
398	100	570	78	339	625	438	403	140	
117	463	586	644	554	544	556	436	337	
325	260	574	632	437	254	636	83	645	
505	580	210	110	89	226	602	531	613	
666	665	375	607	538	551	16	591	705	
530	594	66	10	17	186	488	670	329	
520	394	347	526	388	44	409	349	195	
255	182	354	523	338	121	451	316	259	
472	383	305	562	252	504	557	711	447	
86	142	528	174	299	563	571	707	549	
679	516	266	93	138	39	185	406	19	
618	444	120	206	314	509	588	471	68	
712	713	654	333	43	695	166	362	404	
535	615	619	154	433	308	624	127	65	
686	207	605	477	709	80	675	84	598	
355	73	432	696	494	542	402	244	655	
560	577	462	28	234	209	515	175	201	
61	543	315	155	429	584	300	2	8	
639	677	59	228	642	529	376	483	657	
145	434	332	169	102	386	421	217	220	
582	585	40	492	274	203	561	32	178	
291	622	115	287	71	74	482	647	108	
629	359	473	703	435	441	475	440	446	
536	285	4	21	302	152	235	596	491	
669	125	227	239	423	620	256	331	397	

ESMP Appendix B. Current and Future Status of RCW Clusters

CLUSTER #	TRAINING AREA	HMU	ACTIVE IN FY 2000	INACTIVE < 5 YEARS	INACTIVE ≥ 5 YEARS	FUTURE STATUS	STRATA	Active or Potentially Active in HMU-1	Active or Potentially Active in HMU-2	Active or Potentially Active in HMU-3	Active	Active w/in last 5 years
1	F6	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
2	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
3	B4	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
4	B4	1			X	PRC	LIVEFIRE	0	0	0	0	0
5	C7	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
6	D12	1	X			Natural Cluster	NORMAL	1	0	0	1	0
7	E21	3	X			Natural Cluster	NORMAL	0	0	1	1	0
8	A9	3	X			Natural Cluster	NORMAL	0	0	1	1	0
9	A9	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
10	A18	1	X			Natural Cluster	NORMAL	1	0	0	1	0
11	A12	2			X	SRC	NORMAL	0	0	0	0	0
12	E15	3	X			Natural Cluster	NORMAL	0	0	1	1	0
13	A5	1	X			Natural Cluster	NORMAL	1	0	0	1	0
14	D1	1			X	PRC	NORMAL	0	0	0	0	0
15	D12	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
16	A9	2	X			Natural Cluster	NORMAL	0	1	0	1	0
17	E12	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
18	C3	1	X			Natural Cluster	NORMAL	1	0	0	1	0
19	C2	1	X			Natural Cluster	NORMAL	1	0	0	1	0
20	C2	1	X			Natural Cluster	NORMAL	1	0	0	1	0
21	B20	1	X			Natural Cluster	DUDDED	1	0	0	1	0
22	C7	3	X			Natural Cluster	NORMAL	0	0	1	1	0
23	A18	1	X			Natural Cluster	NORMAL	1	0	0	1	0
24	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
25	B4	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
26	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
27	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
28	B4	1			X	PRC	LIVEFIRE	0	0	0	0	0
29	A5	1			X	PRC	NORMAL	0	0	0	0	0
30	A10	1	X			Natural Cluster	NORMAL	1	0	0	1	0
31	A6	1	X			Natural Cluster	NORMAL	1	0	0	1	0
32	B20	1	X			Natural Cluster	NORMAL	1	0	0	1	0
33	C15	1	X			Natural Cluster	NORMAL	1	0	0	1	0
34	C6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
35	C6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
36	B17	3	X			Natural Cluster	NORMAL	0	0	1	1	0
37	C2	1	X			Natural Cluster	NORMAL	1	0	0	1	0
38	C1	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
39	B13	1	X			Natural Cluster	NORMAL	1	0	0	1	0
40	F4	3			X	SRC	NORMAL	0	0	0	0	0
41	F4	3	X			Natural Cluster	NORMAL	0	0	1	1	0
42	E16	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
43	A18	1	X			Natural Cluster	NORMAL	1	0	0	1	0
44	E12	3	X			Natural Cluster	NORMAL	0	0	1	1	0
45	B14	1	X			Natural Cluster	NORMAL	1	0	0	1	0
46	C5	3	X			Natural Cluster	NORMAL	0	0	1	1	0
47	F16	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
48	F1	2	X			Natural Cluster	NORMAL*	0	1	0	1	0

ESMP Appendix B. Current and Future Status of RCW Clusters

CLUSTER #	TRAINING AREA	HMU	ACTIVE IN FY 2000	INACTIVE < 5 YEARS	INACTIVE ≥ 5 YEARS	FUTURE STATUS	STRATA	Active or Potentially Active in HMU-1	Active or Potentially Active in HMU-2	Active or Potentially Active in HMU-3	Active	Active w/in last 5 years
49	A10	1	X			Natural Cluster	NORMAL	1	0	0	1	0
50	B4	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
51	A18	1	X			Natural Cluster	NORMAL	1	0	0	1	0
52	D5	1		X		Natural Cluster	NORMAL*	1	0	0	0	1
53	A18	1	X			Natural Cluster	NORMAL	1	0	0	1	0
54	B13	1			X	PRC	DUDDED*	0	0	0	0	0
55	B13	1	X			Natural Cluster	DUDDED	1	0	0	1	0
56	B9	2		X		Natural Cluster	NORMAL*	0	1	0	0	1
57	E15	3	X			Natural Cluster	MANEUVER*	0	0	1	1	0
58	D14	1	X			Natural Cluster	NORMAL	1	0	0	1	0
59	E11	3			X	SRC	MANEUVER	0	0	0	0	0
60	E21	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
61	D11	2	X			Natural Cluster	NORMAL*	0	1	0	1	0
62	F3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
63	B14	3			X	SRC	NORMAL	0	0	0	0	0
64	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
65	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
66	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
67	C3	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
68	C3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
69	C1	1			X	PRC	NORMAL*	0	0	0	0	0
70	C1	1	X			Natural Cluster	NORMAL	1	0	0	1	0
71	B17	3	X			Natural Cluster	NORMAL	0	0	1	1	0
72	C3	1	X			Natural Cluster	NORMAL	1	0	0	1	0
73	C4	3	X			Natural Cluster	NORMAL	0	0	1	1	0
74	C4	3	X			Natural Cluster	NORMAL	0	0	1	1	0
75	E8	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
76	C3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
77	D12	1	X			Natural Cluster	NORMAL	1	0	0	1	0
78	C4	3	X			SRC	NORMAL	0	0	1	1	0
79	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
80	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
81	F3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
82	E7	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
83	B9	2	X			Natural Cluster	NORMAL	0	1	0	1	0
84	E8	3	X			Natural Cluster	NORMAL	0	0	1	1	0
85	B20	1	X			Natural Cluster	DUDDED	1	0	0	1	0
86	E10	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
87	F6	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
88	E6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
89	D14	2	X			Natural Cluster	NORMAL	0	1	0	1	0
90	B9	3			X	SRC	NORMAL	0	0	0	0	0
91	C4	3	X			Natural Cluster	NORMAL	0	0	1	1	0
92	C5	3			X	SRC	NORMAL*	0	0	0	0	0
93	B18	3			X	SRC	NORMAL	0	0	0	0	0
94	B18	3			X	SRC	NORMAL	0	0	0	0	0
95	E4	2			X	SRC	NORMAL	0	0	0	0	0
96	C4	3	X			Natural Cluster	NORMAL	0	0	1	1	0

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CLUSTER #	TRAINING AREA	HMU	ACTIVE IN FY 2000	INACTIVE < 5 YEARS	INACTIVE ≥ 5 YEARS	FUTURE STATUS	STRATA	Active or Potentially Active in HMU-1	Active or Potentially Active in HMU-2	Active or Potentially Active in HMU-3	Active	Active w/in last 5 years
97	C5	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
98	C5	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
99	B13	3	X			Natural Cluster	DUDDED*	0	0	1	1	0
100	B13	1	X			Natural Cluster	DUDDED	1	0	0	1	0
101	B12	1	X			Natural Cluster	DUDDED	1	0	0	1	0
102	B13	1		X		Natural Cluster	DUDDED	1	0	0	0	1
103	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
104	B20	1	X			Natural Cluster	DUDDED*	1	0	0	1	0
105	C1	1			X	Natural Cluster	NORMAL*	0	0	0	0	0
106	B4	1		X		Natural Cluster	NORMAL*	1	0	0	0	1
107	F4	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
108	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
109	B4	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
110	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
111	B20	1	X			Natural Cluster	DUDDED*	1	0	0	1	0
112	C3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
113	C7	3	X			Natural Cluster	NORMAL	0	0	1	1	0
114	B4	1			X	PRC	LIVEFIRE*	0	0	0	0	0
115	CNT	1			X	PRC	NORMAL	0	0	0	0	0
116	C6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
117	B4	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
118	E8	3	X			Natural Cluster	MANEUVER*	0	0	1	1	0
119	E11	3			X	SRC	NORMAL	0	0	0	0	0
120	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
121	E16	3	X			Natural Cluster	NORMAL	0	0	1	1	0
122	D15	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
123	A5	1			X	PRC	NORMAL	0	0	0	0	0
124	D7	1	X			Natural Cluster	NORMAL	1	0	0	1	0
125	D5	1	X			Natural Cluster	NORMAL	1	0	0	1	0
126	F6	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
127	A8	1	X			Natural Cluster	NORMAL	1	0	0	1	0
128	C10	1	X			PRC	NORMAL	1	0	0	1	0
129	B17	3	X			Natural Cluster	NORMAL	0	0	1	1	0
130	C7	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
131	D11	1	X			Natural Cluster	NORMAL	1	0	0	1	0
132	E12	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
133	E17	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
134	A5	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
135	C5	3	X			Natural Cluster	DUDDED	0	0	1	1	0
136	F7	3	X			Natural Cluster	NORMAL	0	0	1	1	0
137	E17	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
138	A7	1	X			Natural Cluster	NORMAL	1	0	0	1	0
139	E20	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
140	E18	3			X	SRC	NORMAL	0	0	0	0	0
141	C6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
142	C2	3	X			Natural Cluster	LIVEFIRE	0	0	1	1	0
143	A9	2	X			Natural Cluster	NORMAL	0	1	0	1	0
144	A8	1	X			Natural Cluster	NORMAL*	1	0	0	1	0

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CLUSTER #	TRAINING AREA	HMU	ACTIVE IN FY 2000	INACTIVE < 5 YEARS	INACTIVE ≥ 5 YEARS	FUTURE STATUS	STRATA	Active or Potentially Active in HMU-1	Active or Potentially Active in HMU-2	Active or Potentially Active in HMU-3	Active	Active w/in last 5 years
145	A13	1			X	PRC	NORMAL*	0	0	0	0	0
146	A13	1			X	PRC	NORMAL*	0	0	0	0	0
147	E15	3		X		Natural Cluster	MANEUVER	0	0	1	0	1
148	E15	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
149	E11	3	X			Natural Cluster	NORMAL	0	0	1	1	0
150	F3	3	X			Natural Cluster	NORMAL	0	0	1	1	0
151	E13	3	X			Natural Cluster	MANEUVER	0	0	1	1	0
152	D5	1	X			Natural Cluster	NORMAL	1	0	0	1	0
153	E5	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
154	D7	1	X			Natural Cluster	NORMAL	1	0	0	1	0
155	A6	1			X	PRC	NORMAL	0	0	0	0	0
156	A5	1			X	PRC	NORMAL*	0	0	0	0	0
157	D12	1	X			Natural Cluster	NORMAL	1	0	0	1	0
158	A13	1		X		Natural Cluster	NORMAL	1	0	0	0	1
159	F16	3	X			Natural Cluster	NORMAL	0	0	1	1	0
160	F7	3	X			Natural Cluster	NORMAL	0	0	1	1	0
161	E17	3	X			Natural Cluster	NORMAL	0	0	1	1	0
162	A10	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
163	E13	3	X			Natural Cluster	NORMAL	0	0	1	1	0
164	D8	1		X		Natural Cluster	NORMAL*	1	0	0	0	1
165	A7	1	X			Natural Cluster	NORMAL	1	0	0	1	0
166	A7	1		X		Natural Cluster	NORMAL	1	0	0	0	1
167	F8	3	X			Natural Cluster	NORMAL	0	0	1	1	0
168	D12	1		X		Natural Cluster	NORMAL	1	0	0	0	1
169	B5	2		X		Natural Cluster	NORMAL	0	1	0	0	1
170	B13	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
171	D14	1	X			Natural Cluster	NORMAL	1	0	0	1	0
172	F2	3	X			Natural Cluster	NORMAL	0	0	1	1	0
173	D7	1	X			Natural Cluster	NORMAL	1	0	0	1	0
174	D14	2	X			Natural Cluster	NORMAL	0	1	0	1	0
175	C3	1	X			Natural Cluster	NORMAL	1	0	0	1	0
176	E14	3	X			Natural Cluster	NORMAL	0	0	1	1	0
177	F20	2	X			Natural Cluster	NORMAL	0	1	0	1	0
178	E5	3			X	SRC	NORMAL	0	0	0	0	0
179	B17	1	X			Natural Cluster	NORMAL	1	0	0	1	0
180	B15	1			X	PRC	NORMAL	0	0	0	0	0
181	B13	1			X	PRC	NORMAL	0	0	0	0	0
182	E17	3		X		Natural Cluster	NORMAL	0	0	1	0	1
183	E5	3	X			Natural Cluster	NORMAL	0	0	1	1	0
184	F3	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
185	C9	1	X			Natural Cluster	NORMAL	1	0	0	1	0
186	A10	1		X		Natural Cluster	NORMAL	1	0	0	0	1
187	A13	1	X			Natural Cluster	NORMAL	1	0	0	1	0
188	A13	1	X			Natural Cluster	NORMAL	1	0	0	1	0
189	E12	3	X			Natural Cluster	NORMAL	0	0	1	1	0
190	E8	3			X	SRC	NORMAL*	0	0	0	0	0
191	E22	3			X	SRC	NORMAL	0	0	0	0	0
192	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0

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193	F5	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
194	B21	1	X			Natural Cluster	NORMAL*	1	0	0	1	0
195	B24	2			X	SRC	NORMAL	0	0	0	0	0
196	E20	3	X			Natural Cluster	MANEUVER*	0	0	1	1	0
197	E19	3	X			Natural Cluster	NORMAL	0	0	1	1	0
198	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
199	F18	2			X	SRC	NORMAL*	0	0	0	0	0
200	F18	2			X	SRC	NORMAL	0	0	0	0	0
201	E10	3	X			Natural Cluster	NORMAL	0	0	1	1	0
202	C2	3	X			Natural Cluster	NORMAL	0	0	1	1	0
203	E6	3		X		Natural Cluster	NORMAL	0	0	1	0	1
204	A4	1			X	PRC	NORMAL	0	0	0	0	0
205	E13	3	X			Natural Cluster	NORMAL	0	0	1	1	0
206	E13	3	X			Natural Cluster	NORMAL	0	0	1	1	0
207	E13	3	X			Natural Cluster	NORMAL	0	0	1	1	0
208	B7	2	X			Natural Cluster	NORMAL	0	1	0	1	0
209	B4	1	X			Natural Cluster	NORMAL	1	0	0	1	0
210	A9	2	X			Natural Cluster	NORMAL	0	1	0	1	0
211	D5	1	X			PRC	NORMAL	1	0	0	1	0
212	C6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
213	D12	2	X			Natural Cluster	NORMAL*	0	1	0	1	0
214	D7	1			X	PRC	NORMAL	0	0	0	0	0
215	A18	1			X	SRC	NORMAL	0	0	0	0	0
216	E9	3	X			Natural Cluster	NORMAL	0	0	1	1	0
217	F6	3			X	SRC	NORMAL	0	0	0	0	0
218	F4	3	X			Natural Cluster	NORMAL	0	0	1	1	0
219	C12	1			X	PRC	NORMAL	0	0	0	0	0
220	C10	1			X	PRC	NORMAL	0	0	0	0	0
221	E17	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
222	F7	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
223	F7	3			X	SRC	NORMAL	0	0	0	0	0
224	E11	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
225	HAAF	1			X	PRC @ Ft. Stewart	NORMAL	0	0	0	0	0
226	E16	3			X	SRC	NORMAL	0	0	0	0	0
227	E11	3	X			Natural Cluster	NORMAL	0	0	1	1	0
228	E10	3	X			Natural Cluster	NORMAL	0	0	1	1	0
229	B20	1	X			PRC	NORMAL*	1	0	0	1	0
230	B13	1		X		Natural Cluster	NORMAL	1	0	0	0	1
231	F20	2			X	SRC	NORMAL*	0	0	0	0	0
232	E17	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
233	C5	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
234	D7	1		X		Natural Cluster	NORMAL	1	0	0	0	1
235	F7	3	X			Natural Cluster	NORMAL	0	0	1	1	0
236	F19	2			X	SRC	NORMAL	0	0	0	0	0
237	A9	2		X		Natural Cluster	NORMAL*	0	1	0	0	1
238	E13	3	X			Natural Cluster	NORMAL*	0	0	1	1	0
239	F1	2			X	SRC	NORMAL	0	0	0	0	0
240	C11	1			X	PRC	NORMAL*	0	0	0	0	0

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CLUSTER #	TRAINING AREA	HMU	ACTIVE IN FY 2000	INACTIVE < 5 YEARS	INACTIVE ≥ 5 YEARS	FUTURE STATUS	STRATA	Active or Potentially Active in HMU-1	Active or Potentially Active in HMU-2	Active or Potentially Active in HMU-3	Active	Active w/in last 5 years
241	E7	3		X		Natural Cluster	MANEUVER	0	0	1	0	1
242	C9	1		X		PRC	NORMAL*	1	0	0	0	1
243	C9	1			X	PRC	NORMAL	0	0	0	0	0
244	C9	1			X	PRC	NORMAL	0	0	0	0	0
245	C9	1			X	PRC	NORMAL*	0	0	0	0	0
246	B4	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
247	D7	1	X			Natural Cluster	LIVEFIRE*	1	0	0	1	0
248	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
249	A17	2			X	SRC	NORMAL	0	0	0	0	0
250	C1	1			X	PRC	NORMAL	0	0	0	0	0
251	A4	1			X	PRC	NORMAL	0	0	0	0	0
252	D7	1	X			PRC	LIVEFIRE	1	0	0	1	0
253	B4	1	X			Natural Cluster	LIVEFIRE	1	0	0	1	0
254	D12	2	X			Natural Cluster	LIVEFIRE	0	1	0	1	0
255	C8	1			X	PRC	NORMAL*	0	0	0	0	0
256	C1	1			X	PRC	NORMAL	0	0	0	0	0
257	D15	1		X		PRC	NORMAL	1	0	0	0	1
258	E12	3	X			SRC	MANEUVER	0	0	1	1	0
259	B14	1	X			PRC	DUDDED	1	0	0	1	0
260	D14	1	X			PRC	NORMAL	1	0	0	1	0
261	D13	1			X	PRC	NORMAL	0	0	0	0	0
262	C5	3	X			PRC	NORMAL	0	0	1	1	0
263	D10	1	X			PRC	NORMAL	1	0	0	1	0
264	D15	1	X			PRC	NORMAL	1	0	0	1	0
265	A11	1			X	PRC	NORMAL	0	0	0	0	0
266	D13	1	X			PRC	NORMAL	1	0	0	1	0
267	B12	1	X			PRC	DUDDED	1	0	0	1	0
268	B4	1	X			PRC	LIVE FIRE	1	0	0	1	0
269	B14	1	X			PRC	DUDDED	1	0	0	1	0
270	A11	1	X			PRC	NORMAL	1	0	0	1	0
271	E15	3	X			Natural Cluster	NORMAL	0	0	1	1	0
272	B21	1			X	PRC	NORMAL	0	0	0	0	0
273	D12	2			X	PRC	NORMAL	0	0	0	0	0
274	DTCMA	2			X	SRC	NORMAL	0	0	0	0	0
275	B20	1			X	PRC	NORMAL	0	0	0	0	0
276	D6	1			X	PRC	NORMAL	0	0	0	0	0
277	A6	1	X			PRC	NORMAL	1	0	0	1	0
278	C11	1	X			PRC	NORMAL	1	0	0	1	0
279	C10	1		X		PRC	NORMAL	1	0	0	0	1
280	B15	1			X	PRC	NORMAL	0	0	0	0	0
281	B13	1			X	PRC	DUDDED	0	0	0	0	0
282	B14	1			X	PRC	DUDDED	0	0	0	0	0
283	B13	1			X	PRC	DUDDED	0	0	0	0	0
284	B13	1	X			PRC	NORMAL	1	0	0	1	0
285	A6	1			X	PRC	NORMAL	0	0	0	0	0
286	D15	1	X			PRC	NORMAL	1	0	0	1	0
287	D13	1	X			PRC	NORMAL	1	0	0	1	0
288	A11	1			X	PRC	NORMAL	0	0	0	0	0

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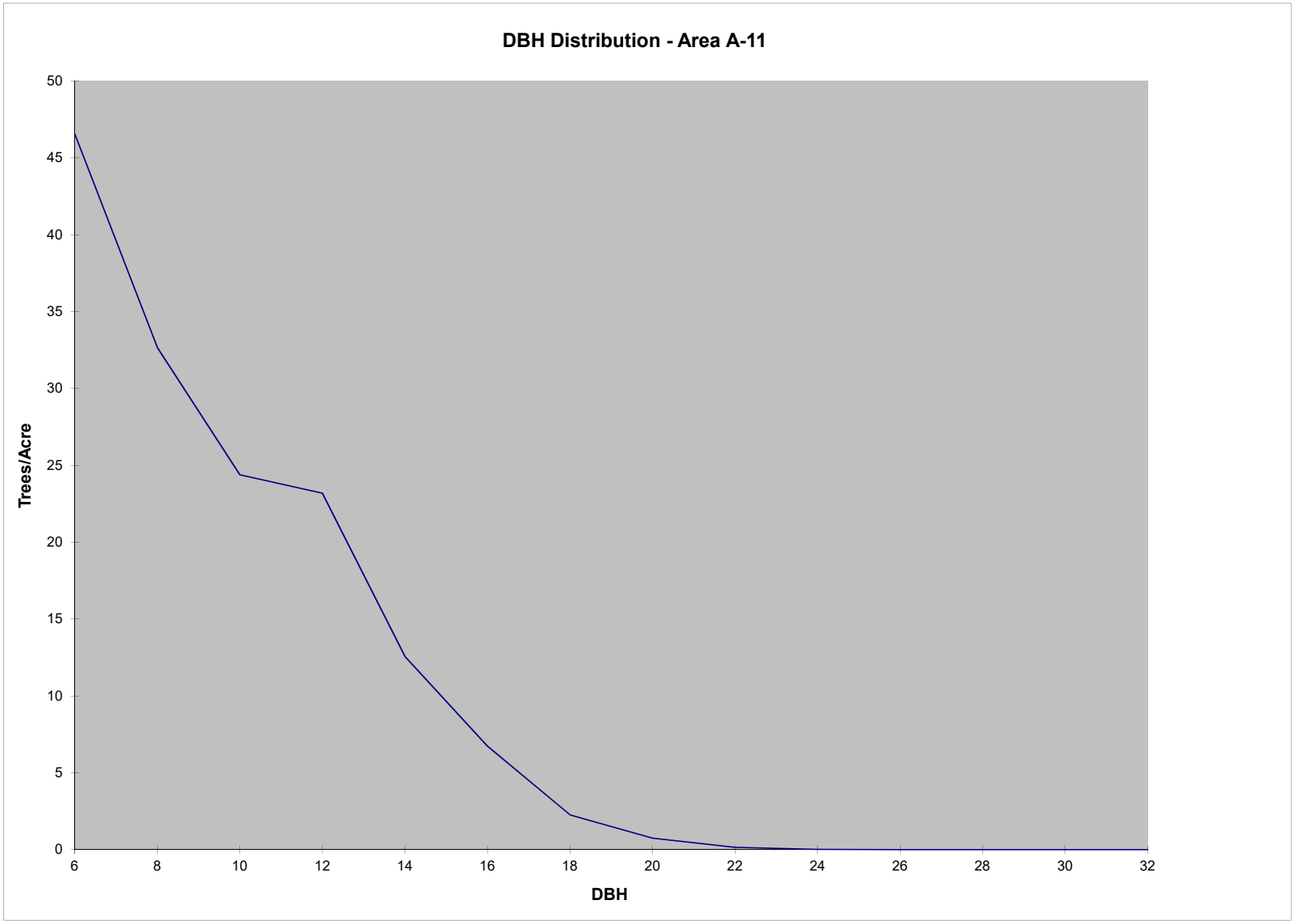
289	B20	1	X			PRC	NORMAL	1	0	0	1	0
290	A6	1			X	PRC	NORMAL	0	0	0	0	0
291	C9	1	X			PRC	NORMAL	1	0	0	1	0
292	B20	1	X			PRC	DUDDED	1	0	0	1	0
293	B13	1	X			PRC	DUDDED	1	0	0	1	0
294	E14	3	X			Natural Cluster	NORMAL	0	0	1	1	0
295	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
296	F6	3	X			Natural Cluster	NORMAL	0	0	1	1	0
297	D7	1			X	PRC	NORMAL	0	0	0	0	0
298	B13	1			X	PRC	NORMAL	0	0	0	0	0
299	D13	1			X	PRC	NORMAL	0	0	0	0	0
300	D8	1	X			PRC	NORMAL	1	0	0	1	0
301	A7	1	X			PRC	NORMAL	1	0	0	1	0
302	A8	1			X	PRC	NORMAL	0	0	0	0	0
303	C2	1	X			PRC	NORMAL	1	0	0	1	0
304	B21	1			X	PRC	NORMAL	0	0	0	0	0
305	B4	1	X			PRC	NORMAL	1	0	0	1	0
Total			212	20	73			113	15	103	212	20
										Does NOT includes		
										231		232

DBH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	Avg. DBH
TREES/ACRE	47	33	24	23	13	7	2	1	0	0	0	0	0	0	9.4



Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
A1	2600	859	176	157	1409	0	0	7.0		7
A2	1738	744	0	99	874	20	0	4.5		4
A3	1518	686	6	83	723	20	0	3.7		4
A4	1073	271	4	80	718	0	0	3.6	3	1
A5	1289	379	1	91	818	0	0	4.1	4	0
A6	1430	283	12	114	1022	0	0	5.1	5	0
A7	1155	422	0	73	659	0	0	3.3	3	0
A8	601	104	1	50	439	8	0	2.2	2	0
A9	1479	205	3	127	9	1134	0	5.7	5	1
A10	917	119	0	80	689	30	0	3.6	5	-1
A11	1235	336	0	90	799	10	0	4.0	3	1
A12	1696	426	156	111	11	992	0	5.0	1	4
A13	1512	453	3	106	948	2	0	4.7	5	0
A14	2510	1229	32	125	898	226	0	5.6		6
A15	326	70	18	24	17	198	0	1.1		1
A16	2825	1282	117	143	836	448	0	6.4		6
A17	349	16	6	33	10	285	0	1.5	1	0
A18	1823	209	249	136	964	264	0	6.1	6	0
A19	449	7	328	11	102	1	0	0.5		1
A20	475	0	469	1	5	0	0	0.0		0

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
B1	2954	1505	60	139	847	404	0	6.3		6
B2	724	251	124	35	18	296	0	1.6		2
B3	1267	402	155	71	176	70	393	3.2		3
B4	6140	1448	569	412	3684	27	0	18.6	24	-5
B5	1072	272	138	66	27	569	0	3.0	1	2
B6	672	279	1	39	350	3	0	1.8		2
B7	1283	462	15	81	60	665	0	3.6	1	3
B8	1727	641	85	100	48	852	1	4.5		5
B9	4977	1447	766	276	0	955	1532	12.4	3	9
B10	3750	633	1606	151	0	5	1354	6.8		7
B11	2908	843	501	156	0	0	1408	7.0		7
B12	4186	2027	501	166	683	2	807	7.5	2	5
B13	4561	2161	6	239	1918	0	236	10.8	13	-2
B14	3162	809	7	235	1803	0	308	10.6	5	6
B15	2258	789	1	147	1304	1	17	6.6	2	5
B16	1327	860	4	46	411	6	0	2.1		2
B17	2272	475	934	86	431	0	346	3.9	4	0
B18	2844	805	1345	69	1	0	623	3.1		3
B19	4086	1461	213	241	0	0	2171	10.9		11
B20	3023	523	282	222	1970	0	27	10.0	9	1
B21	1342	357	2	98	884	0	0	4.4	2	2
B22	2668	1062	97	151	348	0	1010	6.8		7
B23	2314	1516	23	78	698	0	0	3.5		3
B24	2432	942	0	149	302	1039	0	6.7	1	6

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
C1	4640	1619	37	298	2679	0	6	13.4	7	6
C2	1482	440	14	103	662	0	263	4.6	5	0
C3	1343	215	474	65	265	0	324	2.9	6	-3
C4	3162	1466	371	133	0	0	1193	6.0	5	1
C5	2333	558	266	151	164	0	1194	6.8	8	-1
C6	1343	502	143	70	0	0	629	3.1	4	-1
C7	2841	648	160	203	0	0	1829	9.1	4	5
C8	2596	1188	5	140	1240	0	23	6.3	1	5
C9	3669	1201	287	218	1797	165	1	9.8	6	4
C10	1797	650	4	114	938	54	36	5.1	3	2
C11	2747	741	1	200	1799	5	0	9.0	2	7
C12	1724	813	5	91	597	0	218	4.1	1	3
C13	1584	528	3	105	948	0	0	4.7		5
C14	2802	809	150	184	1657	1	0	8.3		8
C15	3391	438	98	286	2281	290	0	12.9	1	12
C16	2151	1280	11	86	714	60	0	3.9		4
C17	3379	1607	10	176	1580	4	0	7.9		8
C18	2630	1250	14	137	1222	6	0	6.1		6

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
D1	1922	348	1019	56	500	0	0	2.5	1	1
D2	324	0	324	0	0	0	0	0.0		0
D3	2042	29	1922	9	82	0	0	0.4		0
D4	808	126	542	14	121	5	0	0.6		1
D5	4987	1850	212	293	2632	0	0	13.2	4	9
D6	1541	524	22	99	890	5	0	4.5	1	3
D7	2451	743	63	165	1474	7	0	7.4	7	0
D8	814	216	5	59	403	131	0	2.7	1	2
D9	2209	948	1	126	1135	0	0	5.7		6
D10	1208	490	5	71	614	27	0	3.2	1	2
D11	1192	281	6	90	280	534	0	4.1	2	2
D12	1413	185	78	115	629	384	23	5.2	8	-3
D13	2044	906	7	113	852	160	6	5.1	3	2
D14	1215	209	8	100	784	114	0	4.5	5	-1
D15	2757	827	6	192	1408	317	6	8.7	4	5
D16	907	130	1	78	90	595	13	3.5		3

