UPDATED
INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN

FOR

COMMAND SERGEANT MAJOR HAROLD L. DISNEY
TRAINING CENTER

KNOX COUNTY, KENTUCKY

KENTUCKY ARMY NATIONAL GUARD

MARCH 2009

PREPARED BY:

AMEC Earth & Environmental, Inc.
960 Kingsmill Parkway# 104
Columbus, Ohio 43229
(614) 430-0487

THIS PACE IS INTENTIONALLY BLANK

SIGNATURE PAGE

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

UPDATE

COMMAND SERGEANT MAJOR HAROLD L. DISNEY TRAINING CENTER (DTC)
KNOX COUNTY, KENTUCKY

This updated Integrated Natural Resources management Plan (INRMP) meets the requirements for INRMP's per NGB and ARMY policy, meets the intent of the Sikes Act, as amended (16 United States Code [USC] 670a *et seq.),* and contributes to the conservation and rehabilitation of natural resources on military installations. It has set appropriate and adequate guidelines for conserving and protecting the natural resources of the Command Sergeant Major Harold L. Disney Training Center (DTC).

Approving Officials:

EDWARD W. TONINI
Major General, KYNG
The Adjutant General

13 Feb 09
DATE

JEFFREY G. PHILLIPS
Colonel, US Army
Chief, Environmental Programs Division

DATE

WAYNE L. BURD
COL, GS, KYARNG
J3

21 Jan 09
DATE

WILLIAM L. McDANIEL
LTC, AR, KYARNG
Commanding

21 Jan 09
DATE

FAITH FIENE
Environmental Program Manager
KY Dept. of Military Affairs

21 Jan 09
DATE

BRIAN S. DeMERS
MAJ, EN, KYARNG
Construction & Facilities Management Office

22 Jan 09
DATE

THIS PACE IS INTENTIONALLY BLANK

EXECUTIVE SUMMARY

Command Sergeant Major (CSM) Harold L. Disney served in the United States Army from 1 958-1 963, and joined the Kentucky Army National Guard (KYARNG) in December 1 963. He became the face of the Eastern Kentucky Training Site at Artemus (EKTS-Artemus) as a Federal Technician in October 1974, and was promoted to CSM in March of 1977. He retired from the KYARNG and federal service in 1997, but returned between May 2006 and December 2007 while the training site Non-Commissioned Officer in Charge (NCOIC) deployed to Iraq. In November 2007, the EKTS-Artemus was renamed the CSM Harold L. Disney Training Center (DTC) in his honor.

This Integrated Natural Resources Management Plan (INRMP) is an **update** and **reorganization** of the 2003 INRMP for the DTC. The INRMP has been updated for use by the National Guard Bureau (NGB) and KYARNG as the primary tool for managing natural resources at the KYARNG's 5 58-acre DTC. The DTC is located in southeast Knox County, 4 miles east of the city of Barbourville, and 0.3 miles southeast of the town of Artemus, Kentucky. The DTC is located on federally-owned land. The KYARNG is licensed by the Louisville District of the U.S. Army Corps of Engineers (USACE) to use and occupy 673.7 acres for year-round training and support of the Kentucky National Guard (License No. DACA 27-3-94-85).

The primary purpose of the DTC is to support the military missions of the KYARNG. To properly train soldiers, the KYARNG must provide a variety of environmental conditions and ecosystems. This training objective must be met in a way that provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation.

INRMPs help installation commanders steward or manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission. The KYARNG published the first INRMP for the DTC in 1997, and updated it in 2003. The reasons for the 2007 INRMP update include (1) collection of updated resource information; (2) development of a Forest Ecosystem Management Plan; and (3) new Army National Guard (ARNG) guidance.

The Sikes Act Improvement Act (SAIA) of 1997, 16 U.S. Code (USC) §670a et seq., as amended, requires Federal military installations with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. The updated INRMP has been prepared in accordance with the SAIA as well as Army Regulation (AR) 200-1, *Environmental Protection and Enhancement',* 32 Code of Federal Regulations (CFR) 651, *Environmental Analysis of Army Actions;* Department of Defense (DoD) Directive 4700.1, *Natural Resources Management Programs;* and Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program;* and NGB policy.

Overall, the DTC has benefited from using the INRMP as a management tool. An evaluation as to operation and effect of the 2003 INRMP, including natural resources management goals, objectives, and projects and their implementation status, can be found in **Appendix B.** A summary of the completion status for the 2003 INRMP projects is provided in **Table ES-1.**

The review of the 2003 INRMP was developed in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR). Developed using an interdisciplinary approach, information has been gathered from the KYARNG Environmental Office and training site staff, as well as other Federal, State, and local agencies and special interest groups with an interest in management of natural resources at the DTC.

Specific goals identified by the updated INRMP in **Section 7.0** are listed in **Table ES-2.** These goals are supported in the updated INRMP by objectives and projects that provide management strategies and specific actions to achieve these goals. Objectives are listed in **Section 7.0** of the updated INRMP, and projects are listed in **Table 36** of **Section 8.**

These goals will ensure the success of the military mission and conservation of natural resources. The general philosophies and methodologies used throughout the DTC natural resources management program are focused on conducting doctrinally-required military training while maintaining ecosystem viability.

This updated INRMP provides a description of the installation (e.g. location, history, and mission), information regarding the on-site and adjacent physical and biotic environment, and an assessment of the anticipated impacts to natural resources as a result of mission activities. Included within the updated INRMP are recommendations for various management practices designed to enhance the natural resource base and mitigate anticipated negative impacts that may result through successful execution of the military mission at the DTC.

Additionally, this updated INRMP presents methods that will increase the environmental awareness of KYARNG personnel, guest units using the DTC for training, and the general public. The implementation of this updated INRMP at the DTC will ensure the successful accomplishment of the KYARNG's military missions while providing for multiple uses of natural resources and promoting adaptive stewardship practices that sustain ecosystem and biological integrity. The updated INRMP complies with applicable Army and DoD policies, as well as applicable Federal, State, and local mandates.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 INRMP

PROJECT	PROJECT DESCRIPTION	STATUS
4.1	Non-LCTA protocol natural resource management surveys	Ongoing. LCTA is now known as RTLA. KYARNG Environmental staff prepare annual INRMP review and update if needed. This project is continued to the following planning period.
4-2	Non-plot erosion surveys	Ongoing. Staff conducts periodic windshield survey and reviews orthophotographs.
4-3	GIS data acquisition and management	Partially accomplished. Most of available layers have been incorporated into central database in Environmental Office in Frankfort. Continued to the following planning period.
4-4	Brief ITAM Committee on GIS capabilities	ITAM Committee discontinued. KYARNG staff is briefed as needed on GIS capabilities.
4-5	Identify ITAM requirements in WAM	Ongoing.
4.6	Convene ITAM Committee semi-annually	ITAM Committee discontinued.
4-7	Siber stake environmentally sensitive areas	Completed. A map with wetland constraints is available
4-8	Training Site Regulation revision	Not accomplished; scope revised.
4-9	Maneuver Damage Repair	Ongoing, as needed.
4.10	Proactive maintenance of maneuver areas	Ongoing, as needed. Includes fertilizer, lime, seed, and mulch.
4.11	Maneuver area/corridor: vegetation clearing	Ongoing, as needed.
4.12	Purchase LRAM equipment for land maintenance	A grass seeder is needed
4-13	Hardened bivouac sites	Completed
4-14	Dust control on gravel roads	Ongoing, as needed.
4-15	Water projects: Stream crossing structure	Stream crossings are tiled with gravel on top. Gravel is added annually.
4.16	Environmental awareness materials	Ongoing. Display for Boy Scouts/Troops. Archeological training module completed.
5-1	Planning Level Surveys (Flora and Fauna)	Flora and vegetation communities updated 2006. Others not updated.
5-2	Bird surveys in coordination with Partners in Flight	Ongoing. This project is continued to the following planning period.
5-3	“NO MOW” around Streamside Mgmt. Zones	Questionable whether signs are needed.
5-4	Lease for hay production	Completed. Maintain lease.
5-5	Forest Inventory	Not completed. Continued to next planning period.
5-6	Planning Level Survey: water quality	Completed. KYARNG to determine if continuation is necessary.
5-7	Planning Level Survey: wetlands delineation	Completed. Update required if additional land acquired.
5-8	Invasive Species Control	Ongoing. Mowing not effective on johnsongrass.
5-9	Pest Species Survey: Hemlock Wooly Adelgid	Ongoing. Project continued for the planning period.
5.10	Pest Species Survey: Southern Pine Beetle	Ongoing. Project is to be continued for the planning period.
5.11	Organized Hunts: Determine hunting quota	Ongoing.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 INRMP		
PROJECT	PROJECT DESCRIPTION	STATUS
5.12	Organized Hunts: Coordinate hunts with KDFWR	Ongoing.
5-13	Law Enforcement	Ongoing.

TABLE ES-2. MANAGEMENT GOALS FOR DTC

#	Management Goal
1	Manage natural resources to ***support the military mission*** in a manner consistent with the KYARNG Environmental Management System and in compliance with Federal and State laws, Army regulations, and policies.
2	***Coordinate mission requirements and land maintenance activities*** to minimize land impacts from training.
3	Manage ***fish and wildlife resources*** in a manner compatible with the military mission and within the limits of the natural habitat.
4	Protect, restore, and maintain populations of ***rare plant and animal species*** in compliance with Federal and State laws and regulations.
5	Protect, maintain, and improve ***soil and water quality*** in accordance with State and Federal laws and regulations to sustain the overall condition of the DTC training lands.
6	***Protect and maintain riparian, wetland, and aquatic habitats*** in accordance with state and federal laws and regulations while adhering to the principles of ecosystem management for purposes of water quality enhancement, wildlife food and cover, and aquatic habitat.
7	Maintain the ***grassland habitats*** for purposes of military training, wildlife food and cover, and soil stabilization.
8	Maintain the ***forest resources*** for purposes of military training, wildlife food and cover, and watershed protection.
9	***Use IPM practices that*** maximize safety and minimize pesticide use and potential hazards to humans, wildlife, and their environments.
10	***Maintain public access*** within the constraints of the military mission and site security needs consistent with sound ecological principles.
11	Continue to ***develop and maintain a GIS system*** providing efficient data storage, retrieval, and presentation to facilitate fully informed management decisions.
12	***Educate site users*** about environmental concerns and responsibilities while using the site to minimize resource damage and instill a sense of pride and stewardship responsibility.
13	***Form communication links*** with other agencies, organizations, and the public to share information and aid in decision-making.
14	***Protect and Preserve Cultural Resources*** in Accordance with State and Federal Laws and Regulations.

This INRMP includes, as **Appendix D,** a Record of Environmental Consideration (REC). The Environmental Assessment (EA) for the DTC 2003 INRMP presented the Proposed Action (implementation of the INRMP) and alternatives, summarized the affected environment, and assessed the environmental consequences of implementation. The EA concluded that the known and potential impacts of the Proposed Action on the physical, biological, and cultural environment will generally be of a positive nature. Implementing the INRMP will not result in significant adverse environmental effects. This National Environmental Policy Act (NEPA) analysis is still valid, and adequately covers the actions in this revised INRMP. The REC describes the Proposed Action and explains why further environmental analysis is not needed.

THIS PAGE IS INTENTIONALLY BLANK.

CONTENTS

TABLES

FIGURES

CHARTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

ABC	American Bird Conservancy
ACHP	Advisory Council on Historic Preservation
AEDB-EQ	Army Environmental Database Environmental Quality module
AH PA	Archeological and Historic Preservation Act
AIRFA	American Indian Religious Freedom Act
AR	Army Regulation
ARNG	Army National Guard
ARPA	Archaeological Resource Protection Act
ATV	All Terrain Vehicle
BBS	Breeding Bird Survey
BMP	Best Management Practices
CES	Center for Earthquake Studies
CFMO	Construction and Facilities Management Office
CFR	Code of Federal Regulations
CRM	Cultural Resources Manager
CSM	Command Sergeant Major
CWA	Clean Water Act
DA	Department of Army
DENIX	Defense Environmental Network Information Exchange
DoD	Department of Defense
DoDI	Department of Defense Instruction
DTC	Disney Training Center
DUSD	Deputy Under Secretary of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EKTS-A	Eastern Kentucky Training Site-Artemus
EL	Environmental Laboratory
EMS	Environmental Management System
EO	Executive Order
EPM	Environmental Program Manager
EQR	Environmental Quality Report
ERDC	Engineering Research and Development Center
ESA	Endangered Species Act
oF	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FIRM	Floodplain Insurance Rate Map
FM	Field Manual
FY	Fiscal Year
GIS	Geographic Information System
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISO	International Standards Organization
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
J3	Joint Forces - Operations
K2O	Water-soluble Potash
KAR	Kentucky Army Regulation
KDEP	Kentucky Department of Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife Resources
KDMA	Kentucky Department of Military Affairs
KDOF	Kentucky Division of Forestry
KDOW	Kentucky Department of Water
KEQC	Kentucky Environmental Quality Commission
KGS	Kentucky Geological Survey
KPDES	Kentucky Pollution Discharge Elimination System
KRS	Kentucky Regulatory Statute
KSNPC	Kentucky State Nature Preserves Commission

KYANG	Kentucky Air National Guard
KYARNG	Kentucky Army National Guard
KYDNR	Kentucky Department for Natural Resources
KY-EPPC	Kentucky Exotic Pest Plant Council
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
LTA	Local Training Area
MAPS	Monitoring Avian Production Survivorship
MBTA	Migratory Bird Treaty Act
METL	Mission Essential Task List
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOUT	Mobile Operations in Urban Training
N	Nitrogen
NAGPRA	Native American Graves Protection and Repatriation Act
NAISA	National Aquatic Invasive Species Act
NBC	Nuclear Biological Chemical
NCOIC	Non-commissioned Officer in Charge
NEPA	National Environmental Policy Act of 1 969
NDAA	National Defense Authorization Act
NGB	National Guard Bureau
NGB-ARE	NGB Army Environmental Programs Division
NGB-ARI	National Guard Bureau Army Installations Division
NHPA	National Historic Preservation Act
NMSZ	New Madrid Seismic Zone
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OHWM	Ordinary High Water Mark
P2O5	Available phosphorous
PAO	Public Affairs Office(r)
PIF	Partners in Flight
PLS	Planning Level Surveys
PSS	Palustrine, scrub shrub
R2UB	Riverine, Perennial
R4SB	Riverine, Intermittent
RM	River Mile
REC	Record of Environmental Consideration
ROTC	Reserve Officers Training Corps
RTLA	Range and Training Land Assessment
RTLP	Range and Training Land Program
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Office
SJA	Staff Judge Advocate
SMZ	Streamside Management Zone
SOP	Standard Operating Procedure
SPB	Southern Pine Beetle
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
STEP	Status Tool for the Environmental Program
T&E	Threatened and Endangered
TAG	The Adjutant General
TCP	Traditional Cultural Properties
TOW	Tube-launched, Optical Wire-guided
TRI	Training Requirements Integration
TSC	Training Site Commander
TSI	Timber Stand Improvement
TVA	Tennessee Valley Authority
UK	University of Kentucky
USACE	U.S. Army Corps of Engineers
use	United States Code
USD	Under Secretary of Defense
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WES	Waterways Experiment Station
WFPM	Wildland Fire Program Manager
WHFRTC	Wendell H. Ford Regional Training Center
WQC	Water Quality Certification

SECTION 1: GENERAL INFORMATION

1.1 PURPOSE

Command Sergeant Major (CSM) Harold L. Disney served in the United States Army from 1 958-1 963, and joined the Kentucky Army National Guard (KYARNG) in December 1 963. He became the face of the Eastern Kentucky Training Site at Artemus (EKTS-A) as a Federal Technician in October 1974, and was promoted to CSM in March of 1977. He retired from the KYARNG and federal service in 1997, but returned between May 2006 and December 2007 while the training site Non-Commissioned Officer in Charge (NCOIC) deployed to Iraq. In November 2007, the EKTS-A was renamed the CSM Harold L. Disney Training Center (DTC) in his honor.

This Integrated Natural Resources Management Plan (INRMP) is an **update** and **reorganization** of the 2003 INRMP for the 558-acre (DTC) in southeastern Knox County. The INRMP has been revised for use by the National Guard Bureau (NGB) and the KYARNG as the primary tool for managing natural resources at DTC. The DTC is 4 miles east of the city of Barbourville, and 0.3 miles southeast of the town of Artemus. The site lies on the south bank of the Cumberland River, with approximately 2.5 miles of river frontage, and is bordered to the south by private lands **(Figure** 1). The DTC is located on federally-owned land. The KYARNG is licensed by the Louisville District of the U.S. Army Corps of Engineers (USACE) to use and occupy the property for year-round training and support of the Kentucky National Guard. License No. DACA 27-3-94-85 is included as **Appendix A.** The main reasons for the INRMP update are to incorporate updated natural resource information, include a forestry management plan, and incorporate new Army National Guard (ARNG) guidance. The natural resources management philosophies and existing programs have not changed. With this revision, the INRMP has been reorganized to focus on natural resource management issues and associated mission support.

The INRMP has been updated for use by the National Guard Bureau (NGB) and the KYARNG as the primary tool for managing natural resources at DTC. The DTC must provide a variety of environmental conditions and ecosystems in which to train soldiers. This objective must be met in a way that provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. An INRMP helps installation commanders manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission. The KYARNG published the first INRMP for the DTC in 1997, and updated it in 2003. An evaluation as to operation and effect of the 2003 INRMP, including natural resources management goals, objectives, and projects and their implementation status, can be found in **Appendix B.** A summary of the completion status for the 2003 INRMP projects is provided in **Table 1.**

The National Defense Authorization Act (NDAA) of 2004 made a significant revision to the Endangered Species Act (ESA). NDAA stated that, "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 United States Code [USC] 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for the long-term conservation of the species.

TABLEI. COMPLETION STATUS OF PROJECTS FROM THE 2003 DTCINRMP

PROJECT	PROJECT DESCRIPTION	STATUS
4.1	Non-LCTA protocol natural resource management surveys	Ongoing. LCTA is now known as RTLA. KYARNG Environmental staff prepare annual INRMP review and update if needed. This project is continued to the following planning period.
4-2	Non-plot erosion surveys	Ongoing. Staff conducts periodic windshield survey and reviews orthophotographs.
4-3	GIS data acquisition and management	Partially accomplished. Most of available layers have been incorporated into central database in Environmental Office in Frankfort. Continued to the following planning period.
4-4	Brief ITAM Committee on GIS capabilities	ITAM Committee discontinued. KYARNG staff is briefed as needed on GIS capabilities.
4-5	Identify ITAM requirements in WAM	Ongoing.
4.6	Convene ITAM Committee semi-annually	ITAM Committee discontinued.
4-7	Siber stake environmentally sensitive areas	Completed. A map with wetland constraints is available
4-8	Training Site Regulation revision	Not accomplished. Scope revised.
4-9	Maneuver Damage Repair	Ongoing, as needed.
4.10	Proactive maintenance of maneuver areas	Ongoing, as needed. Includes fertilizer, lime, seed, and mulch.
4.11	Maneuver area/corridor: vegetation clearing	Ongoing, as needed.
4.12	Purchase LRAM equipment for land maintenance	A grass seeder is needed
4-13	Hardened bivouac sites	Completed
4-14	Dust control on gravel roads	Ongoing, as needed.
4-15	Water projects: Stream crossing structure	Stream crossings are tiled with gravel on top. Gravel is added annually.
4.16	Environmental awareness materials	Ongoing. Display for Boy Scouts/Troops. Archeological training module completed.
5-1	Planning Level Surveys (Flora and Fauna)	Flora and vegetation communities updated 2006. Others not updated.
5-2	Bird surveys in coordination with Partners in Flight	Ongoing. This project is continued to the following planning period.
5-3	“NO MOW” around Streamside Mgmt. Zones	Questionable whether signs are needed
5-4	Lease for hay production	Completed. Maintain lease.
5-5	Forest Inventory	Not completed. Continued to next planning period.
5-6	Planning Level Survey: water quality	Completed. KYARNG to determine if continuation is necessary
5-7	Planning Level Survey: wetlands delineation	Completed. Update required if additional land acquired.
5-8	Invasive Species Control	Ongoing. Mowing not effective on johnsongrass.
5-9	Pest Species Survey: Hemlock Wooly Adelgid	Ongoing. Project continued for the planning period.
5.10	Pest Species Survey: Southern Pine Beetle	Ongoing. Project is to be continued for the planning period.
5.11	Organized Hunts: Determine hunting quota	Ongoing.
5-12	Organized Hunts: Coordinate hunts with KDFWR	Ongoing.

TABLEI. COMPLETION STATUS OF PROJECTS FROM THE 2003 DTCINRMP		
PROJECT	PROJECT DESCRIPTION	STATUS
5-13	Law Enforcement	Ongoing.

If an Army Guard installation has federally-listed threatened or endangered species, proposed federally listed threatened or endangered species, and/or candidate species on the installation, or unoccupied habitat for a listed species where critical habitat may be designated, the INRMP must specifically address the benefits of management of these actions for these species or habitats in the document. The benefit should be clearly identified in the document and included in the table of contents. This updated INRMP is intended to provide a benefit to, and gain a critical habitat exemption for, the following federally-endangered species, should they be found on site: Blackside Dace *(Phoxinus cumberlandensis),* and Cumberland Darter *(Etheostoma susanae).*

The Sikes Act Improvement Act (SAIA) of 1997, 16 U.S. Code (USC) §670a et seq., as amended, requires Federal military installations with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. In accordance with the SAIA, this updated INRMP *"shall, to the extent appropriate and applicable, provide for:*

a) Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;

b) Fish and wildlife habitat enhancement or modifications;

c) Wetland protection, enhancement, and restoration, where necessary for support offish, wildlife, or plants;

d) Integration of, and consistency among, the various activities conducted under the plan;

e) Establishment of specific natural resources management goals and objectives and time frames for proposed action;

f) Sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs offish and wildlife resources;

g) Public access to the military installation that is necessary or appropriate for the use described in subparagraph (F), subject to requirements necessary to ensure safety and military security;

h) Enforcement of applicable natural resource laws (including regulations);

i) No net loss in the capability of military installation lands to support the military mission of the installation;

j) Such other activities as the Secretary of the military department determines appropriate".

The KYARNG has embraced the concept of integrating ecosystem management with its mission activities. The KYARNG recognizes that its on-going and proposed training activities can potentially use or consume the natural resources on mission land, and that successful execution of their mission is dependent on the optimum maintenance of their environment in a mode of sustainable use. The KYARNG recognizes its responsibility to guarantee continued access to its land, air, and water resources for realistic military training while ensuring that the natural and cultural resources entrusted to their care are sustained in a healthy condition for scientific research, education, and other compatible uses by future generations.

The KYARNG is justifiably proud of its excellence in training, its natural resources heritage, and its tradition of stewardship. As such, the KYARNG is committed to the planned, deliberate management of natural resources, supporting the installation operational mission, meeting or exceeding stewardship requirements, and enhancing the quality of life for its personnel and guests.

1.2 AUTHORITY

This updated INRMP has been prepared pursuant to the laws, regulations, guidance, and directives listed in **Table 2.**

TABLE 2. LAWS, REGULATIONS, DIRECTIVES, GUIDANCE, AND POLICIES APPLICABLE TO IN RM P DEVELOPMENT AT DTC

REQUIREMENT	TITLE
Law	The Sikes Act *"Conservation Programs on Military Reservations"* (16 U.S. Code (USC) §670a et seq.), as amended - requires Federal military installations with adequate wildlife habitat to develop long-range INRMPs and implement cooperative agreements with other agencies. Natural resources are to be managed for multipurpose uses and provide public access consistent with the military mission. The act also sets guidelines for the collection of fees for the use of natural resources such as hunting and fishing.
U.S. Army policy	*Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and INRMP* ("Army INRMP Policy"); 21 March 1997.
	Army National Guard INRMP Template, created 16 March 2005, ("Draft NGB Policy")
Department of Defense Instruction (DoDI)	DoDI 471 5.3, Environmental Conservation Program
	DoDI 4700.1, Natural Resources Management Programs
	DoDI 471 5.3, Environmental Conservation Program
Army Regulation (AR)	AR 200-1, *Environmental Protection and Enhancement*
	AR 350-1 9, *Army Sustainable Range Program,* 30 August 2005
Code of Federal Regulations (CFR)	32 CFR 651, *Environmental Analysis of Army Actions*
	32 CFR 1 90, *Appendix - Integrated Natural Resources Management*
Kentucky Laws and Regulations	KRS 146 Natural Resources
	KRS 21 7b, Fertilizer and Pesticide Use and Application KRS 249, Trees, Plants, Weeds, and Pests KRS 250, Agricultural Seeds, Feeding Stuffs, and Fertilizers
	KRS 224 Environmental Protection
	KAR Title 401, Natural Resources and Environmental Protection Cabinet Department For Environmental Protection
	KAR Title 402, Natural Resources and Environmental Protection Cabinet Department For Natural Resources
Guidance	Office of the Under Secretary of Defense (USD), *Implementation of Sikes Act Improvement Act: Updated Guidance,* 10 October 2002
	Office of the Deputy Under Secretary of Defense (DUSD), *Updated Guidance for Implementation of The Sikes Act Improvement Act,* 5 November 2004
	DoD Directive 4700.1, *Natural Resources Management Programs*
Note: Not all applicable Federal and State laws, regulations, and Executive Orders are listed in this table, but are incorporated by reference through the listed documents.	

1.3 RESPONSIBILITIES

1.3.1 NATIONAL GUARD BUREAU RESPONSIBILITIES

Within the NGB headquarters, the Chief of Environmental Programs (NGB-ARE) is responsible for reviewing and approving the INRMP and advising the KYARNG Environmental Office before the KYARNG formally submits the plan to the U.S. Fish and Wildlife Service (USFWS), the Kentucky Department of Fish and Wildlife Resources (KDFWR), the public, and others as appropriate. The

Environmental Directorate ensures operational readiness by sustaining environmental quality and promoting the environmental ethic, and is responsible for tracking projects, providing technical assistance to states, quality assurance, and validation and execution of funds.

1.3.2 KENTUCKY ARMY NATIONAL GUARD RESPONSIBILITIES

The KYARNG is one entity of the Kentucky Department of Military Affairs (KDMA). KYARNG responsibilities for implementation of the natural resources management plan are identified below.

1.3.2.1 THE ADJUTANT GENERAL

The Office of the Adjutant General is directly responsible for the operation and maintenance of DTC, which includes implementation of this INRMP. The Adjutant General (TAG) determines what the state's force structure (types and number of units, types of equipment, training events, etc.) will be at DTC throughout the five-year period of the INRMP. TAG establishes a formal natural resources program for KYARNG/KDMA by implementing this INRMP. TAG also serves as the agency official to ensure that natural resources projects and activities follow the Sikes Act and DoDI 4715.3, and ensures all installation land users are aware of and comply with procedures, requirements, or applicable laws and regulations that accomplish the objectives of this INRMP.

Two key positions within the TAG Office are the State Executive Director and the Chief of Staff. These positions ensure that natural resources issues are considered in state and federal budget and policies; and ensure coordination of projects and construction among environmental, training, and engineering staffs. The Chief of Staff also serves as chair of the Environmental Quality Control Committee, which provides overall guidance and policy direction to the environmental program, including management of DTC natural resources.

Within the State Executive Director's Office, the Director of Facilities Division is responsible for property management, construction, operation, and maintenance of buildings and land statewide for the KDMA. This director ensures that natural resources management is considered during land acquisition, utilities excavation, construction, and maintenance and repair activities on all property managed by the KDMA.

Two key offices on the federal side within TAG'S Office that participate in natural resources decision-making in Kentucky are J3 and the Construction and Facilities Management Office (CFMO).

1.3.2.2 J3

The J3 has primary responsibility for scheduling military training and safety of all personnel while training exercises are being conducted. The J3 and the Training Site Commander (TSC) determine the training load of DTC based on the force structure determined by TAG. The J3 coordinates with the CFMO on matters of construction and maintenance priorities. The J3 determines Integrated Training Area Management (ITAM) projects, and submits an annual ITAM workplan.

1.3.2.3 CONSTRUCTION AND FACILITIES MANAGEMENT OFFICE

The statewide CFMO manages federal construction, maintenance, and engineering for all KYARNG facilities under the jurisdiction of the KDMA, including DTC. The CFMO is responsible for master planning and ensuring natural resources consultation requirements are included in timelines for project design and delivery schedules for all military construction projects.

The statewide Environmental Program Manager is responsible for establishing funding priorities and programming funds for natural resources compliance and management activities into the

federal Status Tool for the Environmental Program (STEP), and works with the DCSOPS to manage the ITAM program budget; advising KYARNG on best ways to comply with federal and state environmental laws and regulations; ensuring natural resources efforts are accomplished either in-house or through contract by individuals with appropriate training; and oversight of Natural Resources Manager activities. The Environmental Program Manager provides technical assistance to KYARNG/KDMA personnel including: developing INRMPs; National Environmental Policy Act (NEPA) documents as appropriate; securing permits; conducting field studies; providing Sustainable Range Awareness (SRA) materials; locating, mapping, and inventorying natural resources; and revising the INRMP at least once every five years. The Environmental Program Manager oversees the NEPA process for the KYARNG.

1.3.2.4 PUBLIC AFFAIRS OFFICE

The Public Affairs Officer (PAO) serves as a liaison with the public for public review, in public meetings, and in community educational events. The PAO gives assistance to the Environmental Office in NEPA public review efforts.

1.3.2.5 STAFF JUDGE ADVOCATE

The Staff Judge Advocate (SJA) reviews legally binding natural resources documents for legal sufficiency and advises on laws and regulations that affect natural resources management.

1.3.3 TRAINING SITE RESPONSIBILITIES

The Training Site Non-Commissioned Officer in Charge (NCOIC) and the statewide TSC will ultimately implement this plan and ensure its success. The Training Site NCOIC is familiar with all aspects of the training site, including training scheduling (and conflicts), locations of training facilities, impairments or problems with human-made structures or natural functions, and needs for improvement or maintenance of the training land.