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
E1	1358	292	95	97	0	873	0	4.4		4
E2	1408	307	165	94	12	830	0	4.2		4
E3	3641	1044	451	215	36	1872	23	9.7		10
E4	2587	858	209	152	0	1367	0	6.8	1	6
E5	1781	618	14	115	0	3	1031	5.2	3	2
E6	3805	1405	53	235	0	2	2111	10.6	2	9
E7	4148	2156	473	152	1	0	1366	6.8	2	5
E8	2760	1021	29	171	0	0	1539	7.7	4	4
E9	1892	806	58	103	0	0	926	4.6		5
E10	1980	601	117	126	0	0	1135	5.7	3	3
E11	4539	1027	1021	249	0	0	2242	11.2	5	6
E12	1814	303	66	145	13	0	1289	6.5	5	2
E13	3184	1063	61	206	28	0	1825	9.3	6	3
E14	1245	508	5	73	0	0	659	3.3	2	1
E15	1632	455	5	117	0	0	1055	5.3	5	0
E16	1848	592	162	109	0	0	985	4.9	3	2
E17	1797	200	822	77	0	0	697	3.5	6	-3
E18	2791	457	797	154	0	0	1383	6.9	1	6
E19	2998	484	1492	102	0	0	921	4.6	1	4
E20	1044	147	47	85	0	0	765	3.8	2	2
E21	1876	362	207	131	0	0	1177	5.9	2	4
E22	1592	432	154	101	0	0	905	4.5	1	4

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
F1	2305	743	0	156	0	1405	0	7.0	2	5
F2	1562	427	0	114	0	376	645	5.1	1	4
F3	2313	280	22	201	0	0	1809	9.0	5	4
F4	1692	322	4	137	0	0	1229	6.1	4	2
F5	2119	967	14	114	0	0	1024	5.1	1	4
F6	4829	923	67	384	0	6	3449	17.3	11	6
F7	3177	756	115	231	0	0	2075	10.4	5	5
F8	2128	463	131	153	0	0	1381	6.9	1	6
F9	3948	626	768	255	0	0	2299	11.5		11
F10	1569	283	153	113	0	0	1020	5.1		5
F11	1210	199	32	98	0	0	881	4.4		4
F12	2433	994	5	143	0	630	660	6.4		6
F13	800	267	0	53	0	480	0	2.4		2
F14	1765	601	29	113	0	1021	0	5.1		5
F15	2995	838	52	211	0	1487	408	9.5		9
F16	2473	567	124	178	0	1074	530	8.0	2	6
F17	1434	223	40	117	0	4	1051	5.3		5
F18	1186	576	1	61	0	465	83	2.7	2	1
F19	2355	1011	9	134	0	1202	0	6.0	1	5
F20	3003	933	176	189	5	1699	0	8.5	2	7

Training Area	Total Acres	Forested Wetland Acres	Non-forest Acres	Hardwood Acres	HMU-1 Acres	HMU-2 Acres	HMU-3 Acres	RCW Carrying Capacity	Current Clusters	Number of Recruitment Clusters to be Established
AIA	12209	687	10741	78	0	0	703	3.5		4
CNT	3392	0	3382	1	9	0	0	0.0	1	-1
EOD	897	330	65	50	444	0	8	2.3		2
HAAF	0							0.0	1	-1
DTCMA	434	78	36	32	0	280	7	1.4	1	0
AWAAF	739	85	490	16	148	0	0	0.7		1
TOTAL	279079	82148	38253	15868	59046	26475	57289	714.1	294	420

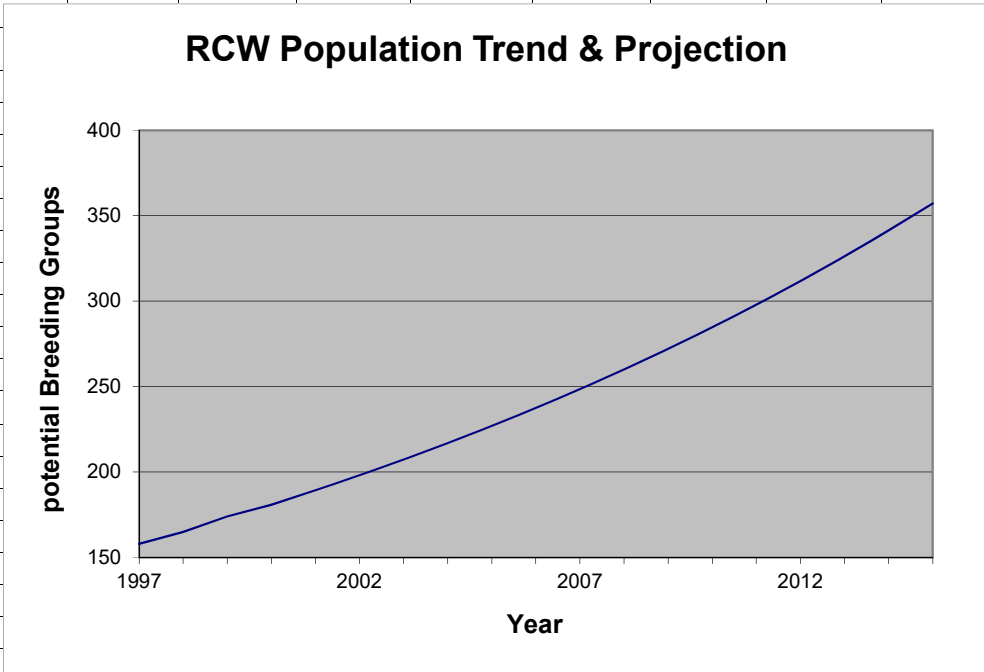
	Total	HMU-1 Training Mission Compatible Land - Suitable for PRCs	HMU-2 Primary Training Lands: Suitable for SRCs, with forage resources maintained at or above normal standards	HMU-3 Primary Training Lands: Suitable for SRCs, but forage resources may be reduced below normal standards.
Suitable / Potential RCW Habitat Acres	136929	58611	25617	52701
Upland Hardwood Management Acres	15214	6512	2846	5856
Wetland Acres (forested)	78400	39922	11611	26867
Non-Forest Acres	48538	11769	3104	33665
Total Acres	279081	116814	43178	119089
Active & Potentially Active Clusters *	231	113	15	103
Recruitment Sites Needed	454	180	113	161
RCW Carrying Capacity	685	293.1	128	264
Mission Compatible Goal (MCG) *	**411**			

RCW Population Trends and Projections

Year	# Active Clusters (Actual count)	# Active Sample Clusters	# Nests (Actual count)	# Potential Breeding Groups (Actual count)	Proportion of Active Clusters w/Nests	# Sample Clusters w/Nests	# Sample Clusters with Successful Nests	Proportion of Nests Successful (Sample Clusters)	Proportion of Active Clusters with a Potential Breeding Group	% Change in # Nests	% Change in # Active Clusters	% Change in # Potential Breeding Groups
1994	157	No Data	100	No Data	0.637	No Data	No Data	No Data	No Data	No Data	No Data	No Data
1995	166	43	110	No Data	0.663	33	25	0.758	No Data	10.00%	5.73%	No Data
1996	166	42	123	No Data	0.741	34	32	0.941	No Data	11.82%	0.00%	No Data
1997	175	43	133	158	0.760	36	28	0.778	0.903	8.13%	5.42%	No Data
1998	189	42	141	165	0.746	36	30	0.833	0.873	6.02%	8.00%	4.43%
1999	198	49	165	174	0.833	44	37	0.841	0.879	17.02%	4.76%	5.45%
2000	213	51	170	181	0.798	40	34	0.850	0.850	3.03%	7.58%	4.02%
					0.735			0.833	0.876	9.34%	5.25%	4.64%
					Avg.			Avg.	Avg.	Avg.	Avg.	Avg.

# Active Clusters Required		**Proportion of Active Clusters with a Potential Breeding Group**		**Number of Potential Breeding Groups Required for Recovery**
399	**x**	**0.876**	**=**	**350**

Year	**# Potential Breeding Groups**	
1997	158	
1998	165	
1999	174	
2000	181	
2001	189	*
2002	198	*
2003	207	*
2004	217	*
2005	227	*
2006	238	*
2007	249	*
2008	260	*
2009	272	*
2010	285	*
2011	298	*
2012	312	*
2013	326	*
2014	341	*
2015	357	*



* - Number of potential pairs projected based on average annual increase in previous years

Flatwoods Salamander Sites on Fort Stewart						
Site Code #	Description	Observation Dates				Monitoring Protocol
A4.1-01	crossing hwy.	1975(A)				opportunistically
A4.2-01	cypress pond	1995(L)	1996(A)	1997(A)		biennial
A6.4-01	roadside ditch	1994(L)				opportunistically
A6.4-02	gum pond	1994(L)				annual
A6.4-03	gum pond	1994(L)				biennial
A6.4-04	cypress pond	1993(A)	1994(L)	1997(A,L)		annual
A6.4-05	cypress depression	1994(L)	1995(L)	1996(A)		biennial
A7.2-01	borrow pit	1994(L)				opportunistically
A10.2-01	cypress pond	1994(L)	1997(A,L)			annual*
A10.2-02	cypress pond	1994(L)				annual
A10.2-03	borrow pit	1994(L)	1994(A)			opportunistically
A18.1-01	crossing hwy.	1975(A)				opportunistically
B4.10-01	cypress pond	1975(A)				biennial
B19.4-01	cypress pond / flooded road	1994(L)	1997(L)			annual
B20.2-01	cypress pond	1994(L)				annual
B20.3-01	roadside ditch	1994(L)				opportunistically
D12.1-01	crossing road	1979(A)				opportunistically
E1.3-01	crossing road	1977(A)				opportunistically
E3.2-01	crossing road	1976(A)				opportunistically
E10.1-01	cypress pond	1994(L)				biennial
E10.1-02	cypress pond	1994(L)				annual
E11.2-01	cypress pond	1994(L)	1997(L)			biennial
E11.2-02	cypress pond	1994(L)	1997(L)			annual
E11.5-01	cypress pond	1978(A)				biennial
F6.3-01	cypress pond	1992(A)				annual
F7.2-01	cypress pond	1994(L)				annual
F7.2-02	cypress pond	1994(L)				biennial
F7.4-01	cypress pond	1995(L)				biennial
F9.5-01	gum pond	1978(L)				biennial
F9.5-02	cypress pond	1978(A)				biennial
A=flatwoods salamander adult(s) observed						
L=flatwoods salamander larva(e) observed						
N/A=suitable flatwoods habitat not present at this site						
* Site currently monitored by GSU						

Position Title	Position Type	Required Staffing	Existing Staffing	
			DAC	Contract / ORISE
Supervisory Wildlife Biologist	DAC	1	1	
Wildlife Biologist	DAC	5	5	
Wildlife Technician	DAC	6	6	
Botanist	DAC	1	1	1
Herpetologist	DAC	1	1	1
GIS Operator	Contract	1		1
ORISE Intern	Contract	2		1
TOTAL		**17**	**14**	**4**

TAB B

Endangered Species Management Plan

for the

Shortnose Sturgeon
(*Acipenser brevirostrum*)

FORT STEWART, GEORGIA

prepared by

Georgia Cooperative Fish and Wildlife Research Unit
D.B. Warnell School of Forest Resources
University of Georgia
Athens, Georgia

2001-2005

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Acronyms/Abbreviations

AR	Army Regulations
DA	Department of the Army
ECO	Environmental Compliance Officer
ESA	Endangered Species Act of 1973
ESMP	Endangered Species Management Plan
FL	fork length
FWS	U.S. Fish Wildlife Service
gal	gallons
h	hour
HQDA	Headquarters, Department of the Army
kg	kilogram
lx	lux
mm	millimeter
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
SNS	Shortnose Sturgeon
YOY	Young of the Year

EXECUTIVE SUMMARY

Background

Army regulations (AR 200-3) require the preparation of Endangered Species Management Plans for listed and proposed threatened and endangered species, and critical habitat present on Army installations. All Army land and water uses are subject to these regulations. Compliance with Chapter 11 of AR 200-3 involves coordination with other Federal agencies responsible for the protection of these species. Implementation of this plan will advance the conservation, protection, and enhancement of the shortnose sturgeon within the Ogeechee River basin and assure installation compliance with the Endangered Species Act of 1973 (ESA), consistent with the requirements of the military mission.

Consultation

In accordance with Section 7 of the Endangered Species Act (ESA), Fort Stewart entered into informal consultation with the National Marine Fisheries Service (NMFS) regarding possible impacts to several protected marine species on 18 February 1992. Of the six species considered, the only significant concern to NMFS was the endangered shortnose sturgeon (SNS). This species historically has been collected in the lower Ogeechee River but little more was known about the abundance and distribution of the species within the river system. Potential impacts to the SNS from military activities on Fort Stewart were examined because Fort Stewart borders the Ogeechee River and its tributary, the Canoochee River, flows across the installation.. The installation concluded that the mission activities were not likely to adversely affect this species. However, NMFS requested additional information on the distribution and abundance of

the SNS before agreeing with the installation's assessment. Consequently, a study of this species was considered necessary to more accurately assess the potential for impact upon the fish. In 1991, the installation entered into a cooperative agreement with The Nature Conservancy (TNC) to conduct a post-wide endangered species inventory. TNC then contracted with the Georgia Department of Natural Resources (DNR) to carry out the SNS study. and the installation contracted with the Georgia Cooperative Fish and Wildlife Research Unit to analyze the data and prepare an Endangered Species Management Plan (ESMP). On 22 January 1996, the NMFS concurred that the mission of the 3rd Infantry Division and Fort Stewart was not likely to adversely affect the shortnose sturgeon and informal consultation was subsequently concluded.

Current Species Status

Shortnose sturgeon (SNS), *Acipenser brevirostrum,* are listed as endangered by the National Marine Fisheries Service (NMFS) along the fish's entire east coast range. An estimated 300 SNS inhabit the Ogeechee River, but none are known to inhabit the Canoochee River. Recent studies show a size distribution skewed toward older juveniles and adults. This finding may indicate compromised nursery function, spawning success, or both. SNS are vulnerable to several threats, including decreased water quality, loss of adequate habitat by sedimentation, and lack of summer thermal refuges.

Habitat Requirements and Limiting Factors

SNS prefer summer refuges in deep holes (> 4.5 m) in summer when water temperatures are >27.0 C. These deep holes are believed to be the sites of cool water springs. SNS also prefer upriver channels with sand or gravel substrates and fast flowing currents for adequate spawning.

In the Ogeechee River, SNS have been located upstream to rkm 86.0 (approximately eight kilometers upstream of the installation's northern boundary). Although regions upriver of rkm 86.0 contain sufficient spawning and overwintering habitats, SNS have not been found there. Habitat degradation by eutrophication of the river, reduction or absence of thermal refuges, and/or bycatch mortalities in the shad fishery are the three most likely limiting factors in the Ogeechee River. The Canoochee River is too shallow to provide suitable summer thermal refuges, but may be deep enough to allow the fish passage on spawning migrations during fall and winter. Further, any decrease in water quality including elevated levels of phosphates and nitrates (i.e., eutrophication), depressed dissolved oxygen (DO) levels, possibly toxic levels of metals (i.e., copper, lead, and mercury), and increases in fecal coliform bacteria may act as limiting factors in the Ogeechee River basin, where SNS occur.

Management Objectives

The objectives of this plan are to protect the SNS and its habitat and enhance, where possible, the existing populations (i.e., numbers of individuals, age classes represented, and reproductive success) in the Ogeechee River system, in support of the range-wide recovery efforts for this species.

Conservation Goals

The conservation goals of this plan are to: 1) embrace and implement conservation strategies on the installation that support the overall recognized efforts to reduce impacts on the existing SNS population in the Ogeechee River system, and 2) support efforts to increase population levels that would accelerate de-listing the SNS. Achieving these goals is dependent

on acquiring new knowledge about SNS life history. These data include life history aspects such as lifespan, age at maturation and spawning periodicity, and habitat requirements at each life stage. Further, protection of the existing population (e.g., reducing bycatch mortality) and preserving the remaining habitat also are critical to achieving the goal of conserving SNS in the Ogeechee River system.

Actions Needed

Major steps needed to satisfy the management objectives and achieve conservation goals outlined in this plan are:

1) A multiple year survey of SNS in the Ogeechee River system to more accurately estimate abundance and population trends. Such a survey would allow for better estimates of the numbers of SNS in the system over years with varying temperatures and different physicochemical conditions. Further, these data would help determine how size class structure changes through time, and allow the estimation of annual growth and mortality.

2) An appropriately timed radiotelemetry survey of SNS in the Ogeechee and Canoochee rivers to establish habitat use, year-round monitoring of movements and behavior, with emphasis on spawning migrations.

3) Establish a program that adequately monitors water quality in the Canoochee River at stations that represent available habitat types along the river. At a minimum, monitoring stations should be located above and below point source discharges on the installation, and

should include at least the following variables: phosphorus, nitrites, nitrates, coliform bacteria, dissolved oxygen, pH, and temperature.

4) Establish a program that monitors the biological integrity of the Canoochee River to provide an indicator of river health as it relates to the SNS. Indicators include the make up, distribution, and abundance of fish populations in the river. Numerous fish species reflect water quality changes and habitat alterations.

Total estimated cost of conservation efforts - Projected costs for the first five years of this plan, by project and year, are given in Table 1.

Table 1. Summary of estimated total costs to implement studies recommended in this ESMP.

Projects	**Year**					
	1	**2**	**3**	**4**	**5**	**Total**
Abundance and Status **Only**	$ 61,700	$ 0	$ 67,870	$ 0	$ 74,600	$204,170
Telemetry **Only** (Worst Case Scenario)[1]	$ 93,800	$ 0	$103,100	$ 0	$113,500	$310,400
Telemetry **Only** (Best Case Scenario)[2]	$ 93,800	$ 0	$ 0	$ 0	$ 0	$ 93,800
Abundance, Status, & Telemetry **Combined** (Worst Case Scenario)[1]	$100,900	$ 0	$111,000	$ 0	$122,200	$334,100
Abundance, Status, & Telemetry **Combined** (Best Case Scenario)[2]	$100,900	$ 0	$ 67,870	$ 0	$ 74,600	$243,370
Biological Integrity & Water Quality Monitoring	$ 25,000	$ 50,000	$ 25,000	$ 50,000	$ 25,000	$ 175,000

[1] Estimates are projected out for 3 years of biotelemetry under a worst case scenario if river conditions and /or SNS spawning behavior warrant multiple year monitoring.

[2] Estimates in projected out for 3 years of biotelemetry under a best case scenario if river conditions and /or SNS spawning behavior warrant a single year of monitoring

1.0 INTRODUCTION (AR 200-3:11-5; SNS Recovery Plan)

The purposes of this Endangered Species Management Plan (ESMP) are to: (1) present information on the shortnose sturgeon (SNS), a federally-listed endangered species present in the Ogeechee River, and possibly in the Canoochee River at Fort Stewart; (2) discuss direct and indirect threats facing SNS; (3) define conservation goals for SNS in the Ogeechee River system; and (4) outline a plan for management of the species and its habitat that will enable achievement of conservation goals. These purposes are consistent with the National Marine Fisheries Service (NMFS) draft SNS Recovery Plan. This plan also discusses the potential effects of proposed conservation efforts on other U.S. Army installation activities.

2.0 SPECIES INFORMATION (AR 200-3; 11-5;)

This section provides a description of SNS, including distribution, habitat and ecosystem, life history, reasons for listing SNS as an endangered species, and conservation measures taken by various agencies or organizations.

Nomenclature/Range/Taxonomy - Shortnose sturgeon, *Acipenser brevirostrum*, belong to the family Acipenseridae, which is among the most primitive of the bony fishes (Order-Acipenseriformes, Subclass Chondrostei, Class-Actinopterygii) (LeSueur 1818) (Figure 1). SNS have several common names, including little sturgeon, pinkster, roundnoser, bottlenose, mammose, salmon sturgeon, soft-shelled, and lake sturgeon (Dadswell et al. 1984).

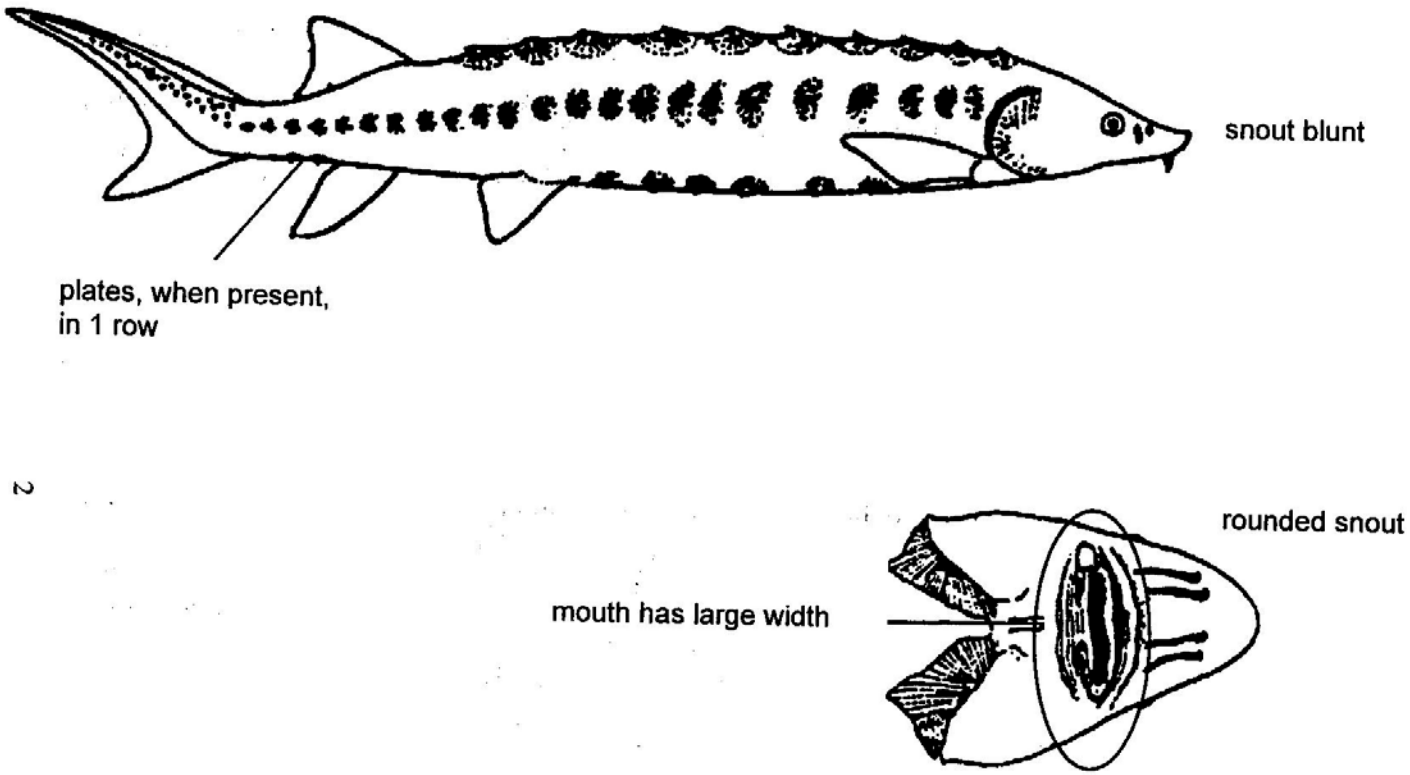

Figure 1. Illustration of shortnose sturgeon, *Acipenser brevirostrum*, (lateral view), and a ventral view of the head region that shows the mouth and barbels.

SNS are restricted to the east coast of North America (Vladykov and Greeley 1963) and have been recorded from the Saint John River, New Brunswick, Canada (Leim and Day 1959) to the Indian River, Florida (Evermann and Bean 1898) (Figure 2). Significant differences in migration patterns, life history, and longevity occur between northern and southern SNS populations, with the Cape Hatteras/Chesapeake Bay area serving as the demarcation (Dadswell et al. 1984). SNS occur primarily in rivers and estuaries, with some documented in offshore waters. Most populations have their greatest abundance in the estuary of their respective river, and all captures at sea have occurred within a few miles of land (Schaefer 1967; Holland and Yelverton 1973; Wilk and Silverman 1976; Marchette and Smiley 1982). Partially landlocked populations also occur (Taubert 1980, Marchette and Smiley 1982). A lack of recent records for populations in the St. Johns River (Florida), St. Mary's and Satilla Rivers (Georgia), and the Chesapeake Bay (Maryland, Virginia) drainage may indicate these populations may be extirpated. Evaluation of sturgeon populations has been further compounded by the concurrent reduction of commercial fishing effort in these river systems in recent years (Ron Michaels, Georgia Department of Natural Resources, personal communication). With the concurrent reduction in commercial fishing effort in these systems SNS populations seem to be diminishing in Georgia, with the largest remaining population occurring in the Altamaha River (Rogers and Weber 1995).

SNS are “freshwater amphidromous”, where adults spawn in freshwater, then remain in either the river’s estuary or in the river, and only periodically visit saltwater at the river’s mouth (Kieffer and Kynard 1993). In the Altamaha and Ogeechee rivers, Georgia, and in the Savannah River, which separates Georgia and South Carolina, SNS occupy waters from oligohaline to fresh in tidal estuaries year-round except when spawning occurs farther upriver (Hall et al. 1991, Flournoy et al. 1992, Smith and Collins 1992, Rogers and Weber 1995). SNS located in the Ogeechee River range from the lower estuary (rkm 12.0) to the upper river (86.0 rkm) (Figures 3 and 4). The Canoochee River is a major tributary to the Ogeechee River, but SNS only seem to ascend it incidentally, as indicated by a one time observation of a SNS traversing 0.8 rkm into the Canoochee River and remaining there for less than a 24-h period.

Morphology - Dadswell et al. (1984) gives a detailed account of SNS morphology. The following description is taken wholly from this account. SNS have elongated, fusiform bodies that are depressed moderately, and are distinguished from other sturgeon by their wide mouth, absence of a fontanelle, the almost complete absence of the postdorsal scutes, and by preanal scutes usually arranged in a single row. Scutes in all five rows are widely set and are weakly developed in adults, and are sharp and closer in juveniles. The head and snout are short, blunt, and rounded. SNS have a single dorsal fin located caudally above the anus, and have a heterocercal caudal tail. SNS also have paired pectoral fins with heavily-ossified first rays; their pectoral girdle is wider than their head and they do not possess a lateral line. Their bodies are yellowish-brown in color and their ventral surface and barbels are white. Mouth width inside their lips is more than 3/5

the width of the bony interorbit. SNS reach adult size between 45-58 cm depending on their region, and attain a maximum length of 120 cm and a maximum weight of 24 kg.

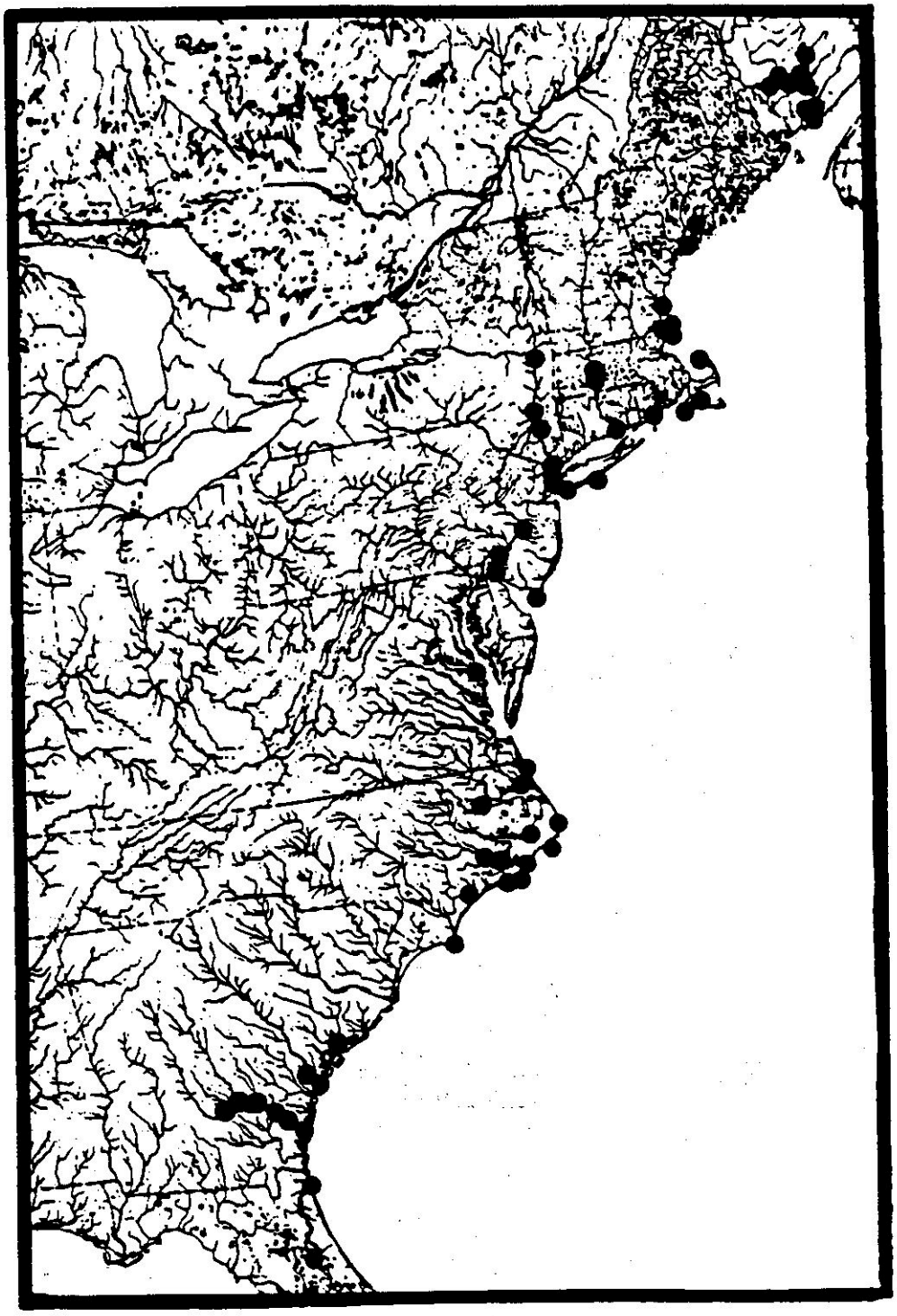

Figure 2. A map of the eastern United States, showing the geographic distribution of shortnose sturgeon, *Acipenser brevirostrum*, (adapted from Gruchy and Parker 1979).

Life History/Ecology - SNS spawn either in fresh tidal or upriver reaches of the head of tidal range. In rivers where spawning areas are >50 km upstream of tidal-estuarine wintering sites, some maturing prespawning SNS move upstream between August and November prior to the onset of winter (Dovel 1981, Dovel and Berggren 1983, Buckley and Kynard 1985, Rogers and Weber 1995). Movement further upstream into freshwater overwintering areas to the spawning grounds is accompanied by substantial upstream migration of individuals from overwintering sites closer to the ocean.

SNS are not normally dimorphic, but they do display minor sexual dimorphism during the spawning season. Adult females are generally larger than adult males of the same age, and gravid females are identifiable in spring because of their swollen appearance (Dadswell 1979). Males and females can be reliably distinguished externally only during the final stages before spawning; external abdominal pressure causes milt to flow from males, and females have black eggs that are apparent through the abdomen. First spawning in males occurs 1-2 years after maturity, but among females spawning is delayed for up to 5 years post maturity (Dadswell 1979). In the Altamaha River, Georgia, males mature at less than five years, at lengths around 58cm FL, whereas males do not mature until age 10 in the St. John River, New Brunswick, Canada, at approximately 50 cm FL (Dadswell et al. 1984). Approximate female age at sexual maturity is 7-15 years in northern rivers (41-58cm FL), and 6 years or less in southern rivers (south of the Chesapeake Bay). Females in the Altamaha River reached maturity at lengths

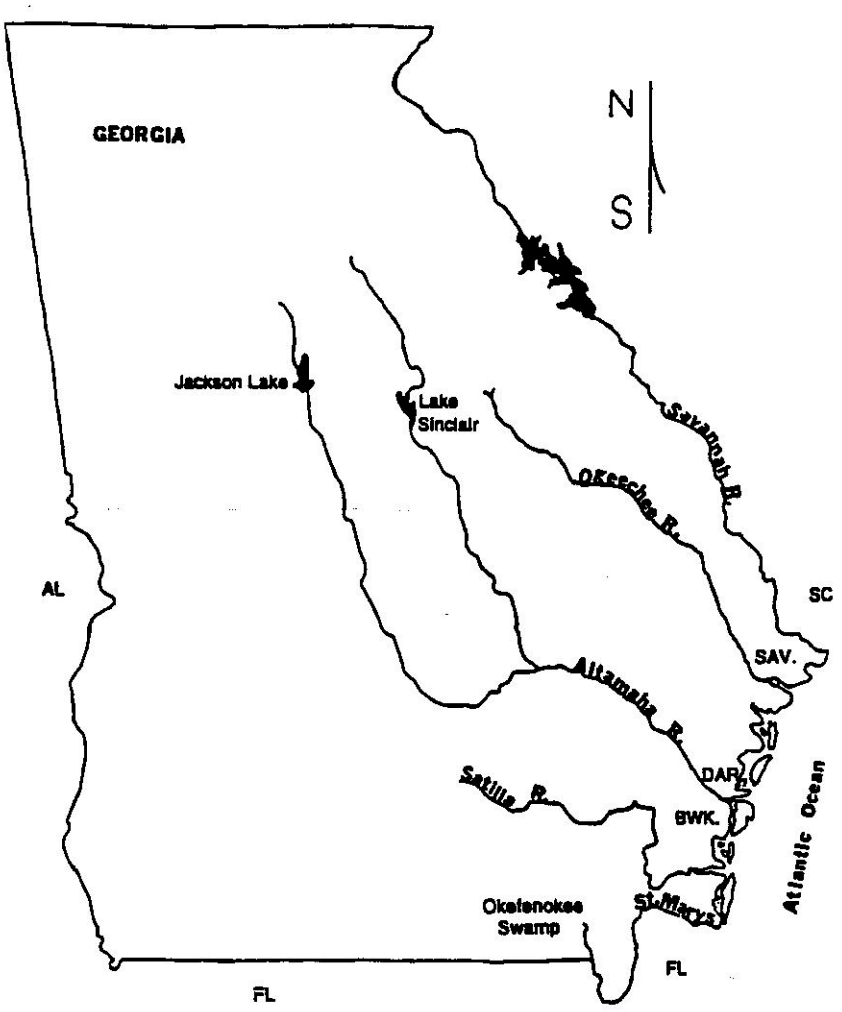

Figure 3. A map of the state of Georgia, showing the major rivers that occur in the Atlantic Slope drainages.

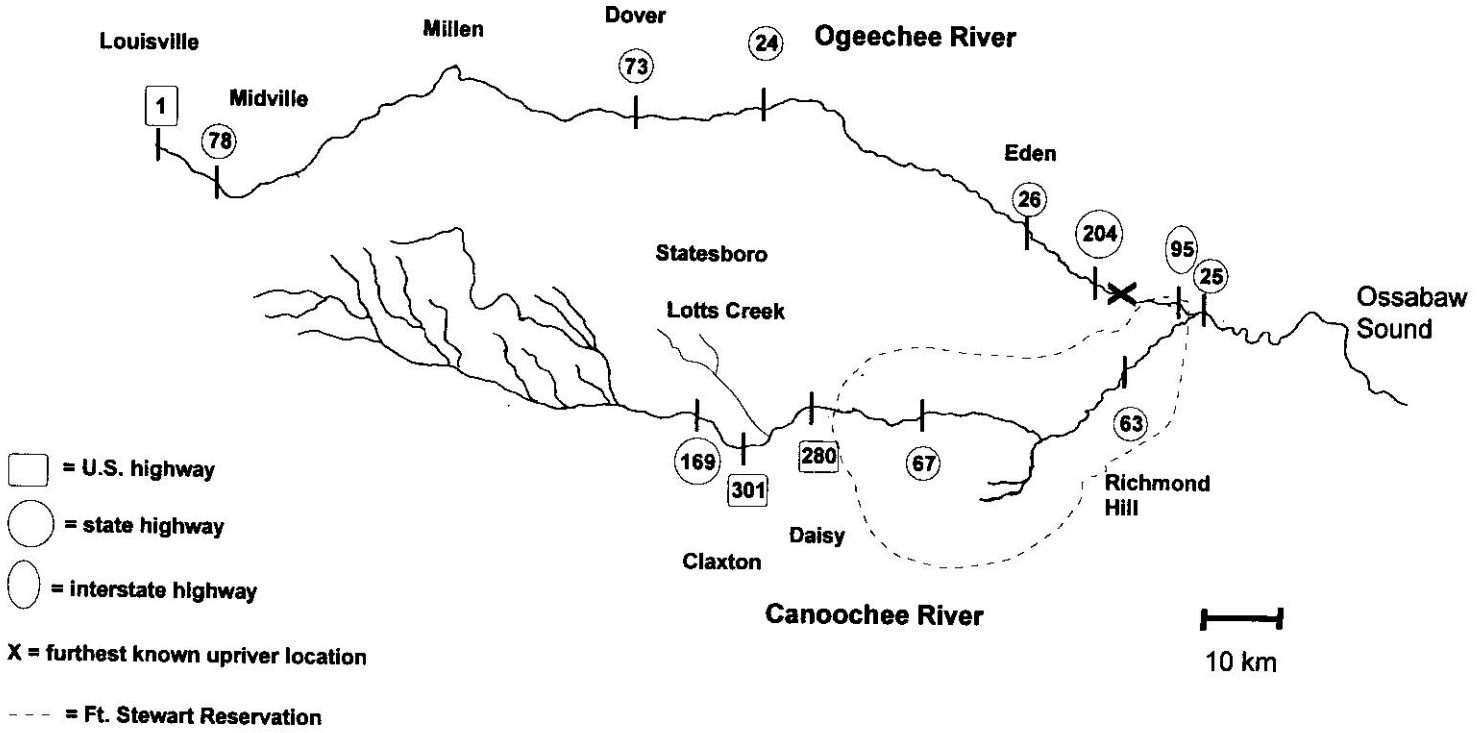

Figure 4. A map of the Ogeechee River System, showing the known distribution of SNS within the system.

>70cm FL (Dadswell et al. 1984). Most females probably spawn once every 3 years at most while males may spawn every other year (Dadswell 1979).

Spawning occurs in freshwater at moderate but decreasing river discharge, usually during late winter in southern rivers and during spring in northern rivers (Dadswell et al. 1984). Spawning appears to be temperature dependent, commencing at water temperatures around 8-9 °C and ceasing when water temperatures reach 12-15 °C (Meehan 1910, Hoff 1965, Heidt and Gilbert 1978, Pekovitch 1979, Taubert 1980, Marchette and Smiley 1982, Dadswell et al. 1984, Buckley and Kynard 1985, Hall et al. 1991, O'Herron et al. 1993, Squires et al. 1993, Rogers and Weber 1994). High river discharge during the normal spawning period creates unacceptably-fast velocities at the bottom and prevents females from spawning (Buckley and Kynard 1985). Buckley and Kynard (1985) postulated that water temperature and velocity appear to affect the reproductive process in a two-step manner. First, rising temperatures are believed to trigger the final maturation of oocytes; next, a specific water velocity may cue the female to deposit eggs. If river conditions do not stimulate females to release eggs, they resorb their eggs and do not spawn (Buckley and Kynard 1985). Females often select channel habitat with rough substrates of rocks, rubble, or logs on sand and small gravel, and a water velocity of 0.2-0.8 m/sec (Buckley and Kynard 1985, Hall et al. 1991, O'Herron et al. 1993, Squires et al. 1993). In most rivers, SNS seem to spawn at the farthest accessible upstream reach of the river (Heidt and Gilbert 1978, Taubert 1980, Dadswell et al. 1984, Buckley and Kynard 1985, Smith et al. 1992, O'Herron et al. 1993, Rogers and Weber 1994).

Spawning periodicity is poorly understood, but in all populations males spawn more frequently and are more abundant than females (Dadswell 1979), and spawning lasts from 2 to 17 days (Buckley and Kynard 1985, Dadswell et al. 1984). Abundance of spawning fish and eggs can vary annually by several orders of magnitude in both northern and southern rivers (Kieffer and Kynard unpublished. data, Smith et al. 1992).

Eggs and Larvae - Females deposit black or dark-brown, 3.5-mm diameter eggs that become sticky after fertilization, and quickly adhere to bottom material (Dadswell 1979). Egg size is the same throughout the SNS range (Dadswell 1979). Fecundity of northern females ranges from 27,000 to 208,000 eggs, averaging 11,568 eggs/kg body weight. Southern SNS have about 14,000-16,000 eggs/kg body weight (Heidt and Gilbert 1978, Marchette and Smiley 1982). Yolk-sac larvae 1-8 days old are photonegative and remain under cover during final development (Richmond and Kynard 1995). At 15-17 °C, the yolk is absorbed in 8-12 days when the larvae are about 15 mm TL (Buckley and Kynard 1981, Richmond and Kynard 1995). Larvae are photopositive, nocturnally active, and migrate downstream in the river channel (Taubert and Dadswell 1980, Bath et al. 1981, Richmond and Kynard 1995). Young-of-the-year move downstream during spring and summer, and overwinter in freshwater (Dadswell 1979, Dovel et al. 1992).

Juveniles - Growth of young SNS is rapid, and average length of young-of-the-year (YOY) in southern rivers is 30 cm; YOY in northern rivers only attain on average length of 14 cm (Dadswell et al. 1984). Young juveniles normally remain in the freshwater portion of the estuary, usually near the freshwater-saltwater interface (Dadswell 1979,

Dovel et al. 1992, Hall et al. 1991, Flournoy et al. 1992, Rogers and Weber 1994). Juveniles often move up- and downstream with the salt wedge during summer (Pottle and Dadswell 1979), possibly to avoid harmful salinity levels (i.e., >7.0 ppt) (Smith et al. 1992). In many southern rivers, water temperatures >27.0°C may limit summer foraging habitat to a few coolwater refuges (Flournoy et al. 1992, Rogers and Weber 1994).

Age and Growth - Growth of SNS has been studied throughout the species' latitudinal range (Dadswell et al.1984). SNS in the South grow fastest, but do not grow as large as northern fish, which continue to grow throughout life (Dadswell 1979). Southern fish also are shorter lived. The oldest SNS ever recorded was a 67 year-old female from the Saint John River, Canada; the oldest male was 32 years old and was from this same river. Fish upstream of dams have the slowest growth rate, suggesting that estuaries are better feeding grounds than rivers (Kynard 1994). Rangewide, SNS reach sexual maturity at about 45-55 cm FL, but southern fish reach this size sooner and at a younger age than northern fish. Northern adults live 30-60 years; southern adults live 10-20 years (Kynard 1994).

Food habits and feeding - SNS are benthic omnivores that forage in both channel and shoal areas (Dadswell 1979, O'Herron et al. 1993) for insects, crustaceans, and small fishes; both juveniles and adults seem to feed primarily on whatever is abundant locally. Juveniles feed by using their protuberant mouth to vacuum bottom substrates, taking in food and non-food items (Marchette and Smiley 1982, Dadswell et al. 1984). Food of juveniles consist mostly of benthic crustaceans, insect larvae, and cladocerans (Curran

and Reis 1937, Dadswell et al. 1984), which may constitute only 5-15% of stomach contents (Dadswell 1979). In contrast, adults appear to be more selective in feeding with analyses revealing little or no non-food items in the stomach (Dadswell 1979). Adults feed mostly on macroinvertebrates such as molluscs (Dadswell et al. 1984, Marchette and Smiley 1982), snails (Marchette and Smiley 1982), and sand shrimp (McCleave et al. 1977); small epibenthic fishes such as flounders also are among the food items of SNS in estuarine areas (McCleave et al. 1977).

SNS feeding habits seem to be thermally-regulated, but the evidence for this hypothesis is incomplete. Most studies report seasonal food habits without providing specific temperatures. Such studies are misleading because seasonal behavior across wide latitudinal gradients may reflect differences in temperature across the same latitudes. Accordingly, summer feeding behavior of SNS in high latitude systems (e.g., New Brunswick, Canada) may not be accurate models for predicting seasonal feeding behavior in lower latitudes (e.g., Georgia, USA). For example, SNS in the St. John River, Canada began feeding in freshwater in early June when water temperatures exceeded 10°C (Dadswell 1979); conversely, SNS in the Altamaha and Ogeechee rivers, Georgia, appear not to feed after late June when water temperatures exceed 27°C, as demonstrated by weight loss and lack of substantial movement (Flournoy et al. 1992, Rogers and Weber 1994). Further, SNS feeding behavior seems to vary between fresh and saline waters; but, this too is complicated by the variation in thermal requirements of the fish and the availability of such habitats across latitudes.

Habits and Movements - SNS move considerable distances in both estuarine and riverine environments. During summers accompanied by heavy rains, high river flows, and subsequent reduced estuarine salinity, SNS are displaced downriver toward the estuary in both northern rivers (Dadswell 1979) and southern rivers (Rogers and Weber 1995b). SNS tend to stay in localized areas during the summer, and migrate to estuarine regions and upriver regions in spring and fall. During summer when water temperatures in the Ogeechee and Altamaha Rivers, Georgia, were >27.0°C, SNS usually remained in deep holes in freshwater reaches, and migrations were seen farther downriver during the fall, winter, and spring. Recapture of individuals was high in summering refuges in the Altamaha River and Delaware River over consecutive years (Dadswell 1979, Rogers and Weber 1994), suggesting that either a very regular, cohort-type migration occurs or that certain segments of the population return to particular areas each summer.

Spatial distribution of adults in freshwater or freshwater-tidal reaches is often restricted to a few discrete areas. In some rivers, adults congregate in areas with reduced flow and current breaks (Buckley and Kynard 1985, Kieffer and Kynard 1993). Adults prefer deep river bends and channels adjacent to islands, as well as areas with daytime illumination levels of 2,600 lx (Kieffer and Kynard 1993). SNS swimming movements are oriented with tidal currents, and upstream and downstream movements coincide with flood and ebb tides (McCleave et al. 1977, Moser and Ross 1993). The distribution of SNS increases with increasing river discharge and cooler (< 27.0°C) water temperatures (Rogers and Weber 1994), suggesting that such physicochemical conditions may render greater availability of suitable habitats; and therefore, less reliance on a few deep holes that may serve as thermal refuges during warmer summers.

As of 1994, the literature contained no reference to tagged or telemetered SNS recaptured in or moving to drainages other than where they were released (Rogers and Weber 1994). One unpublished record identified six hatchery produced SNS, stocked in the Savannah River, that were captured in other coastal rivers, ranging from the Ogeechee River, Georgia to Winyah Bay, South Carolina (Mark Collins, South Carolina Dept. of Natural Resources, personal communication). The parental stock had been collected from the Savannah River. This is the first reported occurrence of this phenomenon. The recaptured fish were all stocked in the Savannah River at age 1 or older, and their occurrence in other coastal rivers may suggest that imprinting of SNS to natal habitat occurs before age 1. Therefore, SNS stocking programs that stock age 1 or older fish may need to be re-evaluated.

In 1995, a telemetered ripe female SNS was relocated at rkm 68.1 in the Ogeechee River, and was then captured in a shad gillnet. This female aborted her eggs, moved upriver to rkm 86.0 and then returned to the estuary. The distance that this sturgeon would have traveled if it had not been captured is unknown. We do know that upriver portions of the Ogeechee and the Canoochee rivers appear suitable for spawning. Nonetheless, SNS probably do not go further than several kilometers into the Canoochee River during summer conditions due to a lack of adequate habitat during that season.

Reasons for listing - SNS were placed on the Endangered Species List on March 11, 1967 by the U.S. Fish and Wildlife Service (32 FR 4001) under the Endangered Species Conservation Act of 1966. This legislation prohibited importation, but did not limit exportation or fishing. The Endangered Species Act of 1969 superseded the 1966 Act

and the species was afforded significant protection. Until that time, SNS commonly were taken in a commercial fishery for the closely related Atlantic sturgeon, *Acipenser oxyrhynchus*. The decreasing commercial catch rate and virtual disappearance of SNS from commercial landings rangewide led the FWS to conclude that the species was in danger of extinction; therefore, the species was listed and provided enhanced protection. The commercial harvest of SNS is still illegal; however, they continue to be taken incidentally in other fisheries such as shad and trawl fisheries (Collins et al.1996). Additionally, non-point-source inputs of nutrients from silvicultural and agricultural lands and heavy industrial development in lower river reaches impairs water quality and impedes species recovery, and possibly may result in the elimination of SNS populations from portions of their historic range. Throughout the SNS range, development-related threats include low dissolved oxygen levels, loss of thermal refuges through aquifer degradation, contaminants, dredging, dams, reservoir operation, sedimentation, blasting/ bridge construction, power plants, and snag removal. Fishery-related threats include by-catch mortality.

Extensive sampling on the Ogeechee and Canoochee Rivers between 1993-1995 (Rogers and Weber 1994; Gordon Rogers, Georgia Department of Natural Resources, personal communication) revealed nearly 71% of the SNS collected were >56.0 cm FL, suggesting an abundance of older juveniles and adults (Figure 5). The Altamaha River study (Rogers and Weber 1994) utilized similar collecting methods and the authors demonstrated this type of gear and the sampling design do not discriminate between juvenile and adult size differences. Consequently, the Ogeechee River study revealed low overall SNS abundance's and size distributions skewed toward older juveniles and

adults, thus supporting the hypothesis of compromised larval and early juvenile life functions.

Historically, water quality in the Ogeechee River basin has varied spatially and temporally. In some areas, the concentrations of some variables (e.g., dissolved oxygen, phosphorous, and ammonium) have increased with time; in other areas, water quality is not different from historic levels (Meyer 1992). Nonetheless, water quality in the Ogeechee River basin is of great concern because the effects of reduced water quality on SNS are unknown. In the Ogeechee River basin, there are 51 National Pollution Discharge Elimination System (NPDES) permitted discharges, authorizing a release of 24.2 million gal/day. Of this, 15.7 million gal/day are permitted for discharge into the Canoochee River, and 8.7 million gal/day are permitted for discharge into the Ogeechee. There are three NPDES permitted discharges within the Fort Stewart Military Reservation. A municipal discharge plant (NPDES GA0047180) run by the city of Hinesville with a maximum allowed discharge level of 7.15 million gal/day is located at Taylor's Creek and serves Hinesville and Fort Stewart. A second plant is located in Evans County at Camp Oliver (NPDES GA0036024) and has a maximum allowed industrial discharge rate of 70,000 gal/day. The third industrial waste plant is located at Mills Creek, a tributary of Taylor's Creek (NPDESGA0004308). This plant has the potential to discharge a maximum of 1.5 million gal/day. Of the total potential 15.7 million gallons/day discharge permitted for the receiving Canoochee River, about 8.5 million gal/day could be generated from within or received by the installation. The Claxton municipal waste plant, Claxton poultry farm, Pembroke Pond municipal waste

plant, Twin City waste plant, and Statesboro sewage treatment plant are all upstream of the military reservation, and may influence water quality within Reservation boundaries. Municipal and industrial wastewater treatment facilities are generally the most common point sources of pollution. Region-wide problem-causing nonpoint sources include runoff from urban areas, agricultural areas, construction sites, and forest harvesting areas. Off-post agricultural activity in the Ogeechee River watershed affects water quality by increasing the input of nutrients and pesticides, increasing soil erosion, and increasing channelization of off-post tributaries to drain the wetlands. These threats to the water quality of the Ogeechee River should not be taken lightly, because blackwater systems such as the Ogeechee River that have naturally occurring low DO levels are vulnerable to organic loading from anthropogenic sources (Meyer 1992).

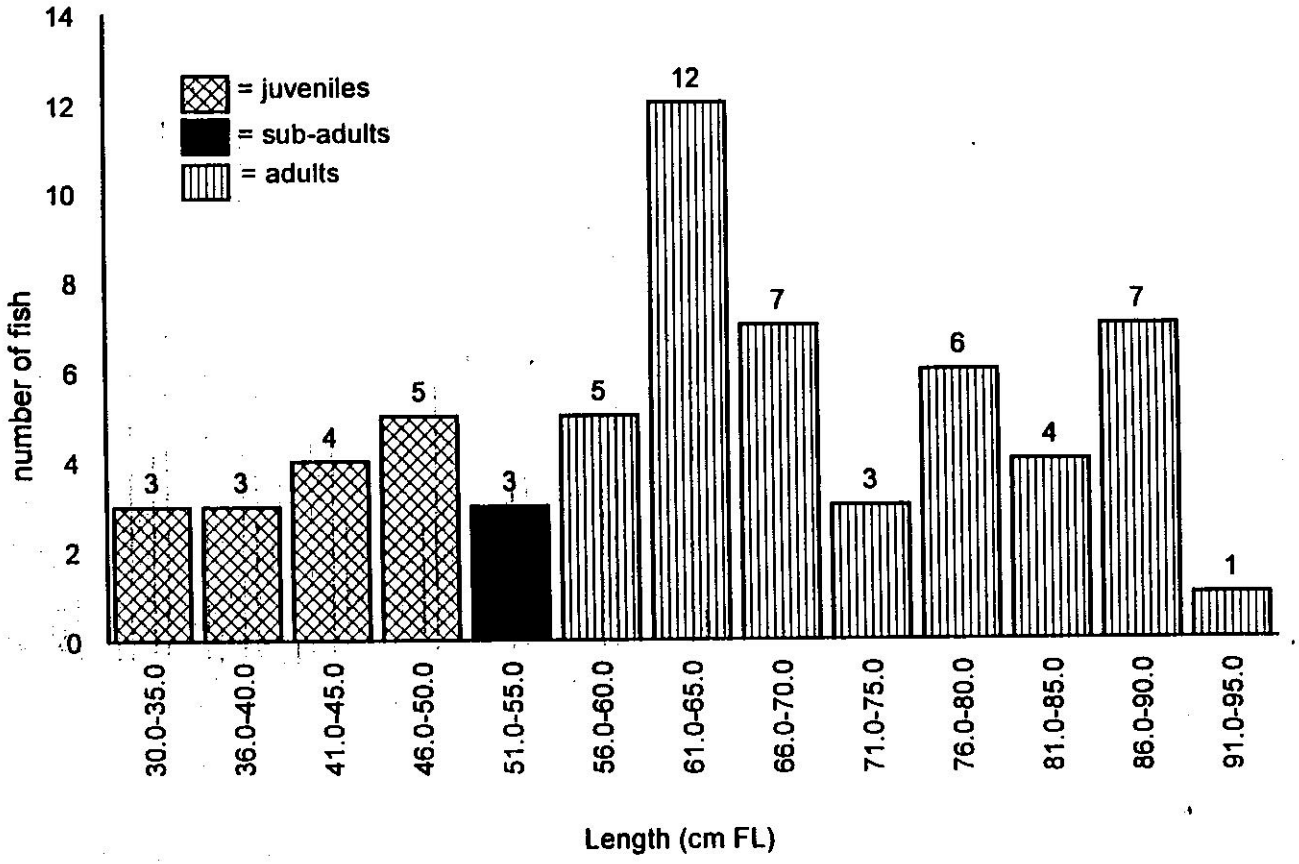

Figure 5. The size distribution of shortnose sturgeon sampled from the Ogeechee River, Georgia during 1993-1995.

Management and Conservation Measures - The National Marine Fisheries Service (NMFS) established a SNS Recovery Team that is currently finalizing a draft SNS Recovery Plan. The Recovery Plan will include four sections: 1) an updated synopsis of the biology and distribution of SNS; 2) a description of factors affecting recovery of the species; 3) an outline of objectives intended to foster recovery of SNS (including the criteria for determining recovery); and 4) a detailed implementation schedule for completing specific recovery tasks.

3.0 CONSERVATION GOALS (AR 200-3: 11-5; SNS Recovery Plan)

The size of the SNS population in the Ogeechee River has been estimated to be about 300 individuals (Rogers and Weber 1994; Gordon Rogers, Georgia Department of Natural Resources, personal communication). The lack of historical records renders historical population levels indeterminable. Maintaining current numbers and striving towards a healthy reproducing population is critical to the future of SNS in the system. This Section presents recommended conservation goals, including identified research needs.

Primarily, additional evaluation of the SNS population and assessment of trends is necessary. A sampling procedure identical to that conducted in the most recent study (i.e., Rogers and Weber's study, 1993 to 1995) is recommended to provide the population estimates. A multiple year study would permit for a more accurate estimate of the size of the Ogeechee population and provide a more thorough assessment of the juvenile segment of the population. Abundance and status will be determined every two years,

beginning year one. If after three surveys the SNS population demonstrates stability over that five year period, consideration will be given to reducing the frequency of abundance and status assessment to once every three to five years. The biotelemetry study, however, will require only one successful year of collection and radio tagging (i.e., adequate sample size) accompanied by a significant spawning run by those tagged SNS. The effectiveness of SNS collection is determined by river conditions that are influenced by the prevailing weather patterns. If hot, dry summer conditions prevail, SNS will be more concentrated, more easily collected, tagged and followed. However, if cool, wet summer conditions prevail, SNS will be more dispersed and less effectively collected. The effectiveness of the biotelemetry study is further complicated by the fact that SNS spawning periodicity varies between males and females, and a significant spawning run may not occur annually. Consequently, timing will be a factor in accomplishing this ESMP's telemetry objectives. In order to conserve the limited funds available for ESMP implementation and practice prudent fiscal responsibility, biotelemetry will be scheduled to coincide with the abundance and status study. Biotemetry will continue to be scheduled in this manner for accomplishment until river conditions, SNS sample size, and spawning behavior enable adequate spawning assessment.

Water quality and biological integrity monitoring are also important conservation measures necessary for the protection and enhancement of the Ogeechee River SNS population. Special attention should be paid to monitoring water quality at discharge areas up- and downriver of the Reservation boundaries. Selected water sampling sites that enable investigators to isolate the installations' waters from off-post influences is recommended as a minimum. Identifying riverine fish communities and monitoring

changes in and trends of those communities are also necessary for assessing long term ecosystem health of the river basin. Strict adherence to Reservation riparian land-use policies (Integrated Natural Resources Management Plan) also are crucial towards the preservation of river habitats, and should be reviewed regularly to ensure compliance with existing statutes. Additionally, implementation of Georgia Forestry Commission's Best Management Practices will promote quality land management, minimize stream siltation and sedimentation, and further enhance water quality.

Conservation of groundwater resources is an important regional strategy for the restoration of thermal refuges for the shortnose sturgeon. Fort Stewart should develop and implement groundwater conservation measures in support of State and local mandates and initiatives.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS (AR 200-3: 11-5)

This ESMP is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA); Army Regulation (AR) 200-3; and the draft SNS Recovery Plan.

Objectives: The objectives of this plan are to advance the conservation, protection, and enhancement of the shortnose sturgeon within the Ogeechee River basin and ensure installation compliance with the Endangered Species Act of 1973, consistent with the requirements of the military mission.

Criteria for conservation

A. Approve and adopt Endangered Species Management Plan.

B. Identify funding sources and secure funds for SNS management/enhancement activities.

C. Use fishery-independent catch-per-unit-effort (CPUE) data to determine a baseline population index.

D. Determine change in established population levels over time. This time frame should be sufficient to detect problems and to provide trend information. Assessment should include life history information including longevity, maturation, variable spawning periodicity, age distribution, and sex ratios.

E. Conduct summertime biotelemetry within Ogeechee River system for fish <50 cm (FL) to assess the interactions of salinity, dissolved oxygen, and temperature on habitat requirements and use by early juveniles. Such information would lead to

specific management recommendations concerning water quality, aquifer withdrawals, and waterway dredging.

F. Develop a plan to monitor bathymetric changes in the Canoochee River, and to determine if these changes threaten shortnose sturgeon river populations (i.e., remotely sensored data).

G. Identify and eliminate known or potentially harmful chemical contaminants from point and non-point sources, and water quantity and quality problems associated with surface water management on installation property. Such threats include proposed developments, agricultural uses, and water diversions. Monitoring stations should be placed at the military reservation boundaries and within the property (preferably downstream of discharge sites) to allow the effects of upriver sites (i.e., Claxton, Statesboro, off-post agriculture, residential runoff influence) to be determined and compared with Reservation-related effects. Special attention would be concentrated on levels of phosphates and nitrates and their sources, as well as the degree of habitat contamination, and body burdens of metals, organochlorines, dioxins, and other potentially harmful compounds.

H. Identify and monitor riverine fish communities in the Canoochee River to determine biological integrity and evaluate ecosystem health. Conduct multiyear electrosampling study of the Canoochee River to classify fish populations, identify changes and monitor trends. Develop an Index of Biological Integrity for the Canoochee River.

I. Monitor SNS habitat quality and quantity on installation property. Develop mitigation measures to restore, enhance, and provide access to essential habitats, if applicable.