The Training Site NCOIC, who also manages the DTC in Knox County, Kentucky, reports to the TSC and J3. The Training Site NCOIC's natural resource-related responsibilities include the following: (1) control of all training areas; (2) operation and maintenance of training site facilities; (3) conducting briefings concerning safety and orientation; (4) conduct investigations and require reports of fires; and (5) integration of the INRMP with the training mission. The Training Site NCOIC ensures that maintenance projects are identified and executed, vegetation cover is maintained on erodible soils, wetlands and rare species habitats are compatible with construction and training activities, and SRA materials are distributed to the troops.

1.4 MANAGEMENT PHILOSOPHY

The KYARNG has developed this updated INRMP using an interdisciplinary approach, with information gathered from the KYARNG Environmental Office and military trainers as well as other Federal, State, and local agencies and special interest groups with an interest in natural resources management at DTC. Agency coordination conducted as part of the INRMP development is included in **Appendix C.** This updated INRMP describes baseline conditions of natural resources at the DTC and provides management programs and guidance for successful military training that conserves renewable natural resources, preserves rare and unique resources, and provides long-term resource sustainability. Specific plan expectations are listed in **Table 3.**

TABLE 3. PLAN EXPECTATIONS FOR INTEGRATED NATURAL RESOURCE MANAGEMENT	
PLAN EXPECTATION	
1	Provide a comprehensive plan for the KYARNG to carry out its mission while promoting ecosystem health and biodiversity at the DTC and in the surrounding region.
2	Document goals, objectives, guidelines, and future direction for natural resources management.
3	Establish a framework for implementing natural resources programs and ecosystem management.
4	Provide centralized information on the natural resources program status.
5	Identify environmental constraints to land use so that military training can be matched to ecosystem carrying capacity.
6	Identify mission-related impacts and options for conflict resolution.
7	Serve as a baseline of existing environmental conditions for defensible future Environmental Assessments (EAs) and Environmental Impact Statements (EIS).
8	Ensure that installations comply with environmental regulations.
9	Identify, prioritize, and schedule long-term budget requirements.

The KYARNG's overall policies and philosophy of land management are derived from AR 200-1 and 32 CFR 651. These policies and regulations are based on the concept that natural resources management is an integral component of the primary mission of military use. The KYARNG must train; therefore, the KYARNG will manage DTC to preserve valuable training resources, including the natural environment. Management of natural resources on an ecosystem basis ensures the sustainable use of training lands while considering the effects on the surrounding environment and public concern.

1.4.1 MILITARY MISSION

This updated INRMP integrates aspects of natural resources management into the military mission. As such, it becomes the primary tool for ecosystem management at DTC while ensuring the successful, efficient accomplishment of the military mission. A multiple-use approach will continue to be implemented through this INRMP to accommodate mission-oriented activities and provide for good stewardship.

The purpose of natural resources management at DTC is to *maintain sustainable natural resources as a critical training asset* upon which to accomplish the KYARNG mission. To accomplish this goal, natural resource managers need to:

- Ensure *no net loss* in capability to support existing and projected military training.
- Maintain *quality training lands* through monitoring, minimizing damage, mitigation, and rehabilitation.

Specific military missions and training requirements are fluid, and change from time to time with realignments, transformations, and changes in equipment and tactics. This requires establishing basic underlying natural resource management principles and practices that have broad application and can be adapted in multiple situations. Implementation of this updated INRMP will continue to successfully promote adaptive management that protects and enhances natural resources for multiple use, sustainable yield, and biological integrity, while supporting the military mission.

1.4.2 ENVIRONMENTAL MANAGEMENT SYSTEM

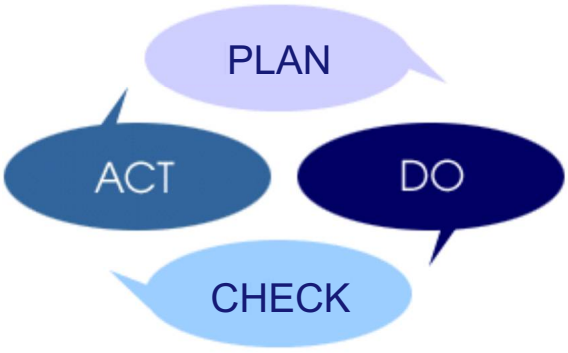
The NGB and KYARNG consider the subject installation to be the combined KYARNG operations in Kentucky. The Environmental Management System (EMS) is part of the overall KYARNG management system, and includes organizational structure, planning, responsibilities, practices, procedures, processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments.

Developing and implementing an EMS is required at all ARNG installations.

In 2000, Executive Order (EO) 13148, *Greening the Government through Leadership in Environmental Management* established a five-year EMS implementation goal for federal facilities.

This updated INRMP directly supports the KYARNG's and the NGB's EMS. Annual review of the INRMP with the USFWS, KDFWR will be conducted in order to support the concept of EMS (see **Section 8.3.)**

The International Standards Organization (ISO)-I 4001 EMS model used by the KYARNG leads to continual improvement based upon a cycle of "plan, do, check, act":



- *PLAN* - Planning, including identifying environmental aspects and establishing goals
- *DO* - Implementing, including training and operational controls
- *CHECK* - Checking, including monitoring and corrective action
- *ACT* - Reviewing, including progress reviews and acting to make needed changes to the EMS

The EMS is continually updated through this cycle, fine-tuning its management of operations that may harm the environment. This continual improvement cycle is a fundamental attribute of the EMS that allows the EMS system to adapt to the KYARNG's operations as they change.

1.4.3 ECOSYSTEM MANAGEMENT

An ecosystem is the "sum of the plant community, animal community, and environment in a particular region or habitat" (Barbour et al, 1987). Ecosystem management may be defined as management "to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities" (U.S. Environmental Protection Agency [USEPA], 1 994).

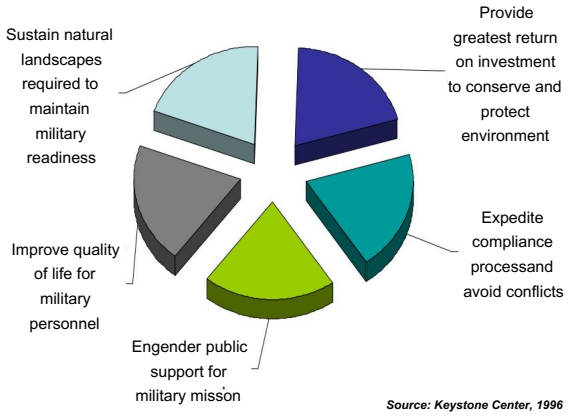
Natural resources at the DTC will continue to be managed with an ecosystem management approach. The DoD's goal for ecosystem management is "to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity" (DoDI 4715.3). Principles of ecosystem management, per DoDI 4715.3 are listed in **Table 4.**

TABLE 4. DoD PRINCIPLES OF ECOSYSTEM MANAGEMENT	
Principle	
1	Guarantee continued access to land, air, and water for realistic military training.
2	Maintain and improve the sustainability of native biodiversity of ecosystems.
3	Administer with consideration of ecological units and timeframes.
4	Support sustainable human activities.
5	Develop vision of ecosystem health.
6	Develop priorities and reconcile conflicts.
7	Develop coordinated approaches to work toward ecosystem health.
8	Rely on the best science and data available.
9	Use benchmarks to monitor and evaluate outcomes.
10	Use adaptive management.
11	Implement through installation plans and programs.
Source: DoDI 4715.3	

Biological diversity or biodiversity may be defined as "the variety of living organisms considered at all levels of organization, from genetics through species, to higher taxonomic levels, and including the variety of habitats and ecosystems, as well as the processes occurring therein" (Meffe and Carrol, 1994).

The DoD's challenge is "to ***manage, for biodiversity in a way that supports the military mission".*** The INRMP is identified by DoD as the primary vehicle for conserving biodiversity on military installations (Keystone Center, 1996).

Why Conserve Biodiversity on Military Lands?



Specific management practices identified in this updated INRMP have been developed to enhance and maintain biological diversity within the ecosystems at the DTC. DoD principles of conserving biodiversity on military lands are listed in **Table 5.**

TABLE 5. DoD PRINCIPLES FOR CONSERVING BIODIVERSITY ON MILITARY LANDS	
Principle	
1	Support the military mission.
2	Use joint planning between natural resources managers and military operations personnel.
3	Integrate biodiversity conservation into the INRMP and other planning protocols.
4	Involve internal and external stakeholders up front.
5	Emphasize the regional (ecosystem) context.
6	Concentrate on results.
Source: Keystone Center, 1996	

1.5 SUSTAINABLE RANGE PROGRAM

The Sustainable Range Program (SRP) is the Army's overall approach for improving the way in which it designs, manages, and uses its ranges to ensure long-term sustainability. Requirements for the SRP are set forth in AR 350-1 9, *Army Sustainable Range Program,* effective August 2005. The two core SRP components are the Range and Training Land Program (RTLP) and the ITAM Program. To ensure the accessibility and availability of Army ranges and training land, the SRP core programs are integrated with the facilities management, environmental management, munitions management, and safety program functions supporting the doctrinal capability.

Information acquired under the SRP/ITAM umbrella is incorporated into this updated INRMP to guide overall military training within the constraints of NEPA and other applicable requirements, threatened and endangered (T&E) species management, rehabilitation activities, and projected sustainability guidelines.

1.5.1 RANGE AND TRAINING LAND PROGRAM

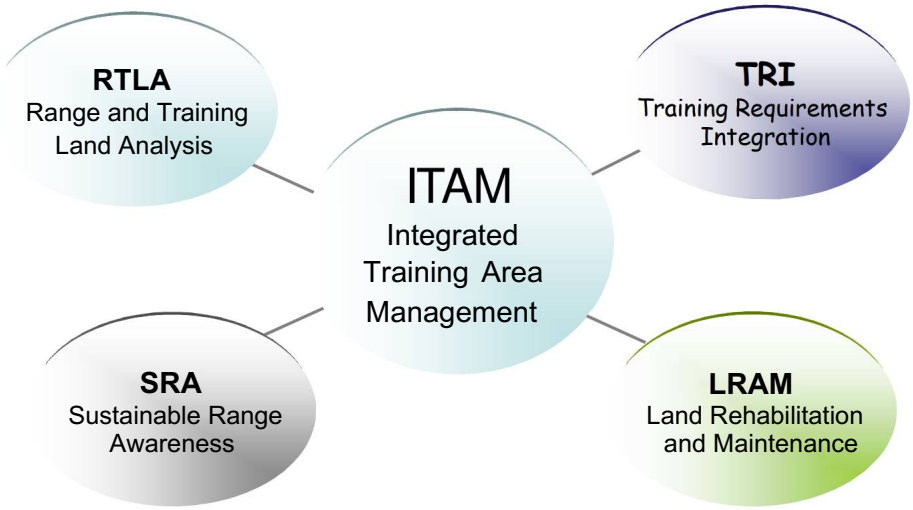
The RTLP provides a range operations and modernization capability for central management, prioritization, planning, and programming of live-fire training ranges and maneuver training lands, including the design and construction activities associated with them. The RTLP planning process integrates mission support, environmental stewardship, and economic feasibility, and defines procedures for determining range projects and training land requirements to support live-fire and maneuver training. The RTLP defines the quality assurance and inspection milestones for range development projects and the Standard Operating Procedures (SOP) to safely operate military training, recreational, or approved civilian ranges under the Army control and support Commanders' Mission Essential Task List, (METL) and Army training strategies. RTLP also establishes the procedures and means by which the Army range infrastructure is managed and maintained on a daily basis in support of the training mission.

1.5.1.1 INTEGRATED TRAINING AREA MANAGEMENT

The ITAM program is the U.S. Army standard for sustaining the capability of installation land units to support military training missions, ensure compliance with existing statutory regulations, and promote sound stewardship of natural resources contained therein. The ITAM Coordinator is stationed at the KYARNG's Wendell H. Ford Regional Training Center (WHFRTC), but all KYARNG sites can receive ITAM funding.

In addition to maintaining key personnel and natural resources data collection efforts, the ITAM work plan budget will fund a number of projects of major importance to maintaining, preserving, and protecting the natural resources at DTC.

The ITAM subcomponent consists of four proactive subprograms designed to facilitate these processes. The four components of the ITAM program are discussed in the following sections.



1.5.1.2 RANGE AND TRAINING LAND ANALYSIS (RTLA)

RTLA, formerly known as the Land Condition Trend Analysis (LCTA), provides for collecting, inventorying, monitoring, managing, and analyzing tabular and spatial data concerning land conditions on an installation. The intent of RTLA is to collect essential natural resources baseline information needed to effectively manage training lands. The Army initiated RTLA in the mid-1980s and emphasized uniform data collection methodologies to provide regional, Major Command, or national-level land assessments.

Range and Training Land Analysis (RTLA)

The ecological monitoring component of ITAM is used to characterize and monitor installation natural resources

With the adoption of Sustainable Range Program (SRP)/ITAM by the Training and Operations community, RTLA has evolved into a decentralized, installation-level program. This allows installation-level land managers and range operations staff to determine how they can best collect and use resource data to support short- and long-term land management decisions such as training area allocation, training area use, and land rehabilitation.

The RTLA program at DTC was informally initiated in 1 992, when baseline data on natural resources (vegetation mapping, plant and animal surveys, aquatic benthos) were first collected, and the NRCS developed a resource inventory and conservation plan for the site. The KYARNG has since customized data collection to focus on areas of known heavy use rather than random formal RTLA plots. This is intended to

provide the most effective data package, when combined with site-wide recurring Planning Level Survey. Geographic Information System (GIS) technology is used to integrate natural and cultural resources data and graphically display the relationships between individual resource components.

1.5.1.3 TRAINING REQUIREMENTS INTEGRATION (TRI)

TRI is the land degradation prevention component of the ITAM program. The main goal of TRI is scheduling training exercises and other land uses in areas most capable of supporting these activities. TRI relies heavily on RTLA-generated data to evaluate land capability to sustain particular training activities with minimal resource impact.

Training Requirements Integration (TRI)

Uses RTLA data to prevent or minimize harmful practices or activities within given training areas through military exercise scheduling and logistics.

Disturbances produced by training may be minimal and not appear to require restoration efforts. However, even small areas of disturbance can start a gully on sloping lands. Gullying can damage vehicles and structures, cut off access to training areas, degrade wildlife habitat, and deposit soil into streams.

TRI matches a training activity with the most suitable site, and includes a rotation schedule for training lands. TRI also incorporates restrictions required to maintain site quality, protect significant natural resources and minimize land damage while providing a safe training environment. Implementing TRI requires coordination between installation/operations training staff and natural resources management/environmental staff.

TRI allows appropriate allocation of specific training requirements to specific land parcels. The decision-making and allocation process is based on the land's "carrying capacity" with respect to training activities. Possible land use options exercised through TRI are listed in **Table 6.**

TABLE 6. LAND USE OPTIONS EXERCISED THROUGH TRI

PRINCIPLE	
1	Re-designate the parcel's use to an alternative training, mission, or non-mission activity to permit natural recovery; prolong sustainable use; or allow for rehabilitation, repair, and maintenance.
2	Re-design or reinforce a given parcel to support higher impact training.
3	Alter likely training use of a given parcel by redesigning and reconfiguring the parcel.
4	Accept training-related degradation of a given parcel.
5	Cease training temporarily on a given land parcel to permit rehabilitation, repair, and maintenance.
6	Cease training permanently on a given parcel of land due to severe impacts and initiate restoration of that parcel.

Source: (Department of the Army [DA], 1999)

1.5.1.4 LAND REHABILITATION AND MAINTENANCE (LRAM)

LRAM is the component of the ITAM Program that provides preventive and corrective land rehabilitation and maintenance to reduce long-term impacts of training on an installation. It includes training area redesign and/or reconfiguration to meet training requirements. Training-damaged lands can be repaired and land construction technology can be used to avoid future damage.

Land Rehabilitation and Maintenance (LRAM)

Provides training-related mitigation and land rehabilitation.

Projects 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. The LRAM process begins with identification of potential LRAM projects, which may be planned and conducted in-house or through contract. RTLA data and GIS technology are typically used to help identify projects. Two common types of LRAM projects are training area rehabilitation and hardened sites.

Training area rehabilitation uses a wide array of techniques to correct erosion features, minimize disturbance, and re-vegetate denuded areas. Rehabilitation areas may also be temporarily “off-limits” or protected through other restrictions. Techniques are specific to each project. Revegetation techniques use native plant species proven effective for erosion control.

Hardened sites are areas that have been resurfaced with a base material, often overlaid with gravel. Sensitive areas within hardened sites may also be protected using barriers. Hardened sites are created in areas that receive repetitive training within a small area to the point where vegetation is damaged and “realism” is already drastically compromised. Potential locations include bivouac sites, firing points, and troop assembly areas.

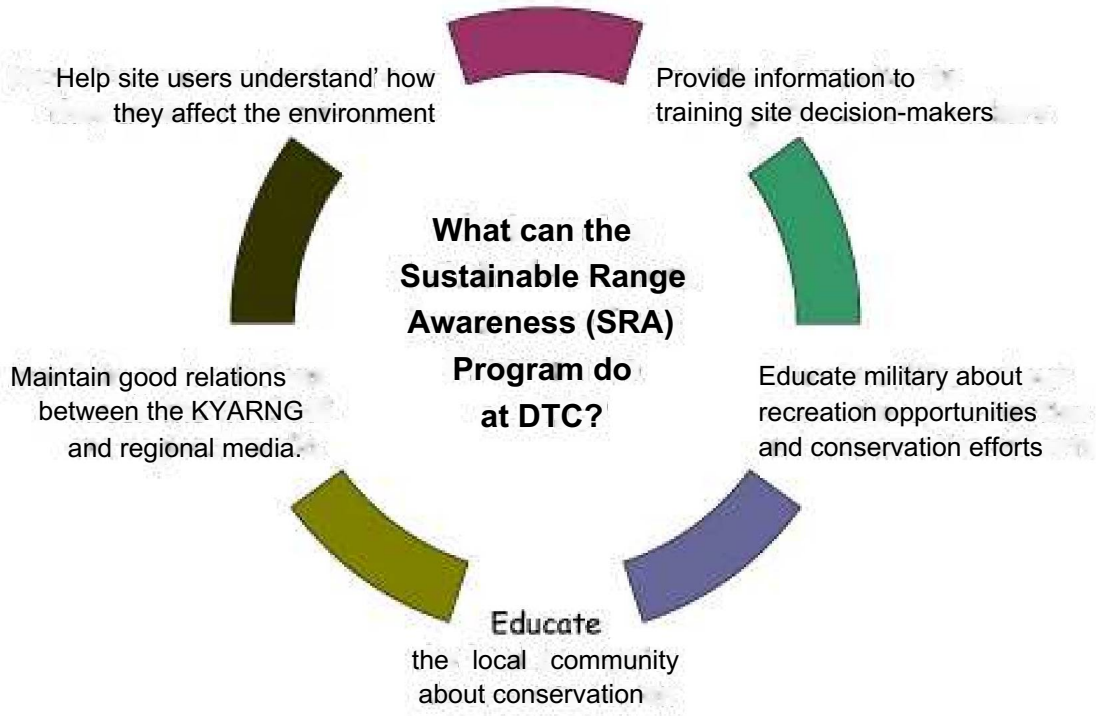
1.5.1.5 SUSTAINABLE RANGE AWARENESS

Awareness is crucial to protecting diverse resources, such as sensitive species and wetlands. Sustainable Range Awareness (SRA) is an educational program that promotes environmental stewardship and responsible use of natural resources on military lands. The KYARNG SRA program focuses on all land users including soldiers, leaders, civilians, and the local community.
SRA serves to educate the public on the military mission’s natural resources needs, and impacts.

Sustainable Range Awareness (SRA)

Promotes awareness of environmentally sensitive issues and fosters stewardship ethic among unit commanders, ground troops, neighboring communities, and other concerned or involved parties.

Military Personnel Awareness - The SRA program particularly focuses on developing and distributing awareness materials, such as soldier’s handbooks, leader’s handbooks, field cards, training videos, and posters. Site-specific information can be provided to training site users to prevent unnecessary damage to the environment and in particular, training lands. Through the dissemination of information, site users can improve their understanding of the effects of their mission and training activities on natural resources.



The KYARNG issues SOPs through Range Control to troops using any training site. These SOPs address fire protection, hazardous materials spills, restricted areas, pyrotechnics use, and environmental considerations. Restricted areas can include impact areas and sensitive ecological and cultural resource areas with use restrictions.

Briefings are usually informal, conducted as needed. For instance, a military unit preparing to bivouac near a sensitive area, or a contractor preparing to work near a wetland will be briefed on environmental requirements by Environmental Office personnel or the trainer. The unit commander will ensure compliance of the troops. Resource awareness training may include: a briefing on wetland locations; rare, threatened, and endangered species locations; cultural resources; restricted areas; pest management; information on dangerous or toxic plants and animals on the site such as poison ivy, poisonous snakes, and ticks; and any other pertinent information that helps reduce the risk of negative impacts to resources on the site and dangers to representatives at the site.

Public Awareness - The KYARNG is committed to cultivating a conservation ethic in the community, especially local youth. Natural resources personnel work with community and youth groups on conservation programs whenever possible. Scouts, in particular, often need support with projects, merit badges, and conservation talks. The KYARNG will continue to work with community and youth groups whenever possible.

Articles published in local newspapers and public service announcements on television and radio are excellent means of promoting new or existing programs involving training sites. Educating and informing the public of management practices generally increases support rather than opposition of the public. Such media reaches a diverse audience, and can be specifically designed to promote the KYARNG mission within the context of stewardship. Awards presented to training site personnel are a good topic for such articles/announcements, and can highlight a “good neighbor” ethic. All media reports should be coordinated through the PAO in Frankfort, Kentucky.

1.6 CONDITIONS FOR IMPLEMENTATION AND REVISION

1.6.1 IMPLEMENTATION

The Environmental Office is responsible for directing natural resource management and developing and implementing the updated INRMP. Successful INRMP implementation requires:

- Administrative and technical support
- Agency cooperation and technical assistance
- Funding
- Priorities and scheduling
- Production of project scopes and budgets
- The ability to amend and revise this document as necessary

These resources are discussed in **Section 6.1.** Where projects identified in the plan are not implemented because of lack of funding or other compelling circumstances, the KYARNG will review the goals and objectives of this updated INRMP to determine whether adjustments are necessary.

1.6.2 EFFECTIVENESS

The primary measure of INRMP effectiveness is whether it helps prevent "net loss in the capability of military lands to support the military mission." The KYARNG is preserving the DTC's capability to support training through its natural resource management practices outlined in the 2003 INRMP and in this revision. Long-term management effectiveness is also evaluated through periodic inventories of species populations, habitat quantity and quality, and habitat values through the recurring Planning Level Survey. Trends can be used to indicate the degree of success. The KYARNG will evaluate these recurring data as they become available. The KYARNG continues to work with USFWS, KDFWR, Natural Resources Conservation Service (NRCS), and Kentucky Division of Forestry (KDOF) etc., to manage the forest, preserve sensitive areas, and practice effective soil conservation. These activities are coordinated through ongoing INRMP implementation.

A practical evaluation of INRMP implementation includes reviewing whether planned projects have been accomplished. Overall, the DTC has benefited from using the INRMP as a management tool. The goals articulated in the 2003 INRMP are being addressed through implementation of management actions recommended in the updated INRMP. Most of the specific management actions have been implemented through projects. A large number of the projects are recurring actions that are continued in this updated INRMP. **Appendix B** contains an evaluation of goals, objectives, and status of projects from the 2003 INRMP. A summary of the completion status of 2003 INRMP projects is provided in **Table 1.**

1.6.3 AGENCY AND PUBLIC PARTICIPATION

This updated INRMP has been developed in cooperation with the USFWS and the KDFWR. Developed using an interdisciplinary approach, information has been gathered from the KYARNG Environmental Office and military trainers, as well as other Federal, State, and local agencies and special interest groups with an interest in management of natural resources at the DTC. Agency coordination and response letters have been included in **Appendix C.**

1.6.4 REVISIONS

Per DoD policy, the KYARNG reviews the INRMP annually in cooperation with the USFWS and KDFWR. The KYARNG will converse with these agencies annually to determine if changes or issues indicate the need for a meeting. If warranted, a meeting will be held with the USFWS and the KDFWR and documented by meeting minutes. If a meeting is not necessary, the conversation will be documented via email correspondence or record of conversation.

If not already determined in previous annual meetings, a determination will be made jointly to continue implementation of the existing INRMP with minor updates or to proceed with a revision by the fourth year annual review. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or it should be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

Section 1.4.2 describes how the EMS of Plan, Do, Check, and Act is tied into INRMP reviews and updates / revisions. **Section 8.3** provides specific guidance on the INRMP review process including review for operation and effect and annual reviews.

1.6.5 RECORD OF ENVIRONMENTAL CONSIDERATION

This INRMP includes, as **Appendix D,** a Record of Environmental Consideration (REC). The Environmental Assessment (EA) for the 2003 INRMP presented the Proposed Action (implementation of the INRMP) and alternatives, summarized the affected environment, and assessed the environmental consequences of implementation. The assessment concluded the known and potential impacts of the Proposed Action on the physical, biological, and cultural environment will generally be of a positive nature. Implementing this INRMP will not result in significant adverse environmental effects. This NEPA analysis is still valid, and adequately covers the actions in this updated INRMP. The REC describes the Proposed Action and explains why further environmental analysis is not needed.

SECTION 2: INSTALLATION OVERVIEW

2.1 LOCATION AND AREA

The DTC is a KYARNG facility encompassing 558 acres located in southeastern Knox County, Kentucky, 4 miles east of the city of Barbourville and 0.3 miles southeast of the town of Artemus. The site lies on the south bank of the Cumberland River, with approximately 2.5 miles of river frontage, and is bordered on the south by private lands. Access to the site is by an unimproved county road accessed from Kentucky Highway 225 onto TVA Road. Dirt or graveled roads traverse most of the site **(Figure 2).** The KYARNG is licensed to use and occupy this federally-owned training site for year-round training and support of the Kentucky National Guard by the Louisville District USACE (License No. DACA 27-3-94-85).

2.2 HISTORY OF KYARNG AND DTC

2.2.1 HISTORY OF THE KYARNG

Throughout her history, Kentucky has cherished the tradition of rendering military duty with zeal when called upon. Kentucky's history teems with incidents of self-sacrifice unsurpassed in daring and achievement. Kentuckians have answered the call to arms in all wars of our country. The present-day KYARNG began as part of the Virginia militia in 1 775 during the American Revolution. When Kentucky became a state in 1792, provisions were made at that time to maintain a militia force. The Kentucky militia played a major part in the War of 1812, and also supported the War for Texas Independence (1 836) and the Mexican War (1846-1848). When the Civil War began in 1861, the Kentucky militia, then known as the State Guard, was split between loyalty to the South and the North. Many men left the State Guard to join either the Union or Confederate armies, with those remaining known as the Home Guard. The Kentucky State Guard served during the Spanish-American War of 1898. In 1903, the State Guard was federalized, meaning standards of uniformity were enforced, and federal monies would be used to train and arm the men.

During World War I (1917-1918), men from the Kentucky National Guard were assigned to replace fallen soldiers from the regular Army. Most of these men were sent overseas to serve in the LeMans area of France. The Kentucky National Guard was called up again for World War II. Once again, every organized National Guard unit was involved in active service during the war. The majority of National Guardsmen fought in the Pacific Theater. The men who fought in the Pacific Theater were stationed in the ZigZag Pass region of Luzon Island. During their time in the region, they earned the nickname, “Avengers of Bataan.” During the Korean War, men from the 1/623rd Field Artillery were in support of other regular Army units. Kentucky Guard troops were there from 1 951-1952, and spent roughly a one-year tour of duty in support of the Tenth Corps, and 1st and 7th South Korean Infantry Division. Only the 2nd Battalion, 1 38th Field Artillery (2/1 38th) of the KYARNG was sent to Vietnam. This regiment, along with a Battalion from West Virginia, was the only National Guard Battalion in the country to serve in Vietnam.

In 1 990-91, KYARNG units were mobilized for active duty to Saudi Arabia in support of Operations Desert Shield and Desert Storm. The 217th Quartermaster Detachment (Water Purification unit), 1/623rd Field Artillery, 438th and 223rd Military Police and 2123rd Transportation companies were sent to active duty. Following September 11, 2001, and in conjunction with the war effort in Iraq and Afghanistan, the training mission of KYARNG units has shifted from one of heavy armor/maneuver training to Military Police, infantry, and dismounted/wheel training.

2.2.2 HISTORY OF DTC

The Tennessee Valley Authority (TVA) acquired 558 acres of land, consolidated from 1 2 parcels of land owned by 11 different land owners, in 1961 to build a coal-fired power plant; however, in 1978 TVA determined development of the plant was not feasible, and the project was never initiated. Prior to TVA ownership, the property had been used for farming and forestry. Nine tracts were actively farmed at the time of purchase, and TVA continued to lease the land for hay production and pasturing cattle.

Between the years of 1 981 and 1 994, TVA leased 5 58 acres to the KYARNG through the KDMA for military training (KYARNG 1993). In 1994, TVA declared the property surplus and the tract was transferred from TVA to the U.S. Department of Agriculture (USDA) and licensed to the KYARNG for an indefinite term (KYARNG 1994). The training site was often referred to as "TVA." This training site, unlike the other training sites in the state, is federally-owned property. In 2007, its name was changed to the "Command Sergeant Major Harold L. Disney Training Center."

2.3 MILITARY MISSION

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it is developed per NGB and Army policy, meets the intent of the Sikes Act, and contributes to the conservation and rehabilitation of natural resources on military installations. Revisions required as a result of this review have been included within this INRMP.

The primary federal mission of the KYARNG is to maintain properly trained and equipped units available for prompt mobilization for war, national emergency, or as otherwise needed. At the federal level, the National Guard provides decisive land power for major war and essential combat support and service support units for contingency operations. The KYARNG federal mission is to provide National Command Authority with units capable of performing their wartime mission. In their federal role, members of the KYARNG are also part of the US Army Reserve Component and can be called to active duty by the President.

The state mission is to provide trained and disciplined forces for domestic emergencies or as otherwise required by state law. At the state level, the Guard provides a return on the federal investment through domestic support capabilities embedded in its units. The KYARNG is a resource to assist local law enforcement and emergency management agencies at the direction of the Governor.