J. Participate in regional efforts to identify essential habitats important to each life stage in river basin and contiguous estuarine waters.

K. Support regional efforts in genetic evaluation and culture of Ogeechee River Basin SNS by cooperating in the capture of broodstock fish to help identify genetic characteristics of wild and hatchery-reared SNS. Additional sampling of fish of known natality is needed to establish "genetic libraries" (i.e., reference collections). If the Ogeechee population is sufficiently genetically diverse (i.e., not significantly different from adjacent river basins) as to tolerate supplemental stocking without threat of gene pool contamination and if the appropriate stocking rates can be determined then a hatchery-supported stocking program should be implemented, if SNS population conditions warrant, habitat quality permits, and stocking in the Ogeechee/Canoochee River system is recommended in the SNS Recovery Plan.

L. Develop groundwater conservation measures for the installation (e.g., an installation Water Conservation Plan currently being prepared by the installation's Environmental Branch), and support regional efforts to assess the relationship between groundwater pumping and reduction of groundwater flows (e.g., reduced ground-water flows may result in the net loss of riverine habitat).

M. Support regional efforts to prohibit additional permitted withdrawals from aquifers underlying estuarine zones that serve as potential or active nursery grounds for SNS until more is understood about the nursery requirements of SNS.

N. Share research findings, foster recovery actions, and encourage the exchange of information on SNS conservation and recovery activities with state and federal agencies, academia, and private institutions.

O. Develop a public information and education program on the SNS and support regional efforts in developing a non-scientific constituency directed toward enhancing regional recovery actions (e.g., Atlantic Coast Conservation Association, Friends of the Ogeechee River, Savannah Science Museum).

P. Implement Georgia Forestry Commission's Best Management Practices to protect Canoochee and Ogeechee River watershed streams and forested wetlands on the installation.

Q. Assess overall success of the recovery program and recommend action at a minimum of every five years.

5.0 MONITORING

The effectiveness of this plan will be determined by the proportion (probably > 50%) of objectives that are undertaken. Objectives A, B, C, D, E, G, H, L, and P are critical to this plan and should receive highest priority for funding considerations and implementation.

6.0 TIME, COSTS, AND PERSONNEL (AR 200-3: 11-5, 11-13)

The initial planning and funding period for the implementation of this ESMP is 5 years, although some components of the plan extend beyond this specified time frame. Implementation of objectives D and E may initially be accomplished simultaneously if while assessing the population status it is determined that river conditions are conducive for biotelemetry as well. Objective D will be accomplished every two years for the first five years and if the SNS population reflects relative stability, frequency of population assessment is likely to be reduced to every three to five years. If in the pursuit of objective E, a single year biotelemetry study is deemed to be highly successful (i.e., significant numbers of SNS are tagged and a major spawning run is observed), additional telemetry studies will not be necessary. Projected annual costs for SNS population, water quality, and biological integrity monitoring are shown in Table 1.

7.0 CHECKLIST

		Implemented	
Criteria	Activity	Date	Signature
A	Approve and adopt the ESMP		
B	Identify and secure funds for ESMP implementation		
C	Determine Fishery-independent population index		
D	Monitor population over 5 years; conduct life history investigation		
E	Conduct summertime biotelemetry; assess SNS spawning		
G	Monitor water quality; identify & correct on-post degradation		
H	Monitor biological integrity; evaluate fish community health		
L	Develop Water Conservation Plan		
P	Implement Best Management Practices		

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Exhibit A

Glossary

Amphidromous - Adults spawn in freshwater then either remain in the river's estuary or in the river and only periodically visit saltwater at the river's mouth.

Aquifer - A water-bearing rock, rock formation, or group of rock formations.

Benthic - The bottom of a sea, lake, or river.

Caudal - Of, at, or near the tail or hind parts; posterior.

Cladoceran - Any of various small aquatic crustaceans of the order Cladocera.

Cohort - Spatially and temporally unique year class.

Coliform bacteria - Facultative, gram-negative, rod-shaped, non-spore forming bacteria that can ferment lactose. They are associated with sewage and mostly derived from the digestive track of mammals.

Crustacean - Any of various predominantly aquatic arthropods of the class Crustacea.

Dimorphic/ dimorphism - The state of having two distinct forms in the same species when the sexes differ in secondary as well as primary sexual characteristics.

Dorsal - Of, toward, on, in, or near the back.

Ecosystem - An ecological community together with its physical environment, considered as a unit.

Epibenthic - Association with the bottom of a body of water.

Estuary - The part of the wide lower course of a river where its current is met by the tides.

Eutrophication - Designating a body of water in which the increase of mineral and organic nutrients has reduced the dissolved oxygen, producing an environment that favors plant over animal life.

Fecundity - The rate or capacity for reproduction.

Freshwater-Saltwater Interface - Region where salt and fresh water meet.

Interorbit - The distance from the interior margin of one eye to the interior margin of the other eye.

Land-locked - Restricted by physical boundaries that prevent access to the sea.

Larval - The newly-hatched, earliest stage of any of various animals that undergo metamorphosis, differing markedly in form and appearance from the adult.

Lateral line - A linear series of sensory pores and tubes extending along the sides of a fish or certain other aquatic animals.

Lux - The international system unit of illumination, equal to one lumen per square meter.

Macroinvertebrate - Animals without backbones that are generally visible to the unaided eye.

Migration - To change location periodically, especially to move seasonally from one region to another.

Nocturnal - Of, pertaining to, or occurring in the night.

Non-point pollution - An indirect source of pollution.

Omnivore - Eating both animal and vegetable substances.

Oocytes - A cell, derived from an oogonium, that undergoes meiosis and produces an ovum.

Ossify - To change into bone; become bony.

Pectoral Fins - Either of the anterior pair of fins attached to the pectoral girdle of fishes.

Photonegative - Light avoidance behavior.

Point pollution - A direct source of pollution.

Preanal - Anterior to the anal cavity.

Protuberant - Swelling, outward; bulging.

Salinity - Of, relating to, or containing salt.

Salt wedge - Where salt and fresh water meet, the denser salt water sinks below the lighter fresh river water. The salinity-density effect dominates over any temperature-density effect.

Scutes - A horny, chitinous, or bony external plate or scale.

Self-sustaining - Capable of sustaining oneself or itself independently.

Sexual maturity - Time at which an organism is able to reproduce.

Shoal - A place in a body of water where the water is particularly shallow.

Skewed - To take an oblique course or direction; to give a bias to.

Ventral - Pertaining to or situated on or close to the belly; abdominal.

Young-of-the-Year - Age class of a species before one year old.

Exhibit B
Individuals and Organizations Contributing to the Plan

1.0 Fort Stewart ESMP Team
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TAB C

ENVIRONMENTAL ASSESSMENT

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT STEWART/HUNTER ARMY AIRFIELD, GEORGIA

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ENVIRONMENTAL ASSESSMENT

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FORT STEWART/HUNTER ARMY AIRFIELD, GEORGIA

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ENVIRONMENTAL ASSESSMENT

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FORT STEWART/HUNTER ARMY AIRFIELD, GEORGIA

1.0 PURPOSE, NEED, AND SCOPE

1.1 Purpose and Need

Fort Stewart/Hunter Army Airfield (AAF) proposes to implement its Integrated Natural Resources Management Plan 2001-2005, hereafter referred to as the INRMP or the Plan, at Fort Stewart/Hunter AAF, Georgia.

The purpose of this study is to identify and evaluate environmental consequences of implementing the proposed plan, in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations, and Army Regulation (AR) 200-2, *Environmental Effects of Army Actions*.

AR 200-2 is the regulation the Army uses to establish policy, procedures, and responsibilities for assessing environmental effects of Army actions. AR 200-2 specifically states that development of natural resource management plans requires preparation of an Environmental Assessment.

1.2 Scope

The proposed action is restricted to the implementation of the INRMP. Environmental effects of implementing this plan on Fort Stewart/Hunter AAF are the focus of this study.

1.3 Impact Analysis

The analysis process involved the review of installation natural resources-related data collected by Fort Stewart/Hunter AAF, a variety of other governmental agencies, and private organizations. The process involved interviews with Fort Stewart/Hunter AAF personnel involved with natural resources management, military training planning, and installation maintenance.

2.0 DESCRIPTION OF THE PROPOSED ACTION

Fort Stewart/Hunter AAF proposes to fully implement the INRMP. The INRMP was developed using draft *Army Guidelines for Preparation of Integrated Natural Resources Management Plans.* All programs are integrated with no inconsistencies. Below is a list of INRMP chapters and major sections:

14. NATURAL RESOURCES MANAGEMENT
- 14-1 Objectives
- 14-2 Forest Management
  - 14-2a Forest Summary
  - 14-2b Management Strategies
  - 14-2c Management Units
  - 14-2d Commercial Forest Products
  - 14-2e Cutting Cycle
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    - *14-2h(1) Thinning*
    - *14-2h(2) Longleaf Restoration*
    - *14-2h(3) Chemical Treatment*
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  - 14-2m Pinestraw
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- 14-3 Habitat Management
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    - *14-3a(2) Game Species Habitat Summary*
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      - *14-3a(2)(c) Feral Hog Habitat*
      - *14-3a(2)(d) Bobwhite Quail Habitat*
      - *14-3a(2)(e) Mourning Dove Habitat*
      - *14-3a(2)(f) Cottontail and Marsh Rabbit Habitat*
      - *14-3a(2)(g) Eastern Gray Squirrel Habitat*
      - *14-3a(2)(h) Fox Squirrel*
      - *14-3a(2)(i) Waterfowl Habitat*

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14-3a(3)(c) Browse Management
14-3a(3)(d) Supplemental Wildlife Food Plantings
14-3a(3)(e) Wildlife Clearings
14-3a(3)(f) Prescribed Burning
14-3a(3)(g) Liming
14-3a(3)(h) Disking
14-3a(3)(i) Mowing
14-3a(3)(j) Forest Crown Closure Management
14-3a(3)(k) Brush Control
14-3a(3)(l) Wiregrass Restoration
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14-3c(2) Aquatic Weed Control
14-3c(3) Liming
14-3c(4) Pond Construction
14-3c(5) Pond Maintenance and Dam Safety
14-3c(6) Fish Attractors
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14-4h Fox Squirrel
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TABS

TAB A: Multi-Species Endangered Species Management Plan (Multi-Species ESMP)
TAB B: Shortnose Sturgeon Endangered Species Management Plan (SNS ESMP)

The INRMP identifies installation and general goals regarding the management of Fort Stewart/Hunter AAF's natural resources and policies to accomplish these goals. It provides more specific objectives in chapters 12-20. The Plan summarizes the military history of Fort Stewart/Hunter AAF and describes the military mission as it relates to natural resources. Brief descriptions of facilities, water supply, and the transportation system are presented. The physical environment (topography, geology, soils, and climate) is described. Known flora and fauna are identified, including species of special interest such as rare, threatened, or endangered species.

The history of the natural resources program is described, and responsibilities for the management of natural resources on Fort Stewart/Hunter AAF are outlined, including agencies and interested organizations outside of the Department of Defense. Land management units are identified. There are discussions of trends in soil productivity, biodiversity, water quality, capability to support the military mission, and capability to produce other human-related products such as forest products, game, and outdoor recreational opportunities.

The INRMP includes plans for inventory and monitoring of flora, fauna, and water quality, as well as implementation of a geographic information system and general data storage/analysis capabilities. Prevention of damage and protection programs include implementation of a fire prevention and suppression program and means to protect wetlands, areas of special significance, and cultural resources sites.

Direct management of natural resources includes forest ecosystem management (timber stand improvement, prescribed burning, harvest, regeneration, and implementation of Best Management Practices), wildlife habitat management (hardwoods maintenance, supplemental food plots, clearing maintenance, wiregrass restoration, waterfowl impoundments and nesting structures, and development of wildlife water sources. Fish habitat management includes pond fertilization, aquatic weed control, fish attractors, pond construction, and river management. Game harvest management strategies are described. Fish population control and stocking programs are described.

Endangered species management programs for the red-cockaded woodpecker, Eastern indigo snake/gopher tortoise (commensal species), bald eagle, wood stork, shortnose sturgeon, flatwoods salamander, and other species of concern are described. Specifics of wetlands protection and water quality protection programs are identified. Management practices specific to the cantonment area are identified, emphasizing management of urban forests. Pest and noxious plant management programs are outlined.

The Integrated Training Area Management (ITAM) program includes: a Land Condition Trend Analysis component to survey and monitor the condition of the land and its vegetation; an Environmental Awareness component to instill a conservation ethic in military personnel and others using Fort Stewart/Hunter AAF; use of a Geographic Information System to assist land managers and users in making land use decisions using computer generated spatial data; a Land Rehabilitation and Maintenance component to repair damaged land, reduce erosion, and minimize future damage; and a Training Requirements Integration component to minimize damage to the land from military activities. All components will be operational during 2001-2005.

External assistance for natural resources programs is identified and prioritized. Natural resources-oriented law enforcement issues and operations are outlined. Conservation education and other awareness programs are identified. Provisions for range access are identified, including public access on an equal

basis with military personnel. Outdoor recreation programs including hunting, fishing, boating, equipment rental, picnicking, shooting sports, etc. are described.

Although the INRMP does not emphasize cultural resources protection, it provides a means to protect cultural resources during implementation of the natural resources program. The INRMP identifies means to implement NEPA on Fort Stewart/Hunter AAF by providing consideration for natural and cultural resources during planning of construction projects, military operations, natural resources management, and installation maintenance.

The INRMP includes 110 programs, projects, or actions, which are listed in three priority categories (high priority, important, and less important). Organization, manpower, personnel training, funding, and command support needed to implement this INRMP is discussed.

The INRMP describes and implements an integrated approach to managing natural resources on Fort Stewart/Hunter AAF for the period of 2001 through 2005. This plan is comprehensive and should be referred to for specific information. The INRMP is on file at the Directorate of Public Works, Environmental and Natural Resources Division, Fort Stewart, Georgia 31314, phone (912) 767-5476.

3.0 ALTERNATIVES

3.1 Proposed Action

Fort Stewart/Hunter AAF proposes to fully implement its Integrated Natural Resources Management Plan 2001-2005 as partial mitigation for environmental effects of the military mission. The INRMP presents information on the management of natural resources on Fort Stewart/Hunter AAF. The plan describes the setting, defines land management units, and how these units will be managed to sustain ecological functions, protect endangered and other nongame species, provide sustained military training, provide forest products, and provide outdoor recreational uses. The proposed action includes implementation of the ITAM program. Major emphasis will be placed on proactive management to reduce the potential for negative environmental impacts due to the installation's military mission.

3.2 Partial Implementation Alternative

The alternative action is to implement portions of the INRMP. Partial implementation involves a wide range of options involved with this alternative including implementation of some features of each major program to implementation of some major programs but not others. Such actions would emphasize reacting to identified problems and noncompliance as opposed to the proactive approach of the total INRMP.

3.3 Other Management Options Alternative

Virtually every major natural resources program at Fort Stewart/Hunter AAF (forestry, fish and wildlife, Integrated Training Area Management, pest management, etc.) has many options different from ones selected for the INRMP. For example, there are many different strategies with regard to white-tailed deer harvest management, just as there are many different options for managing small pond fisheries, and a wide variety of forest management options. Many of these interact with each other. For example,

changing the forest management program would impact upon turkey management and red-cockaded woodpecker recovery.

Possible options create thousands of potential combinations, each of which could be an alternative to the proposed action. Various laws, compliance documents, Army regulations, etc. prohibit the implementation of many of these possibilities. For example, using only cool season prescribed burning is not a possibility due to a Biological Opinion (USFWS, 1992). Closing the installation to hunting is also not a viable option due to public law and Department of Army policy. On the other hand, changing the management technique for controlling aquatic weeds is an option, and there are many choices. The same would be true of changing the monitoring program for land condition trends.

3.4 No Action

The no action alternative would be to not manage natural resources on Fort Stewart/Hunter AAF. This is not a viable alternative. A wide variety of laws and executive orders on endangered species, water quality, federal land management, outdoor recreation, wetlands, etc., as well as Department of Defense and Department of Army policies, preclude the no action alternative. This alternative will not be further discussed in this analysis.

4.0 AFFECTED ENVIRONMENT

4.1 Setting

The setting of the proposed activity is described in the INRMP. The Fort Stewart Military Reservation is located in the Atlantic Coastal Plain of southeastern Georgia, a region known as the "Coastal Empire." It comprises portions of Long, Liberty, Tattnall, Bryan, and Evans counties, and extends from the Ogeechee River (the Pamlico Marine Terrace) at elevations near sea level, westward to the edge of the Sunderland Marine Terrace at elevations of 120-180 feet. It is nearly rectangular, averaging 35 miles long by 18 miles wide, comprising 279,270 acres (MARCOA, 1995).

Hunter Army Airfield (AAF), approximately 35 miles northeast of Fort Stewart, is a 5,653.41-acre installation on the western edge of Savannah, Georgia. Hunter Army Airfield is approximately two miles wide by five miles long, with its long dimension running in a northeast-southwest direction (MARCOA, 1995).

4.2 History and Mission

The history and mission of Fort Stewart/Hunter AAF are more fully described in the INRMP. The primary mission of Fort Stewart is to support and assist in training the 3rd Infantry Division (Mechanized) to fight as required. It is also responsible for supporting non-divisional units training for their respective roles in combat. In addition, Fort Stewart has an area mission to provide support and services to other agencies, reserve forces, and installations within the prescribed area of responsibility (U.S. Army Corps of Engineers, 1990).

Fort Stewart is the largest Army installation east of the Mississippi River, and is home of the 3rd Infantry Division (Mechanized). The installation's great military value is due to its size, terrain, climate, and

proximity to the East Coast and two deep water ports, Savannah, GA and Charleston, SC (MARCOA, 1995). Tanks, field artillery, helicopter gunnery, and small arms ranges can operate simultaneously on its vast acreage throughout the year. The long runway at Hunter AAF and world class facilities at the Port of Savannah help make the 3rd Infantry Division (Mechanized) the Army's premier heavy, rapid deployment force (Fort Stewart/Hunter AAF, 1996).

4.3 Climate

Fort Stewart/Hunter AAF lies in the coastal region of Georgia and has a mild, subtropical climate, typified by warm, humid summers and short, mild winters. The average annual temperature is 70ºF. Average summer temperatures are about 81ºF, though they may be somewhat higher at inland locations like Fort Stewart. Statewide, there is an average of 20 days per year of below-freezing temperatures, with an average daily low of about 39ºF. The first killing frost on Fort Stewart usually occurs about 1 December with the last about 1 March. Winter temperatures at Hunter AAF are moderated by proximity of the Atlantic Ocean and average 52ºF (Prentice Thomas and Associates, Inc., 1996; Terrain Analysis Center, 1976).

Wind speeds rarely exceed five knots, except during hurricanes or tropical storms, generally in August or September, or during summer thunderstorms. Yearly rainfall at Fort Stewart is about 50 inches, half of which falls during the thunderstorm season of June through September. The wettest month is July (normal rainfall 7.6 inches), and the driest is November (1.7 inches) (Terrain Analysis Center, 1976). Local weather data for Fort Stewart is compiled at Wright Army Airfield.

4.4 Geology and Soils

Known geology of coastal Georgia dates to the Paleozoic epoch and extends to 4000 meters below the ocean floor surface. The sedimentary section consists of 700 meters of Paleozoic rocks of Late Devonian age overlain by 2300 meters of Early and Late Cretaceous sediments from the Mesozoic era. Cretaceous rocks are overlain by 1000 meters of Cenozoic sediments, most of which are Eocene in age (Prentice Thomas and Associates, Inc., 1996).

The geomorphology of the Fort Stewart/Hunter AAF area includes marine terraces formed by fluctuations in sea level during the Pleistocene. These features are depositional and, in some cases, erosional surfaces comprised of marine sediments ranging in age from the Pliocene to the Holocene. These shore terraces were formed by wave action from the bluff at the shoreline to some distance offshore. As sea level rose and fell in response to glaciation, successive, parallel terraces were formed by the same process, each one shoreward of the earlier one. Of the nine Pleistocene terraces that occur in Georgia, the Sunderland, Wicomico, Penholoway, Talbot and Pamlico are present on Fort Stewart (Prentice Thomas and Associates, Inc., 1996).

In coastal Georgia, drainage from three physiographic provinces, the Blue Ridge Mountains, Piedmont Plateau and Coastal Plain, affect the composition of alluvial deposits. Near Fort Stewart/Hunter AAF, the parent material for all soils is water-lain sediments deposited during and prior to the Pleistocene (Prentice Thomas and Associates, Inc., 1996).

As a result of the mild climate, freezing and thawing cycles have little effect on soil weathering. Much of the rainfall percolates through the soil and moves dissolved and suspended materials downward. As a

result, most soils on uplands are highly weathered, leached, strongly acid, and low in natural fertility and organic matter (Prentice Thomas and Associates, Inc., 1996).

Soil surveys have been completed for both installations by the USDA Natural Resources Conservation Service (then the Soil Conservation Service). Site-specific soils testing may be required for grounds maintenance or turf management, but further classification of soil series is unnecessary (DEH, 1993a).

Most soils on the two installations are classified as sandy and infertile. The majority of soils at Hunter AAF are in the Cape Fear, Ellabelle loamy sand, Ocilla, and salty tidal marsh series. At Fort Stewart, Ellabelle loamy sand, Ogeechee, Pelham, Stilson, Rutlege, Leefield, and Mascotte are common soil series. Many of these series are well suited to the production of forest trees, and are unsuitable to cross-country movements of heavy equipment during wet periods (DEH, 1993a).

The Nature Conservancy (1995) lists Fort Stewart/Hunter AAF soils according to their drainage characteristics. The INRMP contains a summary of soils and their acreages on Fort Stewart.

4.5 Water Resources

Fort Stewart's surface water resources are diverse and include numerous rivers, streams, ponds, and lakes. Map 7-6a within the INRMP indicates surface drainage on Fort Stewart.

Surface waters of Fort Stewart are part of the Ogeechee River drainage system, which forms part of the eastern boundary of the installation. The Canoochee River is the main tributary of the Ogeechee and bisects Fort Stewart. It merges with the Ogeechee about 35 miles inland from Ossabaw Sound. Although most of the post is drained by the Canoochee, part of the northeast quadrant drains directly into the Ogeechee, and the southwestern quadrant is drained by the Altamaha River (Prentice Thomas and Associates, Inc., 1996).

The Canoochee River has not developed large natural levees due to its low silt loads. The floodplain, however, is generally narrow, with little lateral migration of the stream channel. Organic matter content is generally high, derived from the Blackwater River and Swamp system (Prentice Thomas and Associates, Inc., 1996).

The Little Ogeechee River marks the western edge of Hunter AAF and drains most of the installation. Tides exert a great influence on the river, and salt water is carried upstream for some distance. Fresh to brackish tidal marshes have developed along much of the shore, and the river is not a significant source of drinking water. Because of the large amount of hard-surfaced land at Hunter AAF, fairly large amounts of run-off flow directly into the marsh/river system (Prentice Thomas and Associates, Inc., 1996).

Several old mill ponds were present at the time of the Army's purchase of Fort Stewart. Some of the most significant included Glisson's Mill Pond, Strickland's Mill Pond, Pineview Lake, and mill ponds where Pond #3, Pond #17, and Pond #28 now exist. Since establishment of the fish and wildlife management program, five old mill ponds have been renovated and improved; 12 excavated borrow pits have been converted to usable fish ponds and wetland sites; and 10 impoundments have been constructed (DEH, 1992a).

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes a subjective evaluation of water

quality at the 68 sites sampled for fish. Impacts at each site were ranked as severe, moderate, minimal, or none. Most sites had minimal to moderate disturbance in terms of effects on water quality.

The INRMP contains a list (Section 7-5a) of 24 man-made ponds and 24 significant streams, branches, and rivers on Fort Stewart/Hunter Army Airfield.

There are three distinct aquifer systems in the Fort Stewart region. The principal artesian aquifer is a deep sequence of limestones of Eocene to Oligocene age, the primary source of large ground water withdrawals in the coastal area. This aquifer is generally 300 to 500 feet below the surface and is comprised of two distinct layers. The upper layer is derived from the Oligocene Series of sandy, phosphatic limestone and is not generally used as a water source. It is underlain by the Ocala Limestone of Eocene age (Prentice Thomas and Associates, Inc., 1996).

The principal artesian aquifer is overlain by two shallow aquifer systems. A 120 to 150 meters thick series of Miocene clays, sandy clays, and gravel lies directly above the principal artesian aquifer. Several industries in the coastal area have wells with yields greater than 200 gallons per minute from this aquifer. It is recharged largely by percolation from the surface aquifer, as well as some discharge from the principal artesian aquifer (Prentice Thomas and Associates, Inc., 1996).

The surface aquifer is composed of a relatively thin layer of sands, gravels, and clays, extending to a depth of approximately 25 meters near the coast. The surface aquifer is recharged directly from rainfall percolating through sediments. During dry months the base flow of streams and rivers of the coastal area is maintained by discharge from the surface aquifer. Water quality varies from very low total dissolved solids to slightly alkaline, moderately hard water. The two shallow aquifer systems are used almost exclusively for domestic water, but primarily as a secondary water supply rather than for drinking water (Prentice Thomas and Associates, Inc., 1996).

A significant aquifer recharge area is located in the southwestern corner of Fort Stewart. This area has been mapped by the Geologic Survey Branch of the Georgia Environmental Protection Division.

4.6 Biological Resources

4.6.1 Flora

The mixed forest biome that once existed in the Southeast has been broadly altered or replaced. The fire-dependent regional climax communities of longleaf pine/wiregrass and ancillary habitat types that depend on the longleaf community comprise the overall ecological unit managed by this Plan. The longleaf pine community is the keystone component of the ecological unit and serves as a focal point for management efforts. Optimal management of this ecological unit is highly compatible with military training. This compatibility stems from the ecological unit's tolerance to such environmental factors as fire, mechanical damage, and disease, as well as its characteristic open, park-like stands, which are essential for visibility during maneuver training. Additionally, this type of management provides very good wildlife habitat (DEH, 1992a).

On a very broad scale, there are four types of ecosystems on Fort Stewart... sandhills, pine flatwoods, upland forests, and wetlands (Elfner, 1996). The installation contains 158,869 acres of upland forest, 82,148 acres of forested wetlands and 38,253 acres of clearings.

Floral and faunal diversity, habitat productivity, and environmental stability are greatly enhanced by the persistence of a well defined mosaic of natural habitat types. A standard method of describing natural environments of Georgia (*The Natural Environments of Georgia*, by Charles H. Wharton, 1978) was used to classify Fort Stewart/Hunter AAF habitats and is described in Section 8-1b of the INRMP.

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) includes descriptions (Section V) of 36 conservation sites for Fort Stewart/Hunter AAF. Conservation sites were defined as "*areas of significant biodiversity, harboring concentrations of rare species and containing highly intact natural communities*". Information included in the Inventory for each conservation site includes site name, size, rank (A, B, or C), training area, Natural Heritage resource summary, site description, threats to sites, monitoring and research recommendations, management recommendations, and management comments.

The Nature Conservancy (1995) found 1,066 taxa from 724 sites on Fort Stewart/Hunter AAF. Species found represent 465 genera and 139 families.

4.6.1.1 Threatened, Endangered, or Special Concern Plants

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) provided a comprehensive list of plant species listed pursuant to federal law (Endangered Species Act) or Georgia state law (Endangered Wildlife Act of 1973 and Wildflower Preservation Act of 1973). Species identified by the inventory are as follows:

Species	Common Name	Federal Status*	State Status*	Global Rank*	State Rank*
Agromonia incisa	incised groovebur	SC		G3	S2S3
Balduina atropurpurea	purple honeycomb head	SC	R	G2G3	S2
Bumelia thornei	swamp buckthorn	SC	E	G1Q	S1?
Elliottia racemosa	Georgia plume		T	G2G3	S2S3
Fothergilla gardenii	dwarf witch-alder		T	G4	S2
Litsea aestivalis	pondspice	SC	T	G4G5	S2
Physotegia leptophylla	narrowleaf obedient plant		T	G4G5	SH
Sarracenia minor	hooded pitcher plant		U	G4G5	S4
Stewartia malacodendron	silky camellia		R	G4	S2

* E - Endangered (federal and state code)
T - Threatened (federal and state code)
SC - Species of Concern (federal)
R - Rare (state)
U - Unusual (state)
S1 or G1 - Critically imperiled because of extreme rarity
S2 or G2 - Imperiled because of rarity

S3 or G3 - Either very rare and local throughout its range or found locally, even abundantly, in a restricted range

S4 or G4 - Apparently secure, although it may be quite rare in parts of its range, especially at the periphery

S5 or G5 - Demonstrably secure, although it may be rare in parts of its range, especially at the periphery

SH or GH - Of historical occurrence, perhaps having not been verified in the past 20 years and suspected to still be extant

4.6.1.2 Forest Inventory

A forest inventory was completed toward in 1998. This intensive inventory has 35,000 plots in stands selected from aerial photographs. There are at least 10 plots per stand. The data has been digitized into a GIS compatible format for utilization in the development of natural resources management prescriptions.

4.6.1.3 Wetlands

Fort Stewart contains approximately 82,148 acres of U.S. Fish and Wildlife Service classified wetlands. Palustrine wetlands comprise 77.3% of the total, while forested wetlands comprise 68.8% of the Palustrine system. Hunter AAF contains approximately 1,400 acres of wetlands, of which 58.9% are classified as Palustrine, while forested wetlands comprise 56.4% of the Palustrine system (DEH, 1993a).

4.6.2 Fauna

The Fort Stewart/Hunter AAF area has a rich and diverse fauna. However, natural animal communities in the area, especially large mammals, have been affected by urbanization. Two prominent examples are panthers (*Felis concolor*) and black bears (*Ursus americanus*), which were extirpated from the area prior to military occupation. White-tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*) are common, as are many smaller mammals, which are relatively undisturbed by urbanization (Prentice Thomas and Associates, Inc., 1996). A list of confirmed species from Fort Stewart/Hunter AAF is included in Appendix 8-3 of the INRMP.

4.6.2.1 Game Fish and Wildlife Species

The following fish and wildlife species are actively managed as game for sport hunting or fishing:

COMMON NAME	SCIENTIFIC NAME
Birds:	
Wood duck*	*Aix sponsa*
Eastern wild turkey	*Meleagris gallopavo*
Bobwhite quail	*Colinus virginianus*
Mourning dove	*Zenaida macroura*

*Numerous species of huntable waterfowl have been observed on Fort Stewart/Hunter AAF.