2.4 DTC USAGE AND TRAINING ACTIVITY

Approximately 78 percent of all authorized training site utilization is by military users. Military users include units of the ARNG, Active U.S. Army Components, U.S. Army Reserves, and U.S. Marine Corps Reserves. The 1st Infantry Battalion 149th Armored Brigade, which has its headquarters in Barbourville, Kentucky with subordinate units located throughout eastern Kentucky, is the primary site user. Other major users include the 103rd Chemical Battalion, with headquarters in Danville, and the 206th Engineer Battalion and 206th Chemical Battalion with headquarters in Richmond. KYARNG units primarily use the DTC during weekend inactive duty training and two-week annual training events throughout the year. The site is also used for other training activities for Reserve Components from Kentucky and surrounding states.

Military schools and civilian users also use the site. Groups that use the DTC at various times of the year include 4-H and Boy Scouts, Junior and Senior Reserve Officer's Training Corps (ROTC), hunters and fishers, and the KDFWR.

Existing training operations at the DTC include the following types of light military training and non-destructive activities:

- Squad, platoon, and company sized movement techniques, both vehicular and on foot.
- Squad, platoon, and company sized move, attack, and defend operations or war games.
- Battalion Command and Staff functions and simulated exercises.
- Tube-launched, optical wire-guided (TOW) and Dragon tracking and qualification training, which teaches soldiers to use armored vehicle weaponry and computerized missile tracking systems (no live artillery firing).
- Minefield laying and recovery (no live firing).
- Engineer equipment operator training with bulldozers, backhoe, road grader and loader, which is limited maintaining existing county roads and one small work area.
- Dismounted river crossing exercise once per year, in which 40 individuals swim across the Cumberland River at night in a simulated tactical exercise (no vehicles involved).
- Nuclear, Biological, and Chemical (NBC) defense training operations, which train soldiers to don protective clothing, test gas masks and perform precise decontamination procedures to protect equipment and personnel against warfare agents (no live agents are used).
- Miscellaneous training activities to include Soldier Qualification Training and Common Task Training testing, recovery operations, land navigation, patrolling, bivouac, and mess operations.

Requests for use of the training area are submitted on the Range Request form to the Training Site NCOIC, located at the DTC. Additionally, requests for use of the DTC may be submitted to the Training Site NCOIC via e-mail or telephone. Requests are approved, partially approved, or not approved, and a copy of the request is returned to the requesting unit not later than 1 5 days after receipt. The unit must coordinate with the Training Site NCOIC no later than two working days prior to usage date to ensure all aspects of the intended training are coordinated.

Unit Commanders who desire to train at DTC are required to complete an Environmental Pre-Activity Survey for training activities. A sample form is provided in **Appendix G.** The survey must be sent through the Training Site NCOIC to the Environmental Program Manager before the planned training may be conducted. The Environmental Program Manager will evaluate the survey, determine ways to minimize training impacts , and determine if permits are needed to conduct the described training. The survey is signed and sent to the unit with a list of requirements to conduct the training while minimizing impacts to the environment. If significant changes or additions are made to the training plans, an additional survey must be submitted describing the new training. This system emphasizes preventing rather than repairing damage to the training site.

Historic utilization of DTC is shown in **Chart 1.** Average training site usage during the time-period FY 1993-2003 was 8,257 soldier-days per year, which is approximately 158 visitors per week. Military usage ranged from a minimum of zero soldier-days per month to a maximum of 5,079 soldier-days per month over the 1 5-year period.

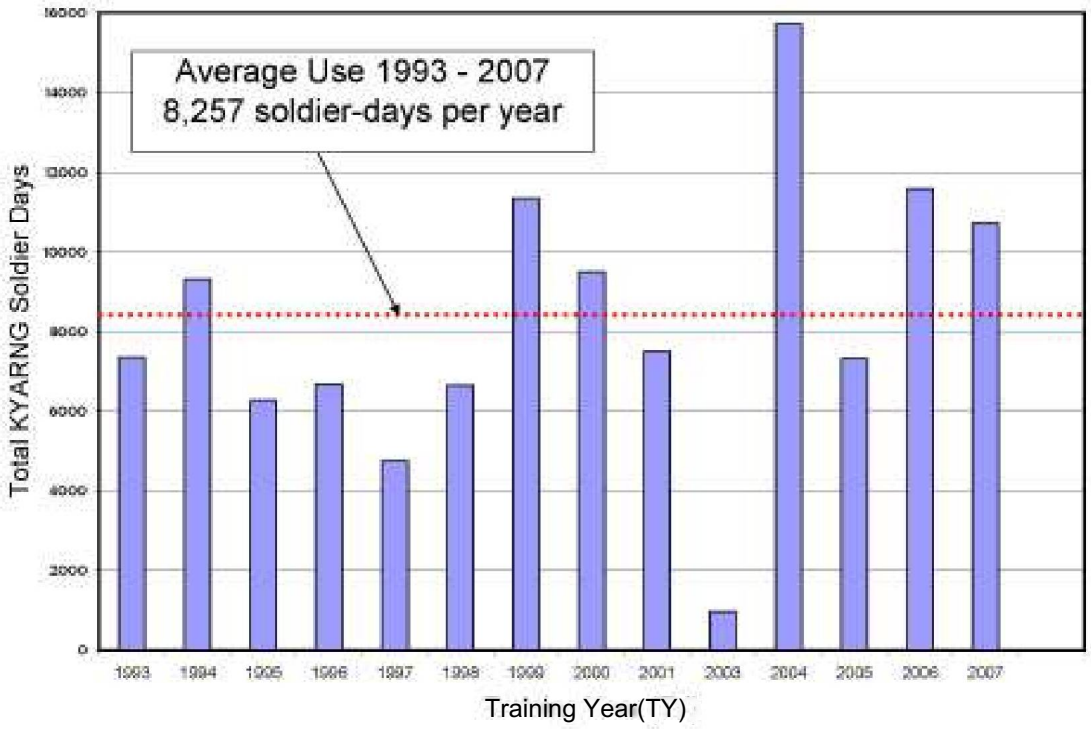


CHART 1. NUMBER OF SOLDIER-DAYS UTILIZED IN FY1993-2007
(MILITARY USERS ONLY)

The KYARNG has primarily used the training site during annual training periods in April, August, and October. Units that conduct their annual training period at DTC participate in a two-week training activity. Weekend training generally involves several units training together in the same exercises. During the 1 5-year training period, approximately 40 percent of training occurred during the driest months of the year (June through October), 23 percent occurred during winter (November through February), and 37 percent occurred when soils are moist and evaporation is low (March through May). Average seasonal distribution of training site utilization is shown in **Chart 2.**

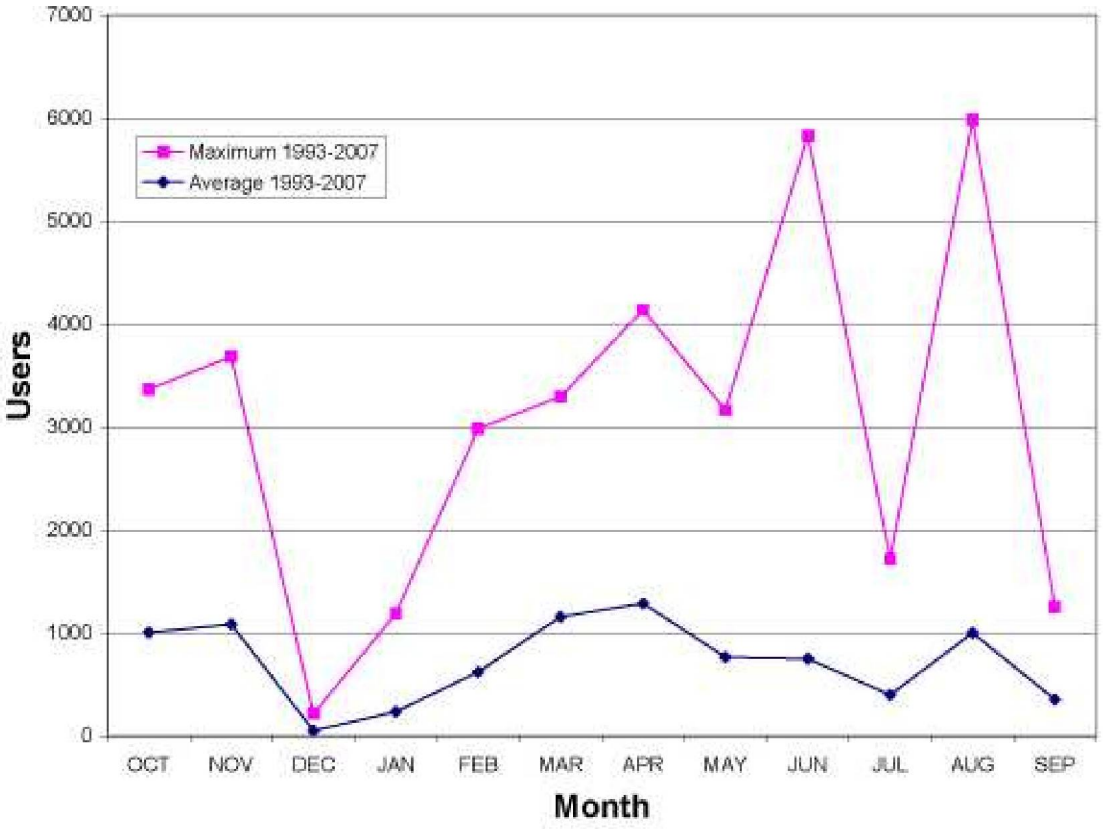


CHART 2. AVERAGE SEASONAL DISTRIBUTION OF TRAINING SITE UTILIZATION FOR FY1993-2007 (MILITARY USERS ONLY)

2.5 LAND USE

The DTC provides several functions that support the Guard and other branches or units of the military that use the site. Training support facilities on the site include an Engagement Skills Training Facility, maintenance shelter, Quonset hut, office trailer, storage trailer, rappelling tower, hand grenade qualification course, attack bunker, land navigation course, obstacle course, four bivouac sites, and a Military Operations in Urbanized Training (MOUT) site. A barracks and an educational center were added since the 2003 INRMP.

Due to the site's small size, training areas have not been delineated, and the entire site is available for use by military units. Maneuver training areas are available for wheeled vehicle, tracked (MI 13 A1/A3 Armored Personnel Carriers), and dismounted training at the squad, platoon, and company levels. Track maneuvers (off-road training) are kept to a minimum on DTC because of limited space and soils limitations. Due to anticipated changes in the force structure of the KYARNG, the use of tracked vehicles at DTC is not expected to continue. At this time, no further construction or acquisition is anticipated.

2.6 FORCE STRUCTURE AND UNIT CHANGES

The Kentucky National Guard is comprised of more than 7,000 soldiers and airmen in the Army and Air National Guard. The KYARNG provides combat-ready units and equipment in support of the federal military strategy. On the state level, the KYARNG provides units and equipment to protect life and property, preserve peace and order, and ensure the public safety of Kentucky's citizens as ordered by the Governor of Kentucky. Major commands include the following:

- State Area Command
- 75th Troop Command
- 1 38th Field Artillery Brigade
- 149th Armored Brigade
- 63rd Aviation Group

Among the ARNG units stationed in Kentucky are Armor, Infantry, Engineering, Transportation, Medical, Aviation, and Maintenance specialties.

2.7 FUTURE LAND USE

The KYARNG would like to increase DTC site usage by encouraging units to use the site for training rather than Local Training Areas (LTAs). Site usage is driven by unit requests. No construction of new facilities is currently planned for DTC; however, the KYARNG would like to acquire approximately 800 acres of previously forested land located south of the training site.

2.8 SURROUNDING COMMUNITIESAND LAND USE

The DTC is located in southeastern Knox County, 4 miles southeast of the city of Barbourville, Kentucky (population 3,600) and 0.3 miles east of the town of Artemus (population 775). Major metropolitan population centers nearest the site are Knoxville, Tennessee 60 miles to the south and Lexington, Kentucky 87 miles to the northwest. The entrance to the training site is located off of KY Highway 225, and also provides access to four private homes. Two private homes share the southern boundary of the site.

Land uses in the region surrounding DTC include small agricultural and livestock farms and wood products industry. To the south and east are primarily steep rugged wooded hills with abandoned strip mines and closed mines.

2.9 NATURAL AREAS

Pine Mountain State Park Nature Preserve is located 10 miles southeast of DTC, in neighboring Bell County, Kentucky. This State Natural Area consists of 2 tracts of approximately 868 total acres. This area contains an old growth forest of hemlock *(Tsuga canadensis),* tulip poplar *(Liriodendron tulipifera),* and white oak *(Quercus alba),* many trees of which are 200-300 years old, as well as a significant archaeological site -- a large sandstone shelter known as the Rock Hotel that was inhabited by prehistoric Native Americans. The preserve is part of the Pine Mountain fault block, one of the most prominent geological structures in the eastern United States (KSNPC, 2007).

SECTION 3: THE PHYSICAL ENVIRONMENT

3.1 CLIMATE

Kentucky lies within the hot continental division of the humid temperate domain (Bailey 1996) and is characterized by hot summers and cool winters. Average monthly temperature and precipitation data between 1948 and 2005 was obtained from Station 1 50381 in Barbourville, Kentucky (SERCC, 2007) and is summarized in **Chart 3.**

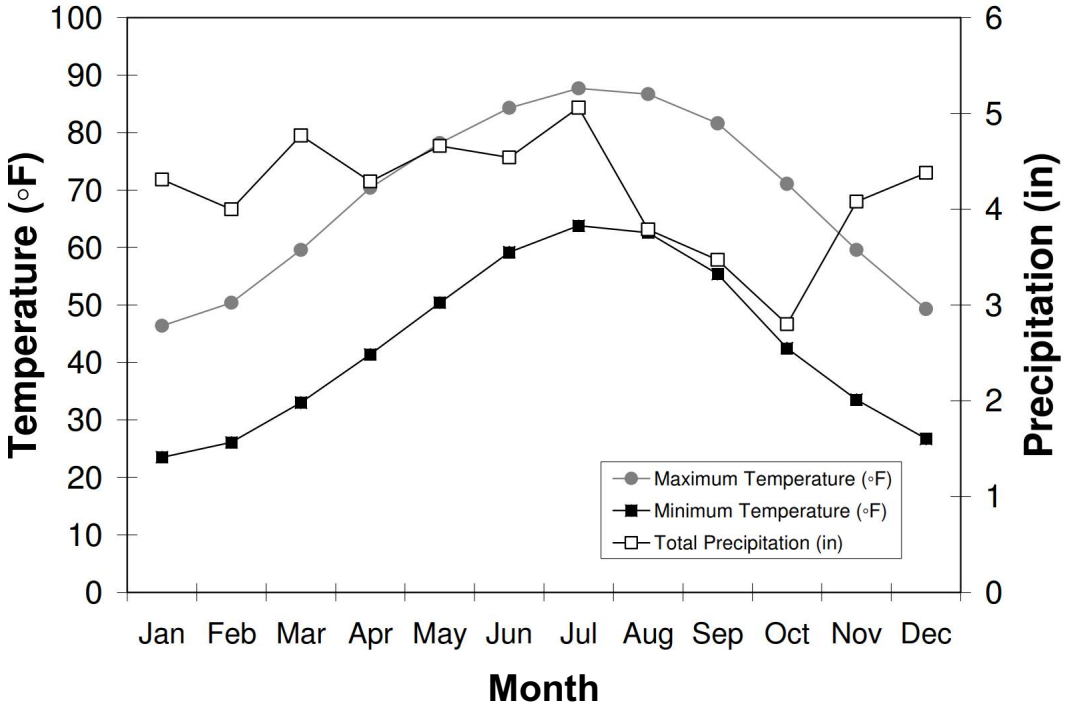


CHART3. AVERAGE MONTHLYTEMPERATURE (1948 - 2005), BARBOURVILLE, KENTUCKY. SOURCE, SERCC, 2007).

The mean annual maximum and minimum temperature are 68.8 and 43.2 degrees Fahrenheit (°F), respectively. On average, July is the warmest month and January is the coldest. The lowest temperature on record in Barbourville is -22 °F, which occurred on 19 January 1994. The highest recorded temperature is 106°F, which occurred on 5 September 1954.

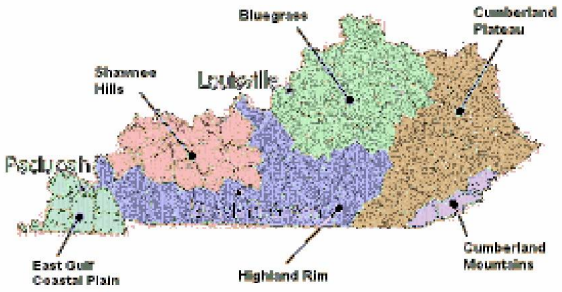
The total mean annual precipitation is 50.65 inches. Of the total annual precipitation, approximately 47 percent falls between March and July. The months between August and November are the driest on average. The average annual snowfall (usually between the months of November and March) is 7.8 inches, with the greatest snow depth at any one time during the period of record being 24 inches in February 1960. The growing season or frost-free period continues for five to six months between mid-April and mid-October.

The prevailing winds are from the south, and the average windspeed is highest, about 12 miles per hour early in spring. The wind changes direction frequently. Winds are usually lighter early in the morning and stronger early in the afternoon (USDA-NRCS, 1994). Clouds cover less than 60 percent of the sky, on average, between sunrise and sunset. Average cloud cover varies annually from about 60 percent in summer to about 40 percent in winter. As a result, sunshine is

abundant, especially during the growing season. The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent.

3.2 PHYSICAL SETTING AND TOPOGRAPHY

The DTC lies in the southeast region of the state within the Cumberland Plateau section of the Appalachian Plateaus Physiographic Province (Fenneman, 1938). This physiographic region has also been called the Mountains and Eastern Coal Fields Physiographic Region (Love, 1988). The Cumberland Plateau is a maturely dissected plateau of varying altitude and relief. Within the Cumberland Plateau, the site is situated near the southern end of the Low Hills Belt, a region of somewhat gentler relief than the Cliff Section to the west and Rugged Eastern Area to the east.



The area surrounding the DTC is characterized by long and narrow ridgetops with steep side slopes, and narrow to broad valleys. Elevation varies from approximately 950 feet along the Cumberland River to just over 1,400 feet along the ridge on the training site's southern boundary **(Figure 3).**

3.3 GEOLOGY AND SOILS

Geologic resources of an area typically consist of surface and subsurface materials and their inherent properties. Geologic factors influencing the ability to support structural development are seismic properties (for example, potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography. Soils are unconsolidated materials overlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ground's ability to support human-made conservation practices, structures, and facilities. Soils are typically described in terms of complex type, slope, physical characteristics, and relative compatibility or constraining properties with regard to types of land use and/or construction activities.

3.3.1 GEOLOGY

3.3.1.1 GEOLOGIC FORMATIONS

The majority of the low-lying areas on the training site are covered by Quaternary alluvium, which is composed of silt, clay, sand, and gravel. The entire training site is underlain by Lower Pennsylvanian age siltstones, shales, and coal beds of the Breathitt Formation (Love, 1988; Rice, 1974). The coal and associated strata on the property dip gently toward the west. The Blue Gem coal member, inferred present at 1,320 to 1,350 feet elevation, averages 26 to 36 inches thick where mined. The Lily Coal bed is usually 24 to 30 inches thick where mined in the area, but is not exposed or known to have been mined on the property. It is believed to be present beneath colluvium on the hillside at 1,020 to 1,060 feet elevation, and is largely eroded away in the valley. Former coal mining operations are not known to exist on the property, but abandoned strip mines are visible on the hillside above the southern boundary.

The training site lies on the western flanks of the nearby Flat Lick Anticline, where a natural gas field was discovered in the 1920s (Rice, 1974). There are six active gas wells and several thousand feet of gas lines located on the property. Construction cannot be placed within 200 feet of existing gas wells, and military training operations maintain a 50-foot no-drive zone around gas

wells for safety purposes. The existing gas wells and pipelines on the property were put in place prior to 1961, and are owned and operated by the Wiser Oil Company. They are part of the Himyar field, which contains 44 wells.

TABLE 7. GEOLOGIC FORMATIONS WITHIN DTC AND SURROUNDING VICINITY

GEOLOGIC FORMATION	CHARACTERISTICS
Quarternary alluvium	Unit is composed of flood plain and low-level terrace deposits. Boundary between the two types of deposits is generally poorly defined and gradational, coincides approximately with limit of 5- to 10-year flood crests as determined by gauging records since 1 923.
High-level fluvial deposits	Sand, silt, clay, and gravel. Occurs as erosional remnants along old high-level channels of the Cumberland River.
Breathitt Formation-Lower and Middle Pennsylvanian	
Jellico (Rim) coal zone	Siltstone, shale, sandstone, coal, and limestone. Siltstone above Jellico coal zone locally contains dark-gray, silty limestone nodules with cone-in-cone structure. Sandstone, light- to medium-gray, weathering yellowish brown; fine to medium grained, thin to thick bedded, ripple beds common.
Coal bed in Blue Gem coal zone	Sandstone above Blue Gem coal zone is massive, crossbedded, in place a channel-fill deposit; upper part is blended. Sandstone approximately 40 feet below Kendrick Shale locally contains brachiopods and crinoid stems in lower part.
Blue Gem (Straight Creek) coal zone	Not present on the training site.
Little Blue Gem coal bed	Siltstone, shale, sandstone, and coal. Shale below Little Blue Gem coal bed is clayey, contains siderite-cemented laminae and abundant siderite nodules. Shale near base is silty. Sandstone above Little Blue Gem coal bed was deposited in channel that locally cuts out coal bed. Sandstone approximately 60 feet above Lily coal bed forms resistant ledge as much as 30 feet thick. Little Blue Gem coal bed is 60 to 80 feet below main Blue Gem coal bed. Unnamed coal beds occur approximately 1 20 and 200 feet below main Blue Gem coal bed.
Lily (River Gem) coal bed	Siltstone, sandstone, and shale. Rocks below the Lily coal bed were designated as the Lee Formation, but because these rocks are lithologically similar to those above the Lily coal bed they are included with the Breathitt Formation.
Source: Rice, 1974	

3.3.1.2 SEISMICITY

The DTC is located approximately 400 miles east of the New Madrid Seismic Zone (NMSZ), the most seismically active zone east of the Rocky Mountains. The NMSZ has historically produced damaging earthquakes, including at least three earthquakes estimated to have had magnitudes of 8.0 or greater during the years from 1811 to 1 812. An earthquake of magnitude 6.0 or larger is expected somewhere in the zone about every 70 years. Considering that a magnitude 6.0 or larger earthquake has not occurred in the NMSZ since 1 895, Johnston and Nava (1984) estimated a 40-63 percent chance of a magnitude 6.0 or larger earthquake in the NMSZ by the year 2000, and an 86-97 percent chance of this size earthquake by the year 2035. The training site lies in eastern Kentucky, which could experience earthquakes of magnitudes greater than 4.5 on the Richter scale (Modified Mercalli intensity of VI) if an earthquake of Richter magnitude 7.0 to 7.9 occurs again in the New Madrid, Missouri epicenter (Center for Earthquake Studies [CES] 1 994).

A magnitude 5.2 earthquake occurred in the Wabash Valley Fault on 18 April 2008, centered about 120 miles east of St. Louis, Missouri. Three magnitude 5 or higher earthquakes have been recorded on the Wabash Valley Fault within the past 20 years, according to Douglas Wiens,, Ph.D. a seismologist at Washington University in St. Louis (Science Daily, 2008).

3.3.1.3 ECONOMIC GEOLOGICAL RESOURCES

Natural gas and coal are the principal mineral resources within the Artemus Quadrangle. Gas production comes from the Himyar gas field located less than one mile east of the training site along the flanks of the Flat Lick anticline, where a natural gas field was discovered in the 1920s (Rice 1974). Fourteen gas wells are located within the training site. Six of the 14 are still in production from depths of 1,057 to 2,255 feet. The existing gas wells and pipelines on the property were put in place prior to 1961, and are owned and operated by Wiser Oil Company, Petroleum Exploration Company, Wittmer Oil and Gas Company, and Distel Martin Oil and Gas Company (Calibre Systems, 2002). No construction can occur within 200 feet of an existing gas well, and military training operations must maintain a 50-foot no-drive zone around gas wells for safety purposes.

Commercial coal mining has occurred throughout the Artemus Quadrangle, but not on the Training Site. Abandoned strip mines are visible on the hillside above the southern boundary of the property. Prior to 1950, all mining took place underground. Since 1950, most coal has been mined by strip or auger methods. In places along the banks of the Cumberland River, alluvium contains 5 to 1 5 percent coal, as laminae and beds. This coal is the result of erosion of coal particles from the mining operation sites.

3.3.2 SOILS

A county-wide survey for Knox County and parts of Whitley County was completed in 1988 (Love 1 988). In 1994, the USDA-NRCS field-checked the training site against the county soil mapping by the (USDA-NRCS, 1994).

3.3.2.1 SOIL DESCRIPTIONS

Soil series occur either singly or in combination with other series in 15 distinct map units where identified (Table 8). The series can be grouped based on deposition:

- Approximately 82 percent (429 acres) of the soils on the training site are alluvial soils deposited by water from the Cumberland River. These soils include the Allegheny, Huntington, small amounts of Whitley, Cotaco, Bonnie, and Newark soils. Allegheny loams are on old high stream terraces not associated with the present drainage system. The more recent Huntington silt loams occur along the floodplains of the Cumberland River. Both of these soils are deep, loamy, and well-drained. Another soil map unit associated with smaller stream terraces, Cotaco loam, is found along several minor tributaries. These acidic soils are rarely flooded, low in organic content, and generally forested. One hydric soil, Bonnie silt loam, is mapped on the site. Bonnie soils are poorly drained and formed in alluvium on level or depressional areas of the floodplain. They are saturated at least part of the year. This soil type generally corresponds to the occurrence of wetlands. Another floodplain soil, Newark silt loam, is mapped adjacent to the Bonnie soils. They are also formed in alluvium and are somewhat poorly drained.
- Approximately 1 3 percent (66 acres) are colluvial soils, which formed primarily in material moved down-slope by gravity. These soils include the Shelocta silt loams which are deep, loamy-textures, and well-drained. Shelocta soils formed in material weathered from shale, siltstone, and sandstone. These soils occur on moderately steep concave upper side and lower side slopes.

- The remaining 5 percent (28 acres) are residual soils, which weathered in place from the underlying bedrock. These soils include the Latham, and Wernock soils. Latham silt loam formed in material weathered from acid shale, and occur mainly on the upper parts of steep convex side slopes. Wernock silt loam formed in material weathered from acid sandstone, siltstone, and shale. Wernock soils are moderately deep and can be found on the ridgetops.

TABLE 8. SOIL TYPES ON THE DTC

SYMBOL	SOIL NAME	K-FACTOR	T-FACTOR	HYDROLOGIC SOIL GROUP	CAPABILITY CLASS	ACREAGE
AlB	Allegheny loam, 2 to 6 percent slopes (*)	0.32	4	B	lie	87.3
AIC	Allegheny loam, 6 to 1 2 percent slopes t	0.32	4	B	IIIe	38.2
AnB	Allegheny loam, 2 to 6 percent slopes, rarely flooded (*)	0.32	4	B	lie	3.9
AnC	Allegheny loam, 6 to 1 2 percent slopes, rarely flooded t	0.32	4	B	IIIe	67.9
AnD	Allegheny loam, 1 2 to 20 percent slopes, rarely flooded	0.32	4	B	IVe	10.1
Bo	Bonnie silt loam, frequently flooded (*)	0.43	5	C/D	II Iw	30
Co	Cotaco loam, rarely flooded (*)	0.37	3	C	IIw	13.8
Hu	Huntington silt loam, occasionally flooded (*)	0.32	5	B	IIw	147.3
LaD	Latham silt loam, 1 2 to 20 percent slopes	0.43	3	D	IVe	0.3
LdF	Latham-DeKalb complex, 30 to 60 percent slopes	0.24	2	C	Vile	19.8
Ne	Newark silt loam, occasionally flooded (*)	0.43	5	C	IIw	21
SIF	Shelocta-Latham silt loams, 30 to 60 percent slopes	0.32	4	D	Vile	66
WnB	Wernock silt loam, 2 to 6 percent slopes (*)	0.37	3	B	lie	4.0
WnC	Wernock silt loam, 6 to 1 2 percent slopes t	0.37	3	B	IIIe	4.2
WtB	Whitley silt loam, 2 to 6 percent slopes, rarely flooded (*)	0.37	4	B	lie	9.2
Water						35
					Total	558

(*) Indicates a prime farmland soil type
t Indicates a farmland of State Importance

Hydrologic Soil Group:
A = Low runoff potential, high infiltration rates
B = Moderate infiltration rates
C = Low infiltration rates
D = Highest runoff potential, very low infiltration rates

Source: Hayes, 1 993

Capability Class:
I = Few limitations
II = Moderate limitations
III = Severe limitations requiring special conservation practices
IV = Severe limitations requiring very careful management
V = Not likely to erode, but limited use
VI = Severe limitations, generally unsuitable for cultivation
VII = Severe limitations, unsuitable for cultivation
VIII = Limitations preclude commercial crop production
Subclass:
e = erosion is main hazard
w = water in soil interferes with plant growth

33.2.2 SOIL EROSION POTENTIAL

It is important to consider the ability of the soil to withstand or recover from the effects of wheeled vehicular training, which occurs at the DTC. Tracked and wheeled vehicles should be used where most appropriate on the training site. A number of physical and chemical factors contribute to the susceptibility of a soil to damage from military training. These include texture, organic matter content, permeability, clay mineralogy, structure, and depth. There are several indices that incorporate the physical and chemical factors into numeric scales or broad categories that are more easily related to the potential effects of wheeled and tracked vehicle training: K-factor, T-factor Hydrologic Soil Groups, and Land Use Capability Class (see **Appendix K** for definitions of each index). An in depth review of these factors can be found in the Soil Survey for the Artemus Training Site (USDA-NRCS 1 994) and the soil survey for Knox County (Love 1 988).