Mammals:	
Eastern gray squirrel	*Sciurus carolinensis*
Eastern fox squirrel	*Sciurus niger*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Feral hog	*Sus scrofa*
White-tailed deer	*Odocoileus virginianus*

Fish:	
Largemouth Bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Redear Sunfish	*Lepomis microlophus*
Channel Catfish	*Ictalurus punctatus*
Black Crappie	*Pomoxis nigromaculatus*
Hybrid Striped Bass	*Morone* sp.

4.6.2.2 Nongame Birds and Mammals

A list of confirmed bird and mammal species from Fort Stewart/Hunter AAF is in Appendix 8-3 of the INRMP.

4.6.2.3 Fish

The Fort Stewart Inventory (The Nature Conservancy, 1995) included a detailed fish survey. A list of fish species from Fort Stewart/Hunter AAF is in Appendix 8-3 of the INRMP.

4.6.2.4 Reptiles and Amphibians

The Fort Stewart Inventory (The Nature Conservancy, 1995) included a detailed reptile and amphibian survey. A list of reptile and amphibian species from Fort Stewart/Hunter AAF is in Appendix 8-3 of the INRMP.

4.6.3 Threatened, Endangered, or Special Concern Animals

The *Fort Stewart Inventory* (The Nature Conservancy, 1995) provided a comprehensive list of plant species listed pursuant to federal law (Endangered Species Act) or Georgia state law (Endangered Wildlife Act of 1973 and Wildflower Preservation Act of 1973). Species identified by the inventory are as follows:

Species	Common Name	Federal Status*	State Status*	Global Rank*	State Rank*
Insect					
Cordulegaster sayi s.	Say's spiketail dragonfly	SC			
Birds					
Aimophila aestivalis	Bachman's sparrow	SC	R	G3	S3
Elanoides forficatus	swallow-tailed kite		R		
Falco peregrinus	Peregin Falcon		E		
Falco sparveniuspaulus	southeastern American kestrel	SC			
Haliaeetus leucocephalus l.	southern bald eagle	T	E	G	S
Mycteria americana	wood stork	E	E	G	S
Picoides borealis	red-cockaded woodpecker	E	E	G2	S2
Sterna antillarum	least tern		R		
Reptiles					
Drymarchon corais couperi	eastern indigo snake	T	T	G4T3	S3
Gopherus polyphemus	gopher tortoise	SC	T	G2	S3
Heterdon simus	southern hognose snake	SC		G4G5	S3
Pituophis melanoleucus mugitus	Florida pine snake	SC		G5	S3
Amphibians					
Ambystoma cingulatum	flatwoods salamander	T	R	G4	S3
Notophthalmus perstriatus	striped newt	SC	R	G3	S2
Rana areolata capito	Carolina gopher frog	SC		G4	S3
Fish					
Acipenser brevirostrum	shortnose sturgeon	E	E	G2	S2

* E - Endangered (federal and state code)

T - Threatened (federal and state code)
SC - Species of Concern (federal)
R - Rare (state)
S1 or G1 - Critically imperiled because of extreme rarity
S2 or G2 - Imperiled because of rarity
S3 or G3 - Either very rare and local throughout its range or found locally, even abundantly, in a restricted range
S4 or G4 - Apparently secure, although it may be quite rare in parts of its range, especially at the periphery
S5 or G5 - Demonstrably secure, although it may be rare in parts of its range, especially at the periphery

4.7 Cultural Resources

Below information on cultural resources on Fort Stewart/Hunter AAF is taken from *Fort Stewart and Hunter Army Airfield Historic Preservation Plan* (draft) (Thomas Prentice and Associates, Inc., (1996).

4.7.1 Summary of Archeological Record

Scant finds on Fort Stewart/Hunter AAF suggest that the area was not used much by Paleoindians (10000 - 8000 B.C.). Few Early and Middle Archaic (8000 - 3000 B.C.) artifacts have been found on Fort Stewart/Hunter AAF, but there are likely more sites buried in deep, subsurface contexts. As expected, there have been a greater number of finds from the Late Archaic (3000 - 1000 B.C.) on the installation, including water-related and interior sites.

The Woodland Period (1000 B.C. - A.D. 1150) was a time of cultural growth of the people in southeastern Georgia. It is represented on Fort Stewart/Hunter AAF by 25 sites. Distribution of these sites is probably more reflective of past survey biases rather than actual distribution of activity.

The Mississippian Period (A.D. 1150 - 1550) witnessed the most complex social/political organization of the peoples of the area. Mississippian people inhabited the area at the time of European arrival. During this period Fort Stewart/Hunter AAF was more occupied by Savannah populations (35 sites) than any occupation during earlier periods.

No traces of the first almost two centuries (Discovery through 1715) of colonial exploration of the southeastern seaboard have been found on Fort Stewart/Hunter AAF. One area in the vicinity of the extreme southeastern tip of Fort Stewart was likely used toward the end of the Pre-Colonial Influence (1715 - 1732), a Native American settlement called "*the Yamassee Camp*." In ca. 1730 Savannah was founded, and this had a profound influence on the area today occupied by Hunter AAF, as the city developed.

The Colonial Presence (1732 - 1775) saw the beginning of European settlement, which would set land use patterns that continued until Camp Stewart was established in 1940. The following settlements have been documented on Fort Stewart: Fort Argyle, Sterling Creek settlements, Barbecue Creek settlements, Cross Swamp settlements, Fort Argyle settlements, and Taylor's Creek Camp. During this period agriculture and timber production were major industries, as is true in the area today. The earliest historic occupation site in the Hunter AAF area is the McNish Site, and six other sites are likely from this period.

The Revolutionary War had very little impact on the Fort Stewart/Hunter AAF area. No specific Revolutionary War sites have been found on the installation.

The Early American Period (1782 - 1820) was a time of increasing settlement within the Fort Stewart area. Specific Early American sites on Fort Stewart include roads and settlement areas around Fort Argyle and Taylor's Creek, and six archeological sites may have been used in the late Eighteenth Century.

The Antebellum Period (1820 - 1860) brought substantial change to the area, but in a steady growth manner, rather than via dramatic events. No archeological sites on Fort Stewart can be linked specifically to the Antebellum Period. However four sites, which can only be dated to the Nineteenth Century, may have been used during this pre-Civil War period. There are cemeteries on Fort Stewart with Antebellum Period burials. Few farms were found in the Hunter AAF area at the time of the Civil War.

The Civil War (1861 - 1865) greatly disrupted economic and social life in the area, but no major military actions occurred there. Union troops, however, came through the area, including sites on Fort Stewart.

Reconstruction (1865 - 1880) marked economic recovery and socio-political adjustment for the South as a whole, including the Fort Stewart/Hunter AAF area. Only churches and cemeteries on the installation have specifically been identified with the Reconstruction, but four sites may have been used during this period.

New Growth (1880 - 1920) was a time of continued agricultural and forest product use in the area, as well as increased populations in general. The Fort Stewart archeological inventory includes 152 sites with both Nineteenth and Twentieth Century use. Another 19 sites are dated within the Twentieth Century. Seventeen of these 171 sites have been specifically dated to the New Growth period. Settlement in the Hunter AAF area slowly increased during the opening decades of the Twentieth Century.

The American Period (1920 - 1940) began with the "Roaring Twenties" which affected the area less than in many other parts of the country. Similarly, the Great Depression had a lessened effect on the area than in other parts of the nation, but its impacts were certainly felt by area residents. Many of these dampened economic effects may have been the result of a general dependence on agriculture and timber, which were locally produced. Small farms and unpretentious homes were the norm in the Fort Stewart area prior to Army acquisition. The communities of Willie, Taylor's Creek, and Clyde were the most important on the future Fort Stewart area. Many of the 171 sites on Fort Stewart dated to both the Nineteenth and Twentieth and only the Twentieth centuries may have been occupied during the American Period, but little information is available on these sites.

In 1928 the City of Savannah purchased land for what was later to become Hunter AAF. Like Fort Stewart, Hunter AAF has no formally recorded sites dating to the time of military proprietorship, but they undoubtedly exist.

Prentice Thomas and Associates, Inc. (1996) (pages 148-155 and 168-169) and Section 2-5 of the INRMP summarize activities on Fort Stewart and Hunter AAF since Army occupation in 1940.

4.7.2 Cultural Resources Survey Results

Thomas Prentice and Associates, Inc. (1996) list (Table 2-1, p.14) the 41 cultural resources investigations at Fort Stewart/Hunter AAF over the past 25 years. To date, 902 sites and 50 isolated finds have been identified on the installation.

Of the 280,000 acres on Fort Stewart, about 50,000 have been surveyed with finds plotted. Much of the 3,777-acre cantonment area will likely be eliminated from future survey as will the 28,736 acres within ordnance-dudded impact and explosive ordnance areas of the post. Thus, a minimum of 197,487 acres remains to be surveyed at Fort Stewart.
At Hunter AAF, 929 acres have been adequately surveyed for cultural resources; 789 acres are highly developed with most likely to be excluded from survey needs; and 1,535 acres in hazardous areas with reconnaissance and consultation required to determine the feasibility for survey. The remaining 1,637 acres have had low intensity investigation, but will require systematic interval survey.

5.0 ENVIRONMENTAL CONSEQUENCES

As discussed in Section 3.0 of this document, three alternatives are considered feasible:

a. The proposed action with full implementation of the INRMP.
b. The partial implementation of the INRMP alternative.
c. The other options alternative considering management strategies not included within the INRMP.

Therefore, the impact on various systems in the affected environments will be assessed based on these three alternatives.

Neither the proposed action nor the partial implementation alternative would have significant negative environmental consequences compared to existing conditions. The other options alternative could have a wide range of environmental consequences, ranging from very positive to very negative on various components of the Fort Stewart/Hunter AAF environment. The alternatives differ significantly in their ability to proactively manage natural resources, support the military mission, mitigate environmental damage due to the Army mission, and comply with environmental laws.

The INRMP provides guidelines for managing natural resources, a course of action designed to significantly improve the management of Fort Stewart/Hunter AAF's natural resources. The INRMP allows flexibility in management options as more information becomes available based on ongoing and planned studies.

5.1 Geology and Soils

5.1.1 Proposed Action

The proposed action includes an integrated program for the planning of land use, evaluation of land use effects, and maintenance and repair of damaged lands. Brief periods of increased erosion would occur during damaged sites maintenance and rehabilitation activities, but these would be more than

compensated through increased environmental awareness while training; use of maneuver islands, hardened stream crossings, and established roads and trails; repair of significant erosion sites; and including natural resources implications in military project planning. Additionally, land disturbing activities that result in erosion require implementation of preventative and corrective actions in accordance with the *Field Manual for Erosion and Sediment Control in Georgia* (1997) and the more detailed reference, *The Manual for Erosion and Sediment Control in Georgia*. There may be slight increases in erosion during bare ground aspects of supplemental food planting operations, construction of pond dams, harvesting timber, and other projects which disturb the soil, but the plan includes provisions to minimize erosion during and following these actions. The proposed action offers the most effective protection and mitigation for damages incurred to soils due to the Army mission.

5.1.2 Partial Implementation

The partial implementation alternative offers a less comprehensive program for the control and repair of negative soil impacts than the proposed action. Partial implementation of the INRMP, implying partial implementation of ITAM, would reduce the planning capabilities of the program, so that the emphasis would be on repairing highly visible and disruptive damage rather than preventing or minimizing such damage to soils. Consequently, negative soil impacts would be greater with partial implementation than under the proposed action.

5.1.3 Other Options

The Army's ITAM program is the most advanced intensive land management program in existence for preventing and mitigating damage to lands by military operations, so it is difficult to envision other options which would provide a more comprehensive package for the protection of soils on Fort Stewart/Hunter AAF.

Almost any other option would likely provide less protection and mitigation of soil losses than the proposed action, since other programs are not specifically developed to deal with military related activities impacts on the soils. Other options could range from intensive traditional erosion control programs which would provide relatively good soils protection to virtually no erosion control or damage prevention which would have extremely negative effects on Fort Stewart/Hunter AAF soils (and associated vegetation) over the next five years.

5.2 Water Resources

The INRMP includes surface and ground water monitoring, but water quality, except as it directly relates to fisheries management, is not a natural resources program within the Army environmental program. Rather due to water quality laws, it is considered a compliance program, and is the primary responsibility of the Environmental Branch.

However, the INRMP describes programs which impact surface water quality, namely, erosion control and fisheries-related water quality monitoring and fish kill investigations. Below discussions relate to these programs, not the water quality program as a whole.

5.2.1 Proposed Action

The proposed action includes perhaps the Army's most intensive fisheries management program, which includes an intensive water quality monitoring component. Fort Stewart/Hunter AAF employs a full time fisheries biologist who is part of the installation spill response team, specializing in fish kill investigations.

The proposed action includes an integrated program for the planning of land use, evaluation of land use effects, and management and repair of significantly eroding lands. The proposed action describes projects to evaluate effects of sedimentation from stream crossings and to harden crossings to protect stream bank/bottom integrity and minimize erosion. Brief periods of increased sedimentation are likely during repair and construction activities, but these should be more than compensated for by the reduction in sedimentation resulting from use of hardened stream crossings and established roads and trails, repair of significant erosion sites, and by including natural resources implications in military project planning. The proposed action offers the most effective mitigation for damages incurred to surface waters due to the Army mission. Implementation of the proposed action would not affect groundwater.

The proposed action includes implementation of *Georgia's Best Management Practices for Forestry* (Georgia Forestry Association, January 1999) and the *Field Manual for Erosion and Sediment Control in Georgia* (Georgia Soil and Water Conservation Commission, 1997) are published specifically for the protection of water quality in Georgia. These practices outlined in these publications are important actions with regard to implementation of the forest ecosystem management program and provisions of the Clean Water Act on Fort Stewart/Hunter AAF.

5.2.2 Partial Implementation

Partial implementation, by definition, offers a less comprehensive program than the proposed action for the control and repair of damaged areas which contribute the most sedimentation. Partial implementation of ITAM would reduce the planning capabilities of the program, so that the emphasis would be on repairing highly visible and disruptive damage rather than preventing or minimizing sedimentation from ongoing military activities. Consequently, sedimentation of surface waters would be greater than under the proposed action. Partial implementation could easily reduce water quality monitoring relating to fisheries management, which could lead to a degradation of small impoundment water quality. It could also lead to a lesser response to fish kills which are often indicators of significant threats to water quality.

5.2.3 Other Options

The Army's ITAM program is the most advanced intensive land management program in existence for preventing and mitigating damage to lands by military operations, so it is difficult to envision other options which would provide a more comprehensive package for the protection of surface water quality from sedimentation on Fort Stewart/Hunter AAF. The ITAM Environmental Awareness component includes using education to minimize petroleum product spills while training on Fort Stewart/Hunter AAF, which will help minimize pollution of surface and possibly ground water.

Almost any other option would likely provide less protection of soils and mitigation of sedimentation than the proposed action, since other programs are not specifically developed to deal with military related activities impacts on soils and watersheds. Other options could range from intensive traditional erosion

control programs which would provide relatively good sedimentation protection to virtually no erosion control which would have negative effects on Fort Stewart/Hunter AAF wetlands and surface water quality in areas of heavy military use over the next five years.

5.3 Biological Resources

5.3.1 Proposed Action

The proposed action would provide management of faunal and floral resources at Fort Stewart/Hunter AAF on an integrated basis. The INRMP uses an ecosystem management strategy to achieve biological diversity conservation, in accordance with the Department of Defense Biodiversity Initiative (The Keystone Center, 1996). It emphasizes the use of native species, as emphasized on the Presidential memorandum to the heads of federal agencies (Office of the President, 1994). The INRMP provides specific means to comply with the biological opinion on threatened or endangered species (U.S. Fish and Wildlife Service, 1992), which requires, among others, the restoration of the longleaf pine-wiregrass ecosystem on Fort Stewart/Hunter AAF.

The plan includes specific actions to manage the forest ecosystem including wildlife habitat manipulations, wildlife population management, preparation and implementation of five threatened/endangered species plans, cantonment area habitat improvement, protection of sensitive ecological areas, and an integrated approach to pest management. These programs include the use of year-round prescribed burning and forest management techniques to restore and maintain the longleaf pine-wiregrass ecosystem, monitoring a wide variety of plants and animals and surface water quality, minimizing damage to wildlife habitat by troops and other users, wetlands protection, and means to reduce nonpoint pollution of surface waters.

The proposed action would be beneficial to the recovery of threatened or endangered species. It would also facilitate the identification of any additional species in these categories. Implementation of NEPA under this INRMP would provide a methodology to help ensure compliance with laws and regulations affecting biological resources at Fort Stewart/Hunter AAF.

This INRMP also provides a means to use biological resources for a wide variety of human uses, a major tenant of ecosystem management. These uses include military training, the production of forest products, and a wide variety of outdoor recreational uses, including hunting, fishing, boating, camping, and others.

5.3.2 Partial Implementation

The alternative action would be less effective than the proposed one since it would emphasize reaction to problems rather than a proactive approach to natural resources management. Partial implementation of the INRMP would likely emphasize responses to current needs to support the military mission as well as site specific responses to environmental compliance. Overall surveys and monitoring of natural resources as well as long term programs would be lower priority. A partial implementation approach would probably achieve compliance with laws, but it would not provide as many benefits to biological resources.

This alternative would probably comply with the letter of the law regarding the Endangered Species Act, but its overall effects on threatened or endangered species recovery would be significantly less than the proposed action. Implementation of this alternative would decrease outdoor recreational opportunities

associated with biological resources on Fort Stewart/Hunter AAF. Partial implementation would decrease the amount of renewable timber which would be produced for the market.

5.3.3 Other Options

Management options selected within the INRMP are the result of decades of on-the-ground management of forests and biological resources on Fort Stewart/Hunter AAF as well as countless consultations with local and regional resources management professionals. The INRMP package represents the best opinions of Fort Stewart/Hunter AAF natural resources personnel as well as those of cooperating partner agencies.

Therefore, the other options, as a total package, would likely produce a lesser degree of ecosystem-wide benefits or actually be detrimental to some biological resources. Below are a few examples of other options and their likely effects:

- The forest could be managed for optimum timber production. This would reduce or virtually eliminate the longleaf-wiregrass ecosystem and significantly reduce or even eliminate species that are dependent upon this ecosystem, including the red-cockaded woodpecker.
- Fort Stewart/Hunter AAF could be managed for maximum production of white-tailed deer and feral hogs, the two most popular hunting species. This would reduce biological diversity, especially those species which require older age pine forests.
- Fort Stewart/Hunter AAF could be managed primarily for old growth climax qualities (fire excluded). While this would benefit a few species of wildlife, it would be extremely detrimental to most game species and many nongame which require lower successional stages.
- Fort Stewart/Hunter AAF landscapes could be more intensively managed for human-related aesthetics qualities. This would reduce the amount of wildlife habitat for most native species, increase risks involved with more pesticide/herbicide use, reduce wetlands and associated species, and encourage the spread of exotic plant and animal species.

The other options alternative would likely produce a less-balanced effect on biological resources than the proposed action. However, the degree of effect would be dependent upon objectives of natural resources management and the degree of implementation applied.

5.4 Cultural Resources

5.4.1 Proposed Action

The proposed implementation of the INRMP would be beneficial to the identification and protection of historic resources. The INRMP does not emphasize cultural resources protection, but it contains provisions to locate historic sites if natural resources ground-disturbing projects are proposed for sites that are unsurveyed. The INRMP includes steps to protect cultural resources sites from damage during implementation of this plan. The natural resources management unit prescription process (Section 22-4) and NEPA (Chapter 20) are used to ensure protection of cultural resources while implementing the INRMP.

5.4.2 Partial Implementation

The partial implementation alternative would have no negative effects on cultural resources since Fort

Stewart/Hunter AAF would still have to comply with laws and policies requiring surveys prior to potential undertakings. It would probably somewhat enhance the effort to locate cultural sites, and such surveys would probably eventually lead to protection of these sites. However, the amount of survey would be lessened as a result of less projects under this alternative action.

5.4.3 Other Options

The other options alternative would have no negative effects on cultural resources since Fort Stewart/Hunter AAF would still have to comply with laws and policies requiring surveys prior to potential undertakings. Many other options are potential undertakings and would require cultural resources surveys, and if such sites were found, protection or mitigation alternatives would be implemented. The amount of survey would be determined by the number of ground-disturbing projects proposed for sites that are unsurveyed.

6.0 FINDINGS AND CONCLUSIONS

The 3rd Infantry Division (Mechanized) and Fort Stewart should implement an Integrated Natural Resource Management Plan at Fort Stewart/Hunter Army Airfield for the period 2001-2005 to manage natural resources, support the military mission, mitigate environmental effects of the overall military mission, and comply with various environmental laws. Full implementation of the plan will also ensure the continued use of Fort Stewart/Hunter AAF's natural resources for military training and outdoor recreational uses.

Implementing the Fort Stewart/Hunter AAF INRMP would result in no significant detrimental impacts to existing environmental systems. Minor adverse impacts on wildlife habitat and restriction of recreational access as a result of timber harvest activities will be mitigated by full implementation of restorative and proactive wildlife management provisions in the INRMP. There would be beneficial consequences to this plan, such as reducing impacts to soil, water, and biological resources, thereby avoiding violations of federal and state laws, including the Sikes Act, Endangered Species Act, Clean Water Act, and NEPA. This implementation would allow the Army to manage its natural resources at Fort Stewart/Hunter AAF in a proactive manner to meet current and future conservation needs.

Implementing the plan would not constitute a major Federal action significantly affecting the quality of the environment. A Finding of No Significant Impact, Appendix A, should be published.

7.0 PERSONS AND AGENCIES CONTACTED

Anderson, Tim - ORISE Biologist, Fish and Wildlife Branch
Andrews, Jeff - LCTA Field Crew Leader, Forestry Branch
Beaty, Tim - Supervisor, TES Management, Fish and Wildlife Branch
Brown, Drew- Integrated Training Area Management Coordinator, Range Division (Contractor)
Bryce, Thomas - Supervisor, Fisheries Management, Fish and Wildlife Branch
Bullard, Howard - Chief, Range Control Division
Caligiure, Joe - Range Scheduler, Range Control Division
Chipple, Susan - Director, Outdoor Recreation
Davis, Gene - Foreman, Fire Management, Forestry Branch

Harris, George - Environmental Specialist, Environmental Branch
Harvey, Grey - Chief, Game Warden (Acting), Law Enforcement Command
Hilliard, Tom - Chief, Forestry Branch
Hoyt, Pamela J (MAJ, MP) - Deputy Installation Provost Marshal, Law Enforcement Command
Keifer, Dale - Deputy, DPW (acting) and Chief, Environmental and Natural Resources Division
Mangun, Jeff - Supervisor, Fire Management, Forestry Branch
McKivergan, Dave - Consulting Archeologist, Bregman and Company, Incorporated
Moore, Pete - Supervisor, Wildlife Management, Fish and Wildlife Branch
Pearson, Jim - Integrated Training Area Management Coordinator, Range Division (Contractor)
Purcell, Jerry - Supervisor, Timber Management, Forestry Branch
Rahn, Arte - GIS Operator, ITAM, Forestry Branch
Rutland, Tressa - Environmental Engineer (Water), Environmental Branch
Stevenson, Dirk - Herpetologist, Fish and Wildlife Branch
Swindell, Linton - Chief, Fish and Wildlife Branch
Wright, Lana D. - Chief, Resource Management Office, Law Enforcement Command

8.0 REFERENCES

The INRMP contains 37 references. The below references were specifically cited in this Environmental Assessment.

Directorate of Engineering and Housing (DEH). 1992a. *Cooperative Management Plan for Conservation and Development of Fish and Wildlife Resources on Fort Stewart/ Hunter Army Airfield*. Department of Army, 24th INF Div (Mech) & Fort Stewart, GA. 188 pp + appendices.

_____. 1993a. *Fort Stewart/Hunter Army Airfield Land Management Plan*. Department of Army, 24th Infantry Division (Mech) & Fort Stewart, GA. 3 pp + appendices.

Elfner, M.A. 1996. *Land Condition Trend Analysis Summary Report, Fort Stewart, Georgia, 1992 to 1994*. Unpublished draft report. Fort Stewart, GA. 68 pp.

Fort Stewart/Hunter Army Airfield. 1996. *Vision 2006*. 36 pp + maps.

Georgia Forestry Association. 1999. *Georgia's Best Management Practices for Forestry*. Wetlands Committee, Macon, GA. 68 pp.

Georgia Soil and Water Conservation Commission. 1997. *Field Manual for Erosion and Sediment Control in Georgia*. Athens, GA. 150 pp.

MARCOA Publishing Inc. 1995. *Fort Stewart and Hunter Army Airfield*. San Diego, CA. 47 pp + appendices.

Office of the President. 1994. *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*. Memorandum to Heads of Executive Departments and Agencies, April 26, 1994. The White House, Washington, D.C. 3 pp.

Prentice Thomas and Associates, Inc. 1996. *Fort Stewart and Hunter Army Airfield Historic*

Preservation Plan (draft). Report of Investigations No. 261. Contract No 1443CX500093047, administered by the National Park Service, Southeast Region. Technical Synthesis Volume - 328 pp; Planning Manual Volume - 175 pp.

Terrain Analysis Center. 1976. *Terrain Analysis of Fort Stewart*. U.S. Army Corps of Engineer Topographic Laboratories, Fort Belvoir, VA 22060.

The Keystone Center. 1996. *A Department of Defense (DoD) Biodiversity Management Strategy*. Keystone Center Policy Dialogue on Department of Defense (DoD) Biodiversity, Final Report. Keystone, CO. 38 p.

The Nature Conservancy. 1995. *Fort Stewart Inventory*. Final Report. Pembroke, GA.

U.S. Army Corps of Engineers. 1990. *Evaluating the On-Going Mission and Future Directions at Fort Stewart, Georgia*. Draft Environmental Assessment, Environmental Resources Branch, Savannah, GA. 176 pp.

U.S. Fish and Wildlife Service. 1992. *Effects of Military Training and Associated Activities at Fort Stewart and Hunter Army Airfield on Endangered and Threatened Species*. Biological Opinion. July 15. Atlanta, GA. 33 pp.

Wharton, C.H. 1978. *The Natural Environments of Georgia*. Georgia Department of Natural Resources, Atlanta, GA.

APPENDIX A

FINDING OF NO SIGNIFICANT IMPACT

INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN FORT STEWART/HUNTER ARMY AIRFIELD, GEORGIA

1. **Description of Action.** The 3rd Infantry Division (Mechanized) and Fort Stewart proposes to implement an Integrated Natural Resource Management Plan at Fort Stewart/Hunter Army Airfield for the period 2001-2005 to manage natural resources, support the military mission, provide outdoor recreation opportunities, provide timber products, and comply with various environmental laws.

   Implementation will be ongoing operations over the five-year period using both in-house and external personnel. The primary thrust of the program will be to survey natural resources and implement programs to conserve and manage them in a proactive manner, avoiding conflicts with environmental laws and regulations.

2. **Anticipated Environmental Effects.** The only significant adverse impacts identified were temporary increases in soil erosion and resulting sedimentation of surface waters during land rehabilitation, wildlife supplemental food planting tillage, and timber harvest actions. Potential negative impacts would be more than offset by positive impacts of implementing this Integrated Natural Resources Management Plan. No adverse impact is expected to occur to any federally-listed threatened or endangered plant or animal species. Preparation and implementation of five management plans for these species will positively affect all federally-listed species on Fort Stewart/Hunter Army Airfield.

   No significant adverse environmental impacts are anticipated for air quality, geology, soils, water quality, biological resources, or cultural resources. This proposed action will positively impact most of these resources.

3. **Conclusions.** Based on a review of the information contained in this Environmental Assessment, it is concluded that the implementation of the Fort Stewart/Hunter Army Airfield Integrated Natural Resources Management Plan is not a major federal action which would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is not required.

4. Point of Contact. Requests for further information or submittal of public comments may be made for 30 days after first publication date to:

Directorate of Public Works
Environmental and Natural Resources Division
Fort Stewart, Georgia 31314
Telephone (912) 767-5476

Reviewed by:

TOM HILLIARD, Chief, Forestry Branch
Directorate of Public Works
Environmental and Natural Resources Division
Fort Stewart, Georgia 31314

LINTON SWINDELL, Chief, Fish and Wildlife Branch
Directorate of Public Works
Environmental and Natural Resources Division
Fort Stewart, Georgia 31314-4928

THOMAS C. FRY
Chief, Environmental and Natural Resources Division
Fort Stewart, Georgia 31314

GREGORY V. STANLEY
Colonel, U.S. Army
Directorate of Public Works
Fort Stewart, Georgia 31314-4928

Approved by:

WILLIAM R. BETSON
Colonel, U.S. Army
Garrison Commander
Fort Stewart, Georgia 31314-5000

Environmental Assessment
Integrated Natural Resources Plan
34
Fort Stewart/Hunter Army Airfield
Georgia

APPENDIX C

EA - COMMENTS

INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN
FORT STEWART/HUNTER army AIRFIELD, GEORGIA

Notice of Availability
Environmental Assessment (EA) and
Finding of No Significant Impact (FONSI)
Integrated Natural Resources Management Plan
& INRMP Environmental Assessment
Fort Stewart, Georgia

The United States Army, 3d Infantry Division (Mechanized) and Fort Stewart give notice of the availability of the Integrated Natural Resources Management Plan (INRMP) and accompanying Environmental Assessment (EA) for Fort Stewart, Georgia. The INRMP is a 5-year plan that guides implementation of the natural resources on Fort Stewart and Hunter Army Airfield from 2001-2005. This plan is developed to conserve, maintain and enhance the training lands so as to accomplish the installation's critical military mission. This plan helps ensure compliance with all related environmental laws and regulations. The INRMP outlines goals and policies in five general areas: military readiness, stewardship, quality of life, compliance, and program integration. Plan elements discussed within the INRMP include: responsible parties, program history, installation flora and fauna, ecosystem status and management, inventorying and monitoring, ecosystem damage prevention, natural resources management, enforcement, awareness, outdoor recreation, cultural resources protection, and plan implementation. Natural resources management policies and practices are outlined in the plan for forest management, fish and wildlife management, and wetlands management. Appendices include the installation's Endangered Species Management Plans (ESMP) for all federally protected species known to occur on the installation. The accompanying EA discusses the impact of implementing the proposed INRMP at Fort Stewart on selected wetland areas, cultural resources, threatened and endangered species, and the surrounding environment. The EA, resulting in a FONSI, indicates that no significant adverse impact would result from the proposed action.

A copy of the INRMP, EA and FONSI are available for public review from March 21, 2001 through April 21, 2001 at the following public libraries. Any and all public review comments must be received no later than April 21, 2001.