Interpretation of the data found in the soil survey reveals that soil erosion is a major management concern at the training site. The USDA-NRCS found that 57 percent of all soils at DTC have capability limitations requiring at least special conservation practices. At least 10 percent of all soils have high K-factor or "erodibility factor" values (>0.34) and low T-factor or "soil loss tolerance" values (< 4.0), which indicate that the soils are highly erodible.

Since intensive tracked vehicle training can also cause severe disruption to and compaction of the soil surface (similar to the effects of cultivation), the Land Use Capability Classification System can be used as an index for military training as well (USA-CERL, no date). In this system, the class numerals (I-VIII) indicate progressively greater limitations and narrower choices for practical use. The subclass letter (e, w, or s) designates limitations due to erosion, water, shallowness, droughtiness, or stoniness. The capability class/subclasses from the soil survey reveal that 36 percent of all soils require very careful management due to risk of erosion and 4 percent of all soils require special conservation practices due to wetness. See Section 4 for a discussion of rehabilitation techniques and guidelines that will be implemented during the planning period.

Hydrologic soil group classifications refer to soils grouped according to their runoff-producing characteristics. Because infiltration rate generally is inversely related to runoff and erosion, the hydrologic soil group is an indirect index to site erodibility. Group A soils have a high infiltration rates when thoroughly wet, and have a low runoff potential (i.e, they are the least erodible of all soils). Group B soils have moderate infiltration rates when thoroughly wetted. Group A and group B soils are most desirable for military training activities (USA-CERL no date). Group C soils have slow infiltration rates when thoroughly wetted, and are borderline for military training activities. Group D soils have a very slow infiltration rate when thoroughly wetted, and are undesirable for military training activities. Of all soils, 56 percent are in Group "B," 19 percent are in Group "C," 25 percent are in Group "D" (Love, 1 988).

3.3.23 PRIME FARMLAND AND UNIQUE SOILS

Approximately 317 acres (61 percent) of the DTC soils are recognized as potential prime farmland soils, and another 110 acres (21 percent) are considered Farmland of Statewide Importance (Table 8). Bottomland fields on the training site are amended with fertilizer and lime and harvested for hay in late summer by local farmers. Much of the grasses that dominate the fields are non-native, such as fescue (Festuca spp.), orchardgrass *(Dactylis glomerate/),* johnsongrass *(Sorghum halepense),* and some legumes, such as crown vetch *(Coronilla varia)* and clovers; however, the training site has also planted some native grasses, including little bluestem *(Schyzachyriumm scoparium).* All fields are used for tracked and wheeled maneuver training and will need annual rehabilitation to prevent soil erosion and degradation of the year's hay production.

3.4 HYDROLOGY

3.4.1 SURFACE WATER RESOURCES

The training site is situated in the Upper Cumberland River drainage basin (HUC #051 30101), which covers approximately 1,967 square miles. The Cumberland River flows a distance of 694 miles, draining a total of 17,909 square miles (Bower and Jackson 1981) in Kentucky and Tennessee before its confluence with the Ohio River near Smithland, Kentucky. The immediate watershed receiving discharge from the site is the Cumberland River, which borders the northern side of the training site. It ranges from 30 to 50 feet wide with steep banks and water depths locally between 2 and 8 feet. Several small unnamed tributaries and intermittent streams cross the property and drain into the Cumberland River **(Figure 5).** With the exception of Gregory Branch, which drains part of the southwestern portion of the training site, no other permanent streams occur within the training site boundaries.

3.4.2 FLOODPLAINS

Floodplains generally are areas of low, level ground present on one or both sides of a stream channel that are subject to either periodic or infrequent inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. High water tables and flooding are associated with floodplains. Inundation dangers associated with floodplains have prompted federal, state, and local legislation limiting the development in these areas to recreation, agriculture, and preservation activities. Floodplains are regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 CFR Part 60.3.

EO 11 988 *(Floodplain Management)* requires agencies to assess the effects that their actions may have on floodplains and to consider alternatives to avoid adverse effects and incompatible development on floodplains.

Flood-prone areas are identified by FEMA on Flood Insurance Rate Maps (FIRM) based on historic, meteorological, hydrologic, and hydraulic data. Open space conditions, flood control works, and development are also taken into account in creating the maps. Base flood areas, or 1 00-year floodplain, are delineated on the maps. An area within the 1 00-year floodplain has a 1 percent chance of flooding each year, or a 26 percent chance of flooding over a 30-year period. According to the FIRM, dated May 1 7, 1 989, portions of the DTC fall within the 1 00-year floodplain along the Cumberland River and Gregory Branch.

3.4.3 WETLANDS

The USACE and the USEPA define wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Both Federal and State laws and regulations protect waters of the state, which includes wetlands. The Clean Water Act (CWA) is the primary law protecting U.S. waters. Section 404 of the CWA (33 USC 1 344) prevents discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. Generally, whenever a Section 404 permit is required, a Section 401 Water Quality Certification (WQC) issued by the Commonwealth of Kentucky is also required.

EO 11990 *(Protection of Wetlands)* requires Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands, and to conserve and enhance the beneficial values of wetlands.

In 1999, the US Army Research and Development Center conducted a Planning Level Survey (PLS) at DTC to locate and map Waters of the US that would potentially be regulated (i.e., jurisdictional) by the USACE under Section 404 of the CWA (Gravatt et al., 1999). All features were delineated either to the limits of the Ordinary High Water Mark (OHWM) or by wetland protocols identified in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory [EL], 1987). Wetlands and shallow water habitats were also classified according to the USFWS's Cowardin classification system (Cowardin et al., 1 979).

Areas identified in the wetland PLS potentially subject to Section 404 CWA jurisdiction include approximately 3 miles of the training site bounded by the Cumberland River, 4.7 miles of intermittent streams, 8.58 acres of palustrine forested (PFO)/scrub shrub (SS), 3.58 acres of palustrine scrub shrub (PSS), and 9.35 acres of PSS/emergent marsh (EM) **(Table 9, Figure 5).** The wetland areas were generally found in association with steam corridors and shallow depressional areas adjacent to agricultural fields on the relatively level floodplain of the Cumberland River.

TABLE 9. POTENTIAL WETLANDS AND OTHER WATERS OF THE US AT DTC

COWARDIN CLASSIFICATION	DESCRIPTION	AMOUNT
PFO/SS	Palustrine, Forested/ Scrub-Shrub (PFO/SS) 2 areas (3.08 to 5.5 acres in size)	8.58 acres (40%)
PSS	Palustrine Scrub-Shrub (PSS) 5 areas (0.04 to 1.37 acres in size)	3.58 acres (17%)
PSS/EM	Palustrine Scrub-Shrub/ Emergent (PSS/EM) 6 areas (0.03 to 5.74 acres in size)	9.35 acres (43%)
	Total Area	21.51 acres
R2UB	Riverine - Lower Perennial, Unconsolidated Bottom - Non-vegetated flowing waterways in the R2 category (1 to 4 acres), such as open ditches.	3.0 miles
R4SB	Riverine - Intermittent, Streambed — Non-vegetated flowing waterways in the R4 categories (1 to 4 acres), such as open ditches.	4.7 miles
	Total Length	*7.7* miles

Prior to impacting wetlands or other Waters of the U.S. at the DTS, the KYARNG will conduct a wetland delineation for the outer limits of the potentially impacted area, and obtain a jurisdictional determination from the USACE. KY ARNG will coordinate with the appropriate USACE District office regarding wetland impacts and permitting.

3.4.4 GROUNDWATER RESOURCES

Groundwater in the area can be obtained from aquifers in the Breathitt Formation or river valley alluvium. Wells drilled in the valleys are likely to yield more water than those on hillsides. Water obtained from most dug and drilled wells is moderately hard and contains noticeable amounts of iron (Kilburn et al., 1 962).

3.4.5 WATER QUALITY

A preliminary water quality investigation was conducted between 1998 and 2000. The study recommended that a long term water quality monitoring program be established on the site to 1) establish a baseline for future reference, 2) allow for making appropriate pollution-control decisions, and 3) track water-quality changes at the site. Three surface water sites, one on-site well, and one private well located on the perimeter of the training site were selected for the long-term surface water monitoring program.

As a result of this recommendation, surface water monitoring was conducted at the DTC between 2000 and 2003 (Cumbie et al., 2004). Water in groundwater wells on-site was characterized by low pH (generally <7) and higher concentrations of dissolved iron than that of surface-water sites. Other dissolved constituents, such as sulfate, bicarbonate, magnesium, calcium, and chloride are considerably higher in the Cumberland River than in on-site wells or interior drainage.

Off-site groundwater well water quality is generally higher in dissolved solids than on-site groundwater or interior drainage. Higher dissolved bicarbonate and lower pH shows that the off-site well (drilled into bedrock) is buffered much better than the on-site well.

The impacts of resource extraction (mining, gas wells) and military activities on water quality at the DTC do not appear to be detrimental to ATS water quality, nor do these activities appear to have any effect on groundwater outside the facility (Cumbie, et al., 2004).

SECTION 4: ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

Several studies have been conducted to describe the biotic environment of the DTC. **Table 10** lists natural resources-related studies conducted at DTC. Many species of flora and fauna are now known from the site as a result of these studies. This section of the INRMP will describe natural vegetation communities and the flora and fauna that inhabit them using an ecosystem classification.

TABLE 10. NATURAL RESOURCE STUDIES AT DTC

YEAR COMPLETED	STUDY	STUDY COMPLETED BY:
1993	Aquatic Investigation	Laudermilk et al.; Kentucky State Nature Preserves Commission
1993	Terrestrial Vertebrate Survey	Palmer-Ball; Kentucky State Nature Preserves Commission
1994	Soil Survey of Knox County	Natural Resources Conservation Service
1995	Resource Inventory and Conservation Plan	Natural Resources Conservation Service
1995	Biological Inventory	White et al., Kentucky State Nature Preserves Commission
1999	Delineation of Wetlands and Other Regulated Waters	U.S. Army Engineer Research and Development Center, Waterways Experiment Station, CEERD-ER-W
2001	Water Quality Investigation	Galceran and Dinger; Kentucky Geological Survey
2002	Update of Biological Inventory	Kentucky State Nature Preserves Commission
2004	Water Quality Investigation	Cumbie et al., Kentucky Geological Survey
2006	Update of Biological Inventory	Kentucky State Nature Preserves Commission

4.1 ECOSYSTEM CLASSIFICATION

The U.S. Forest Service (USFS) identifies ecoregions used to classify geographical locations based on four general levels of order[1]. From the broadest to the most specific, these orders are: Domain - consisting of groups of related climates; Division - consisting of climates within domains; Province - based on vegetation or natural land covers (includes influences of elevation); and Section - based on local terrain features.

DTC is located within the Eastern Broadleaf Forest (Continental) Province of the Hot Continental Division of the Humid Temperate Domain as described by Bailey (1995). This region has also been called the Ozark/Interior Plateaus (Harker et al., 1993). The training site lies within the Cumberland Plateau Physiographic Province (Fenneman 1938).

4.2 VEGETATION

Vegetation communities at the DTC were surveyed and classified during the 1995 biological inventory (White et al., 1995) and 2002 and 2006 updates (KSNPC, 2002; White and Yahn, 2006). A complete list of flora identified at the DTC is provided in **Appendix F.** Vegetation communities

[1] In some instances, more specific sub-divisions of these levels can be made.

at the DTC are summarized in **Table 11** and shown in **Figure 6.** The subsections following describe these communities in greater detail.

TABLE 11. VEGETATION COMMUNITIES ON DTC

COMMUNITY[1]	ACRES	VEGETATION*	WILDLIFE*
Natural Wetland Community			
Alluvial Forest	9.9	tuliptree, American beech, red maple, American sycamore, and river birch	Wild turkey, quail, dove, wood ducks, rails, gallinule, turkey, snipe, woodcock, owls
Riparian Forest	44.9	box elder, silver maple, black walnut, giant cane, Virginia wild rye, fall phlox, and American hog peanut	waterfowl, rails, amphibians
Shrub Swamp	18.0	buttonbush, smooth alder, and black willow	Fish, frogs, insects, waterfowl
Bottomland Hardwood Swamp	2.3	red maple, black willow, smooth alder, buttonbush, Smallspike false nettle, lizard's tail, and caric sedges	Fish, mollusks, frogs, salamanders, insects, waterfowl
Natural Upland Communities			
Appalachian Mesophytic Forest	85.7	sugar maple, white oak, red oak, American beech, fairy-bells, trout-lily, ginseng, bellwort, and bloodroot	Bobcat, eastern chipmunk, white-tailed deer, gray fox, red fox, mink, muskrat, opossum, cottontail rabbit, raccoon, fox squirrel, gray squirrel, weasel, eastern woodchuck
Appalachian Subxeric Forest	14.7	White oak, chestnut oak, pignut hickory, sourwood, blackgum, redbud, cat greenbrier, nakedflower ticktrefoil, and woman's tobacco	White-tailed deer, squirrels, mice, rabbits, foxes, raccoons, grackles, wild turkey, grouse, quail, bluejays, woodpeckers, waterfowl
Hemlock-Mixed Forest	0.3	Eastern hemlock, American beech, Japanese honeysuckle	Wild turkey, quail
Anthropogenic Upland Communities			
Disturbed Deciduous Forest	112.7	Black cherry, white ash, red maple, winged elm, Nepalese browntop, southern blackberry, Japanese honeysuckle, multiflora rose, sassafras, persimmon	Cottontail rabbit, mice, red fox, gray fox
Pine Forest	5.6	Virginia pine, white pine	Waxwings, bobwhite, quail, ruffed grouse, pheasant, wild turkeys, rabbits, foxes, raccoons, skunks, opossums, and coyotes
Current Agriculture	68.5	hay, corn	White-tailed deer, wild turkey, raccoon, quail, mice, cottontail rabbit
Non-Native Grassland	154.6	Orchard grass, tall fescue, timothy, ragweeds, Canada goldenrod, Chinese lespedeza, Japanese honeysuckle, yellow sweetclover, daisy fleabane, and hairy white oldfield aster	White-tailed deer, raccoon, quail, mice, cottontail rabbit
Urban	5.9		
Water	35		
Total	**558**		

*Scientific names are cataloged in Appendix F
'As defined by the Biological Inventory (Littlefield and Yahn, 2006)

4.2.1 NATURAL WETLAND COMMUNITIES

***Alluvial Forest* (successional)** is represented by moderate slopes and high-velocity scouring, and is associated with tributaries of river drainages on 9.9 acres of the DTC. The canopy is dominated by tuliptree, American beech *(Fagus grandifolia),* and red maple *(Acer rubrum).* American sycamore *(Platanus occidentalis)* and river birch *(Betula nigra)* are less dominant, but are good indicators of this community. This forest is subject to seasonal or intermittent saturation.

Riparian Forest forms a continuous narrow zone on 44.9 acres immediately adjacent to the Cumberland River. It occurs on a natural shelf that is regularly flooded, at least for brief durations. Common trees are box elder *(Acer negundo),* silver maple *(Acer saccharinum),* and black walnut *(Juglans nigra).* Giant cane *(Arundinaria gigantea)* occurs throughout this community, especially at the interior edge. Common herbaceous species include Virginia wild rye *(Elymus virginicus),* fall phlox *(Phlox paniculata),* and American hog peanut *(Amphicarpaea bracteata).* This community type is listed as "notable" in the KSNPC monitored natural communities of Kentucky.

Shrub Swamp occurs along several drainages to the Cumberland River, and occupies 1 8 acres of the property. The dominant woody species throughout this system are buttonbush *(Cephalanthus occidentalis),* smooth alder *(Alnus serrulata),* and black willow *(Salix nigra),* the latter sometimes in the form of small trees. The shrub swamp is probably semi-natural at DTC. The original vegetation on these Bonnie soils was likely forested, but the area has been heavily altered by agriculture. Since the original ecological survey of 1995, woody species have continued to increase, reducing the populations of herbaceous species.

Bottomland Hardwood Swamp occupies a small (2.3 acres) area on the DTC. Red maple is the single dominant canopy tree, with black willow scattered throughout. Because of the duration of standing water in this system, the shrub and herbaceous layers are poorly developed except around the perimeter of the topographically depressed swamp area. Smooth alder and buttonbush occur in the perimeter, as well as a variety of herbaceous wetland species and interspersed tussocks of mosses. Smallspike false nettle *(Boehmeria cylindrica),* lizard's tail *(Saururus cernuus),* and caric sedges *(Carex spp.)* are characteristic species around the perimeter. This wetland forest type may have been more common on the DTC in the past, and could have generally followed the original extent of hydric soils.

4.2.2 NATURAL UPLAND COMMUNITIES

Appalachian Mesophytic Forest occurs on the mid to lower slope of the hill above the broad terrace of the Cumberland River, and occupies a total area of 85.7 acres of the training site. It is the only extensive natural community on the site. Soils are rich and mesic, and are slightly to moderately acidic. Many tree species make up the canopy of this forest, including sugar maple *(Acer saccharum),* white oak, red oak *(Quercus rubra),* and American beech. A notable indicator of this forest is the umbrella tree *(Magnolia tripetala),* found mostly in the mid-story. The ground layer is diverse in some areas, presumably depending on the amount of past disturbance and site conditions. Groundcover species include fairy-bells *(Disporum maculatum),* trout-lily *(Erythronium albidum),* ginseng *(Panax quinquefolia),* bellwort *(Uvularia perfoliata),* and bloodroot *(Sanguinaria canadensis).* Rock outcrops occur scattered at mid-elevations on the slope. Although one of the richest communities on site, this community is depauperate when compared with other examples throughout its range.

Appalachian Sub-Xeric Forest is found along ridges and adjacent slopes, and occupies 14.7 acres of the property. Mostly on sandstone bedrock and dry soils, the canopy of this community is dominated by chestnut oak *(Quercus montana),* white oak, red maple, and pignut hickory *(Carya glabra).* Sourwood *(Oxydendrum arboreum),* blackgum *(Nyssa sylvatica),* and redbud

(Cercis canadensis) characterize the mid-story. The understory vegetation can be sparse to moderately developed with cat greenbrier *(Smilax glauca),* nakedflower ticktrefoil *(Desmodium nudiflorum),* and woman's tobacco *(Antennaria plantaginifolia)* as typical components. Through fire suppression and the blight of the American chestnut *(Castanea dentata),* this community type, as well as forests of similar composition, have changed greatly since European settlement (without logging as the primary factor).

Hemlock-Mixed Forest occurs along the bluff above the Cumberland River, but only occupies a small area (0.3 acre). It is located on the narrow strip that extends west along the river near the cemetery and entrance gate. Although disturbed, the canopy of Eastern hemlock, American beech, and the understory of great laurel (Rhododendron maximum) have persisted. The understory vegetation is weedy with plants such as Japanese honeysuckle *(Lonicera japonica)* and multiflora rose *(Rosa multiflora).* This community type, because it occupies such a small area, can probably be subsumed into Appalachian Mesophytic Forest, but the existence of Eastern hemlock is worth distinguishing on the property.

4.2.3 ANTHROPOGENIC[2] UPLAND COMMUNITIES

Disturbed Deciduous Forest community (formerly the **Successional Shrub/Tree Mix** community of 2002) is characterized by having a history of intense disturbance, but more recently succeeding back to forest. These areas surround intermittent and perennial stream drainages and relatively flat uplands, and represent 112.7 acres of DTC. Dominant canopy species include sweetgum *(Liquidambar styraciflua),* black cherry *(Prunus serotina),* white ash *(Fraxinus americana),* red maple, and winged elm *(Ulmus alata).* Southern blackberry *(Rubus argutus),* Japanese honeysuckle, and multiflora rose are common constituents of these thickets and young forests. Early successional areas can also be dominated by sassafras *(Sassafras albidum)* and persimmon *(Diospyros virginiana).*

Pine forest, a small area (5.6 acres), consists primarily of white pine *(Pinus strobus)* with some Virginia pine *(Pinus virginiana).* It occurs on the south side of the road near the entrance gate. Although probably planted, this stand could have seeded from local sources, since both of these pines can aggressively colonize sites. The associated flora in this area is extremely depauperate due to the allelopathic effects of the pine (White et al. 1 995).

Current Agriculture is ongoing in the bottomland areas of DTC. Estimated at 68.5 acres, several large areas have been planted for corn production. In previous years, smaller areas were cultivated for wildlife plantings such as corn and canola in coordination with the local chapter of Quail Unlimited. Before clearing and cultivation, bottomland hardwood forests would have occupied this flat broad terrace of the Cumberland River.

The ***Non-native Grassland*** community (formerly the **Mixed Grass/Forb community** of 2002) represents open fields mowed annually to provide hay to local farmers and allow better troop movement and visibility. The DTC has had a verbal agreement since 1991 with local farmers to cut hay at DTC. Hay is rolled into bales and removed by the farmers at no cost. The **Non-native Grassland** community occupies a total of 154.6 acres of the DTC. Agricultural grasses, such as orchard grass *(Dactylis glomerata),* tall fescue *(Lolium arundinaceum),* and timothy *(Phleum pretense)* have been planted in these areas, and these species have mixed with invasive weedy plants including other grasses, sedges, and forb species over time. Common forb and semi-woody species include ragweeds *(Ambrosia artemisiifolia* and *A. trifida),* Canada goldenrod *(Solidago canadensis),* Chinese lespedeza *(Lespedeza cuneata),* Japanese honeysuckle, yellow

[2] Relating to, or influenced by the impact of humans on nature.

sweetclover *(Melilotus officinalis),* daisy fleabane *(Erigeron annuus),* and hairy white oldfield aster *(Symphyotrichum pilosum van. pilosum).*

4.2.4 TURF AND LANDSCAPED AREAS

Turf areas at DTC are maintained around buildings and roadways. Turf management consists primarily of mowing.

4.3 FISH AND WILDLIFE

Many common species of mammals, birds, reptiles, amphibians, insects, fish, and benthic invertebrates were identified by KSNPC biologists, and are listed in **Appendix F.** To date no rare, threatened, or endangered animal species have been observed at the DTC (see **Section 4.4.2).**

4.3.1 MAMMALS

Six mammal species were identified by the biological surveys at DTC. These included coyote *(Canis latrans),* white-tailed deer *(Odocoileus virginianus),* and four bat species. No rare, threatened, or endangered mammals were identified at the DTC.

4.3.2 BIRDS

Forty-five species of birds were identified in the biological inventories at DTC. Among these species are two hawks, the broad-winged hawk *(Buteo platypterus)* and red-shouldered hawk *(Buteo lineatus),* one upland game species, the wild turkey *(Melagaris gallopavo),* and many Passerine songbirds.

Forty-five species of birds were identified by direct observation or song identification during walkover surveys of the DTC in 1995 (see **Appendix F;** White et al., 1995, Laudermilk et al., 1993). The DTC falls within the Northern Cumberland Plateau Region, where approximately 140 bird species occur annually as nesting species, post nesting dispersal species, transients, and/or wintering residents (American Bird Conservancy [ABC], unpublished report). The following species were identified at the DTC, and are priority species within the Northern Cumberland Plateau Bird Conservation Plans (ABC, 2000):

TABLE 12. PRIORITY BIRD SPECIES IDENTIFIED AT DTC DURING 1995 SURVEY

COMMON NAME	SCIENTIFIC NAME
Wood Thrush	*Hylocichla mustelina*
Prairie warbler	*Dendroica discolor*
Source: White et al., Kentucky State Nature Preserves Commission, 1995	

The DTC provides habitats and open space for a wide variety of migratory birds that migrate annually within and beyond North America (see **Appendix F).** Regardless of how these migratory birds use the DTC, their presence provides important ecological services and an important indicator of ecosystem health. No formal bird conservation plans encompass the DTC.

4.3.3 REPTILES AND AMPHIBIANS

Three amphibian and a single reptile species were identified during the biological surveys. Amphibian species observed included Cope's Gray Treefrog *(Hyla chrysoscelis),* Spring Peeper *(Pseudacris crucifer),* and Green Frog *(Rana clamitans)* and the single reptile species was black rat snake *(Elaphe obsoleta obsolete).*

4.3.4 FISH

Eighteen fish species have been identified during previous biological inventories and aquatic surveys at the DTC (White et al., 1995, Laudermilk, et al., 1993). Several fish inhabiting the Cumberland River are sought after by anglers including: channel catfish *(Ictalurus punctatus),* smallmouth bass *(Micropterus dolomieu),* rock bass *(Ambloplites rupestris),* spotted bass *(Micropterus punculatus),* and other sunfish *(Lepomis spp.).*

4.4 THREATENED AND ENDANGERED SPECIES

4.4.1 THREATENED, ENDANGERED AND RARE PLANT SPECIES

No federally listed plants have been identified during biological inventories conducted on the training site (White et al., 1 995; KSNPC, 2001, KSNPC, 2006). A list of rare, threatened, and endangered species observed at DTC or in Knox County is presented in **Table 13.**

One KSNPC listed special concern plant, butternut or white walnut *(Juglans cinerea),* has been identified at the DTC, although KSNPC does not list the species as occurring in Knox County. The DTC butternut tree specimen has been recognized as a "Kentucky Big Tree Champion" by the KYEPPC as part of Kentucky's Big Tree Program (see **Appendix F).** Management of white walnut is discussed in **Section 6.4.2.1.**

BIG TREE CHAMPION BUTTERNUT AT DTC
Source: KYARNG

TABLE 13. DOCUMENTED AND/OR POTENTIAL THREATENED, ENDANGERED, AND RARE PLANT SPECIES AT DISNEY TRAINING CENTER

SPECIES		ECOSYSTEM				STATUS/RANKING		
COMMON NAME	SCIENTIFIC NAME	G	F/C	R	W/A	FEDERAL	STATE	GLOBAL
Species Documented at DTC								
Slender waternymph or Threadlike Naiad	*Najas gracillima*				X	—	S	G57/S2S3
White Walnut (Butternut)	*Juglans cinerea*		X			-	S	G3G4/S3
Potential Species (Found in Knox County)								
Blue Monkshood	*Aconitum uncinatum*		X			-	T	G4/S2
Grass Pink	*Calopogon tuberosis*	X	X			-	E	G5/S1
Kentucky Lady's Slipper	*Cypripedium kentuckiense*		X			--	S	G3/S3
Short's Hedgehyssop	*Gratiola viscidula*				X	--	S	G4G5/ S3
St. Peter's-wort	*Hypercium crux-andreae*		X			--	T	G5/ S2G3
Loesel's Twayblade	*Liparis loeselii*	X				-	T	G5/ S2G3
Nuttall's Lobelia	*Lobelia nuttalli*	X				-	S	G4G5/S2
Yellow-crested Orchid	*Platanthera cristata*		X			-	T	G5/S1S2
Crossleaf Milkwort	*Polygala cruciata*		X			-	E	G5/S1
Slender Marsh Pink	*Sabatia campanulata*				X	-	E	G5/S1
Grassleaf Arrowhead	*Sagittaria graminea*				X	--	T	65/ S1S2
Curtis' Goldenrod	*Solidago curtisii*		X			-	T	G4G5/S2S3
Narrowleaf bluecurls	*Trichostema setaceum*	X	X			--	E	65/ S1S2
Eelgrass	*Vallisneria americana*				X	-	S	G5/ S2S3

FEDERAL STATUS
E = Endangered = Endangered throughout range
T = Threatened = Threatened throughout range
C = Candidate for Listing

GLOBAL RANK DEFINITIONS
Basic Rank:
G1 = Critically imperiled
G2 = Imperiled
G3 = Vulnerable
G4 = Apparently secure
G5 =Secure
? = Rank Uncertain
T# = Infraspecific Taxon rank

KENTUCKY STATE NATURE PRESERVES COMMISSION STATUS
E = endangered
T = threatened
S = special concern
H = historic
X = extirpated
N = none
SI = Critically Imperiled
S2= Imperiled
S3= Vulnerable
S4= Apparently Secure
S5 = Secure

ECOSYSTEM
G = Grasslands
F/C = Forests/Clifflines
R = Riparian
W/A = Wetland/Aquatic

Source: Calibre Systems 2002, KSNPC 2007, NatureServe 2007, USFWS, 2007

4.4.2 THREATENED, ENDANGERED AND RARE ANIMAL SPECIES

During the biological inventory in 1993-1995, KSNPC searched for federal and state listed animal species. No state or federally-listed animals were identified in the inventory. However, several rare species potentially exist on the site, including the federally threatened fish, Blackside dace *(Phoxinus cumberlandensis),* and other KSNPC listed species in **Table 14.** The Blackside dace is found only in very short segments of 30 creeks in the Cumberland River Basin in Kentucky and Tennessee (Kentucky Environmental Quality Commission [KEQC], 2001). Management of forests, riparian, wetland, and aquatic ecosystems will benefit this species should it be found on the training site during the planning period (see **Sections 6.6 and 6.7).**

In correspondence dated 18 April, 2008, the USFWS Ecological Services Office noted that while they do not have occurrence records for the federally endangered Indiana bat *(Myotis socialist* Knox County, the species is known to occur in summer from several counties surrounding Knox County. The USFWS notes that suitable summer habitat and potentially suitable winter habitat for the species is found within Knox County, the DTC, and along the northern side of Pine Mountain.

Two species previously listed by KSNPC as "notable" species were identified during the biological inventory: Northern bat *(Myotis septentrionalis)* and Valley flame crayfish *(Cambarus deweesae).* Both of these species have been de-listed in Knox County.

TABLE 14. POTENTIAL THREATENED, ENDANGERED, AND RARE ANIMAL SPECIES KNOWN IN KNOX COUNTY BUT NOT OBSERVED AT DTC

SPECIES		ECOSYSTEM				STATUS/RANKING		
COMMON NAME	SCIENTIFIC NAME	G	F/C	R	W/A	FED'L	STATE	GLOBAL
Fish								
Blackside Dace	*Phoxinus cumberlandensis*				X	T	T	G2/S3
Cumberland Darter	*Etheostoma susanae*				X	C	E	G1/G2
Birds								
Sharp-shinned Hawk	*Accipiter striatus*	-	X	-	-	-	S	G5/S3B.S4N
Sedge Wren	*Cistothorus platensis*	X	-	-	-	--	S	G5/S3B
Mammals								
American Black Bear	*Ursus americanus*	-	X	-	-	--	S	G5
Indiana Bat	*Myotis Sodalis*	-	-	-	-	LE	E	G2/S1S2
Reptiles								
Coal Skink	*Eumeces anthracinus*	-	-	X	-	-	T	G5
Molluscs								
Cumberland Papershell	*Anodontoides denigrates*	-	-	-	X	-	E	G1/G2
Little Spectaclecase	*Villosa leinosa*	-	-	-	X	--	S	G5

FEDERAL STATUS
E = Endangered = Endangered throughout range
T = Threatened = Threatened throughout range
GLOBAL RANK DEFINITIONS
Basic Rank:
G1 = Critically imperiled
G2 = Imperiled
G3 = Vulnerable
G4 = Apparently secure
G5 =Secure
? = Rank Uncertain
T# = Infraspecific Taxon rank

KSNPC STATUS
E = endangered
T = threatened
S = special concern
H = historic
X = extirpated
N = none
ECOSYSTEM
G = Grasslands
F/C = Forests/Clifflines
R = Riparian
W/A = Wetland/Aquatic

Source: Calibre Systems 2002, KDFWR 2007, NatureServe 2007, USFWS, 2007

SECTION 5 : MISSION IMPACTS ON NATURAL RESOURCES

5.1 CURRENT POTENTIAL IMPACTS

5.1.1 MINIMUM IMPACTTRAINING

Types of training activities that generally have a minimal impact on natural resources at the DTC include: small unit infantry tactics; reconnaissance; terrain and map analysis; escape and evasion tactics; infiltration tactics; land navigation; patrolling; TOW and Dragon tracking and qualification training (no live firing); NBC defense; and engineer maintenance, repair, and minor construction project training. Some of these types of training require undisturbed cover to conceal movements. Others use existing roads, hardened trails, and infrastructure. As such, the disturbance is no greater than walking through the woods or open areas or driving down a road, and would normally require no extraordinary precautions, limitations, or restrictions. Aviation training (rotary wing only) is also considered minimum impact training. Aviation operations tend to be of short duration and relatively quick moving.

5.1.2 MAXIMUM IMPACTTRAINING

Training that disturbs soils and/or vegetation has more potential to impact natural resources at DTC. Impacts to soil and water resources may have secondary impacts to water quality, fish populations, and wildlife. Such disturbances may require corrective actions such as leveling ruts, adding soil, seeding, mulching, and/or installing erosion control devices, sedimentation structures, or other management practices. Training activities at the DTC that have potential to cause soil or vegetation disturbance include: tactical concealment/ bivouac, off-road cold or wet weather operations, certain cover and concealment training, field fortifications, and obstacle training.

5.2 FUTURE POTENTIAL IMPACTS

The use of tracked vehicles at DTC is anticipated to end, and more engineering training is expected. Because current site usage minimized use of tracked vehicles, this change in site usage is not likely to significantly alter future potential impacts.

Natural resource management techniques, policies, and procedures identified in this plan will be used to facilitate future site development for military training while minimizing environmental impacts. The KYARNG's active ecosystem management program accommodates the training mission while emphasizing an adaptive management style focused on maintaining biological diversity. Adequate advance planning and design in support of training site development will minimize impacts from the military mission on natural resources and provide for long term sustainability of the land to support training.

As training site usage increases, this document and the expertise of the KYARNG Environmental Office may be used to identify locations best suited for certain types of training. Future mission planning requirements can be determined through a multidisciplinary team approach that identifies potential impacts, management goals, objectives to meet those goals, and specific practices to be implemented to achieve the objectives and goals. Since the INRMP is a living document, guidance on specific natural resources in specific locations may be modified, goals and objectives added, and the document updated as needed.

Non-training future activities that could disturb natural resources include facility maintenance and new construction. Maintenance consists of vegetation control (mostly mowing) around fence lines, roadside ditches, and road surfaces. Herbicides could be used to augment and support

vegetation control efforts and in areas where mowing is not possible or appropriate. The KYARNG does not plan to use controlled burning as a management technique at DTC.

No new construction is planned at this time for the DTC. New construction has a permanent impact on natural resources by totally modifying the landscape within the construction zone and facility footprint. Temporary impacts to soil and surface water quality could result from erosion. Should a need for additional construction arise, erosion Impacts would be expected to be negligible because Best Management Practices (BMP) for erosion control would be implemented during construction. The impacts of any future construction would be analyzed through the NEPA process.

5.3 NATURAL RESOURCES NEEDED TO SUPPORTTHE MILITARY MISSION

The KYARNG requires a mixture of open and forested land areas to support military training requirements. Realistic training is dependent on an intact natural setting. Degraded training lands, soil erosion, degraded forests, and silted streams may limit or prevent sustainable long-term training. Degradation of natural resources results in inadequate training, impaired readiness, and wasted training dollars. Maintaining healthy ecosystems keeps the training land continuously available for use by soldiers. Healthy ecosystems are resilient and can support long term training needs. The KYARNG needs the land and its natural resources to function together in a healthy ecosystem to support training.

5.4 NATURAL RESOURCES CONSIDERATIONS FOR MISSION PLANNING AND INITIATION

The primary goal of this INRMP is to manage natural resources ***to support the military mission*** in a manner consistent with sound conservation principles and in compliance with Federal and State laws, Army regulations, and policies. Training success at DTC is only possible through a supportive, proactive natural resource management program. The KYARNG natural resource management program aims to minimize the impacts of normal training use on DTC natural resources, and complements the doctrinally-required military training conducted. Proper execution of the INRMP provides sustainable training lands, and provides adaptive means of dealing with normal training impacts, thereby protecting natural resources. Many features of this plan contribute to its ability to provide sustainable training lands. Some of these features are techniques, practices, and procedures, which include immediate repair and restoration of terrain damage, "resting" repaired terrain while vegetation is re-established, minimizing off-road vehicle activity when soil is saturated, posting wetlands as no-go areas, and establishing rotational use of field bivouac sites. Other features provide for "hardening" of areas frequently used for training, to minimize impacts on natural resources within the surrounding areas. Permanent stream crossing sites are another example of these BMPs, which minimize damage to vegetation, soil loss, erosion, and sedimentation. Natural resources management will facilitate accomplishment of the military mission.

Ideal times to schedule training from a climate perspective would be from May to October, when rainfall is at its lowest for the year. Maneuver damage (ruts, disturbed vegetation, and bare soils) caused during this training period would be exposed to minimal erosion factors (wind and rain) during these months. Areas needing rehabilitation can then be revegetated in the late fall, when rainfall increases and soils are less trafficked.

Refer to **Section 6.0** for additional information on how to properly manage natural resources limitations during mission planning. Laws and regulations that pertain to these natural resources are also incorporated into **Section 6.0.**

SECTION 6 : NATURAL RESOURCES PROGRAM MANAGEMENT

6.1 NATURAL RESOURCES PROGRAM MANAGEMENT

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it meets the requirements of the Sikes Act and if it contributes to the conservation and rehabilitation of natural resources on military installations. Intra- and inter-agency cooperation, coordination, and communication at the Federal, State, and local levels (for example, USFWS and KDFWR) are requisite to the success of the updated INRMP. The USFWS and KDFWR review the plan and concur with its contents. Concurrence from the USFWS on this updated INRMP is provided in a letter dated 11 April 2008. Concurrence from the KDFWR on this updated INRMP is provided in a letter dated 1 8 April 2008 **(Appendix C).**

6.1.1 ADMINISTRATIVE AND TECHNICAL SUPPORT

The Natural Resources Program at the DTC is administered by the KYARNG Environmental Program Manager, located in Frankfort, KY, whose responsibilities are listed in **Table 15.** The Environmental Program Manager also receives support from the Environmental staff, each of whom has significant duties in addition to natural resources support.

TABLE 15. RESPONSIBILITIES OF THE KYARNG ENVIRONMENTAL PROGRAM MANAGER

RESPONSIBILITY	
1	Implement this updated INRMP.
2	Provide oversight and coordination with other agencies.
3	Coordinate with the SRP Coordinator to ensure sustainable management of training lands.
4	Develop and implement programs to ensure the inventory, delineation, classification, and management of wetlands, scenic areas, endangered and threatened species, sensitive and critical habitats, and other natural resource areas of special interest.
5	Provide for training of natural resources personnel.
6	Maintain natural resources management records.
7	Review NEPA documents, remedial action plans, construction designs, and proposals to ensure adequate natural resource protection and consideration of technical guidance presented in this updated INRMP.
8	Evaluate training mission impacts and provide guidance to trainers.
9	Coordinate the Cultural Resources program and Section 106 compliance.
10	Coordinate with local, State, and Federal governmental and civilian conservation organizations with respect to the DTC natural resources management program.
11	Coordinate hunting and fishing programs.
12	Implement and execute AR 200-1.
13	Assist the Adjutant General in prioritizing natural resources and compliance funding.

Source: KYARNG

6.1.2 COOPERATIVE AGREEMENTS AND TECHNICAL ASSISTANCE

Specialized expertise is often required to adequately manage KYARNG natural resources. Technical assistance will be sought from Federal and State agencies, universities, and special

interest groups. Intra- and inter-agency cooperation, coordination, and communication at the Federal, State, and local levels are requisite to the success of the INRMP. The Environmental Program Management Office has a strong relationship with such groups. Additional labor resources may include Federal and State agencies, State agencies; local and regional Universities; scouting groups; and special interest groups (for example, Audubon Society, Boy Scouts, and sportsmens' clubs).

6.1.2.1 FEDERAL AGREEMENTS

The DoD and subcommand entities have memoranda of agreement (MOA), memoranda of Understanding (MOU)s, and other cooperative agreements with other federal agencies, interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the United States. Generally, these agreements allow installations and agencies or interest groups to obtain mutual conservation objectives. The DoD agreements applicable to the DTC are listed in **Table 15.** A copy of these agreements is maintained by the Environmental Program Manager.

TABLE 16. DEPARTMENT OF DEFENSE COOPERATIVE AGREEMENTS APPLICABLE TO DTC

TYPE		COOPERATING AGENT	SUBJECT
1	MOU	U.S. Fish and Wildlife Service	Ecosystem-based management offish, wildlife, and plant resources on military lands
2	Cooperative Agreement	The Nature Conservancy	Assistance in natural resources inventory
3	MOA	National Biological Service of the Department of the Interior	Professional and Technical Assistance Conducting Biological Surveys, Research and Related Activities
4	MOU	U.S. Environmental Protection Agency	Integrated Pest Management (IPM)
5	MOA	Over 110 Federal and State agencies and non-governmental organizations	Federal Neotropical Migratory Bird Conservation Program (Agreement is among DoD, and through each of the Military Services)
6	MOU	U.S. Department of Agriculture, Natural Resources Conservation Service	Watershed and Environmental Enhancement of U.S. Army Installations (Agreement is with U.S. Army Environmental Center)
7	Interagency Agreement	U.S. Department of the Interior, United States Forest Service	Natural and Cultural Resources Support to ARNG Installations (Agreement is with ARNG)
8	MOU	Ducks Unlimited, Inc.	Cooperative development of selected wetlands and associated uplands to maintain and increase waterfowl populations and fulfill objectives of the North American Waterfowl Management Plan, within the context of DoD's environmental security and military missions
9	MOU	Bureau of Land Management, USFWS, National Park Service (NPS), Bureau of Reclamation, USFS, Defenders of Wildlife, Izaak Walton League, National Audubon Society, National Wildlife Federation.	Watchable Wildlife Programs

6.1.2.2 STATE AND LOCAL AGREEMENTS

The DTC INRMP is reviewed and signed by the KDFWR, and in a sense functions as a cooperative agreement. It is a cooperative plan that identifies how the KDFWR and the KYARNG will work together to meet mutual conservation objectives. The KYARNG maintains an agricultural lease with a local farmer for hay production at the DTC. The lease is included as **Appendix E.** More information on this agreement is provided in **Section 6.7.4.**

6.1.2.3 FEDERAL AGENCY COORDINATION AND TECHNICAL ASSISTANCE

U.S. Army Corps of Engineers - The KYARNG leases the DTC from the federal government under a license with the USACE. Additionally, the USACE issues Section 401 and 404 permits. The KYARNG will work closely with the USACE-Nashville District in any permitting or planning efforts during FY 2008-201 3. The Waterways Experiment Station (WES) is headquarters for the U.S. Army Engineer Research and Development Center (ERDC). WES assists KYARNG with wetland management and mapping. In 1999, WES produced a comprehensive planning level wetland delineation of DTC, including values and functions of wetlands and recommendations for management.

U.S. Fish and Wildlife Service - The USFWS is the principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The agency also enforces federal wildlife laws, manages migratory bird populations, conserves and restores wildlife habitat such as wetlands, and administers the ESA. USFWS is a cooperating agency in development of this plan. The agency is responsible for reviewing the INRMP and providing guidance on federally listed species, species of management concern, and wetland management. **Appendix C** contains coordination with agencies for the protection and management of fish and wildlife at the DTC.

Natural Resources Conservation Service - The NRCS has been an active partner in assisting the KYARNG to manage the natural resources on the training site. In 1994, the NRCS developed a resource conservation plan for the site. After identifying problem areas, the NRCS produced an engineering design, construction/material specifications and estimated costs for the highest priority erosion site on the DTC. NRCS will continue to be a major partner in the LRAM program. This support is provided through the MOU listed in Section 6.1.2.1.

U.S. Forest Service - The USFS can assist the KYARNG in conducting timber inventories and developing tree planting specifications through the Interagency Agreement between the ARNG and the USFS. The USFS will assist the KYARNG in conducting a forest inventory for DTC and providing guidance for forest management plan through the Interagency Agreement listed in Section 6.1.2.1.

National Weather Service - The National Weather Service provides federal and state land management agencies fire weather information for prevention, suppression, and management of forest and rangeland fires. The National Weather Service Forecast Office in Jackson (http://www.crh.noaa.gov/jkl/) provides year-round weather forecasts for eastern Kentucky. Routine fire weather forecasts are issued daily for Knox County in which DTC is located, and are available at: http://www.crh.noaa.gov/jkl/firewx/fire_weather.html.

6.1.2.4 STATE AGENCY COORDINATION AND TECHNICAL ASSISTANCE

Kentucky Environmental and Public Protection Cabinet (EPPC) - The Environmental and Public Protection Cabinet protects Kentucky's environment and manages natural resources through the programs of the Department for Environmental Protection (KDEP) and Department for Natural Resources (KDNR).

- ***Department for Environmental Protection -*** The Division of Water, Division for Air Quality, Division of Waste Management, and Division of Environmental Services make up the Kentucky Department of Environmental Protection. The Division of Water issues "Water Quality Certification Permits" for any activity that involves alteration of waters of the State. The Division for Air Quality issues air quality permits.
- ***Department for Natural Resources -*** Within the DNR, the Division of Forestry (KDOF) provides forest stewardship assistance to the KYARNG staff in case of wildfire on the property. The KDOF has assisted and will continue to assist the KYARNG in conducting timber inventories and developing tree planting specifications.

The Division raises native tree seedlings that may be suitable for KYARNG planting needs. Tree seedlings available in Kentucky include white oak *(Quercus velutina),* northern red oak, pin oak *(Quercus palustris),* cherrybark oak *(Quercus pagoda),* black walnut, white and green ash *(Fraxinus americana and F. pennsylvanica),* sycamore, yellow poplar, black locust *(Robinia pseudo-acacia),* bald cypress *(Taxodium distichum),* shortleaf pine *(Pinus echinata),* white pine, and Virginia pine. Also within the DNR, the Division of Conservation provides assistance to implement sound soil and water management practices.

Kentucky Department of Fish and Wildlife Resources - The KDFWR is within the Kentucky Tourism Cabinet. KDFWR and USFWS were both consulted during development of this plan. The KDFWR District Ranger assists the KYARNG in enforcing state game regulations, including the MOU discussed in **Section 6.1.2.2. Appendix C** contains coordination letters from both federal and state fish and game agencies for the protection offish and wildlife resources at DTC.

Kentucky State Nature Preserves Commission - The KSNPC has a mission to protect Kentucky's natural heritage by (1) identifying, acquiring and managing natural areas that represent the best known occurrences of rare native species, natural communities and significant natural features in a statewide nature preserve system; (2) working with others to protect biological diversity; and (3) educating Kentuckians as to the value and purpose of nature preserves and biodiversity. The KSNPC will continue to assist KYARNG in performing rare species and natural community consultations. KSNPC provides necessary expertise to the LCTA program by assisting with plant and animal identification.

Kentucky Heritage Council - The Kentucky Heritage Council will ensure this plan is implemented in accordance with cultural resources management laws and regulations. This agency and the State Historic Preservation Officer (SHPO) have reviewed this plan and will provide a letter of cooperation following the final review. **Appendix C** contains coordination with agencies for the protection and management of cultural resources at the DTC.

The University of Kentucky - Through the University of Kentucky, the Kentucky Geological Survey (KGS) assists the KYARNG in conducting surface and ground water quality and quantity monitoring at all Kentucky training sites. The KYARNG also coordinates closely with the State Archaeologist and staff at the Kentucky Archaeological Survey at the University of Kentucky.

6.2 GEOGRAPHIC INFORMATION SYSTEMS

6.2.1 BACKGROUND

GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information. Within the ITAM Program, GIS technology is used to create, analyze, display, and print information about training land in support of training (DA, 1999).

GIS is most commonly used to create maps by overlaying multiple data layers, for example training area boundaries, roads, streams, wetlands, and so forth. However, a more valuable application of GIS software (ArcView, Arcinfo, or ArcGIS, for example) is the ability to perform data analysis. Simple analyses on data layers have the ability to generate reports that might, for example, show the number of acres of wetlands within a training area. More detailed analyses can also involve using multiple data layers and numeric functions to create new data layers. For example, in order to select the most appropriate location for a trail, a data layer could be produced showing all areas excluding wetlands or areas within streamside management zones.

GIS is a tool that natural resource managers use to analyze and evaluate the condition and capabilities of training lands. GIS also allows the information collected by the environmental office to be communicated to the trainer via computer (and vice versa). This supports the planning and scheduling component of military training.

The data entered into the training site's database has many different uses. Of primary interest to the users of DTC is the application of data to produce overlays of particular areas of the training site to get a snapshot of what is happening within that portion of the site. Satellite imagery and aerial photography can be used to create a geo-referenced raster image and superimpose on a map of the site's training areas and training facilities using GIS. Trainers can use GIS-generated maps to plan maneuvers, since terrain, topography, and vegetation can be portrayed on each map at or above the original scale of the input data.

6.2.2 KYARNG GIS

The KYARNG is in the process of developing its GIS facilities and skills at the Environmental Office in Frankfort and the Wendell H. Ford Regional Training Center, both of which will serve the KYARNG throughout the entire Commonwealth of Kentucky.

The KYARNG GIS program was implemented in 1997, when ArcView software and computer hardware for data management were acquired in the Environmental Office in Frankfort, Kentucky. To date, most core databases, or map layers, for DTC have been completed [aerial photography, contour lines, grid scale, installation boundary, political boundary (county), roads, hydrology (rivers, streams, and ponds), wetlands inventory, soils, and vegetation cover]. Additional data layers needed include: erosion control structures, bivouac sites, constraints to training, crossing sites/ ford sites, and sensitive species locations. Computer hardware and software have been acquired for statewide use.

6.3 FISH AND WILDLIFE MANAGEMENT

The KYARNG initiated hunting for deer and wild turkey at DTC in 1 991, with quotas for each hunt determined by KYARNG one year in advance. Hunts were conducted to determine population densities for each species. In the spring of 1996, twenty wild turkeys *(Meleagris gallopavo)* (16 hens and 4 toms) were stocked by KDFWR; therefore, no turkey hunt occurred in 1 996. Currently, hunting for white-tailed deer and wild turkeys is not permitted at DTC. Rabbit and squirrel hunting is allowed on a day permit basis for KYARNG personnel and family members.

The training site, located in Knox County, is within Kentucky Hunting Zone 3. Game species are hunted in Knox County include: white-tailed deer, wild turkey, grouse *(Bonasa umbellus),* quail *(Colinus virginianus),* rabbit *(Sylvalagus floridanus),* squirrel *(Sciurus niger, S. carolinensis),* groundhog *(Marmota monax),* bobcat *(Felis rufus),* crow *(Corvus brachyrhynchos),* frogs, migratory game birds and waterfowl (ducks, geese, coots, mergansers, moorhens, gallinules, rails, doves, snipe *[Gallinago gallinago],* and woodcock *[Scolopax minor]),* wild hog *(Sus scrofa),* coyote, and furbearers (raccoon *[Procyon lotor],* opossum *[Didelphis virginicmus],* red fox *[Vulpes vulpes],* weasel *[Mustella vison],* striped skunk *[Mephitis mephitis],* muskrat *[Ondontra zibethicus],* and

beaver *[Castor Canadensis]).* The eastern spotted skunk *(Spilogale putorius),* a KSNPC species of special concern, has been observed at DTC.

Recreational fishing at the DTC is available to military personnel and the public on a day permit basis. Supervision by Training Site Personnel or the KDFWR is required to ensure that all fishers are properly licensed, and that size limits, as determined by KDFWR, are being observed.

Hunting and fishing activities at DTC will be suspended by the Training Site NCOIC when conflicts with military training arise. Laws, regulations, and EOs pertaining to fish and wildlife management are listed in **Table 1** 7 and are described in **Appendix H.**

TABLE 17. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO FISH AND WILDLIFE MANAGEMENT

REQUIREMENT	TITLE
Law	Clean Water Act (33 USC §1341)
	Endangered Species Act, 7 U.S.C. 1 36; 1 6 U.S.C. 460 et seq. (1 973) as amended
	Fish and Wildlife Conservation Act (USC §2901 et seq.)
	Fish and Wildlife Coordination Act, as amended (16 USC §661 et seq.)
	Sikes Act Improvement Act (16 USC §670a-o)
	Migratory Bird Treaty Act, as amended (16 USC §703-71 2)
	National Environmental Policy Act (42 USC §4321 et seq.)
Code of Federal Regulations	50 CFR 21, Migratory Bird Permits
Executive Order	EO 11990, Protection of Wetlands
	EO 11988, Floodplain Management
	EO 1 31 86, Responsibilities of Federal Agencies to Protect Migratory Birds
Kentucky Regulations	KRS 146 Natural Resources
	KRS 1 50 Fish and Wildlife Resources
	KRS 224 Environmental Protection

6.3.1 GAMEAND FISH POPULATIONS

General fish and wildlife management is accomplished in conjunction with the military mission and training activities. Inventory and monitoring of terrestrial habitats, wetlands and aquatic habitats, fish and game populations, non-game populations, and T&E species are primarily conducted as PLS.

6.3.2 MIGRATORY AND BREEDING BIRDS AT DTC

Considerations with regard to migratory bird management are: compliance with the Migratory Bird Treaty Act (MBTA); implementation of migratory bird management actions in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds;* and support, contribution, and compatibility with the goals and efforts of numerous regional migratory and game bird conservation programs.

Virtually all birds that occupy the DTC throughout the year are protected under the MBTA. The MBTA controls many actions that may negatively affect migratory birds, particularly collection and transportation of birds. Special purpose permits may be requested and issued that allow for relocation or transport of migratory birds for management purposes.

Incidental taking of migratory birds is regulated in 50 CFR 21, Migratory Bird Permits. Part 21.1 5, Authorization of Take Incidental to Military Readiness Activities, effective 28 February 2007, allows incidental take by DoD in the course of military readiness activities under certain conditions specified in Paragraph (a) Take Authorization and Monitoring:

Except to the extent authorization is withdrawn or suspended pursuant to 50 CFR 21, the Armed Forces may take migratory birds incidental to military readiness activities provided that, for those ongoing or proposed activities the Armed Forces determine may result in a significant adverse effect on a population of a migratory bird species. The Armed Forces must confer and cooperate with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects.

When conservation measures implemented under paragraph (a)(1) of this section require monitoring, the Armed Forces must retain records of any monitoring data for five years from the date the Armed Forces commence their action. During INRMP reviews, the Armed Forces will also report to the USFWS migratory bird conservation measures implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

It is DoD policy to promote and support a partnership role in the protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission. The Partners in Flight (PIF) program is an umbrella network of which DoD's bird conservation program is a vital part. DoD works with the National Fish and Wildlife Foundation to develop cooperative programs and projects with other Federal, State, and non-governmental organizations. Migratory birds include species with at least some populations breeding in the United States and/or Canada, for example songbirds, shorebirds, waterbirds, and waterfowl. Attention has centered on migrants, since this group is experiencing steep rates of population declines. However, decreasing populations have also been observed in resident bird species, which do not migrate, and temperate-zone migrants, which only migrate within North America.

PIF encourages state and federal agencies and non-governmental organizations to participate in Breeding Bird Surveys (BBS), off-road point counts, Monitoring Avian Production Survivorship (MAPS), and migration monitoring stations. It is important to note that breeding bird surveys record birds only seen during the nesting season, and do not account for birds in the area at other times of the year. Also, birds occurring in extremely low densities, or in cyclic years, may be missed.

6.3.3 NUISANCE WILDLIFEAND WILDLIFE DISEASES

When an animal causes damage to government property, it can be a health or safety risk to humans or other animals, a disruption to normal ecosystem function, or considered a nuisance. Feral hogs and beaver have been noted as problem species at DTC. Nuisance control will be initiated, if needed, to maintain the nuisance species population at acceptable levels. Other common nuisance animals in the region are feral cats *(Felis sylvestris catus),* brown-headed cowbirds *(Molothrus ater),* pigeons *(Columba livia),* starlings *(Sturnus vulgaris),* raccoons, muskrats, and coyotes. With the exception of feral cats, these animals are not always considered a nuisance.

Ticks can sometimes be a serious problem at training sites, although they have not been a serious issue at DTC. The best means to prevent tick-borne disease transmission to soldiers is to implement personal protective measures, such as insect repellents, body checks, tick avoidance, and tick elimination where practicable.

6.4 MANAGEMENT OF THREATENED AND ENDANGERED SPECIES

This section presents information about the management of sensitive species that are located or may be located at the DTC, and requirements and strategies for management. No federally-listed endangered, threatened, or candidate species have been observed to date at DTC, and no designated critical habitat for any species is located on the site. However, suitable habitat exists for the federally-threatened blackside dace and candidate species, Cumberland darter.

Laws and regulations pertaining to the management of T&E species are included as **Table 18.** These laws and regulations are described in **Appendix H.**

TABLE 18. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO THREATENED AND ENDANGERED SPECIES MANAGEMENT

REQUIREMENT	TITLE
Law	Endangered Species Act, 7 U.S.C. 1 36; 1 6 U.S.C. 460 et seq. (1 973) as amended
	Sikes Act Improvement Act (16 USC §670a-o)
	Migratory Bird Treaty Act, as amended (16 USC §703-71 2)
	Bald Eagle Protection Act of 1940 (1 6 U.S.C. 668-668d, 54 Stat. 250);
Code of Federal Regulations	50 CFR 21, Migratory Bird Permits
Executive Order	EO 11990, Protection of Wetlands
	EO 11988, Floodplain Management
Kentucky Regulations	KRS 146 Natural Resources
	KRS 1 50 Fish and Wildlife Resources
	KRS 224 Environmental Protection

The NDAA of 2004 made a significant revision to the ESA. NDAA stated that, “The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.” Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for the long-term conservation of the species. This updated INRMP is intended to provide a benefit to, and gain a critical habitat exemption for the blackside dace and Cumberland darter. No critical habitat has been proposed or designated for either species (USFWS, 2008).

The KYARNG will manage threatened and endangered species and Kentucky Species of Conservation Concern primarily by avoiding sensitive areas during training, preventing damage to sensitive areas, and rehabilitating damaged areas. Informal consultation is completed with the USFWS on activities at DTC as required. Neither a separate biological assessment nor a separate formal consultation is necessary for this updated INRMP.

In cases where endangered species management and mission activities conflict, consultation with the USFWS and the KDFWR (as appropriate) would be initiated to avoid jeopardizing any listed species. The KYARNG is required to manage federally listed T&E species. Failure to protect Federally-listed species could lead to an ESA violation, which could negatively impact training land availability.

6.4.1 FEDERALLY LISTED SPECIES

There are no known federally listed species at the DTC at this time. Federally listed fauna species with known occurrences in Knox County, Kentucky include the threatened blackside dace, and the candidate Cumberland Darter. Potential habitat for both exists at DTC. As discussed in Section 4.4.2, suitable habitat also exists in the area and at the DTC for the federally endangered Indiana bat. Management of these species includes implementing appropriate water resource protection and soil conservation techniques (see **Section 6.5),** protection of on-site forest habitat (see **Section 6.8),** and proper use of pesticides (see **Section 6.11).**

6.4.1.1 BLACKSIDE DACE

BLACKSIDE DACE
SOURCE: EASTERN KENTUCKY UNIVERSITY, 2007

The blackside dace is a small, secretive fish, usually less than 3 inches long with olive or gold colored backs and silver-white or red along the underside. Two dark stripes run along each side of the fish's body (Eastern Kentucky University [EKU], 2007). Blackside dace spend most of their time in pools near undercut banks or other cover, feeding on algae attached to rocks or other objects on the stream bottom. In the winter, they feed on aquatic insects. Spawning is April - July over silt-free gravel areas. Life span is around three years (EKU, 2007). Blackside dace inhabit small, cool, upland streams in forested areas. The forest adjacent to the stream keeps the water cool and minimizes the runoff of silt. In preferred habitat, stream bottoms are composed of sand, sandstone, or shale substrates. Dace are found in pools near undercut banks or other cover such as brush or large rocks. The range of the blackside dace coincides with the coal-rich regions of Kentucky and Tennessee. Surface coal mining, siltation and acid mine drainage have have caused declines in blackside dace populations and continues to be a threat. Logging is also a threat to blackside dace populations.