Library	Hours of Operation
Fort Stewart Main Post Library Building 411 316 Lindquist Road Fort Stewart, Georgia	Mon. – Thurs. 10:30 a.m. to 9:00 p.m. Fri. - Closed Sat. – Sun. 11:30 a.m. to 6:00 p.m.
Liberty County Public Library 236 Memorial Drive Hinesville, Georgia	Mon. Thurs. 9:00 a.m. to 9:00 p.m. Fri. – Sat. 9:00 a.m. to 6:00 p.m. Sun. 2:00 p.m. to 6:00 p.m.
Mall Branch Library 7 Mall Annex Savannah, Georgia 31406	Mon. – Thurs. 9:00 a.m. to 9:00 p.m. Fri. – Sat. 9:00 a.m. to 6:00 p.m. Sun. 2:00 p.m. to 6:00 p.m.

Request all comments be mailed to the following address:

CHIEF, ENRD (MR. THOMAS C. FRY)
DIRECTORATE OF PUBLIC WORKS
HQS 3D IN DIV (MECH) AND FORT STEWART
1550 FRANK COCHRAN DRIVE
FORT STEWART, GA 31314-4927

EARD

OFFICE OF PLANNING AND BUDGET

ROY E. BARNES
GOVERNOR

WILLIAM M. TOMLINSON
DIRECTOR

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Col. Gregory V. Stanley
Department Of The Army
1113 Frank Cochran Drive
Fort Stewart, GA 31314-4928

WS 234pa 01

FROM: Z. J. Curry, Administrator
Georgia State Clearinghouse

DATE: 4/18/01

SUBJECT: Executive Order 12372 Review

PROJECT: EA-FONSI-Intergrated Nat. Res. Mgmt. Plan (INRMP)

STATE ID: GA010320003

CFDA#:

The State level review of the above referenced document has been completed. As a result of the environmental review process, the activity this document was prepared for has been found to be consistent with state social, economic, physical goals, policies, plans, and programs with which the State is concerned.

Additional Comments:

None.
The DNR, Game and Fish Commission was included in this review but chose not to comment during the review period. Should they have comments, they will contact you directly.

ENCL: Georgia Forestry Commission, April 2, 2001
DNR, Coastal Resources, April 10, 2001
Coastal Georgia Regional Development Center, April 16, 2001

Form SC-4-EIS-4
January 1995

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Z. J. Curry, Administrator
Georgia State Clearinghouse

FROM: MR. YORK PHILLIPS
COASTAL GEORGIA RDC

SUBJECT: Executive Order 12372 Review

PROJECT: EA-FONSI-Intergrated Nat. Res. Mgmt. Plan (INRMP)

STATE ID: GA010320003

DATE: 4/10/01

☑ This notice is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This notice is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. Additional pages may be used for outlining the inconsistencies).

☐ The criteria for developments of regional impact, federal executive orders, acts and/or rules and regulations administered by your agency. Negative environmental impacts or provision for protection of the environment should be pointed out. (Additional pages may be used for outlining the inconsistencies).

☐ This notice does not impact upon the activities of the organization.

Form SC-3
January 1995

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Z. J. Curry, Administrator
Georgia State Clearinghouse

FROM: MS. KELIE M. MATRANGOS
DNR/COASTAL RESOURCES DIVISION

SUBJECT: Executive Order 12372 Review

PROJECT: EA-FONSI-Intergrated Nat. Res. Mgmt. Plan (INRMP)

STATE ID: GA010320003

DATE: 4-10-01

☑ This notice is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This notice is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. Additional pages may be used for outlining the inconsistencies).

☐ The criteria for developments of regional impact, federal executive orders, acts and/or rules and regulations administered by your agency. Negative environmental impacts or provision for protection of the environment should be pointed out. (Additional pages may be used for outlining the inconsistencies).

☐ This notice does not impact upon the activities of the organization.

Form SC-3
January 1995

Stuart Stein 4/3/01

SIGNATURE

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Z. J. Curry, Administrator
Georgia State Clearinghouse

FROM: MR. GARLAND NELSON
FORESTRY COMMISSION

SUBJECT: Executive Order 12372 Review

PROJECT: EA-FONSI-Intergrated Nat. Res. Mgmt. Plan (INRMP)

STATE ID: GA010320003

DATE: 4-3-01

☒ This notice is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This notice is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. Additional pages may be used for outlining the inconsistencies).

☐ The criteria for developments of regional impact, federal executive orders, acts and/or rules and regulations administered by your agency. Negative environmental impacts or provision for protection of the environment should be pointed out. (Additional pages may be used for outlining the inconsistencies).

☐ This notice does not impact upon the activities of the organization.

4/2/01

Form SC-3
January 1995

EMRD
Action - FYI

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Col. Gregory V. Stanley GVS 27 Mar 01
Department Of The Army
1113 Frank Cochran Drive
Fort Stewart, GA 31314-4928

FROM: Georgia State Clearinghouse

DATE: 3/20/01

SUBJECT: Executive Order 12372 Review

APPLICANT: Department Of Army/Fort Stewart

PROJECT: EA-FONSI-Intergrated Nat. Res. Mgmt. Plan (INRMP)

CFDA #:

STATE ID: GA010320003

FEDERAL ID:

Correspondence related to the above project was received by the Georgia State Clearinghouse on 3/20/01. The review has been initiated and every effort is being made to ensure prompt action. The proposal will be reviewed for its consistency with goals, policies, plans, objectives, programs, environmental impact, criteria for Developments of Regional Impact (DRI) or inconsistencies with federal executive orders, acts and/or rules and regulations, and if applicable, with budgetary restraints. The initial review process should be complete by 4/18/01.

If the Clearinghouse has not contacted you by that date, your proposal may be considered consistent. In that event, forward this receipt to the funding agency to show compliance with Executive Order 12372 or make it part of the federal record for this project.

In future correspondence regarding this project, please include the State Application Identifier number shown above. If you have any questions regarding this project, please contact us at (404) 656-3855.

Form SC-1
January 1995

DEPARTMENT OF THE ARMY
HEADQUARTERS, 3D INFANTRY DIVISION (MECHANIZED) AND FORT STEWART
FISH AND WILDLIFE BRANCH
1113 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-4928

REPLY TO
ATTENTION OF

AFZP-PWV-W (200-1a) March 19, 2000

MEMORANDUM FOR COMMANDER, FORCES COMMAND, ATTN: AFEN-ENE (MR. EDWARD HILL), 1777 HARDEE AVENUE SW., FORT MCPHERSON, GEORGIA 30330-1062

SUBJECT: Review of Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI) for the Draft Integrated Natural Resource Management Plan for Fort Stewart/Hunter Army Airfield, Georgia

1. Respectfully request your review of the enclosed EA and FONSI. Please provide your comments to this office on or before 21 April 2001.

2. Your comments and/or concurrence is appreciated. If you have any questions or require further information, please contact Mr. Linton Swindell of the Fish and Wildlife Branch at (912) 767-2584 COMM or 870-2584 DSN.

FOR THE COMMANDER:

Encl

GREGORY V. STANLEY
COL, EN
Director, Public Works

STATE OF GEORGIA
COUNTY OF Liberty

Personally appeared before me, the undersigned Notary Public

Mark Griffin

who after being duly sworn state under oath that he is the

Publisher

of the Coastal Courier newspaper, a newspaper of general circulation published in th city of Hinesville, Georgia, and who further states under oath that the advertisement attached hereto and made a part of this affidavit appeared in the Frontline on MAR. 22 2001

Marshall Griffin

Sworn to and subscribed before me,

this 22nd day of MAR, 2001.

Elly Mattingly

My commission expires

ELLY MATTINGLY NOTARY PUBLIC LIBERTY COUNTY, GA My Comm. Exp. Dec. 9, 2003

Errors - The liability of the publisher on

STATE OF GEORGIA
COUNTY OF Liberty

Personally appeared before me, the undersigned Notary Public

Mark Griffin

who after being duly sworn state under oath that he is the

Publisher

of the Coastal Courier newspaper, a newspaper of general circulation published in th city of Hinesville, Georgia, and who further states under oath that the advertisement attached hereto and made a part of this affidavit appeared in the Coastal Courier on MAR. 21, 2001

Sworn to and subscribed before me,

this 21st day of MAR., 2001.

Kelli Mattingly

My commission expires

KELLI MATTINGLY NOTARY PUBLIC LIBERTY COUNTY, GA My Comm. Exp. Dec. 9, 2003

Errors - The liability ...

AFFIDAVIT OF PUBLICATION
SAVANNAH MORNING NEWS

STATE OF GEORGIA
COUNTY OF CHATHAM

Personally appeared before me, LYNNETTE TUCK, to me known, who being sworn, deposes and says:

That she/he is the CLASSIFIED INSIDE SALES MANAGER of Southeastern Newspaper Corporation, a Georgia corporation, doing business in Chatham County, Ga., under the trade name of Savannah Morning News, a daily newspaper published in said county;

That she/he is authorized to make affidavits of publication on behalf of said published corporation;

That said newspaper is of general circulation in said county and in the area adjacent thereto;

That she/he has reviewed the regular editions of the Savannah Morning News, published on:

3-21, 2001, _____, 2001,

_____, 2001, _____, 2001,

and finds that the following advertisement, to-wit:

Appeared in each of said editions.
Sworn to and subscribed before me

This 21 day of Mar, 2001

Lynnette Tuck
(Deponent)

Lillie D. Lang
Notary Public, Chatham County, Ga.

LILLIE D. LANG
Notary Public, Chatham County, Ga.
My Commission Expires Apr. 8, 2001

TAB D

DEPARTMENT OF THE ARMY
HEADQUARTERS, 3D INFANTRY DIVISION (MECHANIZED) AND FORT STEWART
DIRECTORATE OF PUBLIC WORKS
1557 FRANK COCHRAN DRIVE
FORT STEWART, GA 31314-4928

REPLY TO
ATTENTION OF

Directorate of Public Works

U.S. Department of the Interior
Fish and Wildlife Service
ATTN: Sandra S. Tucker
4270 Norwich St.
Brunswick, GA 31520

Dear Ms. Tucker:

In accordance with the Sikes Act, we have prepared an Integrated Natural Resource Management Plan (INRMP) for Fort Stewart and Hunter Army Airfield. The INRMP includes a multi-species Endangered Species Management Plan (ESMP) for the red-cockaded woodpecker, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander. Your office has already provided valuable input during the development of the plan, including review of the draft document. The completed plan is now ready for review and signature by the Regional Director.

A Biological Evaluation for the implementation of the INRMP and ESMP is also provided for your review. Implementation of the INRMP/ESMP will benefit the installation's threatened and endangered species populations. However, the plan's training restrictions for endangered species cannot completely preclude the possibility of accidentally taking individual animals or important habitat components incidental to the conduct of training activities. Imposition of additional restrictions beyond those provided by the INRMP/ESMP would have unacceptable adverse impacts on the Army's ability to train effectively at Fort Stewart. It is our conclusion that implementation of the INRMP/ESMP may adversely affect individual red-cockaded woodpeckers, eastern indigo snakes, bald eagles, wood storks, and flatwoods salamanders by incidental taking. We therefore request formal consultation in accordance with section 7 of the Endangered Species Act so that an incidental take authorization can be granted.

We believe that an appropriate incidental take authorization should provide for accidental taking as described in the attached biological evaluation. It is our belief that implementation of the proactive management, protection, and monitoring programs provided for by the INRMP/ESMP will be more than adequate to minimize the likelihood and extent of such takings, and to mitigate for any takings that do occur, so that viable threatened and endangered species populations will be sustained.

We look forward to working cooperatively with you and your staff during the consultation process. If additional information is needed, please contact Mr. Tim Beaty, DPW Fish & Wildlife Branch, at telephone (912) 767-7261. Your continued cooperation and assistance are appreciated.

Sincerely,

Walter L. Sharp
Major General, U.S. Army
Commanding Officer

Enclosures

DEPARTMENT OF THE ARMY
HEADQUARTERS, 3D INFANTRY DIVISION (MECHANIZED) AND FORT STEWART
DIRECTORATE OF PUBLIC WORKS
1557 FRANK COCHRAN DRIVE
FORT STEWART, GA 31314-4928

REPLY TO
ATTENTION OF

Directorate of Public Works

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Regional Office
ATTN: Andreas Mager, Jr.
9721 Executive Center Drive North
St. Petersburg, FL 33702-2432

Dear Mr. Mager:

In accordance with the Sikes Act, we have prepared an Integrated Natural Resource Management Plan (INRMP) for Fort Stewart and Hunter Army Airfield. The INRMP includes an Endangered Species Management Plan (ESMP) for the shortnose sturgeon (*Acipenser brevirostrum*). Your office has already provided valuable input during the development of the plan, including review of the draft document. The completed plan is now ready for review and signature by the Regional Director. Review and approval of the INRMP will also satisfy the Army's responsibility under the Endangered Species Act to obtain your agency's concurrence that implementation of the plan is not likely to adversely affect the shortnose sturgeon.

We look forward to working cooperatively with you and your staff as you review the INRMP. If additional information is needed, please contact Mr. Tom Bryce, DPW Fish & Wildlife Branch, at telephone (912) 767-5477. Your continued cooperation and assistance are appreciated.

Sincerely,

Walter L. Sharp
Major General, U.S. Army
Commanding Officer

Enclosures

BIOLOGICAL ASSESSMENT

Integrated Natural Resources Management Plan

Fort Stewart / Hunter Army Airfield, Georgia

Prepared By:

Directorate of Public Works
Environmental & Natural Resources Division (ENRD)
Fish & Wildlife Branch
Fort Stewart, GA

Reviewed By:

TIMOTHY A. BEATY
TES Management Supervisor

Submitted By:

LINTON L. SWINDELL
Chief, Fish & Wildlife Branch

Approved By:

THOMAS C. FRY
Chief, ENRD

BIOLOGICAL EVALUATION

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FOR

FORT STEWART / HUNTER ARMY AIRFIELD, GEORGIA

DESCRIPTION OF THE ACTION BEING CONSIDERED

The proposed action is the implementation of the Integrated Natural Resources Management Plan (INRMP) for Fort Stewart and Hunter Army Airfield (HAAF), Georgia, hereinafter referred to as the installation. The INRMP includes an Endangered Species Management Plan (ESMP) for the shortnose sturgeon (*Acipenser brevirostrum*), and a multi-species ESMP for the red-cockaded woodpecker (*Picoides borealis*), eastern indigo snake (*Drymarchon corais couperi)*, bald eagle(*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and flatwoods salamander (*Ambystoma cingulatum*). The INRMP is a 5 year plan (FY 2000-2004), developed in cooperation with the U.S. Fish and Wildlife Service (FWS) and Georgia Department of Natural Resources (DNR) in accordance with the Sikes Act . It will be reviewed annually and revised every 5 years in cooperation with FWS and DNR. Specific management actions (timber harvest, prescribed burning, plantings, etc.) will be prescribed and carried out in accordance with the policies and procedures established in the INRMP.

The INRMP provides a general description of the installation's on-going mission activities. A biological assessment of these activities was prepared in 1991. The FWS issued a biological opinion on these activities in 1992, and in 1996, the NMFS concurred with the assessment's conclusion that these activities were not likely to adversely affect the shortnose sturgeon. The installation's current mission activities continue to be within the scope of the 1991 assessment, except as follows.

Since 1992, one new species (flatwoods salamander) has been listed, and new Army-wide management policies for the red-cockaded woodpecker (RCW) have been developed. Significant new information is also available from monitoring and management activities conducted on the installation since 1992. The INRMP incorporates these new policies and new information. It includes provisions for protection of endangered species and their habitat from possible adverse effects associated with military training, as well as management and monitoring activities to minimize and mitigate unavoidable or unintended impacts. The purpose of this document is to assess the potential effects of installation activities on the flatwoods salamander, assess the possible effects of implementing new DA guidelines for the RCW, and incorporate new information about the status of the installation's threatened and endangered species (TES) populations. The INRMP and ESMP provide detailed descriptions of management and

protection policies to be implemented, anticipated effects on listed species, current status and trends of the installation's TES populations, and references from the scientific literature regarding the species at issue.

DESCRIPTION OF THE AREA THAT MAY BE AFFECTED BY THE ACTION

The action area is Fort Stewart and Hunter Army Airfield located in the lower coastal plain of Georgia in Bryan, Chatham, Evans, Liberty, Long, and Tattnall counties. A complete description of the area is contained in the INRMP.

SPECIES THAT MAY BE AFFECTED

The following species occur in the action area and were considered in this evaluation:

Bald eagle (*Haliaeetus leucocephalus*) - Threatened
Red cockaded woodpecker (*Picoides borealis*) - Endangered
Wood stork (*Mycteria americana*) - Endangered
Eastern indigo snake (*Drymarchon corais couperii*) -Threatened
Flatwoods Salamander (*Ambystoma cingulatum*) - Threatened
Shortnose sturgeon (*Acipenser brevirostrum*) - Endangered

Survey methods and other details of the installation's TES inventory are contained in Chapter 2-2 of the ESMP.

MANNER IN WHICH LISTED SPECIES MAY BE AFFECTED

The INRMP identifies all actions to be implemented for the management, protection, and monitoring of the installation's natural resources, including wildlife populations and wildlife habitat. It is a proactive plan, designed to promote recovery of the installation's TES populations in cooperation with other land managers in our region. The plan include measures to ensure that activities such as herbicide application and timber harvest are conducted in a manner that protects sensitive species. Section 2-5 of the ESMP and Section 3 of the INRMP discuss the relationship between the military mission and installation TES populations. None of the installation's TES populations are likely to be adversely affected by implementation of the plan, but the possibility of harm to individual animals cannot be ruled out, except for the shortnose sturgeon. Telemetry and capture data from a 1994 study indicate that shortnose sturgeon probably do not travel more than a few kilometers up the Canoochee river, making it unlikely that they would enter any live fire impact areas. The Shortnose Sturgeon ESMP provides for further studies to learn more about the species' distribution and movements on the installation.

Although earthen berms have been constructed to protect RCW habitat from direct munitions impact on small arms ranges, munitions impacts could kill or injure individuals of any species that happened to enter a live fire area. Indigo snakes, which are known to occur in the Artillery Impact Area, and RCWs, which are known to occur in the danger zones for small arms, armor, and artillery live fire, are most at risk for this type of incidental take. Flatwoods salamanders are also likely to occur in these areas, and wood storks and bald eagles may occasionally forage in them as well. Training activities in close proximity to RCW nest trees in SRC sites could frighten nesting adults and interfere with normal incubation and feeding routines, which might meet the definition of "take" as defined by the Endangered Species Act (ESA). There is also a possibility that TES could be accidentally killed or injured by vehicles during training exercises or training area management activities. The table below summarizes the foreseeable incidental take associated with the proposed action.

Nature of Taking	**Extent of Taking**	**Species**
1 - Munitions impact	Any individual animal or habitat component within the Surface Danger Zone for any live fire facility (Figure 1).	Red-cockaded woodpecker (RCW), bald eagle, eastern indigo snake, flatwoods salamander, wood stork
2- Accidental detonation of unexploded ordnance (UXO)	Any individual animal killed or injured, or any habitat component damaged by UXO on Fort Stewart	RCW, bald eagle, eastern indigo snake, flatwoods salamander, wood stork
3 - Disturbance of RCWs or habitat damage in Supplemental Recruitment Clusters (SRCs).	All SRCs (all new clusters in HMU-2 and HMU-3 as defined in ESMP)	RCW
4 - Vehicle impact	Any individual animal killed or injured by vehicle impact on Fort Stewart	RCW, bald eagle, eastern indigo snake, flatwoods salamander, wood stork
5 – Replacement of RCW cluster 258 with an SRC	One group of RCWs currently roosting in cluster 258	RCW

Installation training and safety regulations, natural resource management guidelines, and environmental awareness programs are in place to reduce the likelihood of accidental taking as described in items 1-4 above, but the possibility cannot be ruled out entirely. Imposition of training restrictions adequate to completely preclude the possibility of these types of takings would have unacceptable adverse impacts on the Army's ability to train effectively at Fort Stewart. However, the proactive management, protection, and monitoring programs provided for by the INRMP are expected to be more than adequate to minimize the likelihood and extent of such takings, and to mitigate for any takings that do occur so that viable TES populations will be sustained.

The replacement of cluster 258 with an SRC (item 5) is necessary to allow timber density in an important maneuver training area to be reduced, and provide adequate foraging resources for RCWs IAW current FWS guidelines. This action is described in detail on pages 43-45 of the ESMP. Cluster 258 was formerly part of cluster 189, but was split off as a separate cluster in 1997 after an independent pair of RCWs was observed there. The original pair of RCWs has since left, and a new pair has moved in. There was no nest in cluster 258 in 1997, 98 or 99, but there was a nest in cluster 189 in 1994, 96, 97, and 99. The ESMP calls for cluster 258 to be re-absorbed into cluster 258. This action would be mitigated by creation of a new Supplemental Recruitment Cluster (SRC) approximately 1400 meters east of cluster 258.

CUMULATIVE EFFECTS

The INRMP is a tripartite plan, prepared by the installation in coordination with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Georgia Department of Natural Resources. It will be reviewed annually by all parties and will be updated every 5 years. The plan incorporates an adaptive management strategy, so monitoring results will determine necessary changes in future management plans. It is the goal and expectation of all the parties that the cumulative effect of the INRMP on all TES populations will be positive.

The TES conservation measures and population goals in the ESMP were developed in a regional context. There are no foreseeable state, local, tribal, or private actions that would have a cumulative adverse effect when combined with impacts associated with the proposed action.

CONCLUSION

The implementation of the INRMP is not likely to adversely affect any TES populations, but it may adversely affect individual red-cockaded woodpeckers, eastern indigo snakes, bald eagles, wood storks, and flatwoods salamanders.

United States Department of the Interior

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July 2, 2001

Colonel Gregory V. Stanley
Directorate of Public Works
Department of the Army, 3D Infantry Division
1113 Frank Cochran Drive
Fort Stewart, Georgia 31314-4940
Attn: Mr. Tim Beaty
DPW/ENRD, Fish and Wildlife Branch

Re: FWS Log # 00-0843

Dear Sir:

This document transmits the U.S. Fish and Wildlife Service's (Service's) Biological Opinion based on our review of the Integrated Natural Resources Management Plan 2001 - 2005 (INRMP), and its attached Endangered Species Management Plan (ESMP) for Fort Stewart and Hunter Army Airfield, Georgia, and its effects on the federally endangered red-cockaded woodpecker (*Picoides borealis*) (RCW), threatened eastern indigo snake (*Drymarchon corais couperi*), threatened bald eagle (*Haliaeetus leucocephalus*), endangered wood stork (*Mycteria americana*), and the threatened flatwoods salamander (*Ambystoma cingulatum*), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended, (16 U.S.C. 1531 et seq.). Your request for formal consultation for these species was received on July 6, 2000.

This biological opinion (BO) is based on information provided in the July 6, 2000, biological assessment and Fort Stewart's Integrated Natural Resources Management Plan (INRMP) 2001 - 2005 and its revisions; the 1996 Management Guidelines for the Red-cockaded Woodpecker on Army Installations and associated Service biological opinion issued on October 25, 1996; the July 15, 1992, biological opinion concerning the ongoing training at Fort Stewart; field investigations; discussions with experts and other sources of information. A complete administrative record of this consultation is on file at the Service's office in Brunswick, Georgia.

Consultation History

On July 15, 1992, the Service issued a biological opinion to Fort Stewart on the effects of military and associated activities at Fort Stewart and Hunter Army Airfield. Preparation of an RCW management plan was required as a reasonable and prudent alternative.

In 1993, Fort Stewart developed an RCW ESMP that was incorporated into their Cooperative Fish and Wildlife Management Plan and approved by the Service Regional Director.

On October 25, 1996, The Service completed the final biological opinion for the implementation of the Management Guidelines for the Red-cockaded Woodpecker on Army Installations. The final approved version of the Guidelines was dated October 30, 1996.

On November 8, 1996, the Army's Assistant Chief of Staff for Installation Management wrote a memorandum approving the October 30, 1996, version of the Guidelines and ordered their immediate implementation at all installations that manage RCW habitat. The memorandum ordered all installations to incorporate the Guidelines into their RCW ESMPs and Natural Resources Management Regulations (AR 200-3).

In February 1998, the Service received a draft ESMP from Fort Stewart at a RCW meeting in Atlanta, Georgia. This ESMP was undertaken, in part, to comply with the requirements of the Management Guidelines for the Red-cockaded Woodpecker on Army Installations (Guidelines), which were issued in October 1996 (U.S. Army 1996a). The Guidelines provide standard RCW management guidance to Army installations for developing ESMPs.

In April 1998, the Service provided comments to Fort Stewart on the draft ESMP with particular comments concerning the proposed goals for RCWs.

On February 13, 1999, the Service received a draft INRMP, which included the revised ESMP, for Fort Stewart and Hunter Army Airfield.

On July 6, 2000, the Service received Fort Stewart's request for formal consultation, a final INRMP, and a biological assessment for the INRMP. With receipt of this information, formal consultation began on July 6, 2000.

On October 23, 2000, the Service and Fort Stewart agreed to an extension of formal consultation for the INRMP, thus extending the due date from November 18, 2000, to December 18, 2000.

On December 14, 2000, Fort Stewart and the Service agreed to another extension of formal consultation. A final draft biological opinion was provided to Fort Stewart on January 23, 2001.

On May 7, 2001, Fort Stewart provided the Service with proposed changes and comments on the draft biological opinion. Fort Stewart also made significant changes to the INRMP and ESMP.

BIOLOGICAL OPINION

I. Description of the Proposed Action

The proposed action is the implementation of the INRMP, in the midst of ongoing training activities, on Fort Stewart and Hunter Army Airfield, located in the lower coastal plain of Georgia in Bryan, Chatham, Evans, Liberty, Long, and Tattnall Counties. The INRMP guides implementation of the natural resources program on Fort Stewart\Hunter Army Airfield (the installation), and includes a multi-species ESMP for the red-cockaded woodpecker, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander. This INRMP is a five year plan (FY2001-2005) that is developed in cooperation with the Service and Georgia Department of Natural Resources (GADNR) in accordance with the Sikes Act, and will be revised every five years.

The installation's INRMP is to guide the installation in sound conservation and enhancement of its resources, including federally-listed species, while maintaining its training mission. A biological assessment of the on-going mission training activities was prepared in 1991. The Service issued a biological opinion on these activities in 1992. In 1996, the National Marine Fisheries Service concurred with the assessment's conclusion that the ongoing training activities were not likely to adversely affect the endangered shortnose sturgeon (*Acipenser brevirostrum*). The installation's current mission training activities continue to be within the scope of the 1991 assessment except for: 1) a new species, flatwoods salamander, has been listed since the assessment; 2) new Army-wide management guidelines have been developed for the RCW; and 3) new information about the status of the installation's threatened and endangered species that has become available from monitoring and management activities conducted on the installation since 1992. Management actions will emphasize the protection and enhancement of existing endangered species populations and associated habitat on the installations in addition to expansion into formerly occupied or unoccupied suitable habitat, where appropriate.

Training activities on Fort Stewart and Hunter Army Airfield are described in detail in the 1991 biological assessment of the on-going mission training activities (see Appendix). These training activities include live fire training and maneuver training by mechanized units and infantry units of the 3 rd Infantry Division (Mechanized), 1st /75th Ranger Battalion, 92nd Engineer Battalion, 260th Quartermaster Battalion, other non-divisional units, Army National Guard and Reserve units, and Air Force and other aviation units.

To educate Fort Stewart personnel about endangered and threatened species, an Environmental Compliance Officer class is taught quarterly by Fort Stewart's Environmental Natural Resource Department personnel. This course includes a one-hour segment on endangered and threatened species. Also, a video is shown and an Environmental Field Card is given to inprocessing soldiers.

Other specifics of the ESMP include the following species specific actions:

Red-cockaded Woodpecker

To ensure that RCW management and the training mission are fully integrated and compatible, the development of the ESMP tiers from the October 1996 Management Guidelines for the Red-cockaded Woodpecker on Army Installations (Guidelines). These Guidelines provided standard RCW management guidance to Army installations for developing ESMPs. The ESMP was prepared in accordance with these Guidelines and Chapter 11, AR 200-3, Natural Resources - Land, Forest, and Wildlife Management. Thus, the Guidelines established baseline standards for Army installations in managing for the RCW and its habitat. These Guidelines are supplemented by the ESMP with detailed measures to meet installation-specific RCW conservation needs while simultaneously enhancing training realism. The requirements within the Guidelines apply to all activities that occur on Fort Stewart and Hunter Army Airfield.

Goals

Pursuant to the Guidelines, the Army must identify the installation's RCW Regional Recovery and Mission Compatible Goals (U.S. Army 1996a). Fort Stewart's ESMP has an RCW management goal to recover Fort Stewart's RCW population and reduce conflicts with the training mission by eliminating the need for training restrictions. The ESMP sets an Installation Regional Recovery Goal (IRRG) at 500 active RCW clusters for Fort Stewart. To reduce any impacts on the installation's training mission, Fort Stewart has set a Mission Compatible Goal (MCG) of 411 active RCW clusters. The MCG is the number of protected clusters considered to be compatible with the current military mission.

The installation will also promote additional RCW expansion to achieve a population density of one active cluster per 200 acres of suitable habitat. Fort Stewart has about 136,931 acres of potentially suitable RCW habitat, thus making it possible to support up to 185 surplus Supplemental Recruitment Clusters (SRCs) above the 500 cluster IRRG.

The RCW population goal for Hunter Army Airfield (HAAF) is zero. There is currently one inactive cluster on HAAF that has apparently been inactive for over 10 years. Reestablishment of an RCW population at HAAF would not be feasible because of its proximity to the city of Savannah and it is mostly urbanized land. Management activities such as prescribed burning would be complicated because of the airfield and the surrounding urban development of Savannah.

Management Actions

1. Recruitment Clusters

To achieve the MCG of 411 active clusters, artificial cavities and habitat improvements will be used to create 180 Primary Recruitment Clusters (PRCs). The difference between the IRRG and the MCG will be satisfied by establishing 89 SRCs that will be managed to promote RCW

expansion. PRCs and SRCs will be established annually to achieve a total number of available recruitment sites equal to 10% of the active RCW clusters for PRCs, and 5% of the population for SRCs. Since there were 212 active RCW clusters in FY'00, at least 21 PRCs and 10 SRCs will be available for RCW recruitment in FY'01.

2. Habitat Management Units (HMUs)

Fort Stewart will be divided into three Habitat Management Units (HMUs). HMU-1 consists of 116,814 acres and is an area where training restrictions due to RCW clusters will not have unacceptable impacts on the installation's training mission. PRCs will be located in Habitat Management Unit (HMU)-1 (see Figure 1, p. 17 of ESMP), and these PRCs will be subject to the same training restrictions as the existing active RCW clusters. HMU-2 consists of 43,178 acres and is an area where imposition of training restrictions on any new RCW clusters would have unacceptable impacts on the installation's training mission, therefore any new recruitment clusters and new natural clusters in this area will be designated as SRCs. HMU-3 consists of 119,088 acres and is the installation's most heavily-used mechanized maneuver training lands. New facilities that require clear cutting or substantial thinning may be required in this area in the future. Therefore, all recruitment clusters and new natural clusters established in this HMU will be designated as SRCs and not be subject to training restrictions and, in some cases, may not have adequate foraging resources to meet the Service's Bluebook guidelines.