6.4.1.2 CUMBERLAND DARTER

CUMBERLAND DARTER
SOURCE: FISHBASE, 2007

The Cumberland darter is a small fish about 3 inches long. It has straw-yellow background body color with brown markings forming six, evenly-spaced, dorsal (back) saddles and a series of X-, M-, or W-shaped markings on its sides. During spawning season, the overall body color of breeding males darkens and the side markings become obscure or appear as a series of blotches (NatureServe, 2007). The Cumberland darter is endemic to the upper Cumberland River system, above Cumberland Falls, Kentucky and Tennessee. It inhabits shallow water in low velocity shoals and backwater areas of moderate to low gradient stream reaches with stable sand or sandy-gravel substrata. All specimens collected in recent years have been found in less than 15 centimeters (6 inches) of water (NatureServe, 2007). Remaining population clusters are isolated from one another by poor quality habitat, impoundments, and natural barriers. Siltation appears to be the major factor contributing to the decline of the Cumberland darter throughout its range, primarily from coal mining activities, but also from forestry and agricultural activities, road construction, and urban development. It has been on the candidate list since 1985 (NatureServe, 2007).

6.4.1.3 INDIANA BAT

General information for this species is from the Kentucky Bat Working Group. The Indiana bat is a small bat, less than two inches in length, with dark gray to brownish black fur. Characteristics that help distinguish it from similar species include a pinkish nose, small hind feet with sparse, short hairs that do not extend beyond the toes, and a calcar (the spur extending from the ankle) that has a slight keel. Its hair is less glossy in appearance than that of little brown bats. For hibernation, Indiana bats prefer limestone caves with stable temperatures of 39 to 46 degrees F. Few caves meet the specific roost requirements of the species. Subsequently, more than 85 percent of the population hibernates in only 9 sites. Summer habitat requirements are not completely known. Although floodplain and riparian forests are important habitats for foraging and roosting, other habitats are also used. Indiana bats typically roost under loose bark during the summer.

Indiana Bat
Source: John MacGregor, Kentucky Bat Working Grouo. 2007

Indiana bats mate in the fall and begin entering hibernation in October. Males tend to be active longer in the fall, but are hibernating by late November. During hibernation, Indiana bats cluster tightly together. Female bats become pregnant soon after emergence in March - April, and migrate to summer habitats before the males. During summer, maternity colonies can be found under loose tree bark and usually consist of fewer than 100 individuals. Some males to not migrate and spend the summer near the hibernacula; others roost in similar habitats as the females but in smaller numbers. Females bear a single pup in late June or early July. Young bats are able to fly within one month after birth. Small moths are a major part of the diet of Indiana bats, but many different kinds of flying insects are taken. Most decreases in Indiana bat populations are the result of human activity, including altered cave entrances, cave and forest disturbance, and vandalism. Because Indiana bats gather together in large numbers during the winter, they are even more vulnerable to disturbance. Some bats are lost periodically to flooding caused by natural events or human activity. Loss of forest habitat may be affecting maternity and foraging areas. As with all bats that feed primarily on insects, Indiana bats have probably suffered declines due to use of pesticides (Kentucky Bat Working Group, 2007).

6.4.2 STATE-LISTED SPECIES

One KSNPC listed special concern plant, butternut or white walnut, has been identified at the training site. White walnut or butternut (Walnut family) is a deciduous tree reaching nearly 1 80 feet in height. The leaves are clammy to the touch (Wharton and Barbour 1973). The butternut tree was once common, but has dramatically declined throughout its range due to an introduced canker disease which is caused by the fungus *Sirococcus clavigignenti- Juglandacearum.* In some areas, 90 percent of the Butternut trees have been killed. Trees may re-sprout, but never achieve much height and rarely produce nuts (NatureServe, 2007). Conservation efforts focus on finding and protecting resistant trees. Because the individual butternut at DTC is located on the bank of the Cumberland River, soil conservation practices that prevent erosion will benefit the species. Frequent inspection of the individual will allow early detection of infection.

BUTTERNUT
Source: Robert H. Mohlenbrock USDA-NRCS PLANTS Database

6.5 WATER RESOURCE MANAGEMENT

Roads are the only modifications to hydrology on the site. Refer to **Section 3.4** for information on site hydrology. No wastewater or stormwater management issues presently exist at the DTC.

Laws and regulations associated with control and abatement of pollution in U.S. waters, erosion control and soil conservation are listed in **Table 19.** These laws and regulations are described in **Appendix H.**

TABLE 19. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO WATER RESOURCE MANAGEMENT AT DTC

REQUIREMENT	TITLE
Law	Sikes Act Improvement Act (16 USC §670 et seq.);
	Federal Water Pollution Control Act as amended by the CWA of 1 977 (33 USC §1251);
	U.S. Fish and Wildlife Coordination Act (16 USC §661);
	NEPA (42 USC §4321);
	Soil Conservation Act (1 6 USC §590a et seq.);
Code of Federal Regulations	32 CFR 651, Environmental Analysis of Army Actions
Army Regulations	AR 200-1, Environmental Protection and Enhancement
Executive Order	EO 11 989, Off-road Vehicle Use;
	EO 11990, Protection of Wetlands;
	EO 1 1 752, Prevention, Control, and Abatement of Environmental Pollution;
	EO 1 2088, Federal Compliance with Pollution.
Kentucky Laws and Regulations	KRS 146 Natural Resources
	KRS 1 51 Geology and Water Resources
	KRS 224 Environmental Protection
	401 KAR 5, Water Quality

6.5.1 PERMITTING

For KYARNG construction at DTC, units should coordinate with the Training Site NCOIC and the Environmental Office 60 days in advance to review proposed activities for applicable permit requirements. Even when a permit is not required, KYARNG BMPs must be followed.

Under the CWA, Section 319 requires each state to prepare a Nonpoint Source Management Program. The Kentucky Division of Water (KDOW) is responsible for administering the state's stormwater management program. Kentucky's stormwater program is closely modeled after the federal National Pollution Discharge Elimination System (NPDES) program, which requires stormwater be treated to the maximum extent practicable. KDEP's stormwater program requires any construction or other land-disturbing activity of more than one acre of soil disturbance to obtain a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The KPDES permit establishes the required erosion control and revegetation standards. The construction general permit does not require runoff sampling, but there is a requirement for preparing and implementing a stormwater pollution prevention plan prior to start of construction. This plan

should be available for review by the KDOW upon site inspection, although it does not need to be submitted to or approved by the agency prior to permitting.

Physical disturbances to waters of the U.S. are regulated by the CWA under Sections 404 and 401, and are discussed in **Section 6.6.1.**

6.5.2 EROSION AND SOIL CONSERVATION

Erosion control and soil conservation are important water resource conservation issues. Accelerated erosion, continued compaction, or removal of topsoil can drastically alter soils. Sediment resulting from erosion affects surface water quality and aquatic organisms. Two main types of soil erosion exist - wind erosion and water erosion. According to the soil survey, none of the soil components or mapping units has any significant erosion potential from wind. However, many of them are susceptible to water erosion. Specific information regarding erosion potential of the soils at DTC is provided in **Section 33.2.2.**

Warning signs for trails or areas on site in need of maintenance include:

- Disturbed vegetation (i.e., trampled, crushed, or vegetation missing, “the soil is visible”).
- Puddling of the trail surface.
- Gullies and deep wheel ruts in the trail or road.
- Accumulation of sediment into nearby areas (sides of trails, bases of slopes).

Soil conservation provisions include routine trail maintenance (e.g., backfill ruts and stabilize soils as needed), regular inspection, and repair of disturbed areas. The Environmental Office staff will identify areas needing maintenance or repair annually in late spring, following heavy spring rains. Damaged areas will be evaluated and prioritized. Land rehabilitation projects, including revegetation, will be scheduled and performed as soon as possible following disturbance, allowing sufficient time for soils to recover. All necessary rehabilitation work, best management practices, and associated costs will be included in project proposals and construction contracts and specifications.

BMPs to be implemented during these activities to maintain soil and water quality are provided in **Section 6.5.3.** Soil management techniques that will be used at the DTC are provided in **Section 6.5.4.**

6.5.3 BEST MANAGEMENT PRACTICES FOR EROSION CONTROL AND CONSTRUCTION

The KYARNG will follow BMPs for erosion control developed by KDOW in the Kentucky Best Management Practices for Controlling Erosion, Sediment, and Pollutant Runoff from Construction Sites: Planning and Technical Specifications Manual (KDOW, 2007) and the Kentucky Erosion Prevention and Sedimentation Control Field Guide (KDOW, 2006). This section has been adapted from these materials. The KYARNG will incorporate these BMPs into all construction and natural resources management activities. Units must contact the Environmental Office for planning and documenting BMPs to comply with permit requirements.

TABLE 20. GENERAL BEST MANAGEMENT PRACTICES FOR EROSION CONTROL DURING REVEGETATION AND CONSTRUCTION PROJECTS

TYPE	BEST MANAGEMENT PRACTICE
CONSTRUCTION	■ Clearing and grubbing must be held to the minimum necessary for grading and equipment operation. ■ Construction must be sequenced to minimize the exposure time of cleared surface area. Grading activities must be avoided during periods of highly erosive rainfall. ■ Construction must be staged or phased for large projects. Areas of one phase must be stabilized before another phase can be initiated. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and runoff. ■ Erosion and sediment control measures must be in place and functional before earth moving operations begin, and must be properly constructed and maintained throughout the construction period. ■ Regular maintenance is vital to the success of an erosion and sediment control system. All control measures shall be checked weekly and after each rainfall. During prolonged rainfall, daily checking is necessary. ■ Construction debris must be kept from entering any stream channel. ■ Stockpiled soil shall be located far enough from streams or drainageways so that runoff cannot carry sediment downstream. ■ A specific individual shall be designated to be responsible for erosion and sediment controls on each project site.
VEGETATIVE EROSION CONTROL	■ A buffer strip of vegetation at least as wide as the stream shall be left along any stream bank whenever possible. On streams less than 1 5 feet wide, the buffer zone shall extend at least 1 5 feet back from the water's edge. ■ Temporary soil stabilization with appropriate annual vegetation (ex. annual ryegrass) shall be applied on areas on areas that will remain unfinished for more than 30 calendar days. ■ Permanent soil stabilization with perennial vegetation shall be applied as soon as practicable after final grading.
STRUCTURAL EROSION CONTROL	■ Sediment barriers such as a silt fence must be installed along the base of all fills and cuts, on the downhill sides of stockpiled soil, and along stream banks in cleared areas to prevent erosion into streams. Barriers may be removed at the beginning of the workday, but must be replaced at the end of the work day. ■ All surface water flowing toward the construction area shall be diverted around the construction area to reduce its erosion potential, using dikes, berms, channels, or sediment traps, as necessary. Temporary diversion channels must be lined to the expected high water level and protected by non-erodible material to minimize erosion. Clean rock, log, sandbag or straw bale check dams shall be properly constructed to slow runoff and trap sediment. ■ Sediment basins and traps shall be properly designed according to the size of disturbed or drainage areas. Water must be held in sediment basins until at least as clear as upstream water before it is discharged to surface waters. Water must be discharged through a pipe or lined channel so that the discharge does not cause erosion and sedimentation. ■ Streams shall not be used as transportation routes for equipment. Crossings must be limited to one point. A stabilized pad ofclean and properly sized shot rock must be used at the crossing point. ■ All rocks shall be clean, hard rocks containing no sand, dust, or organic

TABLE 20. GENERAL BEST MANAGEMENT PRACTICES FOR EROSION CONTROL DURING REVEGETATION AND CONSTRUCTION PROJECTS

TYPE	BEST MANAGEMENT PRACTICE
	materials.
ROAD AND TRAIL MAINTENANCE	Maintain access roads and trails in such a way as to prevent sediment from entering water bodies. Use methods such as: ■ Construct water bars or other drainage structures. ■ Remove sediment and debris from dips, ditches and culverts; and revegetate problem areas. ■ Use lime, fertilizer, mulch, and/or seed when needed to prevent soil erosion. Amounts should be based on recommendations from the USDA-NRCS or the Kentucky Agricultural Extension Service.
STREAMSIDE MANAGEMENT ZONES (SMZ)	Streamside management zones shall be designed and managed along perennial and intermittent streams, lakes, and impoundments to prevent sediment from entering waters of the State. Methods to prevent sedimentation to streams include, but are not limited to, the following: ■ Establish SMZs along any stream or water body where the potential exists for movement of sediment into stream or waterbody. The width of SMZs should be a minimum of 50 feet from the disturbed area to the stream for zero percent slope and 20 additional feet for each additional 10 percent of slope. This applies to both sides of the stream (total minimum width of 100 feet). In association with wetlands, establish SMZs at least 50 feet in width along all sides of wetlands and open water. ■ Do not remove any trees within an SMZ if such removal would result in soil potentially getting into stream or wetland. If trees can be harvested without risk of soil loss, maintain 50 to 75 percent of the vegetation canopy shading a perennial stream; however, see restrictions on tree removal in Table 4-2, #8. ■ Avoid operating any vehicles within an SMZ.

6.5.4 ADDITIONAL SOIL MANAGEMENT TECHNIQUES

For more information on soil management techniques, consult KDOW guides mentioned above.

6.5.4.1 REVEGETATION

Seedbed Preparation. To control erosion on bare soil surfaces, plants must be able to germinate and grow. Seedbed preparation is essential. The following guidelines will be used for revegetation projects:

- Existing Vegetation: When seeding warm season species into areas dominated by exotic cool season grasses, all existing vegetation should be weakened or destroyed, if possible with herbicide, or a combination of tillage and herbicide. In areas dominated by native species, use less damaging techniques to prepare the seedbed, such as prescribed fire.
- Soil Amendments: All soils on the site are known to be highly acidic, and lime should be applied at the rate of two tons of pulverized agricultural limestone per acre (Hayes 1993). Fertilizer should be applied as 450 pounds per acre of 10-20-20 (10 pounds per 1,000 square feet) or equivalent when soils are dry. Lime and fertilizer shall be incorporated into the top two to four inches of the soil. If establishing a stand on bare soils, apply lime to obtain a pH of 6.4. Avoid applying nitrogen at the time of seeding, as it will stimulate growth of weedy plants and cool season grasses. Use of fertilizers should not be necessary after planting native grasses.

- Surface Roughening: If the area has been recently loosened or disturbed, no further roughening is required. When the area is compacted, crusted, or hardened, the soil surface shall be loosened by discing, raking, harrowing, or other acceptable means.
- Tracking: Tracking with bulldozer cleats is most effective on sandy soils. This practice often causes undue compaction of the soil surface, especially in clayey soils, and does not aid plant growth as effectively as other methods of surface roughening.

Invasive Species. The KYARNG will avoid using plant species considered invasive by the Southeast Exotic Pest Plant Council or as defined in EO 13112 "Invasive Species" in revegetation projects (see **Section 6.8).** For special circumstances, consult the Environmental Office.

Native Species. The KYARNG will use native non-invasive seeds such as those recommended in **Table 21** when feasible, effective, and economical. Local, native species are the best species for revegetation. The KYARNG will coordinate with other agencies as necessary to choose the most appropriate seed mixtures for application at DTC. Optimal seeding dates for warm season grasses is 15 April to 1 June. When planting native grasses, include non-persistent grasses that act as a cover crop for the first two or three years to minimize erosion before native species become established; for example, red top, timothy, winter wheat, and grain sorghum. Soil pH should be in the range of 5.8 to 6.4.

TABLE 21 RECOMMENDED NATIVE VEGETATION FOR REVEGETATION PROJECTS

COMMON NAME	SCIENTIFIC NAME	FORM
GRASSES		
Big bluestem	*Andropogon gerardii*	Grass
River oats, Spangle grass	*Chasmanthium latifolium*	Grass
Wild rye	*Elymus virginicus*	Grass
Switch grass	*Panicum virgatum*	Grass
Little bluestem	*Schizachyrium scoparium*	Grass
Indian grass	*Sorghastrum nutans*	Grass
Gamma grass	*Tripsacum dactyloides*	Grass
MOSAIC FOR FULL SUN		
Big blue stem	*Andropogon gerardii*	Grass
New England aster	*Aster novae-angliae*	Forb
White wild indigo	*Baptisia alba*	Forb
Partridge pea	*Chamaecrista faciculata*	Forb
Tall coreopsis	*Coreopsis tripteris*	Forb
Joe Pye weed	*Eupatorium fistulosum*	Forb
Purple bee balm	*Mon a rd a fistulosa*	Forb
Grey headed coneflower	*Ratibida pinnata*	Forb
Blackeyed susan	*Rudbeckia hirta and R. triloba*	Forb
Sedum, stonecrop	*Sedum ternatum*	Forb
Rose vervain	*Verbena Canadensis*	Forb
Ironweed	*Vernonia altissima*	Forb
MOSAIC FOR SHADE		
Thimbleweed	*Anemone virginiana*	Forb
Wild Ginger	*Asarum canadense*	Forb
Ebony Spleenwort	*Asplenium platyneuron*	Fern
Shooting Star	*Dedecatheon meadia*	Forb
Alumroot	*Heuchera Americana*	Forb
Pachysandra	*Pachysandra procumbens*	Forb
Christmas Fern	*Polystichum acrostichoides*	Fern
Broad Beech Fern	*Phegopteris hexagonaptera*	Fern
Golden ragwort	*Senecio g la bell us*	Forb
Foam-flower	*Tiarella cordifolia*	Forb
Spiderwort	*Tradescantia virginiana*	Monocot
Violets	*Violet spp.*	Forb
Woodsia	*Woodsia obtuse*	Forb

Seeding. Seed shall be evenly applied with a cyclone seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than one inch deep. Grasses and legumes shall be planted no more than % inch deep. Seeding will be done during optimum seeding periods for individual species to the extent practicable.

Mulching. All seedings made in fall for winter cover shall be mulched. At other times of the year, seedings made on slopes in excess of 4:1, or on adverse soil conditions, or during excessively hot or dry weather, shall be mulched. For seedings made during optimum spring and summer seeding dates, with favorable soil and site conditions, mulching may be optional.

Re-seeding. Areas that fail to establish vegetative cover adequate to prevent rill erosion (caused by water running over the surface of the soil) will be re-seeded as soon as such areas are identified and weather permits.

Temporary Seeding Planting Dates. Use temporary erosion control methods (such as cover crops) during rainy periods to provide cover to soils. Temporary plants should be planted at the following rates and dates: rye at 3 bushels per acre from 15 August through 1 November; wheat at 2-3 bushels per acre from 1 September through 1 November; annual ryegrass at 30 pounds per acre from 1 5 August through 1 November.

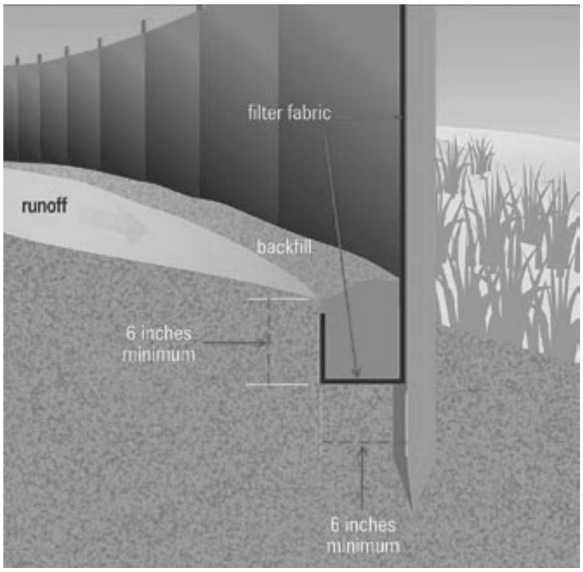
6.5.4.2 SEDIMENT BARRIERS

In addition to seeding and mulching areas greater than 1 50 square feet, use sediment barriers to prevent silt from leaving the site. Silt fences, rock filters, or other commercial sediment barriers are required below (downhill from) areas of bare soil. Hay or straw bales must not be used as sediment filters due to their inherent weakness and tendency to fall apart (KDOW, 2006).

Place filters on downhill edge of bare soil areas. Make sure the filter catches all the muddy runoff. The goal is to pond runoff, to filter and settle it out. Multiple units are needed for long slopes. Spacing on long slopes is every 60 to 110 feet. Put filters across slopes, on the contour (level).

Silt Fences. Silt fences should be installed on the contour below bare soil areas. Use multiple fences on long slopes 60 to 80 feet apart. Silt fencing should not be installed up and down hills, above (uphill from) areas of bare soil, or in ditches, channels, or streams. Each 100-foot section of silt fence can filter runoff from about 1/4 acre (about 110 feet uphill). To install a silt fence correctly, follow these steps:

- Note the location and extent of the bare soil area.
- Mark silt fence location just below bare soil area.
- Make sure fence will catch all flows from area.
- Dig trench six inches deep across slope.
- Unroll silt fence along trench.
- Join fencing by rolling the end stakes together.
- Make sure stakes are on downhill side of fence
- Drive stakes in against downhill side of trench.
- Drive stakes until 8 to 10 inches of fabric is in trench.
- Push fabric into trench; spread along bottom.
- Fill trench with soil and tamp down.



SILT FENCE
Source: KDOW, 2006

Inspect the silt fence frequently, and repair or replace promptly as needed. Sediment collecting behind silt fences must be removed before it is halfway up the fence. Move collected sediment to a vegetated area or other place where it will not wash into ditches, channels, or streams. Re-trench and tamp down fencing that is undercut by gullies. Remove the silt fence when it has served its usefulness to avoid blocking storm flow or drainage.

Other Sediment Barriers. Brush cleared from the site can make an excellent sediment filter if it is properly placed (see previous illustration) and built up well. Brush barriers are installed on the contour and are 2 to 5 feet high and 4 to 10 feet wide at the base. Walk them down slightly with a loader or dozer to compress the material in the brush barrier. Stuff additional brush on the uphill side where bypasses or undercutting are evident.

Fiber rolls and other commercial products made from coconut fiber, plastic, wood shavings, or other material can also be used as sediment barriers on slopes flatter than 10:1. Follow manufacturers' installation instructions and ensure that sediment filter spacing on slopes is correct. Make sure runoff does not bypass brush barrier, coconut rolls, or other barriers underneath or around the ends.

6.5.4.3 ROADWAYSAND DITCHES

Provide V-shaped side ditches as shown in Field Manual (FM) 5-35 *Engineer Field Data* (DA, 1987). Size and shape the ditches according to this manual, generally with a 2:1 slope. Slopes should not be too steep to avoid bank sloughing. Provide properly sized and installed culverts according to FM 5-35 to protect roadways and prevent erosion. In erosive areas, use rip rap to stabilize the ditches. On steep erosive slopes, construct V-ditches with geotextile fabric and rip rap to add stability. Shape and crown roads to drain water. Install culverts to improve drainage and minimize shrinking, swelling, and frost damage. Add crushed rock or gravel to prevent road damage caused by low strength. Use sediment barriers in sloping areas where road ditches have a tendency to wash.

6.6 WETLANDS, FLOODPLAINS AND OTHER AQUATIC HABITAT MANAGEMENT

The northern boundary of the DTC and a portion near the southwest boundary, along Gregory Branch is located in the 100-year flood plain of the Cumberland River. No structures currently exist in this flood prone area and no construction is planned. Refer to **Section 3.4** for information pertaining to wetlands, floodplains, and other aquatic habitats existing at the DTC. Laws, regulations, and EOs pertaining to wetlands and floodplain protection and policies are listed in **Table 22** and described in **Appendix H.**

TABLE 22. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO AQUATIC HABITAT MANAGEMENT AT DTC

REQUIREMENT	TITLE
Law	Rivers and Harbors Act of 1 899;
	Fish and Wildlife Coordination Act of 1 967;
	Land and Water Conservation Fund Act of 1 968;
	Federal Water Pollution Control Act as amended by the CWA of 1 977 (33 USC §1251);
	Sikes Act Improvement Act (16 USC §670 et seq.)
Executive Order	EO1 1 988, Floodplain Management;
	EO 11990, Protection of Wetlands;
Kentucky Laws and Regulations	200 KAR 6:040 and 401 KAR 4:060, Floodplain Management and Flood Control
	KRS Chapter 224; 401 KAR 5:031, Water Resources Protection
	405 KAR 16:1 80 and 405 KAR 1 8:1 80, Wetland Protection

6.6.1 PERMITTING

Projects involving discharge of dredged or fill materials into waters of the United States, including wetlands, are regulated by the USACE under CWA Section 404 and require Section 401 water quality certification (WQC). Units should contact the Environmental Office regarding any activities that could potentially affect waterbodies. The Environmental Office will review proposed activities for applicable permit requirements and will coordinate regulatory permits. Even when a permit is not required, KYARNG BMPs must be followed. When a permit is required, a pre-application meeting with the USACE and KDOW is recommended, particularly for large-scale projects. The meeting should be held well in advance of the onset of a project (at least three months). Agencies should be notified by letter (KYARNG letterhead). A written meeting agenda is recommended. A sign-in sheet is required. After the meeting, a written meeting summary should be prepared and provided to attendees and the Environmental Office.

Examples of activities that may require a Section 404 permit and Section 401 WQC are stream relocations, road crossings, stream bank protection, construction of boat ramps, placing fill, grading, dredging, ditching, mechanically clearing a wetland, building in a wetland, constructing a dam or dike, and stream diversions. General or individual permits may be required for such activities.

General permits issued by the USACE authorize various types of development projects in waters of the U.S. Activities authorized under general permits are considered similar in nature, causing minimal adverse effects to the environment. The USACE uses general permits for certain activities to minimize regulatory burdens and administrative costs by allowing landowners to proceed without having to obtain individual permits in advance. One type of general permit is known as a Nationwide permit; there are currently 49 Nationwide permits covering a variety of issues that were issued by the USACE in March 2007. Nationwide permits authorize certain activities, and are valid only if the conditions applicable to the permit are met. A summary table of these permits is included as **Appendix I.** Additional information on these permits can be found at http://www.usace.army.mil/cw/cecwo/reg/nationwide_permits.htm.

In general, individual permits are required for disturbances that exceed thresholds for disturbances covered by general permits. Permitting requirements vary depending on type,

location, and extent of disturbance. A Section 404 individual permit, issued by the USACE, may be required prior to significant impacts.

The CWA and KRS Chapter 224 authorize the CWA Section 401 for WQC. The KDOW is responsible for implementing the Section 401 program. The WQC program ensures activities involving a discharge into waters of the state and requiring a federal permit or license are consistent with Kentucky's water quality standards in 401 KAR 5. For wetland and stream disturbances, the applicant must complete and submit the Combined Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification along with appropriate attachments. For stream-related impacts, detailed plan and profile drawings must be submitted along with the permit application. Impacts in streams or lakes designated as Special Use Waters always require an individual WQC and a detailed sediment and erosion control plan.

For wetland-related impacts involving greater than one acre of wetland loss, the KDOW Wetland Mitigation Guidelines must be followed. Wetland losses involving less than one acre may be regulated by the USACE. The USACE is responsible for making official jurisdictional wetland determinations.

The KDOW also has authority over and issues permits for placement of debris (e.g., including logging during tree cutting) and/or construction activities within the floodplains of perennial streams that have a drainage area larger than one square mile. Activities that occur in a regulated floodplain may also require a Stream Construction Permit from the KDOW.

6.6.2 MANAGEMENT STRATEGIES

The KYARNG will maintain riparian habitats along streams by implementing riparian buffer zones [also called a streamside management zone (SMZ)3] from the water's edge back on both sides of streams. These areas need the protection of a permanent vegetative cover to reduce erosion into adjacent waterways. Maintaining connectivity between drainages will facilitate wildlife migration, provide habitat cover for small and large mammals, shade stream banks, and ultimately allow for reduced erosion into the Cumberland River. The KYARNG will use the following habitat management techniques for maintaining the riparian, wetland, and aquatic ecosystems on the DTC:

- Maintain a 100-foot SMZ (or riparian buffer zone) around intermittent streams and the Cumberland River. Do not dig for training purposes, mowing, or construction activities in these SMZs without prior review and permission from the Training Site NCOIC and the Environmental Office. Do not remove trees within an SMZ without prior approval from the Training Site NCOIC and an inspection to ensure the tree is not being used as a roosting site by Indiana bats. Avoid vehicle operations within SMZs and cross intermittent streams only at established trail and road culvert crossings.
- Maintain a 50-foot wetland buffer zone around wetlands, marked with Siebert stakes or equivalent, where necessary, to sustain the quality of soils, vegetation, aquatic systems, and habitat qualities. Wetlands are off-limits to tracked and wheeled vehicles and fox-hole digging. Foot traffic is permissible at any time of the year; however, excessive foot traffic can cause soil instability, which can result in sediments entering the Cumberland River. If impacts (e.g., dredging or fill) could potentially result to wetlands or other waters of the US as a result of a construction or other land-disturbing activity on-site, the

[3] The width of SMZs should be a minimum of 50 feet from the disturbed area to the stream for zero percent slopes and 20 additional feet for each additional 10 percent of slope. This applies to both sides of the stream (total minimum width of 100 feet). In association with wetlands, establish SMZs at least 50 feet in width along all sides of wetlands.

KYARNG will conduct a jurisdictional wetland delineation and obtain all appropriate permits prior to initiating these activities.

- Monitor and maintain wetland, floodplain, and other aquatic ecosystems through periodic Planning Level Surveys, troop awareness, and implementation of soil and water conservation management techniques (see **Section 6.5).**
- Follow the Guidelines for Management of Floodplains, Wetlands, and Aquatic Areas:
  - Caution should be taken within 100 feet of either side of a stream for the presence of small isolated wetlands (Gravatt et al., 1 999).
  - Avoid the net loss of size, function, or value of wetlands. Avoid modification of flood plains and wetlands where there are practical alternatives. Where no practicable alternatives exist, one must obtain necessary permits from the USACOE, KDFWR, and KDOW, and implement mitigating measures to minimize potential harm to life, property, and the natural values of flood plains and wetlands.
  - Present all construction project plans to the Environmental Office for review as far in advance as possible. Special permits are required when disturbing federal jurisdictional wetlands, or perennial or intermittent streams.
  - Maintain wetland and floodplain riparian vegetation buffers to reduce buildup of sediments and delivery of chemical pollutants to streams and wetlands.
  - Monitor and direct location and use of toxic substances, such as pesticides, petroleum products, and other hazardous substances to minimize the risk of water contamination.
  - Monitor erosion along the intermittent streams within the training site boundaries. Walk the streambanks annually during the winter months when erosion is most visible. Mark erosion sites on a map and take appropriate corrective measures.
- Aquatic, Riparian, and Wetland Ecosystem Management Policies in **Table 23** will be implemented.