3. Habitat Management

Clusters, PRCs, and SRCs will be kept clear of dense midstory to maintain an open, park-like stand. All midstory within 50 feet of cavity trees will be eliminated, and beyond 50 feet, some pine midstory will be retained for regeneration and a few hardwood trees may also be retained but will not exceed 10 square feet of basal area (BA). Prescribe burning will be the primary method to control midstory, with mechanical control or herbicides being used where fire is not effective or possible. The INRMP has a goal of prescribe burning on an interval of three years or less in RCW HMUs, conducting most of the burns during the growing season. RCW cavity trees will be protected during prescribe burns by pre-burning, raking, foaming, wetting, or other effective means.

Wildfires will be allowed to burn whenever feasible, but suppression of these fires will be necessary to protect personnel and facilities, to avoid unacceptable smoke management risks, and to protect RCW trees or other sensitive habitats. Firebreaks will not be plowed in wetlands or within 200 feet of an RCW cavity tree except in emergency situations.

Pine stands will be thinned each entry cycle to maintain a 50-80 square feet/acre BA to achieve sufficient habitat for RCWs. Also, 10 to 20% of slash or loblolly pine plantations will be regenerated to longleaf pine. Logging, pine straw raking, and other similar activities will not be conducted in active RCW clusters during the nesting season.

Restoration of RCW cavities and construction of artificial cavities is a high priority on Fort Stewart. About 642 artificial inserts have been installed on the installation since 1993. The need for artificial cavities is evaluated each year during RCW site visits by Fort Stewart staff. A minimum of four useable cavities are required for each cluster. Current records indicate that 17 active clusters are below this standard, therefore additional artificial cavities will be installed in these clusters in FY 2001. Artificial cavities will also be used to establish PRCs and SRCs. Each PRC and SRC will be provisioned with at least 2 cavities and 3 starts.

4. Restrictions

All cavity trees on Fort Stewart and Hunter Army Airfield are marked with white reflective bands and yellow warning signs are posted around the 200-foot buffer zone. These same markings with be used on PRCs. SRCs will not have these markings and will be invisible to training.

When the final INRMP and ESMP is approved, training restrictions for RCW clusters will follow the 1996 Guidelines for the RCW on Army Installations. Only the 411 clusters that comprise the MCG will be subject to training restrictions. The MCG includes all existing clusters that have been active in the last five years across the installation, except for cluster #258, and all new PRCs to be established in HMU-1. Cluster #258 will be combined with another active RCW cluster and replaced with an SRC due to insufficient foraging resources and conflicts with training. RCW cluster #258 currently contains one group of roosting RCWs that have not nested. Training restrictions will not apply to SRCs.

5. Augmentation and Translocation

Augmentation may be used in single bird groups, depending on availability of suitable juvenile RCWs, with priority given to solitary male groups. Adult birds will not be moved. Also, Fort Stewart may provide RCWs for translocation to support efforts to expand smaller RCW populations, at the request of the Service's RCW Recovery Coordinator. Translocation will depend upon availability of juveniles, need for local augmentation, and need of other properties. Fort Stewart has already been involved with translocations to Fort Gordon near Augusta, Georgia.

6. Surveys and Monitoring

Prior to any timber harvests or other land disturbing activity, the affected area is 100% surveyed for any RCW cavity trees and foraging areas. Each cluster, PRC, and SRC that has not been deleted from management, will be inspected annually in March or April. These inspections will be used to develop habitat prescriptions. Also, all suitable RCW habitat will be surveyed and mapped for new cavity trees every 10 years, with 10% of the installation being surveyed annually.

During the nesting season, each active cluster will be visited weekly to check for nesting activity. This monitoring will cease once a nest is confirmed, except for a random sample of about 25% of the total number of clusters. These clusters will be used to monitor nesting success. All adults and nestlings in this sample are banded with color bands and Service aluminum bands. Also, all PRCs and SRCs that become active will be monitored for number of fledglings produced for up to 5 years after activation. Active clusters that do not nest by the end of May will be visited late in the nesting season to determine whether or not a potential breeding pair of RCWs is present.

A forest survey will be conducted in 10% of the land in the RCW HMUs each year to update forest survey data following timber harvests. Data will also be gathered to determine quantity and quality of foraging and nesting habitat for the RCW.

Monitoring results will be reviewed annually and a report will be submitted to the Service. If an annual report shows an RCW population decrease of more than 5%, the installation will reinitiate consultation with the Service within 30 days. The installation, in cooperation with Service, will then revise the ESMP to prevent further population decline.

Eastern Indigo Snake

The conservation goal for the eastern indigo snake is to maintain the four populations on Fort Stewart and to encourage expansion into suitable unoccupied habitat. Longleaf-wiregrass ecosystem management for the RCW will support the achievement of these goals. The HMU for the eastern indigo snake consists of about 101,130 acres in all or portions of Training Areas B1, B3, B8, B17-B19, C5-C18, D13-D16, E12-E22, F9-F15, F17-F20, and EOD (see Figure 4 in ESMP). Although the Artillery Impact Area (AIA) is known to support a large population of indigo snakes, access restrictions and safety concerns make it impossible to actively manage and monitor this population, therefore it is not included in this HMU.

Midstory control measures and prescribe burning for the RCW will also improve eastern indigo snake habitat. In order to minimize risk to young snakes, prescribe burning will be avoided as much as possible in the eastern indigo snake HMU during mid-July to September. Other forest management activities are generally as for the RCW, except stumps will not be harvested unless facilitating construction projects. Also, timber harvest activities will be avoided in the HMU during the period when the snakes are using gopher tortoise burrows (November through April). Gopher tortoise burrows will be flagged and avoided when possible and windrows will be left intact.

Snake collecting and burrow gassing will also be prohibited on Fort Stewart to protect indigo snakes. No training restrictions are imposed on behalf of the eastern indigo snake, however, soldiers are instructed to not harm the snakes and avoid damage to gopher tortoise burrows.

Eastern indigo snake surveys will be conducted annually at sites known to support them. Additional sites within the HMU thought to have high potential will also be surveyed. Since

eastern indigo snakes depend on gopher tortoise burrows, gopher tortoise sites will be surveyed and monitored once every 10 years at 30 sites in areas known or suspected of being inhabited by eastern indigo snakes. Sites containing smaller non-survey populations and sites with potential for tortoises will be visited once every 5-10 years to determine presence or absence of gopher tortoise.

Bald Eagle

The conservation goal for the bald eagle is to maintain support for a nesting pair of eagles in the vicinity of Pineview Lake. Also, Fort Stewart will provide suitable nesting and foraging habitat for additional eagle pairs by protecting wetlands by way of existing laws and regulations. Fort Stewart will also continue management of recreational fish ponds to benefit the bald eagle.

There are two bald eagle HMUs on Fort Stewart that consist of the buffer area around the nest sites, one in Training Area E13 and the other at Pineview Lake (in Training Area E22). The Pineview Lake site was last used in FY'94.

Bald eagle nesting areas will not be burned during the eagle nesting season and nest trees will be protected from fires. In thinning cuts, dominant pine trees with well-formed crowns will be retained for roosting and perching trees for the eagles. Timber harvest activities will not be conducted within 1500 feet of an eagle nest during the eagle nesting season.

Mechanized-maneuver, live-fire are prohibited within 1500 feet of the eagle nest tree during the nesting season and low altitude flight is prohibited within 1000 feet of the nest tree during nesting season. Buffer areas around the eagle nests are marked with signs and Training Area E13 will be closed for recreational use during the nesting season unless the eagles do not use the nest. The alternate nest site on Pineview Lake is posted off-limits year round since it is an important eagle resting area.

Wood Stork

The conservation goal for the wood stork is to provide suitable foraging habitat by protecting wetlands through existing laws and regulations. No HMUs have been designated for the wood stork, but an HMU may be designated in the future if a breeding colony or significant foraging area is identified.

Wood stork sightings are recorded and maintained. There are no training restrictions due to wood storks because these birds only forage occasionally on the installation. The Georgia Department of Natural Resources conducts aerial surveys of wading bird rookeries.

Flatwoods Salamander

The conservation goal for the flatwoods salamander is to maintain the five existing populations and 21 breeding sites known at Fort Stewart and to manage other areas of suitable habitat to encourage establishment of flatwoods salamander populations. Longleaf pine-wiregrass ecosystem management for the benefit of the RCW will also benefit the salamander.

A total of 10 HMUs that encompass 79,917 acres have been designed for the flatwoods salamander on Fort Stewart. These HMUs include sites that are known to support flatwoods salamander populations as well as other areas of suitable habitat. Each HMU includes pine flatwoods sites containing isolated cypress pond wetlands.

Midstory control for the RCW will also benefit the flatwoods salamander. Prescribe burns of salamander habitat will be conducted during the growing season when feasible. Mechanical midstory control will be avoided as much as possible in pine flatwoods and in wetlands to minimize rutting. No herbicides will be applied within wetlands or wetland ecotones located in flatwoods salamander HMUs.

Forest management actions developed for the RCW will also benefit the salamander to create open forested habitats. Timber harvest operations on Fort Stewart do not include site preparation techniques such as bedding and logging will be conducted in dry weather conditions in salamander HMUs to prevent rutting and compaction of the soil. Logging will be prohibited within a 100-foot buffer around cypress ponds and other potential salamander breeding sites with exceptions for habitat improvement efforts. Timber harvest activities within 450 meters of the outer edge of any known flatwoods salamander breeding pond will be conducted within these guidelines:

1) Log only during dry periods and keep soil disturbance to a minimum.
2) Allow a minimum interval of 10 years between harvests.
3) Maintain a basal area of 45-50 sq. ft./acre in pine flatwoods habitat.
4) Selective harvest only within 164 meters of the breeding pond.
5) Clearcut no more than 25% of the pine flatwoods habitat between 164-450 meters from the breeding pond.
6) Shape clearcuts so that habitat continuity is maintained.
7) Minimize skid trails and their effects through the use of pallets, bridges, and prescription planning.
8) Locate skid trails parallel rather than perpendicular to wetland edges.
9) Do not locate log landings within 450 meters of a breeding pond. Exceptions may be made with the approval of Fort Stewart's Fish and Wildlife Branch in cases where it would serve to reduce overall soil and groundcover damage.
10) Do not conduct intensive mechanical site preparation such as root raking, discing, stumping, bedding, or other methods which cause significant soil disturbance.

11) Utilize prescribed fire as the preferred site preparation method, and limit herbicide use to manual application following BMPs when fire cannot be employed.

The use of seines or nets to collect bait from cypress ponds is not permitted on Fort Stewart. The wetland edges of known flatwoods salamander breeding sites will be marked with signs. Vehicle traffic and excavation are prohibited within known flatwoods salamander breeding ponds. No other training restrictions are imposed on behalf of the flatwoods salamander. Training activities include live fire training and maneuver training and are described in detail in the 1991 biological assessment of the on-going mission training activities (see Appendix).

Annual monitoring of flatwoods salamander populations on Fort Stewart will be initiated in FY 2000 at 10 known breeding ponds. Most other recently documented breeding pond sites, as well as some potential sites, will be sampled biennially beginning in FY 2000. Other documented sites, such as ditches and wet firebreaks, will be monitored periodically.

II. Status of the Species/Critical Habitat

Red-cockaded Woodpecker

Species/critical habitat description

The U.S. Department of the Interior identified the RCW as a rare and endangered species in 1968 (USDI 1968). In 1970, the RCW was officially listed as endangered (*Federal Register* 35:16047). With passage of the Act in 1973, the RCW received the protection afforded listed (endangered) species under the Act. No critical habitat has been designated for the RCW.

The current distribution of this non-migratory, territorial species is restricted to the remaining fragmented parcels of suitable pine forest in 12 southeastern states in the southern Coastal Plain; from Virginia to south Florida and west to east Texas and north to Kentucky. It has been extirpated in New Jersey, Maryland, Missouri, and Tennessee.

Although populations have become more fragmented and isolated, the RCW is still rather widely distributed. RCWs survive as very small (1-5 groups) to large (groups of 200 or more) populations. The majority of the largest populations remaining are located in the longleaf pine forests of the Sandhills of North and South Carolina and the Coastal Plain longleaf pine forests of North and South Carolina, Georgia, Florida, and Louisiana; a relatively large population also occurs in the loblolly/shortleaf and longleaf pine forests of eastern Texas.

Life History

The RCW is a territorial, non-migratory, cooperative breeding species (Lennartz *et al.* 1987; Walters *et al.* 1988). It is unique in that it is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pines. Usually, the trees chosen for

cavity excavation are infected with a heartwood decaying fungus (*Phellinus pini*) (Jackson 1977). The heartwood associated with this fungus, and typically required for cavity excavation, is not generally present in longleaf pine and loblolly pine until 90-100 and 75-90 years of age, respectively (Clark 1992). Each group member has its own cavity, although there may be multiple cavities in a cavity tree. The aggregate of cavity trees, surrounded by a 200-foot forested buffer, is called a cluster (formerly colony) (Walters 1990). Cavities within a cluster may be complete or under construction (starts) and either active, inactive or abandoned.

RCWs live in social units called groups (formerly clan); this family unit usually consisting of a breeding pair, the current years offspring and one or more helpers (adults, normally male offspring of the breeding pair, from previous years) (Walters 1990). Walters (1990) and Delotelle and Epting (1992) have documented instances of female helpers. A group may contain from 1-9 birds, but never more than one breeding pair. Groups maintain year-round territories near their roost and nest trees. Juvenile females from the current years breeding season normally disperse, prior to the next breeding season.

Excavation of cavities in living pines is a difficult process which may take 10 months to several years to complete (Hooper *et al.* 1980; Walters 1991). Because suitable trees are scarce and cavity construction is a significant investment of time and energy, cavities are a critical determinant of habitat quality and are the ecological basis of group formation (Walters *et al.* 1995).

RCWs forage almost exclusively on pine trees. Although in some habitat types they will use smaller pine trees as foraging substrate, they prefer pines greater than 10" diameter at breast height (DBH) (U.S. Fish and Wildlife Service 1985). Determining the number of pines required to provide the arthropod biomass needed to meet their year-round dietary requirements continues to be a challenging research problem. Many complex and interrelated factors undoubtedly contribute to the answer, including condition of understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season-of-year, fire frequency and intensity, etc. The number of acres required to supply adequate foraging habitat depends on the quantity and quality of tree stems available.

Population Dynamics

Reduction in population size may jeopardize the continued existence of any endangered species because the longer a species remains at low population levels, the greater the probability of extinction from chance events, inbreeding depression, or additional environmental disturbance (Pimm 1991; Shaffer 1987). Although population size has a clear relationship to a species' extinction probability, it can be less important than population variability. Large populations may not protect a species from extinction in the face of extreme environmental disturbance (Pimm 1991; Shaffer 1987).

Fluctuations in a species' population over time can affect significantly the probability of its extinction (Pimm 1991). As a population fluctuates, one or more factors can lead to a chance extinction, e.g., irreversibly lowering population size to a point where it can no longer recover. Consequently, actions increasing a species' population variability may affect the continued existence of the species more significantly than a reduction in population size. Population variability is affected by several characteristics of a species' life history, including: unstable age distributions and reproductive rates; widely variable mortalities resulting from unstable food resources or predation; population density; sex ratios; recolonization rates; and genetic viability (Pimm 1991).

Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding male and female RCWs is high, ranging from 72 to 84 percent and 51 to 81 percent, respectively (Delotelle and Epting 1992).

Regarding sex ratios, only two studies (Francis Marion National Forest and Central Florida populations) report significantly different fledgling sex ratios than 50:50 (Gowaty and Lennartz 1985). Other populations (Walters 1990; unpubl. USFS data) report sex ratios not significantly different from 50:50. Because most managers and researchers do not report significant differences from the expected 50:50 ratio, it is assumed that they are finding "normal" ratios. Reasons for the differences in sex ratios between the two populations initially discussed and most (presumably) other populations are uncertain, as are the implications for population variability.

RCW genetic research to date does not suggest that genetic viability is a serious concern at this time; however, genetic variability will decrease in small, isolated populations. Stangel *et al.* (1992) reported no significant relationship between heterozygosity and population size (when two very small populations, of the 26 sampled, were removed from the analysis); additionally, although allelic diversity was correlated with population size and had eroded in some small populations, most populations were still characterized by "normal" levels of genetic variability. Haig and Rhymer (1994) examining the genetic variation among 14 RCW populations concluded that RCWs do not appear to have major genetic differences among regional populations.

Reproductive rates for RCWs are variable. Walters *et al.* (1988), based on eight years (1981-1988) of data for the Fort Bragg RCW recovery unit, found a range of 1.11 to 1.85 fledglings per breeding group; additionally, in some years many groups failed to nest, while in other years most groups attempted to nest. Walters *et al.* (1988) suggest that annual variation in reproductive effort may be associated with food availability, weather, and cavity competition.

Although the relationship between RCW population variability and population density is not well understood, some aspects of population density as it relates to group size, and population trend have been examined. Connor and Rudolph (1991) found that in sparse populations, as fragmentation increased, RCW group size and the number of active clusters decreased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within

1.25 miles on average had critically low densities that inhibited population expansion. Beyer *et al.* (1996) also speculate that low RCW densities (4.8 active clusters within 1.25 miles) on the Wakulla Ranger District (RD), Apalachicola National Forest may be implicated in that sub-population's declining trend (Unpubl. USFS data).

RCW populations can be increased dramatically because of their ability to "recolonize" unoccupied habitat, made suitable (everything else being equal) by providing the limiting resource of cavity trees, via artificial cavities (Copeyon 1990; Allen 1991). Walters *et al.* (1992a) conclusively demonstrated that unoccupied sites remain so because they lack suitable cavities. Walters *et al.* (1992b) cooperative breeding ecological model for RCWs strongly suggests that individual RCWs are better off from a fitness perspective (first year survival, rate of successful dispersal, reproductive success at early ages) competing for a high-quality territory (i.e., one with cavity trees) than accepting a territory without this critical resource.

Prior to the routine use of artificial cavities for stabilizing and expanding populations, most populations were declining and many had been extirpated (Baker 1983; Costa and Escano 1989). While acknowledging that most RCW populations have not increased on their own (in the absence of artificial cavities), it is equally important to point out that the two largest populations in the 1980's, the Francis Marion National Forest recovery unit and the Apalachicola Ranger District recovery unit, increased by approximately 10 percent between 1980/81 and 1987/88 (FMNF) and 1990/91 (ARD) (Hooper *et al.* 1991; unpubl. USFS data). The common denominators in these landscapes were large (480-500 active clusters)/dense populations, availability of well-distributed relic longleaf pines, and open park-like forests, a result of frequent prescribed fire since the 1940/50's.

Population stability, the ability of a species' populations to resist change or dramatic fluctuations over time, directly affects a species' sensitivity to the adverse effects of a proposed action. While many RCW populations have been extirpated, many others, some very small and seemingly demographically-isolated, have persisted for a remarkable period of time, i.e., 10+ years; although their long-term survival is certainly not secure. This short-term (10+ years) survival (stability is not an accurate description, as most of these populations have been slowly declining) of small populations is probably related to: long life span (10-year old wild birds are not uncommon); predation/exposure protection afforded by a permanent, secure roost chamber; relatively consistent number of fledglings/successful nest; and, cooperative behavior at territory defense and raising young.

The instability of declining populations is frequently related to poor habitat conditions (midstory development, young forests with few potentially suitable cavity trees, habitat loss and landscape fragmentation), and the demographic isolation of individual groups and/or the intra-population distribution of groups; i.e., density, brought about over time by the gradual loss and degradation of suitable habitat. Intensive management designed to improve habitat conditions at the critical resource, the cluster/cavity tree complex, has contributed to the stability of both large and small populations. Primary management has been the installation of artificial cavities and hardwood

midstory control. Additionally, the benefits afforded large/dense populations regarding potential breeding opportunities, accounts in part, for their stability.

The observations above have been generally supported by the use of an individually-based, spatially-explicit simulation model (Letcher *et al.*, 1998; Crowder, Priddy, and Walters 1998). Results of these modeling efforts indicate that group density and spatial configuration did influence demographic influences on population persistence.

Status/Distribution

The reasons for the RCW's classification as endangered in 1968 were its perceived rarity, documented declines in local populations, and presumed reductions in available nesting habitat. Although professional opinion was widely solicited to make an objective assessment of the RCWs status, much of the information provided was anecdotal. No systematic censuses have been conducted rangewide, and no quantitatively-derived estimates of landscape level population size or distribution, nor of availability and trends of nesting habitat.

Jackson (1978) estimated the distribution of RCWs by ownership to be 83.6 percent Federal, 8.6 percent State/municipal, and 5.6 percent private; and suggested that because of their extensive habitat requirements the survival of the RCW on most private lands is problematic. Baker (1983) documented the decline (from 11 nests to 0) and extirpation of a private land population between 1970 and 1981. Ligon *et al.* (1986) pointed out that nowhere were RCWs known to be increasing in numbers. Costa and Escano (1989) documented RCW population declines in at least 10, and perhaps in as many as 17, populations on National Forests; and they reported the extirpation of 5 Forest Service populations. James (1991) studying the Wakulla Ranger District, Apalachicola National Forest RCW subpopulation concluded that this population was probably declining. Unpublished Forest Service data confirms James' findings (Costa, pers. comm.). More recently, James (1995) estimated that between the early 1980's and 1990 the number of active clusters rangewide declined 23 percent; with more than 300 fewer active sites in designated recovery populations. All land ownership categories have suffered declines. In James (1995) survey, a total of 1,017 and 672 active clusters were reported on private lands in 1980 and 1990, respectively, indicating a 34 percent decrease; a total of 185 and 155 active clusters were reported on State lands in 1980 and 1990, respectively, a 16 percent decrease. Numerous other biologists, in Georgia (Baker 1995), North Carolina (Carter *et al.* 1995), South Carolina (Cely and Ferral 1995), and Florida (Cox *et al.* 1995) have documented declining populations on Federal, State and/or private lands during the past decade in their respective States.

Recently however, numerous populations, particularly on Federal lands have shown population increases; Savannah River Station - DOE (Gaines *et al.* 1995), Noxubee National Wildlife Refuge (Richardson and Stockie 1995), St. Marks National Wildlife Refuge (Reinman 1995), Francis Marion National Forest (Watson *et al.* 1995), Apalachicola National Forest (unpubl. USFS data), National Forests in Texas (Connor *et al.* 1995), Kisatchie National Forest (unpubl.

USFS data), Croatan National Forest (Walters pers. comm.), Camp Lejeune Marine Corps Base (Walters pers. comm.), Fort Benning, and Fort Stewart, Georgia (unpubl. Army data). The Service expects that most populations on Federal properties will eventually increase as proven management techniques and ecosystem management programs are implemented. Costa and Walker (1995) estimated the rangewide population of RCW at 4,694 active clusters.

Eastern Indigo Snake

Species/Critical Habitat Description

The eastern indigo snake is a large, docile, non-venomous snake reaching more than seven feet in length. The common name refers to the dark, blue-black color of the glossy, iridescent body scales on the snake's back and belly. Lighter-colored patches ranging from reddish-brown to cream occur on the throat and chin. Historically, the eastern indigo snake occurred in the southeastern Coastal Plain from South Carolina to extreme southern Mississippi. It now occurs in significant numbers only in Georgia and Florida (Diemer and Speake 1983). The indigo snake is believed to be declining throughout its range (Speake *et al.* 1978) and is federally-listed as threatened (*Federal Register* 43(21):4026-4028). No critical habitat has been designated for this species.

Life History

The primary habitat of the indigo snake is xeric upland communities (especially the longleaf pine-turkey oak-wiregrass association) interspersed with wetland habitats such as drainageways, river swamps and cypress ponds (Landers and Speake 1980, Speake *et al.* 1978). Research indicates that the majority of the winter dens used by eastern indigo snakes are located in gopher tortoise burrows (Speake *et al.* 1978; Landers and Speake 1980) and that most activity in winter occurs in xeric upland habitat. Diemer and Speake (1983) found that the majority of the winter sightings of indigo snakes occurred within or at the entrance of a tortoise burrow, and Speake *et al.* (1978) determined that most of the locations of indigo snakes from December through April were on ridges in the xeric upland (e.g., sandhill) habitats. Indigo snakes are quiescent during winter, therefore the availability of deep dens that do not flood is essential for winter survival (Landers and Speake 1980); gopher tortoise burrows may be 30 or more feet long (Mount 1975). Indigo snakes show a tendency to locate dens in gopher tortoise burrows near windrows of logging debris (Speake *et al.* 1978) and will use more than one gopher tortoise burrow as dens during the winter (Speake *et al.* 1978, Landers and Speake 1980).

From May through November, eastern indigo snakes move out of winter habitat in these upland habitats to stream bottoms and agricultural fields (Speake *et al.* 1978). Seasonal range during the period from May through July is estimated at 43 hectares (ha) and increases to 97 ha from August to November (Speake *et al.* 1978). Extensive movements in the late summer and fall probably are related to searches for winter dens or mates (Speake *et al.* 1978). Indigo snake mating activity (recorded in a captive colony at Auburn, Alabama) begins in November, peaks in

December, and continues into March (Speake *et al.* 1978). Smith (1987) located four indigo snake nests in abandoned gopher tortoise burrows and one in a damp rotting pine stump covered with pinestraw; clutch size in these five nests ranged from three to ten eggs, and many were infertile (Smith 1987).

Indigo snakes forage in a variety of forest types including wetlands and upland pine-hardwoods up to a mile from their winter dens. The snake feeds on other snakes, frogs, toads, small mammals, birds, turtles (including gopher tortoise hatchlings), fish, and other vertebrates (Mount 1975). Indigo snakes appear to be at the top of the insect-amphibian-reptile food chain of the sandhills (Landers and Speake 1980).

Status/Distribution

Declines in indigo snake populations are primarily due to habitat loss (Speake *et al.* 1978, Landers and Speake 1980) and collections of the pet trade (U.S. Fish and Wildlife Service 1982). Xeric upland habitats within the range of the indigo snake have been severely impacted by silviculture, farming, and urbanization. A reduction in numbers and extent of wildfires and prescribed burns has resulted in adverse modification of upland pine habitats. Snake collections for the pet trade and deaths related to rattlesnake hunting also reduced numbers. Additional mortality may result from bioaccumulation of pesticides.

The current status and future survival of the eastern indigo snake is likely linked to the status of xeric upland habitats and other habitat that supports healthy gopher tortoise populations. Density of gopher tortoise populations, and therefore, indigo snake habitat, is closely related to available biomass of herbaceous food plants; this in turn is dependent on a sparse tree canopy and relatively open (litter free) ground conditions (Landers and Speake 1980). Frequent fires that remove some, but not all, scrub hardwood and most brush are essential in maintaining habitat quality.

Bald Eagle

Species/Critical Habitat Description

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*) of June 8, 1940, as amended on October 23, 1972. The bald eagle was listed as endangered below the 40th parallel on March 11, 1967, in accordance with the Endangered Species Preservation Act of 1966, and subsequently received protection under the Act on February 14, 1978. Its listing status was changed to endangered throughout the conterminous United States except for Washington, Oregon, Minnesota, Wisconsin, and Michigan, where it was designated as threatened. A proposed rule to reclassify the bald eagle from endangered to threatened was published in the *Federal Register* on July 12, 1994. On March 23, 1995, the public comment period was reopened to alert the public to the Service's consideration of the Southwestern Recovery Region in the reclassification. The final rule to

reclassify the bald eagle to threatened in the lower 48 States was published in the *Federal Register* on July 12, 1995. A proposed rule to delist the bald eagle in certain parts of its range was published by the Service on July 6, 1999 (*Federal Register* 64: 36453-3646464), no final rule has been published yet.

The bald eagle is a large raptor with a wingspan of about 7 feet. In the lower 48 States bald eagles typically weigh eight to ten pounds, with females being larger than males. The plumage is mainly dark brown with a pure white head and tail when adult. First year juveniles are often chocolate brown to blackish, sometimes with white mottling on the tail, belly, and underwings. The head and tail become increasingly white with age until full adult plumage is reached in the 5th or 6th year (Stevenson and Anderson 1994).

Life History

Nest locations usually provide proximity to a food source, good visibility from the nest, and a clear flight path to the nest (Herrick 1924, Robards and King 1966, Grubb 1976). Bald eagle nesting densities depend, in part, on total prey availability. At Besnard Lake, Saskatchewan, nesting densities were higher in areas of higher lake productivity (Gerrard *et al.* 1983), and eagle nesting densities in central Saskatchewan were significantly correlated with the commercial fish catch per acre of surface water (Whitfield and Gerrard 1985). In California, there was a positive relationship between bald eagle nesting densities and lake or reservoir productivity (Detrich 1985).

Throughout their breeding range, bald eagles typically nest close to open water. Shorelines provide fishing and loafing perches, nest trees, and open flight paths (Whitfield *et al.* 1974, Gerrard *et al.* 1975). In western Washington and Canada, over half of the known nests were within 47 yards of a lake or river and over 90 percent were within 187 yards (Gerrard 1973, Grubb 1976). Whitfield *et al.* (1974) found that over 90 percent of all nests in their Manitoba and Saskatchewan study areas were within 190 yards of a lake or river. Very few nests were found over 740 yards from water. In several other populations, at least 90 percent of the nests were less than 200 yards from open water (Robards and King 1966, Corr 1974, Henney *et al.* 1978). In Florida, most nests were located within 1.6 miles or less from open water, however, the average distance to water varied depending on the physiographic region of the State (southwest, north-central, south-central, etc.)(Bohall Wood 1987, McEwan and Hirth 1979).

In the southeastern United States, nesting activities generally begin in early September. Nests are often in the ecotone of forest and marsh or water, and are constructed in dominant or codominant living pines or bald cypress (McEwan and Hirth 1979). In Everglades National Park, eagles nest in low mangroves and, in some cases, use nests that have fallen on the ground. Most nests, however, are located in the upper third of the tree with canopy cover above and a clear view of the surrounding area. The cone-shaped nest can be 6 feet in diameter and 6 to 8 feet from top to bottom. Nests are typically lined with Spanish moss, corn husks, grasses, or other soft materials.