TABLE 23. KYARNG AQUATIC HABITAT MANAGEMENT POLICIES

TOPIC	POLICY
Streamside Management Zones or Riparian Buffer Zones	SMZs shall be designated and managed along perennial and intermittent streams and ponds to prevent sediment from entering waters of the Commonwealth. Methods to prevent sedimentation to streams include, but are not limited to, the following: a. No digging for training purposes, mowing, or construction activities is allowed 100 feet on either side of intermittent streams and the Cumberland River without prior review and permission from the Training Site NCOIC and the Environmental Office. b. Trees will not be removed within an SMZ without prior approval from the Training Site NCOIC and an inspection prior to removal operations to ensure the tree is not being used as a roosting site by Indiana bats. c. Avoid operating any vehicles within an SMZ, and cross intermittent streams only at established trail and road culvert crossings.
Wetland Buffer Zones	Tracked and wheeled vehicles shall not be driven within 50 feet of wetlands (marked with Siebert stakes or equivalent where necessary). Foot traffic in wetlands is permissible at any time of the year; however, excessive foot traffic can cause soil instability, which can increase sedimentation of Lulbegrud Creek. No soil disturbance may occur within a 50-foot zone around wetlands without first notifying the KYARNG Environmental Office. Permits may be necessary for all soil disturbing activities within 50 feet of wetlands on the site.
Vehicle Movement and Training Activities	No tank traps, foxholes, hull downs, tent drainages, or similar excavations are permitted on dams or emergency spillways of any water impoundments. Vehicle traffic on the dams will be confined to existing roads (Draft EKWETS Regulation 1-5 (g)). Movement of any soil must be approved. Digging/excavation will have prior approval of the Training Site NCOIC. No soil disturbance may occur within this 50-foot zone around wetlands without first notifying the KYARNG Environmental Office. Permits may be necessary for all soil disturbing activities within 50 feet of wetlands on the site. Cross intermittent streams only at established trail and road culvert crossings. Avoid operating any vehicles within an SMZ. Tracked and wheeled vehicles shall not be driven within 50 feet of wetlands (marked with Siebert stakes or equivalent). Foot traffic in wetlands is permissible at any time of the year; however, excessive foot traffic can cause soil instability, which can increase sedimentation of Lulbegrud Creek. Vehicle refueling on range firing lines or in training areas is prohibited. Units will clean up any petroleum, oil spills, and lubricant contamination before clearing the training area (Draft EKWETS Regulation 2-3 (2)(j)). Report all hazardous materials/petroleum spills to the Training Site NCOIC immediately. Reportable quantity spills must be reported to KDEP immediately. Manage spills in accordance with the KYARNG Hazardous Materials/Waste Management Plan.
Wildlife and Natural Resources Protection:	Should any of the potential rare, threatened, or endangered species listed in Section 4.4 be encountered on the training area at any time, contact the KYARNG Environmental Program Manager, who will contact the Kentucky State Nature Preserves Commission, Kentucky Department of Fish and Wildlife Resources, and/or the U.S. Fish and Wildlife Service, depending on jurisdiction.

6.7 TERRESTRIAL HABITAT MANAGEMENT

Terrestrial habitat at DTC includes approximately 294 acres of forested land (53 percent of total area) and approximately 1 55 acres of grassland (28 percent of total area). **Section 4.2** provides a complete summary and description of the community types found on the installation, which include six distinct forest community types and a grassland community type **(Figure 5).** According to Littlefield and Yahn (2006), invasion of non-native species is currently the most detrimental factor affecting the health of the natural vegetation communities on DTC. Invasive/exotic species management is addressed in **Section 6.8.**

Laws, regulations, and EOs pertaining to terrestrial habitat management are listed in **Table 24** and described in **Appendix H.**

TABLE 24. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO TERRESTRIAL HABITAT MANAGEMENT AT DTC

REQUIREMENT	TITLE
Law	Federal Insecticide, Fungicide, and Rodenticide Act (6 USC §1 36) Forestand Rangeland Renewable Resources Planning Act (16 USC §1601 et seq.) Sale of Certain Interests in Land, Logs (10 USC §2665) Migratory Bird Treaty Act, as amended (16 USC §703-71 2) Sikes Act Improvement Act (16 USC §670 et seq.)
Army Regulation	AR 200-1, *Environmental Protection and Enhancement* AR 405-90, *Disposal of Real Estate*
Kentucky Laws and Regulations	KRS 146 Natural Resources KRS 224 Environmental Protection

6.7.1 FOREST MANAGEMENT

The Forest Ecosystem occurs on approximately 53 percent (294 acres) of the training site (Littlefield and Yahn, 2006). Forest types on the DTC are distributed according to a moisture gradient from Appalachian mesophytic and sub-xeric forests on drier sites (100 acres) to riparian forests (45 acres), pine forest (6 acres) and hemlock-mixed forest (<1 acre) on moister soils near streams to alluvial forests (10 acres) and bottomland hardwood swamp (2 acres) on wetter soils. Detailed descriptions of each forest type are presented in Section 4.2.2.

As part of this INRMP update, a preliminary Forest Management Plan has been developed for the KYARNG, and is provided in **Appendix J.** This plan outlines specific goals, objectives management policies, and projects to manage forest land at the DTC. Prior to implementation of forest management practices at DTC, a forest inventory will be conducted to determine current stocking levels of the forest ecosystem. The Louisville District of the USACE licenses the KYARNG to use and occupy the DTC. Because the property is owned by the Federal Government and overseen by the USACE, any forest management practices conducted on the training site must be coordinated with the USACE.

Timber Sale Policy: Because the DTC is federally-owned, timber sales are regulated by AR 405-90, *Disposal of Real Estate.* Timber may not be given away. Sales must be open to the public and advertised with a public notice of availability. The USACE acts as the Contracting Officer's Representative for timber sales. Both minor forest product sales and formal timber harvests are available options. Detailed explanation of Timber Sale procedures and policies are given in the **Appendix J** Forest Management Plan.

Within the Northern Cumberland Plateau physiographic regions, the wood thrush is a priority bird species (ABC, 2000; ABC, unpublished). This and other forest species could benefit from forest management on the training site.

6.7.2 GRASSLAND MANAGEMENT

The Non-native Grassland community occupies a total of 155 acres of the DTC. Agricultural grasses, such as orchard grass, tall fescue, and timothy *(Phleum pretense)* have been planted in

these areas, and these species have mixed with invasive weedy plants including other grasses, sedges, and forb species over time. **Section** 4.2.3 describes the grassland ecosystem and the species dependent on this particular ecosystem. Grasslands (open treeless areas) are especially important to the military mission for tracked and wheeled maneuver exercises. Without some type of human intervention, open areas will continue to close in and become unusable for military purposes over time.

Maintenance of a healthy grassland ecosystem will provide vital maneuver opportunities for FTXs at the training site and vital habitat for ground-nesting birds and other grassland dependent species. Within the Northern Cumberland Plateau physiographic regions, the prairie warbler is a priority bird species (ABC, 2000; ABC, unpublished). This species and other grassland or early successional birds, including field sparrow *(Spizella pusilla)* and Eastern meadowlark *(Sturnella magna)* could benefit from grassland habitat management on the training site.

If left unmanaged, grasslands would succeed to shrub communities, and then to acidic mesophytic forest or alluvial forest along the Cumberland River. During the planning period, the KYARNG will use the following grassland habitat management techniques at the DTC:

- **Mowing, bush hogging, and haying** of DTC grasslands occurs as needed, and when possible. KYARNG currently leases agricultural fields along the Cumberland River to a local farmer for hay production. A copy of this lease is provided as **Appendix E.**
- **Conduct PLS** (floristic, faunal, migratory bird, and erosion surveys).
- **Manage riparian areas and wetlands adjacent to grasslands.** Allow riparian areas and wetlands adjacent to the Cumberland River and intermittent streams currently in mixed grass/forbs to succeed to shrub communities and then to riparian forest by ceasing mowing within 100 feet of the Cumberland River, 50 feet of intermittent streams, and 50 feet of wetlands. Mark areas with Siber stakes as needed.
- Monitor grasslands regularly for areas needing rehabilitation and after implementing management practices. Rehabilitate any loss of soils or vegetation in areas where vegetation does not recover naturally and/or soils have been disturbed during military training exercises.
- Delay mowing practices during the breeding season for grassland birds to enhance brood survival. Recommended time to exclude mowing within the grasslands is from April to September. Late March or November is the best time to mow. Vegetation management during these times allows for sufficient plant growth, which provides nesting for bird species and winter cover for other wildlife.
- Minimize pesticide use in the grasslands. Pesticides can affect insect species and the birds that rely on them for food. Pesticide use on grasslands is also expensive because of the large areas that must be treated.
- Do not plant KY 31 Fescue *(Festuca arundinacea),* Chinese, Korean, or Kobe lespedezas *(Lespedeza bicolor, L. cuneata,* and *L. stipulacecf),* as these species provide very little benefit to wildlife and may even be detrimental. Instead, use other locally grown (or developed) native grasses and native lespedezas. The only exception is when Kobe lespedeza is used for quail management.
- Large, non-fragmented tracts of quality habitat are required as territory for survival and maintenance of neotropical migratory bird and large mammal populations. Configuration of protected habitats should conform to shapes that minimize edge-to-area ratios (Reese and Ratti, 1988). Circular shapes are preferable in achieving this goal. Narrow, linear, or small protected habitats should be avoided if possible.

- Educate all military personnel about species dependent on grasslands and their habitats. Ensure that any sensitive species discovered on the training site in the next five years are included in Environmental Awareness training materials and monitored (especially ground-nesting birds).
- Implement Grassland Habitat Management Policies in **Table 25.**

TABLE 25. DTC GRASSLAND HABITAT MANAGEMENT POLICIES

TOPIC	POLICY
1	Cease mowing on approximately 45 acres of grassland, which occurs within the SMZ, so that a 100-foot shrub and tree buffer zone can establish around streams.
2	Many small (0.5 - 1 acre) wildlife clearings are scattered throughout the training sites, either as isolated clearings within the forest or as cultivated areas in the tactical training space. 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.
3	Hunting and fishing are allowed only by permission of the Training Site NCOIC and with the required licenses.
4	Should rare, threatened or endangered species be encountered on the training area at any time, contact the KYARNG Environmental Program Manager, who will contact the KSNPC, KDFWR, and/or the USFWS, depending on jurisdiction.
5	Movement of any soil must be approved. Digging/excavation will have prior approval of the Training Site NCOIC.

6.7.3 FIRE MANAGEMENT

Wildfire has the potential to severely damage property and natural resources and to endanger human life. The effects of wildfire on the military mission are twofold; primarily the destruction of natural vegetative communities, training structures, and equipment; and secondarily, exposing sensitive areas to weather events, which could result in soil erosion.

The KYARNG has prepared a Statewide Integrated Wildland Fire Management Plan (IWFMP) for its training areas (see **Appendix L).** Army policy requires that an IWFMP be developed for installations with unimproved grounds that present a wildfire hazard and/or installations that use prescribed burns as a land management tool. Responsibility for implementation of the IWFMP falls on the TAG, who designates a Wildland Fire Program Manager (WFPM) to administer the plan.

The IWFMP complies with principles, policies, and recommendations articulated in the revised INRMP, Integrated Cultural Resources Management Plan (ICRMP), installation fire and emergency service program plans, and in accordance with relevant Federal, State and local regulations.

The purpose of the IWFMP is to reduce wildfire potential, effectively protect and enhance valuable natural resources, integrate applicable state and local permit and reporting requirements, and implement ecosystem management goals and objectives on Army installations (Department of the Army [DA], 2002). Responsibility for implementation of the IWFMP falls on the TAG, who designates a WFPM to administer the plan.

The goals of the IWFMP reflect the KYARNG's commitment to safety and the sustainable use of training land, as well as its long-term vision for terrestrial habitat.

- **GOAL** 1: **SAFETY -** Provide first and foremost for firefighter, military personnel, and public safety. Ensure all fire management activities implement suppression, control

practices, and technologies that minimize resource damage and unnecessary suppression and rehabilitation costs.

- **GOAL** 2: **MILITARY MISSION** - Support the military training mission by managing wildland fire to sustain military training areas.
- **GOAL 3: ECOSYSTEM MANAGEMENT -** Maintain, protect, and improve ecological integrity.

Major components of the IWFMP include a general description of the installation, information pertaining to the causes and management of wildfires that occur on site, and prescribed burning program(s).

Prescribed fire will not be used as a management tool at the DTC. To ensure fire control agencies are familiar with the training site and the mission of the training site, the KYARNG will provide the KDOF, KDFWR, and local volunteer fire departments training site information. This information includes directions to the site, how to access various areas of the site, natural fire breaks that exist on the site, natural resources concerns (for example, wetlands and rare species habitats), and fire hazards. If necessary, a meeting will be held with these agencies to discuss wildfire suppression at the site.

In the event a wildfire arises during training-related activities (e.g., trip flares) at the DTC, following protocol will be followed:

- Training is to cease immediately and the DTC Training Site NCOIC and his immediate supervisor are to be notified.
- If it is safe to do so (wildfire is small or easily contained), military personnel are to attempt to extinguish the fire using appropriate fire suppression gear. **If the unit can not safely extinguish or contain the wildfire, they are to back off and immediately move to a safe location.**

If it is determined that the wildfire cannot be safely restricted to the desired area, and/or life or property is threatened, the KDOF Southeastern District Forester is to be called immediately at 606-337-301 1.

In addition to the above-listed guidance, fire protection policies have been developed for the DTC. These policies are provided in **Table 26.**

TABLE 26. DTC FIRE PROTECTION POLICIES

TOPIC	POLICY
1	When a grass or brush fire occurs, training will immediately be halted and all available personnel will be utilized to extinguish the fire. Training will not be resumed until the officer in charge is confident the fire will not re-ignite.
2	Open burning is not allowed.
3	The periods commencing 1 5 February and ending 30 April and commencing 01 October and ending 1 5 December of each year are hereby declared established as the fire hazard seasons. During the fire hazard seasons, even though the precautions required by KRS 149.375 shall have been taken, it shall be unlawful for any person to set fire to, or to procure another to set fire to, any flammable material capable of spreading fire, located in or within one 1 50 feet of any woodland or brushland, except between the hours of 1 800 and 0600, prevailing local time, or when the ground is covered with snow (This rule applies except when noted in KRS 149.400).
4	No person shall: Within or adjacent to timberland, dispose of a lighted match, cigarette, cigar, ashes, or other flaming or glowing substance, or any other substance or thing in such

TABLE 26. DTC FIRE PROTECTION POLICIES	
TOPIC	POLICY
	condition that it is likely to ignite a forest, brush, grass, or woods fire; or throw or drop any of the aforesaid objects or substances from a moving vehicle; or drop or leave any of the aforesaid objects or substances within the limits of the right-of-way of any road or highway in such timberland. The driver of a moving vehicle shall be deemed prima facie liable where it cannot be determined which of the occupants of the moving vehicle threw or dropped any of the aforesaid objects or substances (KRS 149.370 (1)).

6.7.4 AGRICULTURAL OUTLEASING

Agricultural outleasing at the DTC provides a mechanism by which the KYARNG maintains open areas as training lands without incurring the expense of labor or equipment costs. Although a variety of agricultural interests are feasible at the DTC, hay production is most conducive to training activities. The KYARNG currently leases agricultural fields along the Cumberland River for hay production. A copy of this lease is provided in **Appendix E.** Currently, these fields are being used for corn production. Agriculture fields at DTC are surrounded with a buffer area to prevent wetland impacts.

6.8 INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) is “a comprehensive approach to pest control or prevention that considers various chemical, physical, and biological suppression techniques; the habitat of the pest; and the interrelationship between pest populations and the ecosystem” (AR 200-1). Laws, regulations, and executive orders pertaining to integrated pest management are listed in **Table** 27 and discussed in **Appendix H.**

TABLE 27. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO INTEGRATED PEST MANAGEMENT AT DTC

REQUIREMENT	TITLE
Federal Law	Federal Noxious Weed Act of 1 974 (7 USC §2801 et seq.)
	Federal Insecticide, Fungicide, and Rodenticide Act (7 USC §1 36)
	Federal Pest Plant Act (7 USC §1 50a et seq.)
	National Aquatic Invasive Species Act of 2003 (NAISA)
Executive Order	EO 1 2865, Reduction of Pesticide Application by 50 percent by Fiscal Year (FY) 2000
	EO 13112, Invasive Species
Kentucky Laws and Regulations	KRS Chapter 224; 401 KAR 5:031, Water Resources Protection Laws
	KRS Chapters 21 7.541 et seq., 249; 250: Noxious Weed Control
	405 KAR 16:1 80 and 405 KAR 1 8:1 80, Wetland Protection

6.8.1 STATEWIDE PEST MANAGEMENT PLAN

The Statewide IPM Plan (U.S. Army Center for Health Promotion and Preventive Medicine - North [USCHPPM], 1999) governs pest management operations at DTC. The KYARNG Pest Management Coordinator is responsible for overall program administration, oversight, quality assurance, scope of work reviews, record keeping, and reporting. Pest management files are kept in the KYARNG Environmental Office in Frankfort. The KYARNG Pest Management Coordinator periodically evaluates ongoing pest control operations and will evaluate all new pest management operations to ensure compliance with the ESA and MBTA.

The Statewide IPM Plan describes the KYARNG's pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. A copy of the Statewide IPM Plan is available for review in the KYARNG Environmental Office in Frankfort.

6.8.2 KYARNG PEST MANAGEMENT APPROACH

The Statewide IPM Plan sets forth a three-step approach to controlling an unwanted plant or animal, as shown in **Table 28.**

TABLE 28. KYARNG APPROACH TO PEST SPECIES MANAGEMENT

STEP		DESCRIPTION
1	**Assess Species Level**	Assess species abundance before using any control approach. In most cases, periodic visual inspections should be sufficient to determine population levels of invasive species. Maps, permanent plots, or photographs can be used to help determine levels of specific plant or animal species. A determination of how much a plant is spreading will be made before control is attempted.
2	**Attempt Control ***	**Cultural Control:** Manipulate environmental conditions to suppress or eliminate pests. For example, removing trash from the training areas will eliminate a source of food for predators and, through good sanitary practices, may prevent pest populations from becoming established. ***Cultural controls should always be the first attempt at controlling pests at the training site.***
		Mechanical/Physical Control: Alter the environment in which a pest lives by mechanically removing or trapping pests from where they are not wanted or preventing their entrance. Another type of cultural control for weedy vegetation is use of hot water treatment using a steam unit to eliminate weeds and seed production. Perennial weeds may need subsequent treatment to provide complete control.
		Biological Control: Use predators, parasites, or disease organisms to control pest populations. Biological control may be effective by itself, but is often used in conjunction with other types of control.
		Chemical Control: Chemicals were once considered the most effective control available, but pest resistance rendered many pesticides ineffective. In recent years, the trend has been to use pesticides that have limited residual action. While this has reduced human exposure and lessened environmental impact, the cost of chemical control has risen due to requirements for more frequent application. Since personal protection and special handling and storage requirements are necessary with the use of chemicals, the overall cost of using chemicals as a sole means of control can be quite costly when compared with nonchemical control methods. ***Whenever possible, chemical control will be considered the last option when performing control operations, and most likely will be used in conjunction with other control methods.***
3	**Monitor Results**	Monitor control method efficiency after control methods have been undertaken. Periodic visual inspections, interpretation of aerial photos, and photo point monitoring should be sufficient to monitor most invasive plant and animal species. Populations of invasive exotic plant or animal species will be resurveyed and compared to the baseline determination of a species level after control efforts are implemented. This can be accomplished during routine site inspections. Units should report suspected rabid or injured animals to their field commander, who will report the occurrence to the KDFWR District Biologist at (606) 864-9358.

* Attempt control using these general means. Specific control prescriptions are contained in the Kentucky IPM Plan.

Source: KYARNG Statewide IPM Plan

6.8.3 PEST SPECIES MANAGEMENT

The Statewide IPM Plan provides detailed management information on the following topics, which will not be duplicated in this plan, with the exception of noxious and invasive plants identified at DTC, which are discussed in **Sections 6.8.6 and 6.8.7.** Forest pest management is discussed in **Appendix J.**

- Disease Vectors and Public Health Pests
- Pest of Real Property
- Stored Food Product Pests
- Noxious and Invasive Plants
- Ornamental Plant and Turf Pests
- Other Undesirable Vegetation
- Animal Pests
- Household and Nuisance Pests
- Other Pest Management Requirements I

6.8.4 USE OF CHEMICALS AT ETC

Herbicides can be used to control unwanted vegetation in areas where mechanical mowing is difficult or not cost effective. A wide range of USEPA-registered herbicides are available for use at the DTC, but only those herbicides pre-approved by the KYARNG Pesticide Coordinator and included in the KYARNG IPM Plan can be applied by someone not certified. All other pesticides must be applied by a certified individual. Herbicides can also be used to conduct Timber Stand Improvement (TSI) and to control invasive plants and noxious weeds through subcontracted projects. Aquatic weed control, if necessary, would be done by KYARNG or subcontracted. Treatment is typically done to control non-native invading species, and to control weeds in designated fishing ponds. The Kentucky Department of Agriculture is available for technical support.

6.8.5 INTEGRATED PEST MANAGEMENT POLICIES

It is the policy of the KYARNG to minimize use of all pesticides, including herbicides, at the DTC. Aquatic ecosystems and native species of plants and animals can be negatively affected by pesticide use. For example, neotropical migratory birds, bats, and wading birds that pass through and/or nest on the training site feed primarily on insects and/or fish. Pesticides that are sprayed to kill insects can accumulate in the tissues of higher mammals that eat the insects and fish. This process is called “bioaccumulation,” and can eventually lead to the death of the “bioaccumulator.” In addition to aquatic habitats, sensitive areas also include habitats important to listed plant and animal species (see **Section 4.4).**

Whenever possible the KYARNG will use those families of pesticides that degrade rapidly in the environment in order to minimize the potential for soil and water contamination. KYARNG pest management policies are listed in **Table 29.**

Pesticides are used annually at DTC for mosquito/tick control, kudzu control, and weed reduction in parking areas.

TABLE 29. KYARNG INTEGRATED PEST MANAGEMENT POLICIES

TOPIC		POLICY
1	Permitted Pesticides and Herbicides	a. Only those pesticides/herbicides pre-approved by the KYARNG Pesticide Coordinator and included in the KYARNG IPM Plan may be used. b. No pesticide/herbicide will be used whose registration has been suspended or canceled by the EPA or the Commonwealth of Kentucky. c. When more than one formulation is available for a specific application, the pesticide/herbicide which is the least persistent and most non-leaching that will provide the desired control, will be selected.
2	Monitoring and Reporting Requirements	a. An annual report characterizing pesticide/herbicide applications, including types, amounts, locations, and dates of applications and habitats effects by applications (e.g., standing water, grasses, etc.) will be kept in the Environmental Office.
3	Application of Pesticides and Herbicides	a. Use of pesticides will be in accordance with manufacturer's directions and the label. This includes, but is not limited to mixing instructions, application guidelines, storage requirements, and disposal guidelines. b. Pesticides will not be applied directly into waterbodies, or be applied in a manner that might result in runoff (within 24 hours of rainfall) or drift into waterbodies, unless indicated as appropriate on pesticide label / instructions. c. Pesticides and fertilizers shall not be applied in riparian buffer zones. d. Consult with the Environmental Office before spraying pesticides aerially on the training site. An aerial application validation statement is required from NGB.
4	Pesticide/ Herbicide Applicator Training and Certification Requirements	a. All KYARNG personnel (State or Federal) who apply pesticides classified as restricted-use or state limited-use by either the EPA or State have received and maintained DOD or State commercial certification or they are applied under direct supervision of a DOD or State certified pesticide applicator. b. Federal employees of the KYARNG must be certified by the DOD or State plan for certification when applying restricted or state limited-use pesticides on Federal property. State employees of the KYARNG must receive certification from the Commonwealth of Kentucky certification program prior to applying restricted-use or state limited-use pesticides on Federal or State property. c. To comply with DOD Instruction 41 50.7, individuals who evaluate the quality of work of pest control contracts (Quality Assurance Evaluators) must also be trained in the pest management category or categories of work being performed.
5	Requirements for Contractors Conducting Pest Control on DTC	Contractors conducting pest control on DTC must: a. Show proof of liability insurance. b. Have State commercial certification and licensing in the category or categories of work to be performed. c. Use only EPA or State registered pesticides or herbicides. d. Furnish KYARNG personnel with legible copies of specimen labels and the Material Safety Data Sheets of all pesticides proposed for use. e. Furnish KYARNG personnel with information required for pest management record keeping. Facility personnel will record pest management operations on the Pest Management Maintenance Record (DD Form 1 532-1) for the building or site where the work was performed. f. Pesticides must be mixed, stored, and disposed of in accordance with Federal, State, and local regulations, and with procedures established by the KYARNG.

6.8.6 Noxious WEEDS

Noxious weeds are defined as "any living stage (including, but not limited to seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health (Federal Noxious Weed Act of 1 974)."

The Federal Noxious Weed Act of 1974 and EO 13112 require Federal agencies to control exotic species on federal lands. The USDA has designated 104 species as federally listed Noxious Weeds. None have been identified at DTC to date. The Kentucky Department of Agriculture is authorized to prevent importation and spread of pests that are injurious to the public interest and for the protection of the agricultural industry. Of the eight Kentucky-listed Noxious Weeds species, four have been identified at DTC (see **Table 30).** Recommendations for these four species are presented in the following sections.

TABLE 30. KENTUCKY STATE-LISTED NOXIOUS WEEDS

COMMON NAME	SCIENTIFIC NAME	CODE	U.S. NATIVITY
musk thistle	*Carduus nutans*	CANU4	Invasive
Canada thistle	*Cirsium arvense*	CIAR4	Invasive
kudzu*	*Puereria lobata*	PULO	Invasive
multiflora rose*	*Rosa mu lt if lona*	ROMU	Invasive
giant foxtail	*Setaria faberi*	SEFA	Invasive
burr cucumber*	*Sicyos a ng ul at us*	SIAN	Native
black nightshade	*Solanum ptycanthum*	SOPT7	Native
johnsongrass*	*Sorghum halepense*	SOHA	Invasive

* designates species which have been identified at DTC (Littlefield and Yahn, 2006).

6.8.6.1 MULTIFLORA ROSE

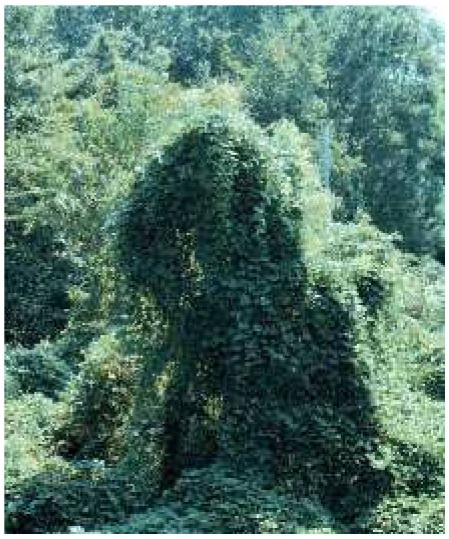
Multiflora rose is an introduced, thorny shrub that can form impenetrable thickets in successional fields, pastures, roadsides, and in dense forests, particularly near natural disturbances such as treefall gaps and along streambanks. A single mature plant can produce up to half a million seeds annually. If well established, a huge seed bank develops that can continue to produce seedlings for at least 20 years after removal of mature plants.

MULTIFLORA ROSE
Source: James H. Miller, USDA Forest Service, Bugwood.org

Mowing can prevent expansion of populations of multiflora rose and pulling small plants, if repeated, can be used to control root sprouts. Foliar application of glyphosate or triclopyr at 2 to 3 percent, cut stump treatment at 25 percent, or basal bark treatment with triclopyr at 25 percent mixed with horticulture oil have all been shown effective in controlling multiflora rose (Littlefield and Yahn, 2006).

6.8.6.2 KUDZU

Kudzu (Puereria montana) is an introduced perennial vine that has become a significant pest species throughout the Midwest and southern U.S. The following management guidance can be found in the Missouri Vegetation Management Manual (MDC, 2006). Leaves are dark green, arranged in groups of 3 leaflets, 7 to 25 cm (2.75 to 9.84 in) long, with or without irregular, shallow lobes, otherwise entire, hairy beneath. Many rampantly growing, hairy vines trail, sprawl, and loosely twine from a large, central root crown. Rhizomes are also present and contribute to the plant's rapid spread. In late July to September, plants in full sun sometimes produce pea-like, grape scented, purple flowers [up to 2 cm (0.79 in)] in elongated clusters. Seeds are few in number, bean-like, and contained in elongated clusters of hairy pods. Vines can have a diameter up to 2.5 to 3.0 cm. (1.0 to 1.18 in) in southern states. Sugars produced in the leaves are stored in swollen taproots, which can descend four meters into sandy loam soils.



KUDZU
Source: Lowell Urbatsch, USDA-NRCS PLANTS Database

The vine grows up to one foot per day in early summer. In the South, it has become destructive to the point of damaging utility poles, breaking power lines, collapsing buildings, and killing trees. A cold winter will kill young vegetative growth back to the root crowns, but the vine resumes growth again in spring (MDC, 2007). Freeze and frost does not kill vines 1 cm in diameter and larger (MDC, 2007). Kudzu thrives through drought and hot temperatures; however continuous removal of all vegetative parts during extreme weather will kill kudzu over time. Vegetative reproduction occurs as trailing vines root at the nodes and from rhizomes that sprout new vines.

Total eradication of kudzu is necessary to prevent re-growth. For complete control, the root system must be killed. Mow or cut monthly over two or more growing seasons, sever vines, and treat roots to get foliar levels manageable for more direct treatments. Late season cutting of vines at root tops followed by immediate stump treatment with 25 percent glyphosate is most effective. Repeated foliar applications of glyphosate to small plants in a season may keep plants in check (Littlefield and Yahn, 2006).