Egg laying may begin as early as late October with a peak occurring in the latter part of December. Varying with latitude within the southeastern United States, incubation is initiated from October to March. Clutches usually consist of one or two eggs, but occasionally three or four. Incubation is approximately 35 days and fledging takes 10 to 12 weeks. Parental care may extend 4 to 6 weeks after fledging. As is typical for raptors, young eagles are fully developed at the time of fledging.

The bald eagle's diet is primarily composed of fish, but they will opportunistically supplement their diet with a variety of vertebrate species. McEwan (1977) reported 79 percent fish and 17 percent bird prey, by occurrence, based on 788 animal remains recovered from nests. Of these, the dominant items were catfish and the American coot. In South Carolina, prey items observed in nests during banding of young were primarily fish, American coot, gallinule, and waterfowl in early spring, with increased use of fish in late spring (T.M. Murphy, unpubl. data). Dugoni (1980) studied bald eagle food habits at nests in Louisiana. He collected and identified the remains of food items at 10 active nests following the 1978-1979 nesting season. Of those remains, birds represented the largest proportion (42.38 percent), followed by fish (41.57 percent), mammals (15.69 percent), and reptiles (0.41 percent). Freshwater catfish and American coots comprised 41.97 percent of all remains; waterfowl contributed 16.46 percent.

Population Dynamics

Breeding bald eagles are more sensitive to disturbance than non-breeding or wintering birds, and the early stages of the breeding cycle (nest repair, egg laying, and incubation) are the most critical time (Mathisen 1968, Harper 1974, Weekes 1974, Ohmart and Sell 1980). Bald eagles are more likely to abandon a nest early in the season before a bond is established or young hatch. The vulnerability of eggs or young to adverse weather if adults are flushed from a nest is also most critical early in the season. Disturbances may be a problem later in the season and result in premature fledging (Grier 1969).

Human disturbance has been shown to reduce productivity, nest success, and territory use (Grubb 1980, Anthony and Isaacs 1989, Stalmaster 1987, Montana Bald Eagle Working Group 1991, Anthony *et al.* 1995). Though eagles vary considerably in their response to human activity, it is clear that at some point the duration and intensity of human disturbance will alter the habitat to an extent that it is no longer suitable for bald eagle use. Segments of the Chesapeake Bay shoreline that historically provided eagle habitat have now become so saturated with human activity that bald eagles no longer use these sites (Buehler et *al.* 1991). Similarly, as shoreline development or human activity increases, eagles often rebuild nests further inland to avoid disturbance (Whitfield *et al.* 1974, Grubb 1976, Newman *et al.* 1977, Fraser *et al.* 1985).

Status/Distribution

Historically, the bald eagle was a common nesting species throughout the coastal plain of the southeastern United States as well as along major lakes and rivers. Hence, the breeding range

was uninterrupted along the east coast from the Chesapeake Bay to the Florida Keys and north along the west coast of Florida to the panhandle. The nesting range also appears to have been continuous along the entire Mississippi and other major rivers, through Louisiana and into east Texas with a low density along the Gulf Coast.

Intensive conversion of natural plant communities to agricultural, residential and commercial uses has, and continues, to encroach on bald eagle nesting and foraging habitats (Heinzman 1961, 1962 and Smith 1969, Bohall Wood *et al.* 1989). Adverse effects are particularly evident near water bodies where both man and eagle prefer waterfront locations (Bohall Wood *et al.* 1989; Harris *et al.* 1987). Habitat alterations effect the quantity, quality, and distribution of essential environmental factors needed to support bald eagles. Changes in the landscape reduce or fragment natural vegetative communities thereby decreasing suitable nest sites. Human growth and associated land alterations are also responsible for degradation of many surface waters, which adversely effect bald eagle foraging areas. In addition to the direct effects of altering the physical habitat, human growth and the infrastructure necessary to support that growth, often indirectly result in an increased exposure of nesting bald eagles to human disturbance. New roads, houses, commercial complexes, agribusiness, and recreational facilities resulting from land conversions may have adverse effects to nesting bald eagles.

Despite the continuing effects of habitat alterations in the years since it was listed, the Nation's bald eagle population has improved. The improvement resulted from the banning of DDT and other persistent organochlorines, as well as from other recovery efforts. In 1963, a National Audubon Society survey reported only 417 active nests in the lower 48 States with an average of 0.59 young produced per active nest. In 1995, about 4,400 occupied breeding areas were reported by the States with an estimated average young produced per occupied territory of 0.93. Compared to 1974, for example, the number of occupied breeding areas in the lower 48 States has increased over 400 percent, and since 1990, there has been a 32 percent increase. Florida currently supports the highest number of breeding bald eagles of any southeastern state and contains approximately 70 percent of the occupied territories in this region (Nesbitt 1995).

Wood Stork

Species/critical habitat description

Wood storks are large, long-legged wading birds, about 50 inches tall, with a wingspan of 60 to 65 inches. The plumage is white except for black primaries and secondaries and a short black tail. The head and neck are largely unfeathered and dark gray in color. The bill is black, thick at the base, and slightly decurved. Immature birds are dingy gray and have a yellowish bill.

The Service listed the United States breeding population of wood storks as endangered on February 28, 1984. All populations of wood storks breeding within the U.S., and their offspring, are protected by the listing action. No critical habitat has been designated for this species.

Life History

Wood storks nest in colonies, called rookeries. Typically, storks nest in medium to tall trees located either in standing water or on islands surrounded by relatively broad expanses of open water (Ogden 1991, U.S. Fish and Wildlife Service 1996). Nests in Georgia often are constructed in cypress, blackgum, southern willow (*Salix carolina*), and, on the coast, buttonbush (*Cephalanthus occidentalis*) (U.S. Fish and Wildlife Service 1996). Storks tend to use the same rookeries over many years, as long as the sites remain undisturbed and sufficient foraging habitat remains in surrounding wetlands. Rookery sites must remain inundated during the nesting period to prevent predation and abandonment (U.S. Fish and Wildlife Service 1996).

The average age at which wood storks first breed is unknown; some birds are known to breed at three and four years old. Once storks reach sexual maturity, they nest on a yearly basis (U.S. Fish and Wildlife Service 1996). In Georgia, wood storks lay two to five (generally three) eggs from March through late May. Adults incubate the eggs approximately 30 days, and the young fledge from July to August. Adults feed young by regurgitating whole fish into the bottom of the nest three to ten times per day.

Wood storks feed in a variety of shallow (6-10" deep) wetlands, generally on small fish 1-10" long (Kahl 1964, Coulter 1987, U.S. Fish and Wildlife Service 1996). Bryan and Coulter (1987) in a study of wood storks in Georgia, determined that over 85% of foraging sites were within 12 miles of the nesting colony, but foraging flights up to 60 miles from the colony occur (Browder 1984). Wood storks capture prey by a specialized technique called tactolocation, where a stork wades through the water with the beak immersed and partially open, then quickly snaps the bill shut and raises the head when the bill contacts a prey item. Effective tactolocation requires concentrated prey in relatively high densities. In southern Florida, a dropping water level often is necessary to concentrate fish to suitable densities (Kahl 1964). However, in east-central Georgia, stork prey is almost twice as large as prey in southern Florida, and foraging storks do not appear to depend on evaporative concentrating of prey (U.S. Fish and Wildlife Service 1996).

Population dynamics

The number of breeding pairs of wood storks in the southeastern United States decreased from an estimated 10,000 pairs in 1960 to 6,000 pairs in 1975 (Ogden and Nesbitt 1979). The breeding population dipped to a low of 2,500 pairs in 1978, and fluctuated between 2,500 and 5,200 pairs from 1976-1982 (Ogden et al. 1987). Since 1984, when the wood stork was listed, the U.S. population of wood storks has ranged between 5,500 and 6,500 pairs.

Status/Distribution

The wood stork is one of 20 stork species worldwide, and is the only stork that occurs regularly in the United States. The breeding range of the species extends from the southeastern United States through Mexico, Central America, and most of South America, as well as Cuba and

Hispaniola. In the United States, the wood stork formerly may have bred in all coastal states from Texas to South Carolina but currently is restricted to Florida, Georgia, and South Carolina. Historically, wood stork nesting colonies primarily were located in south Florida. However, since the mid 1970's, the geographical center of wood stork nesting has shifted: numbers of nesting wood storks have declined substantially in south Florida, due, in large part, to loss and alteration of foraging habitat, and numbers have increased in northern Florida, Georgia, and South Carolina (Ogden *et al.* 1987). Most wood storks probably migrate to freshwater wetlands in south Florida in the winter months (U.S. Fish and Wildlife Service 1996).

Flatwoods Salamander

Species/critical habitat description

The flatwoods salamander is a slender, small-headed mole salamander that rarely exceeds 13 centimeters in length when fully mature (Means 1986, Conant and Collins 1991, Ashton 1992). The dorsum of adults is chocolate-black to silvery-gray, with fine, light gray lines that form a cross-banded pattern. The belly is black with scattered gray spots or flecks. The aquatic larvae of the flatwoods salamander are broad-headed and bushy-gilled, with a distinct and bold color pattern that includes yellow-cream longitudinal stripes along the sides of their chocolate brown-black bodies (Palis 1995).

The flatwoods salamander was listed as threatened by the Service on April 1, 1999, (U.S. Fish and Wildlife Service 1999) under the Endangered Species Act. No critical habitat has been designated for the salamander.

Historically, the flatwoods salamander inhabited mesic, seasonally wet, pine flatwoods and pine savannas from southwestern Alabama, eastward through the Gulf Coastal Plain to north-central Florida, and northward through the Atlantic Coastal Plain to southern South Carolina (Conant and Collins 1991). Recent status surveys completed in 1999 indicated that the salamander is no longer found at 88 percent of its historical locations.

Life History

Adult flatwoods salamanders migrate to wetland breeding sites during wet weather from October to early December (Palis 1997). These salamanders deposit their eggs terrestrially in wetland depressions that fill with late fall and early winter rains (Anderson and Williamson 1976). The eggs hatch into aquatic larvae when inundated by rising pond levels. Larvae typically complete development and transform into terrestrial salamanders in late March or early April, before the seasonal wetlands dry up (Palis 1997).

Following metamorphosis, flatwoods salamanders are fossorial and inhabit low areas in pine flatwoods where they live underground in burrows they excavate or in crayfish tunnels (Ashton 1992). These salamanders have been observed eating earthworms, which are abundant in some

mesic flatwoods habitats (Wolf *et al.* 1988). It is likely that a variety of other small invertebrates are also eaten.

Population Dynamics

The minimum viable population size needed to sustain a salamander population is unknown. High-quality habitat for this species should include several breeding sites within a matrix of pine flatwoods and savanna (Palis 1996). The presence of multiple breeding sites guards against extinction at any particular site, because it is presumed that over time salamanders can immigrate and colonize from nearby wetlands (Palis 1996). Long-term survival of a flatwoods salamander population probably requires a large area of terrestrial habitat that encompasses a suite of alternative breeding sites (Palis 1996) and corridors. In a study by Ashton (1992), flatwoods salamanders were found greater than 1,700 m (1,859 yards) from their breeding pond. However, based on more recent data (Semlitsch 1998) and additional peer review, the final listing rule recommends a 450 m (1476 ft) "buffer" around breeding ponds to protect the majority of a flatwoods salamander population. This buffer extends 450 m out from the wetland edge.

Status/Distribution

The historical range of the flatwoods salamander includes the Lower Coastal Plain and portions of the Upper Coastal Plain of the southeastern United States, from the southern half of South Carolina through Georgia to northern-central Florida, and west to Mobile County, Alabama (Palis 1996). The current distribution of this salamander consists of isolated populations that are scattered throughout remaining pine flatwoods at sites in South Carolina, Georgia, and Florida (Palis 1997). Amphibians are, in general, thought to be declining throughout the world due to habitat loss and use of xenobiotic agents (e.g., herbicides). Habitat loss is the primary cause of the continued decline of the flatwoods salamander.

III. Environmental Baseline

The total land base affected by implementation of the INRMP and ESMP encompasses approximately 279,270 acres. A detailed description of Fort Stewart and Hunter Army Airfield's location, mission, history, physiographic and biological environment, past and present land use, which are all part of the environmental baseline that contributes to the current status of the species and its habitat on the installation, can be found in the ESMP.

Status of the Species Within the Action Area

Red-cockaded Woodpecker

All of Fort Stewart, except for the Artillery Impact Area (AIA), was surveyed for RCWs by The Nature Conservancy (TNC) between 1992 and 1994. Aerial surveys were conducted over the AIA and no RCW clusters were found. Fort Stewart personnel continually update survey

numbers and location data. As of FY 2000, Fort Stewart had a total of 303 sites identified as RCW clusters or recruitment clusters, of which 231 are currently active or have been active within the last five years. There is one RCW cluster at Hunter Army Airfield which has been inactive for over five years. Another 72 sites at Fort Stewart have not been active within the last five years. Since 1994, the actual number of active RCW clusters has increased each year, from 157 active RCW clusters in 1994 to 212 active RCW clusters in 2000. One currently active RCW cluster (#258) will be combined with an adjacent cluster due to lack of adequate foraging habitat and conflicts with the training mission, and it will be replaced with a SRC.

Eastern Indigo Snake

Surveys for the eastern indigo snake were also conducted by TNC from 1992-1994 (Gawin et al. 1995) and are continuously updated by Fort Stewart personnel. The eastern indigo snake is uncommon and locally distributed on Fort Stewart, with the majority of observations at gopher tortoise burrows in sandhills. The installation's four known eastern indigo snake populations are associated with sandhills along the Canoochee River, the Ogeechee River, and Beard's Creek. The known populations are: 1) F Training Area population, in Canoochee River sandhills in Training Areas F11, F12, and F13, located in the northwest corner of Fort Stewart in Bryan and Evans counties; 2) E21 Training Area population in Long County, in sandhills near Beards Creek; 3) Artillery Impact Area (AIA) and Training Areas B3 and B4 in Bryan and Liberty Counties, in sandhills adjacent to the Canoochee River; and 4) C11 Training Area population in Bryan County near sandhills adjacent to the Ogeechee River.

Due to the secretive nature of the eastern indigo snake, a precise number of individual snakes is not known from each population. However, the F Training Area population and the AIA/B3 & B4 Training Area population are believed to be thriving and stable. The populations in E21 and C11 are poorly known because of the few sightings recorded in each population.

Bald Eagle

A pair of bald eagles has nested and foraged on Fort Stewart in the Pineview Lake area, in Training Area E21, on the west side of Fort Stewart in Long County. These eagles at first nested on Pineview Lake, but have since made a nest in Training Area E13. This pair of bald eagles have successfully fledged one or two offspring every year since 1993, except for 1998, when no young were fledged. Also, single adult and juvenile eagles are seen regularly on Fort Stewart's lakes and rivers, therefore it is likely that another pair of bald eagles will establish a nest on Fort Stewart sometime in the near future.

Wood Stork

TNC conducted aerial surveys for wood storks in 1993, but none were found. Also, Fort Stewart personnel conduct aerial reconnaissance of forest areas for beetle outbreaks and conduct ground surveys of several wading bird rookeries, but no nesting wood storks have been discovered on the

installation. Foraging wood storks are seen on Fort Stewart and Hunter Army Airfield regularly in streams, lakes, and borrow pits. There are several wood stork rookeries within 30 miles of the installation, and it is possible that wood storks may nest on the installation in the future.

Flatwoods Salamander

Recent surveys for the flatwoods salamander in Georgia have documented 11 salamander populations across the state with 28 breeding sites. Of these, Fort Stewart has five populations and 21 breeding sites (U.S. Fish and Wildlife Service 1999). These populations are scattered over the installation with several breeding sites per population (see ESMP).

Factors Affecting Species Environment Within the Action Area

This section addresses all unrelated Federal, State, local, Tribal, and private actions within the action area that have already occurred or that will occur contemporaneously with the proposed action and will affect the environment of the red-cockaded woodpecker, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander.

Within the action area, the Service has identified two categories of factors that ultimately affect the status and distribution of the endangered and threatened species on Fort Stewart and Hunter Army Airfield.

Training impacts - Training activities at the two installations likely have the most significant impacts on endangered and threatened species and their habitats. Ongoing training activities such as live-fire exercises, vehicle and troop maneuvers, all may have an impact on listed species. In 1992, the Service consulted with Fort Stewart on these training impacts on the red-cockaded woodpecker, eastern indigo snake, bald eagle, and wood stork. These training impacts are described in detail in Fort Stewart's 1992 biological assessment of the ongoing training activities. Training impacts on the flatwoods salamander were not discussed during this previous consultation because the species was not listed until 1999.

Training impacts on RCWs were also discussed in the Service's 1996 biological opinion on the 1996 Management Guidelines for the RCW on Army Installations. These impacts included 1) transient off-road vehicle travel within RCW buffer zones, 2) hand-digging of hasty individual fighting positions, 3) firing of 50 caliber blanks, artillery/hand grenade simulators, and Hoffman devices, 4) use of smoke grenades and star clusters/parachute flares, 5) infiltration of smoke and haze operations. These training activities and their effects are described in more detail in the 1996 biological opinion.

Habitat loss/degradation - Loss of habitat and habitat degradation due to development and construction of buildings, facilities, roads, and new ranges or range expansions on Fort Stewart and HAA also may have an impact to the installations' endangered and threatened species. One example of habitat loss or degradation is the proposed construction of the Multi Purpose Training

Range (MPTR) on Fort Stewart. The Service consulted with Fort Stewart on this proposed range project in June 2000, and it may cause the loss or degradation of eastern indigo snake and/or flatwoods salamander habitat.

IV. Effects of the Action

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with that action. The effects of the proposed action are added to the environmental baseline to determine the future baseline which serves as the basis for the determinations in this document.

Factors considered by the Service for purposes of analyzing the effects of the INRMP and ESMP on Fort Stewart and Hunter Army Airfield include: 1) various training impacts on individuals and habitats of each listed species; 2) conservation goals and habitat management impacts on each species; and 3) replacement of an active RCW cluster (#258) with a SRC. The Service considered direct and indirect effects of the proposed action. The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.

This proposed ESMP forms a general planning document that provides management goals and actions for the RCW, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander. All project-level activities will undergo National Environmental Policy Act (NEPA) and section 7 consultation when proposed and before a decision document is signed.

Training Impacts

Under this proposed ESMP, Fort Stewart will be increasing the size of their existing RCW population, however SRCs and future RCW clusters in HMU-2 and HMU-3 will be subject to no training restrictions and will not be marked. Thus, the Service anticipates the possibility of harm to RCWs within HMU-2 and HMU-3, primarily through training-related behavioral disturbance and habitat degradation or loss, resulting in the potential for reduced reproductive success and breeder retention. The training restrictions (200 ft. buffer, etc.) placed on PRCs and current RCW clusters will have a positive effect on the RCW. A more detailed discussion of the anticipated effects from training activities on supplemental recruitment clusters and associated RCWs can be found in the Service's biological opinion on the U.S. Army's Management Guidelines for the Red-cockaded Woodpecker on Army Installations (U.S. Fish and Wildlife Service 1996) and the Army's biological assessment for the same document (U.S. Army 1996b).

Training impacts due to Fort Stewart's ongoing training mission were analyzed in detail in the Service's 1992 biological opinion and Fort Stewart's 1991 biological assessment. According to the 1992 opinion, the most significant impacts affecting the RCW and the eastern indigo snake were: 1) maintenance of the Artillery Impact Area, 2) use of vehicles in training areas, 3) use of small and large caliber weapons, 4) use of CS agent, and 5) use of obscurant smoke. These

impacts were found to not have a significant effect on the bald eagle and wood stork in the 1992 opinion because bald eagles or wood storks did not nest on the installations. However, bald eagles currently nest on Fort Stewart and the flatwoods salamander became a federally-threatened species. Therefore, these training activities could also have an adverse effect on the bald eagle and flatwoods salamander. These effects would be similar to those effects expected for RCWs and eastern indigo snakes in the 1992 biological opinion.

Additionally, munitions impacts could kill or injure individual RCWs, eastern indigo snakes, bald eagles, wood storks, and flatwoods salamanders that happen to enter into a live-fire area, or damage their habitat, even though earthen berms have been constructed to protect habitat. Accidental detonation of unexploded ordnance could kill or injure individuals of these species. Vehicle impacts from training could also kill or injure all of these listed species. Also, wildfires caused by munitions impacts or other training could mainly affect RCWs or eastern indigo snakes. Any of these impacts would be rare, but could occur.

Fort Stewart is implementing training and safety regulations, and environmental awareness programs to reduce the likelihood of accidental adverse impacts to threatened and endangered species. Instruction regarding protection of sensitive species is included in environmental awareness training in Environmental Officer classes, etc. Guidelines and restrictions have also been incorporated into Fort Stewart's Range Regulation 385-14 (see Appendix F in INRMP). All violations are reported to the Range Control Office, where action taken depends on the nature and severity of the violation.

Conservation Goals and Habitat Management Impacts

The conservation goals of maintaining and increasing populations of the RCW, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander, will have beneficial effects on each species. HMUs will be set up for the RCW, eastern indigo snake, bald eagle, and flatwoods salamander. Habitat management actions, such as prescribe burning, mechanical or chemical midstory control, thinning, longleaf restoration, etc., may harm or injure individuals of a species, but will ultimately be beneficial to populations of each species. These actions will create open park-like stands preferred by the RCW, eastern indigo snake, and flatwoods salamander. Protecting and leaving older pine trees during thinnings will be beneficial for the bald eagle and RCW. Protecting wetland areas will benefit the wood stork and flatwoods salamander. Protection of buffer areas around nesting and breeding sites for the RCW, bald eagle, and flatwoods salamander will be beneficial also.

Monitoring of each species' populations will have beneficial effects to each species by assisting in project-level analysis and by disclosing population size and trend information installation wide, which, in turn, dictates appropriate management changes. This information will be used to schedule and implement actions to correct, improve, or maintain suitable habitat conditions.

Providing recruitment clusters for the RCW, provisioning artificial cavities, translocations, and augmentations will ultimately benefit the RCW population. Creation of PRCs and SRCs and the habitat management actions will help achieve the Mission Compatible Goal and the Installation Regional Recovery Goal.

Replacement of Active RCW Cluster 258 with a SRC

The replacement of RCW cluster 258 with a supplemental recruitment cluster is necessary to allow timber density in an important training area to be reduced to allow for suitable mechanized maneuver training in the area. Cluster 258 was originally part of cluster 189, but became a separate cluster in 1997 after another pair of RCWs was noticed using the area. Cluster #258 did not have any nest in 1997, 1998, and 1999, and will therefore be reabsorbed into cluster 189 to provide adequate foraging for adjacent RCW clusters. An SRC will be created about 1400 meters east of cluster 258 to provide a replacement for the lost cluster. This would be beneficial for the RCW population because another cluster would be created with sufficient foraging habitat.

V. Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Actions adjacent to Fort Stewart and Hunter Army Airfield, such as logging and clearcutting operations, urban development, and associated activities, will all continue to reduce and degrade available habitat for the RCW, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander. However, there is no State or private land within the action area considered in this consultation. Consequently, the Service did not identify any State or private activities that are reasonably certain to occur within the action area that would constitute cumulative effects.

VI. Conclusion

After reviewing the current status of the red-cockaded woodpecker, eastern indigo snake, bald eagle, wood stork, and flatwoods salamander, the environmental baseline including ongoing training activities, the effects of the proposed ESMP, and the cumulative effects, it is the Service's biological opinion that the implementation of the INRMP and ESMP, as proposed, is not likely to jeopardize the continued existence of the RCW, eastern indigo snake, bald eagle, wood stork, or flatwoods salamander No critical habitat has been designated for these five species, therefore none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by Fort Stewart, for the exemption in section 7(o)(2) to apply. Fort Stewart has a continuing duty to regulate the activity covered by this incidental take statement. If Fort Stewart fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Fort Stewart must report the progress of the action and its impact on the species to the Service in a yearly report provided to the Service's Brunswick, Georgia office.

Red-cockaded Woodpecker

In the Service's October 25, 1996 final biological opinion for the implementation of the Management Guidelines for the Red-cockaded Woodpecker on Army Installations, no incidental take was specified since the Guidelines were Army-wide. Each military installation was to develop its own ESMP, and biological opinions with Incidental take statements would be provided by the Service.

Therefore, the Service anticipates 109 RCW groups could be taken as a result of this proposed ESMP for Fort Stewart and Hunter Army Airfield, for the 5-year period, 2001 through 2005. This total includes 99 RCW groups in eventual SRCs that could be taken as a result of training activities and 10 RCW groups in other areas that could be taken due to wildfires, training accidents or habitat management actions, that occur on Fort Stewart and Hunter Army Airfield during the 5-year ESMP period. This "take" may be in the form of harass, harm, wound, or kill.

This level of take assumes an annual RCW active cavity growth rate of about 8% per year (the highest growth rate for Fort Stewart from 1994-2000) for the period 2001-2005. At this growth rate, there would be 311 active RCW clusters at Fort Stewart in 2005, a gain of 99 clusters from 2000. These new clusters could all be located in SRCs, thus the need for this amount of take.

Eastern indigo snake

The Service anticipates ten eastern indigo snakes could be taken as a result of this proposed ESMP over the five year period, 2001 - 2005. The incidental take is expected to be in the form of harass, harm, wound, or kill from either military training activities or habitat management actions that occur on the installation.

The 1992 biological opinion on the on-going training at Fort Stewart and Hunter Army Airfield, provided for take in the form of one eastern indigo snake, and to date, none have knowingly been taken.

Bald Eagle

The Service anticipates two bald eagles could be taken as a result of this proposed ESMP over the five year period, 2001-2005. Fort Stewart only has one pair of breeding bald eagles and the take could either be adults or juveniles. The incidental take is expected to be in the form of harass, harm, wound, or kill from military training activities.

The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Wood Stork

The Service anticipates one wood stork could be taken as a result of this proposed ESMP over the five year period, 2001-2005. Wood storks are not commonly seen on Fort Stewart or Hunter Army Airfield and do not nest on the installations. The incidental take is expected to be in the form of harass, harm, wound, or kill due to military training activities.

Flatwoods salamander

The Service anticipates incidental take of flatwoods salamanders will be difficult to detect for the following reasons:

1. Adult flatwoods salamanders are small, they live underground, and they can be wide-ranging. Adults typically live in subterranean passages such as crayfish burrows and root channels; therefore, they are difficult to locate and observe. Individuals killed during training or management activities would likely be buried under dirt and debris.

2. Larval flatwoods salamanders are also difficult to detect due to their small size and their special habitat requirements. Due to natural fluctuations and seasonal environmental

factors, a single survey is not adequate to determine presence, absence or number of species.

3. Losses may be masked by natural fluctuations in numbers of individuals.

However, all individual flatwoods salamanders in the 199,164 acres not in the salamander HMU may be taken as a result of this proposed ESMP over the five year period from 2001-2005. This incidental take is expected to be in the form of harass, harm, wound, or kill from either military training or habitat management activities.

Additionally, all flatwoods salamanders in 320 acres of known salamander breeding pond buffer areas within the HMU may be taken as a result of this proposed ESMP over the five year period from 2001-2005. This incidental take is expected to be in the form of harass, harm, wound, or kill from military training activities. This level of take in the HMU assumes that the military training that will be detrimental to the salamander will take place on no more than 10% of the total buffer areas of the salamander breeding ponds minus the amount of wetland acreage (which will be off limits to mechanized training), in this five year period. The buffer areas (450 meters from edge of ponds) of the 22 known salamander breeding ponds, less the wetland acreage, totals 3,208 acres, and 10% of this is 320 acres.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the five species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of RCWs, eastern indigo snakes, bald eagles, wood storks, and flatwoods salamanders:

1. Avoid damaging, destroying, or felling pine trees to the maximum extent practicable within supplemental RCW recruitment clusters. The purpose would be to reduce potential disturbance and avoid the loss of suitable and potential future nesting and foraging habitat for RCWs.

2. Avoid rutting and compacting of the soils within the primary buffer zones of known flatwoods salamander breeding ponds, whenever possible.

3. Inform all hunters, fishermen, hikers, construction workers and other non-military personnel associated with Fort Stewart and Hunter Army Airfield about the presence of protected species and the legal and financial penalties regarding "take" of these species.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Fort Stewart must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Ensure, via military environmental training programs (Environmental Compliance Officer class, etc. as described in ESMP) at Fort Stewart and Hunter Army Airfield, that specific emphasis is placed on the importance of protecting pine trees for future and potential RCW habitat. Monitor all SRCs for at least five years after they become occupied and record the level of exposure to training disturbance in the SRCs, and other relevant information. This information should be included in a yearly report to the Service office in Brunswick, Georgia.

2. Limit heavy mechanized training to existing roads and trails within 164 meters of known flatwoods salamander breeding ponds when possible to prevent rutting and compaction of the soil.

3. All hunters, fishermen, hikers, construction workers, and other non-military personnel who may spend time in habitat of threatened and endangered species, shall receive informational brochures regarding identification of red-cockaded woodpeckers, eastern indigo snakes, bald eagles, wood storks, and flatwoods salamanders and their habitats, and the legal and financial penalties regarding "take" of these species. Fort Stewart will provide a copy of this brochure and to whom they were given out to the Service office in Brunswick, Georgia.

4. Report incidental take due to training and/or species management activities to the Service's Brunswick office annually.

5. If a dead or injured RCW, eastern indigo snake, bald eagle, wood stork, or flatwoods salamander is found on Fort Stewart or Hunter Army Airfield, Fort Stewart should immediately notify the Service office in Brunswick, Georgia.

The Service anticipates that no more than 109 RCW groups, ten eastern indigo snakes, two bald eagles, one wood stork, and all flatwoods salamanders in the 199,162 acres outside the HMU plus all salamanders within 320 acres of known salamander breeding pond buffer areas within the HMU, will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes

of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementation of the following conservation recommendations:

1. Due to the variability of RCW populations and associated pine habitats within forest types and physiographic provinces, the Service recommends Fort Stewart develop installation-specific RCW foraging habitat guidelines.

2. Continue to participate in the RCW regional recovery translocation and monitoring efforts.

3. Conduct studies providing information on movement and distribution of eastern indigo snakes and flatwoods salamanders on the installation.

4. Monitor vegetation changes in known flatwoods salamander breeding ponds and upland buffer areas in at least 10% of the breeding sites in each of Fort Stewart's five flatwoods salamander populations.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION

This concludes formal consultation on the action outlined in the biological assessment we received on July 6, 2000. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. Also, according to the Army RCW guidelines, formal consultation will be reinitiated within 30 days of discovering a 5% or greater population decrease in RCWs. In

instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. We appreciate the cooperation of your staff in the preparation of this biological opinion. If you have any questions about this opinion or consultation, please contact staff biologist Robert Brooks of our Brunswick office at (912) 265-9336, extension 25.

Sincerely,

Sandra S. Tucker
Field Supervisor

cc: file
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