6.8.6.3 BURR CUCUMBER

Burr cucumber *(Sicyos angulatus)* is a climbing weed found in forests and shady, damp places, and along streams and roads. Vines are slightly fuzzy and can reach lengths of 15-25 feet. Leaves are relatively circular in shape, and resemble cultivated cucumber leaves with three to five shallow lobes. Its flowers range from white to green. Fruits are borne in clusters of 3 to 10. Each fuzzy, yellow fruit is only about 1/2 to 3/4 inches long, and about 1/4 inch thick, and covered with prickly bristles. Inside each fruit is a single, flat, egg-shaped seed (UMN Extension, 2007).

BURR CUCUMBER
Source: Robert H. Mohlenbrock, USDA-NRCS PLANTS Database

Repeatedly pulling or cultivating young plants before they have set seed will over time reduce the number of seeds in the area.

Dicamba, the active ingredient in some post-emergent herbicides, will control burr cucumber, but it should not be used under the canopy of trees and shrubs, because rain or irrigation water can wash it into the root zone where it will be a problem (UMN Extension, 2007). Glyphosate, the active ingredient in post-emergent herbicides such as Round-Up, can be sprayed or painted onto young plants early in the season. This product may be used around trees, as it will not be absorbed by the roots or bark.

6.8.6.4JOHNSONGRASS

The following information can be found in the Missouri Vegetation Management Manual (MDC, 2006). Johnsongrass *(Sorghum halepense)* is a tall, coarse, perennial grass with stout (up to three-quarter inches in diameter) rhizomes. Leaves are smooth, 6-20 inches (15.2-50.8 cm.) long, and have a white or light green midvein. Stems are pink to rusty red near the base. Panicles are large, loosely branched, purplish, and hairy. Spikelets occur in pairs or threes and each has a conspicuous awn. Seeds are reddish-brown and nearly one-eighth of an inch (0.3 cm.) long.

JOHNSONGRASS
Source: Ted Boder,
IKnA-NPr; PI ANK natahaco

Johnsongrass is a very aggressive, perennial grass. It occurs in dense clumps that spread by seed and rhizomes to form nearly pure stands. Rhizomes will over-winter and develop new, white, spur-like shoots in spring. In clay soils, 80 percent of the rhizomes are in the top 4 inches of soil. In sandy loam soil, 80 percent occur in the top 6 inches. However, rhizomes may grow downward through cracks to a depth of 10 to 20 inches. The grass leaves emerge late in spring and the plant forms seed by July 1. A single plant may produce more than 80,000 seeds per year. Stems and leaves die back after the first frost, but the dead litter often covers the ground all winter. Rhizome cuttings commonly form new plants, making it very difficult to eradicate. It spreads rapidly, and is not affected by many of the agricultural herbicides.

At DTC, the KYARNG uses mowing to help control this species. Johnsongrass control requires a combination of various cultural and chemical practices. These include the following:

- Prevent production and spread of seed.
- Destroy seedlings before rhizomes are formed.
- Weaken and kill existing rhizomes.
- Control new infestations as they appear.

Johnsongrass infestations characteristically occur in naturally disturbed environments, such as along river banks where it is difficult to control selectively. Seed panicles should be cut and removed from the area where practical. In conjunction with mechanical control practices, best results are obtained when glyphosate is applied to plants that are 18 inches tall to early flowering stage. Hand pulling plants is generally not effective (Littlefield and Yahn, 2006).

6.8.7 NON-NATIVE/INVASIVE PLANTS AT DTC

Invasive and exotic species may include plants, insects, or animals. An **invasive** species is defined as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." An alien (or **exotic)** species is defined as a "species including its seeds, eggs, spores, or other biological material capable of propagating that species that is not native to that ecosystem *(EO 13112)."* Because of their invasive capacity, many exotic species have the ability to spread rapidly through ecosystems, since their natural predators are often not present. Such species often retard natural succession and reforestation, and generally cause a reduction of biological diversity in natural ecosystems. Management action is needed to keep them under control.

The Kentucky Exotic Pest Plant Council (KY-EPPC), as part of the Southeast EPPC, considers numerous plant species in Kentucky to be invasive (EPPC, 2006). The KY-EPPC was established in 2000 to raise awareness and promote public understanding regarding the threat posed by invasive exotic pest plants to native plant communities in Kentucky. KY-EPPC maintains a list of invasive exotic pest plants for the state of Kentucky.

Biological inventories (White et al., 1 995, Littlefield and Yahn, 2006) identified 29 plant species at DTC considered invasive exotic pest plants by the KY-EPPC (EPPC, 2006). These species are listed in **Table 31.**

TABLE 31. INVASIVE/EXOTIC PEST PLANT SPECIES AT DTC

KY-EPPC MANAGEMENT PRIORITY	SCIENTIFIC NAME	COMMON NAME	KY-EPPC RATING
Severe Threat	Ailanthus altissima	tree-of-heaven	High-monitor, control, do not plant
	Alliaria petiolata	Garlic mustard	
	Carduus nutans	musk thistle	
	Celastrus orbiculatus	Asian bittersweet	
	Conium maculatum	poison hemlock	
	Coronilla varia	crown vetch	
	Dioscorea oppositifolia	Chinese yam	
	Elaeagnus umbellata	Autumn olive	
	Lespedeza cuneata	Chinese lespedeza	
	Ligustrum vulgare	European privet	
	Ligustrum sinense	privet	
	Lonicera japonica	Japanese honeysuckle	
	Melilotus officinalis	yellow sweet clover	
	Microstegium vimeneum	Japanese grass	
	Miscanthus sinensis	Chinese silvergrass	
	Pueraria lobata	Kudzu	
	Rosa multiflora	Multiflora rose	
	Sorghum halepense	Johnsongrass	
Significant Threat	Albizia julibrissin	Mimosa	Medium-monitor, control if needed, do not plant
	Arthraxon hispidus	Small carpgrass	
	Chrysanthemum leucanthemum	Ox-eye daisy	
	Eleusine indica	goose grass	
	Glecoma hederacea	Ground ivy	
	Paulownia tomentosa	Princess-tree	
	Polygonum cespitosum	bunchy knotweed	
	Populus alba	White poplar	
Lesser Threat	Barbarea vulgaris	Garden yellow rocket	Low-monitor, do not plant
	Chenopodium ambrosioides	Mexican tea	
	Chicorium intybus	chicory	
	Commelina communis	dayf lower	
	Dianthus armeria	Deptford pink	
	Duchesna indica	Indian strawberry	
	Hypercium perforatum	common St. John's-wort	
	Medicago lapulina	black medic	
	Prunella vulgaris	self-heal	
	Ranunculus bulbosa	bulbous buttercup	
	Rumex acetosella	sheep sorrel dock	
	Stellaria media	chickweed	

Kentucky Exotic Pest Plant Council (EPPC, 2000)

RANK 1. "SEVERE THREAT". Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation; includes species that are or could become widespread in Kentucky.

RANK 2. "SIGNIFICANT THREAT". Exotic plant species that possess characteristics of invasive species but are not presently considered to spread as easily into native plant communities as those species listed as Rank 1.

RANK 3. "LESSER THREAT". Exotic plant species that spread in or near disturbed areas; and are not presently considered a threat to native plant communities.

Control is only legally required for species also found on the USDA federal noxious weed list, none of which have been identified at DTC. However, the KY-EPPC recommends that Rank 1 (severe threat) and Rank 2 (significant threat) species be controlled and managed in the early stages of

detection when possible. The “Lesser Threat” and “Watch List” species may become problems in the future and should be monitored. This approach is consistent with EO 13112.

The KYARNG’s primary approach to control undesirable vegetation is by mowing in areas where vegetation growth is unwanted or would interfere with military operations. The following sections provide specific management strategies for the invasive/exotic pest plants identified by White and Yahn (2006) of particular concern at DTC. Multiflora rose, kudzu, and Johnsongrass, discussed in **Section 6.8.6.1,** are also noted as species of particular concern at DTC.

Additional management recommendations to control or eradicate invasive pest plants on the DTC are available from the Plant Conservation Alliance Alien Plant Working Group’s internet-based project “Alien Plant Invaders of Natural Areas: Weeds Gone Wild” (http://www.nps.gov/plants/alien/).

6.8.7.1 TREE-OF-H EAVEN

Species and management information is from Penn State University [PSU], 2004. Tree-of-heaven *(Ai la nth us altissima),* is a fast growing, weakwooded tree, native to China that can grow 60 ft tall under roadside conditions. Ailanthus grows in colonies that spread quickly as new shoots arise from the root system. Because of its size and rate of spread, it is an acute hazard along roadsides, and poses a threat to adjacent properties as well.

TREE-OF-HEAVEN
Source: USDA-NRCS PLANTS Database

Ailanthus has a large, compound leaf that is up to 3 feet long, with as many as 30 leaflets. Ailanthus tolerates poor soils, and can quickly colonize disturbed areas and low maintenance landscapes. The winged seeds are produced in abundance, and vastly improve the plant's ability to infest adjacent areas. Ailanthus suckers freely from its root system, and after cutting or other disturbance, ailanthus resprouts ferociously from the stump and its roots. Stump sprouts and suckers can grow 10 feet or more in the first season. Due to its rapid growth and structural weakness, it is highly undesirable along roadways and utility rights-of-way, as well as in parks and wildlands (PSU, 2004).

Newly germinated seedlings can be hand pulled so long as the entire root is removed. Saplings and mature trees should be cut down and the stump immediately sprayed with 25 percent glyphosate solution. Girdle-injection with 25 percent glyphosate solution can also be effective. Alternately, a 25 percent glyphosate solution in an oil base can be painted on basal bark. All herbicide treatments should be conducted in September (Littlefield and Yahn, 2006).

6.87.2 GARLIC MUSTARD

GARLIC MUSTARD
Source: PCA, 2007

Garlic mustard is a cool season biennial herb with stalked, triangular to heart-shaped, coarsely toothed leaves that give off an odor of garlic when crushed. First-year plants appear as a rosette of green leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. Flowering plants of garlic mustard reach from 2 to 37z feet in height, and produce buttonlike clusters of small white flowers, each with four petals in the shape of a cross (Plant Conservation Alliance [PCA], 2007a).

Garlic mustard poses a severe threat to native plants and animals in forest communities in much of the eastern and Midwest U.S. Many native wildflowers that complete their life cycles in the springtime occur in the same habitat as garlic mustard. Once introduced to an area, garlic mustard outcompetes native plants by aggressively monopolizing light, moisture, nutrients, soil and space. Wildlife species that depend on these early plants for their foliage, pollen, nectar, fruits, seeds and roots, are deprived of these essential food sources when garlic mustard replaces them (PCA, 2007a). Small infestations of garlic mustard can be pulled or cut before seed development in spring. Treatment with glyphosate or triclopyr herbicides can be effective as well as burning. After any control activity, monitoring should be conducted for five years (Littlefield and Yahn, 2006).

6.87.3 MUSKTHISTLE

Musk thistle *(Carduus nutans),* is an invasive weed that has become widespread in the contiguous United States. It is a highly competitive weed of Eurasian origin that has replaced much of the native vegetation in pastures and disturbed areas. Musk thistle invades pastures, rangeland, and forest lands, and areas along roadsides, railroad rights-of-way, waste areas, and stream banks. In agricultural systems, the invasive nature and prolific seed production of musk thistle result in large populations of the weed, which compete with crops for space, nutrients, and light (Invasive Plants of the Eastern U.S. [IPEUS], 2007a).

MUSKTHISTLE
Source: Elaine Haug
USDA-NRCS PLANTS Database

Musk thistle generally does not pose a great threat to high-quality natural areas, although it has been known to invade native and restored grasslands despite the presence of dense, native prairie vegetation. Musk thistle may retard natural secondary succession processes. Because musk thistle is unpalatable to wildlife and livestock, selective grazing leads to severe degradation of native meadows and grasslands as grazing animals focus their foraging on other plants, giving musk thistle a competitive advantage (IPEUS, 2007a).

Effective control includes handpulling or cutting small populations after heads have bolted but before seed maturation. Flower and seed heads should be bagged to prevent seed dispersal. Alternately, foliar spray of glyphosate or triclopyr can be applied during rosette stage (Littlefield and Yahn, 2006).

6.87.4 ORIENTAL BITTERSWEET

Oriental bittersweet *(Celastrus orbiculatus)* is a deciduous woody perennial plant that grows as a climbing vine and a trailing shrub. Stems of older plants four inches in diameter have been reported. The leaves are alternate, glossy, nearly as wide as they are long (round), with finely toothed margins. There are separate female (fruiting) and male (non-fruiting) plants. Female plants produce clusters of small greenish flowers in axillary clusters (from most leaf axils), and each plant can produce large numbers of fruits and seeds. The fruits are three-valved, yellow, globular capsules that at maturity split open to reveal three red-orange, fleshy arils each containing one or two seeds. The abundance of showy fruits has made Oriental bittersweet extremely popular for use in floral arrangements (PCA, 2007b).

ORIENTAL BITTERSWEET
Source: USDA-NRCS PLANTS Database

Oriental bittersweet is a vigorously-growing vine that climbs over and smothers vegetation, which may die from excessive shading or breakage. When bittersweet climbs high up on trees, the increased weight can lead to uprooting and blow-over during high winds and heavy snowfalls. In addition, Oriental bittersweet is displacing our native American bittersweet *(Celastrus scandens)* through competition and hybridization (PCA, 2007b).

Small infestations can be hand pulled. Complete removal is essential and difficult. For dense infestations, cut vines and follow with application of glyphosate herbicide to the stumps. Follow-up and late season treatments may be necessary (Littlefield and Yahn, 2006).

6.87.5 POISON HEMLOCK

Poison hemlock *(Conium maculatum)* is a biennial flowering plant which grows from 2-7 ft in height. It has a stout, fleshy stem, carrot-like leaves, and a white, fleshy taproot. Poison hemlock is native to Europe. However, it is now widely distributed across the United States. It is common along roadsides, hiking trails, ditches, and field borders (Weed Watch, 2007). Poison hemlock is an aggressive invasive plant which can quickly develop tall dense vegetation, shading out other plants. All plant parts are toxic to animals and humans (Weed Watch, 2007).

POISON HEMLOCK
Source: USDA-NRCS PLANTS Database

Small infestations can be dug up or cut back before flowering. Do not compost flowers—they will go to seed. Plants and first year rosette phase can be treated with 2,4D

in early spring or late fall. Repeated applications may be required (Littlefield and Yahn, 2006).

6.8.7.6 CROWN VETCH

CROWN VETCH
Source: Jim Stasz
USDA-NRCS PLANTS Database

Trailing crown vetch *(Coronilla varia)* is a perennial, herbaceous legume that flowers from May to August. Flowers are in clusters and range from pinkish lavender to white. This plant spreads rapidly by seed and by its creeping root system. Trailing crown vetch is distinguished by its compound leaves with an odd number of leaflets (1 5 to 25), the presence of leaves and flower stalks arising from the main stem, and the occurrence of flowers in an umbel. The preferred habitat of this plant is open, sunny areas. It occurs along roadsides and in open fields (INPC, 2007).

For small infestations of mature plants, hand pulling can be effective. Mowing during the flower bud stage for two to three years may reduce vigor and control spread. Be sure to cut plants low to the ground before they seed. Application of triclopyr and glyphosphate subsequent to mowing can also be effective. Repeat treatments are necessary to control this species effectively (Littlefield and Yahn, 2006).

6.8.77 CHINESE YAM

Chinese yam *(Dioscorea oppositifolicf)* is a deciduous perennial vine that reproduces primarily vegetatively through aerial tubers or bulbils. Although production of seeds has been seen, sexual reproduction has not been verified in the United States. The bulbils form on the axils of the leaves in late summer and fall. The mature bulbils fall from the plant and are spread primarily by gravity. Animals may also play a role in dispersal. Since the bulbils float and Chinese yam is commonly found in alluvial soils, water may play a role in longer-range dispersal. The aerial tubers are covered with adventitious buds, and damaged or partially eaten tubers can produce new plants. The large tuberous root of Chinese yam is capable of resprouting if it is fractured or damaged (Southeast Exotic Pest Plant Council [SEPPC], 2007).

CHINESE YAM
. Source: USDA-NRCS PLANTS Database

Shading is not recommended for long-term control. Mechanical control includes clipping, pulling, or burning plants before bulbils form in mid-June. Follow-up with foliar application of glyphosate herbicide particularly on new sprouts. Glyphosate foliar spray can be used from June to August as bulbils form (Littlefield and Yahn, 2006).

6.8.7.8 SILVERBERRY/AUTUMN OLIVE

Silverberry *(Elaeagnus* spp.), woody shrubs often capable of nitrogen fixation, typically occurs within disturbed areas, successional fields, pastures, and roadsides where it crowds out other native vegetation. Young branches are often covered with a silvery gray or golden-brown hairy pubescence, but with age develop a scaly gray-brown bark. In some species, the branches are armed with spines. Plants are capable of flowering and producing fruit after reaching only three years of age. The yellowish fragrant flowers appear in June and July, and are later replaced by abundant silvery fruit. Bird species are probably the primary vector for dispersal, although raccoons, skunks, and opossums also feed on the fruit. Some vegetative propagation has been reported. Once established, *Elaeagnus* spp. is highly invasive and difficult to control (Plant Conservation Alliance [PCA], 2007).

SILVERBERRY
Source: Herman, D.E. et al.
USDA-NRCS PLANTS Database

For areas containing large thickets of silverberry, a foliar spray with triclopyr or glyphosphate when air temperature exceeds 65 degrees F is recommended. When dealing with single trees, a basal bark treatment with triclopyr and 2,4-D should be considered (Littlefield and Yahn, 2006).

6.8.7.9 CHINESE LESPEDEZA/SERICEA LESPEDEZA

CHINESE LESPEDEZA
Source: G.A. Cooper
USDA-NRCS PLANTS

Chinese lespedeza *(Lespedeza cuneata)* is a warm season, perennial herbaceous plant. It has an erect growth form, ranging from about 3 to 5.5 feet in height, and leaves that alternate along the stem. Each leaf is divided into 3 smaller leaflets, about 0.5 to one inch long, which are narrowly oblong and pointed, with awl-shaped spines. Leaflets are covered with densely flattened hairs, giving a grayish-green or silvery appearance. Mature stems are somewhat woody and fibrous with sharp, stiff, flattened bristles. Small (about 0.25 inch) creamy white to pale yellow flowers emerge either singly or in clusters of two to four, from the axils of the upper and median leaves (PCA, 2007).

Hand pulling is impractical. Mowing plants in the flower bud stage for two to three consecutive years may reduce vigor and prevent further spread. Plants should be cut as close to the ground as possible. Chemical treatment includes a foliar spray. A foliar treatment with a 2 percent glyphosphate herbicide mixture has proven effective from late June until seed set (Littlefield and Yahn, 2006).

6.8.7.10 PRIVET

Privet *(Ligustrum sinense)* is a semi-evergreen to evergreen, thicket-forming shrub growing to 30 ft in height. Stems are multiple and leaning-to-arching with long leafy branches. The species is aggressive and troublesome, often forming dense thickets, particularly in bottom-land forests and along fencerows, thus gaining access to forests, fields, and rights-of-way. It is shade tolerant, colonizes by root sprouts and spreads widely by abundant bird- and other animal-dispersed seeds (IPEUS, 2007b).

PRIVET
Source: Larry Allain, USDA-NRCS PLANTS

Control can be accomplished by mechanical means such as hand-pulling; however, roots must be removed too. Chemical treatment should consist of glyphosate 3 percent herbicide as a foliar spray. Application in late fall can help avoid damage to non-target native plants. Complete control requires follow-up treatments for seedlings and sprouts (Littlefield and Yahn, 2006).

6.8.7.11 JAPANESE HONEYSUCKLE

Japanese honeysuckle *(Lonicera japonica)* is a perennial vine that climbs by twisting its stems around vertical structures, including limbs and trunks of shrubs and small trees. Leaves are oblong to oval, sometimes lobed, have short stalks, and occur in pairs along the stem. In southern and mid-Atlantic states, Japanese honeysuckle often remains evergreen - its leaves remain attached through the winter. In colder northern climates, the leaves may fall off after exposure to prolonged winter temperatures. Flowers are tubular, with five fused petals, white to pink, turning yellow with age, very fragrant, and occur in pairs along the stem at leaf junctures. Stems and leaves are sometimes covered with fine, soft hairs. Japanese honeysuckle blooms from late April through July and sometimes into October. Small black fruits are produced in autumn, each containing two to three dark brown seeds about 1/4 inch across (PCA, 2007).

JAPANESE HONEYSUCKLE
Source: Jil M. Swearingen
National Park Service,
Washington D.C

Littlefield and Yahn (2006) recommended the following methods of control for Japanese honeysuckle: (1) hand pulling, (2) grubbing, (3) prescribed burning, and/or (4) a late summer foliar spray of 2 percent glyphosphate. Repeat treatments and monitoring are necessary for effective control of this species.

6.8.7.12 SWEET CLOVER

White and yellow sweet clover *(Melilotus alba,* and *M. officinalis),* native to Europe and Asia, were used as a forage crop and soil builder during their initial introduction, and are now used as a wildlife cover crop and in production of honey. These biennial herbs have adapted to a variety of temperatures and light levels. In the first year, they put all energy reserves toward developing a strong root system, and in the second season they flower, set seeds, and die. Thus, seed production is essential in proliferation. The leaves of both sweet clovers are alternate and trifoliate. Leaflets are finely-toothed and oblong. Mature plants (second-year) may appear bushy and have small pea-like flowers that are yellow or white, which produce one or two seeds each. Areas most likely to contain sweet clover include roadsides, abandoned fields, railroad ballasts, pastures and any unflooded, open natural community such as a prairie (INPC, 2007).

YELLOW SWEET CLOVER
Source: PatrickJ. Alexander
USDA-NRCS PLANTS Database

For small infestations, hand pulling of first year stems in late summer/early fall is a feasible method to control white and yellow sweet clover. Mowing in late spring/early summer may reduce, but not prevent seeds from setting. Burning two years in a row has also been found to reduce the size of sweet clover populations. If chemical control is required, use a foliar application of 2,4-D on young seedlings (Littlefield and Yahn, 2006).

6.8.7.13 NEPAL GRASS, JAPANESE STILT GRASS

JAPANESE STILT GRASS
Source: Ted Bodner,
USDA-NRCS PLANTS Database

Japanese stiltgrass *(Microstegium vimineum),* or Nepal grass, is an annual grass with a sprawling habit. It germinates in spring and grows slowly through the summer months, ultimately reaching heights of 2 to 3.5 feet. The leaves are pale green, lance-shaped, asymmetrical, one to three inches long, and have a distinctive shiny midrib. Slender stalks of tiny flowers are produced in late summer (August through September-early October) and dry fruits called achenes are produced soon afterward (PCA, 2007).

Small, isolated patches can be managed by repeated hand pulling, especially when plants are in bloom (late summer). It is important to control small infestations quickly. For large populations, plants may be cut with a weed whacker just before plants produce seeds (late summer). Chemical control using glyphosates (Roundup) have also been proven successful. When infestations are within or adjacent to wetland or other waterbodies, be sure to use a glyphosate herbicide that has been approved for water use (e.g., Habitat, Aquamaster, Aqua Neat, and Eagre) (Littlefield and Yahn, 2006).

6.8.7.14 MISCANTHUS

Miscanthus sinensis is a member of the Poaceae or Grass Family. It continues to be a popular ornamental in many areas of the United States, as well as being used as a barrier plant along roadsides and agricultural fields. There are many ornamental varieties of this plant, including one that is used in Europe and Asia as a biofuel and for paper pulp. Miscanthus spreads primarily by underground roots or rhizomes. Mature plants have extensive perennial root systems. New growth emerges in mid-spring and rapidly replaces the previous year's dried erect leaves. The flower spike emerges in late August to early September and matures in early November. The seed viability of miscanthus is varied according to variety. Although it is speculated this plant will spread by seed, its main form of reproduction is vegetative (SEPPC, 2007b).

MISCANTHUS
Source: James H. Miller, USDA-NRCS PLANTS Database

Miscanthus will grow on a variety of sites, but prefers moist well-drained soil to reach its maximum growth potential. It is intolerant of shade, although it will persist in sparsely forested areas and small openings. In many natural areas, this grass is prevalent on abandoned home sites where it was used as an ornamental. It has been documented invading shores of reservoirs, roadsides, and in forests and old fields following fires. The plant is extremely flammable, and upon catching fire burning fragments cause difficulty in fire control. Miscanthus will grow in relatively cold as well as warm climates (SEPPC, 2007b).

Individual plants or small patches can be effectively grubbed, as long as all of the roots are removed. After removal, monitoring is necessary to ensure complete control. For herbicidal controls to be effective, the plants must be actively growing. Glyphosate has been shown to be effective in controlling miscanthus. A 2 percent solution of glyphosate is effective in the fall or late spring. Treatments should cover the leaves of the plants to the point of runoff. Since glyphosate is a non-selective herbicide, it will affect any native plant it comes into contact with (Littlefield and Yahn, 2006).

6.9 OUTDOOR RECREATION MANAGEMENT

AR 200-1 provides guidance for access to military lands and waters by recreational users stating that "such access 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 times as such can be granted without bona fide impairment of the military mission, as determined by the installation commander." This section provides details on public access and enforcement at the DTC. Laws and regulations pertaining to site access and use are listed in **Table** 32 and discussed in **Appendix H.**

TABLE 32. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO OUTDOOR RECREATION AT DTC

REQUIREMENT	TITLE
Law	Sikes Act Improvement Act (16 U.S.C 670 et seq.)
Executive Order	EO 12960, Recreational Fisheries;
Army Regulation	AR 200-1, Natural Resources Management
Kentucky Laws and Regulations	KRS Chapter 56:010, Action for Trespass or Injury to State Property
	KRS Chapter 149, Forest Protection Laws of Kentucky
	KRS Chapter 1 50, Fish and Wildlife Protection
	KRS Chapter 235.00, Boating Statutes
	KAR Title 301, Tourism Development Cabinet Department Of Fish And Wildlife Resources

6.9.1 PUBLICACCESS

Access to DTC must be controlled during training exercises for military troop and public safety. Limitations on public access will be enforced during training exercises due to the presence of hazards related to training activities. Some possible threats to public safety related to training activities include: training residue (e.g., concertina wire) and training mechanisms (e.g., vehicles). All of these are potential hazards within the training site.

The entrance to the training site is gated, and illegal use of or entry to the site is subject to state (KRS 511, 512, 513, 514) as well as federal trespass regulations (18 USC 1 382 Entering Military, Naval, or Coast Guard Property). Any person entering the training site for any purpose prohibited by law or lawful regulation is trespassing. Trespassing is a serious matter in that it may endanger the life of the person entering the training site as well as potentially endangering lives of Kentucky Army National Guardsmen and interfering with training. According to KRS Chapter 56.010, “Action for Trespass or Injury to State Property,” the Finance and Administration Cabinet shall institute civil proceeding in the name of the Commonwealth for any trespass or injury to any state property under its control.

AR 200-1 provides guidance for access to military lands and waters by recreational users stating that “such access 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 times as such can be granted without bona fide impairment of the military mission, as determined by the installation commander.”

6.9.1.1 HUNTING AND FISHING

Public fishing is permitted at DTC, and rabbit and squirrel hunting is permitted for Guardsmen and their family members. Military training supersedes recreational access to the site, and will be suspended by the Training Site NCOIC in the event that military training conflicts with public access. All hunting and fishing activities at DTC are regulated in accordance with Kentucky laws and wildlife regulations. Any person hunting or fishing at the DTC must carry on their person a valid Kentucky hunting or fishing license and any appropriate permit(s) (KDFWR, 2006).

6.9.1.2 ALL-TERRAIN VEHICLE USE

All-terrain vehicles (ATVs) have great potential for damage to natural resources. Army policy on ATVs is very restrictive (AR 200-1). No vehicular access for recreational purposes is permitted on DTC. A person shall not operate an all-terrain vehicle on public property unless the governmental agency responsible for the property has approved the use of all-terrain vehicles (KRS 1 89.51 5).

6.10 CULTURAL RESOURCES PROTECTION

Cultural resources include sites, buildings, structures, or objects that may have significant archeological and historic values, or properties that may play a significant traditional role in a community's history, beliefs, customs, and practices. Cultural resources, thus, encompass a wide range of sites and buildings from prehistoric Native American campsites to military buildings constructed during the Cold War, as well as traditional cultural properties still used today.

Sections 106 and 110 of the National Historic Preservation Act (NHPA, Public Law (PL) 89-655) provide the framework for federal review and protection of cultural resources, and ensure they are considered during federal project planning and execution. The implementing regulations for the Section 106 process (36 CFR Part 800), have been developed by the Advisory Council on Historic Preservation (ACHP). The Secretary of the Interior maintains a National Register of Historic Places (NRHP) and sets forth significance criteria (36 CFR Part 60) for inclusion in the register. Cultural resources may be considered "historic properties" for the purpose of consideration by a federal undertaking if they meet NRHP criteria. Historic properties may be those that are formally placed in the National Register by the Secretary of the Interior, those that meet the criteria and are determined eligible for inclusion, and historic properties that are yet undiscovered but may meet eligibility criteria.

Archeological resources on federal lands are protected under the Archeological Resources Protection Act (ARPA, PL 96-95). Native American human remains, burials, and associated burial goods on federal lands or federally controlled lands are protected under Section 3 (c) of the Native American Graves Protection and Repatriation Act (NAGPRA, PL 101-601), and its implementing regulations (43 CFR Part 10). These regulations also require Federal officials to take reasonable steps to determine whether a planned activity may result in the excavation of human remains, funerary objects, sacred objects, or objects of cultural patrimony from Federal lands (43 CFR Part 10.3(c)(1)).

The DoDI 4710.02 provides guidance for interacting and working with federally recognized American Indian and Alaska Native governments or tribes. This instruction implements DoD policy, assigns responsibilities, and provides procedures for DoD interactions with federally recognized tribes. The policy requires that government agencies communicate with tribes on a government-to-government basis in recognition of their sovereignty. Addressing tribal concerns between tribes and military installations requires communication at both the tribal leadership-to-installation commander and the tribal staff-to-installation staff levels. The effect of a proposed DoD action that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands must be assessed before decisions are made.

The laws, regulations, executive orders, and policies governing protection of cultural resources are listed in **Table 33** and discussed in **Appendix H.**

TABLE 33. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO CULTURAL RESOURCES MANAGEMENT AT DTC

REQUIREMENT	TITLE
Law	Archaeological and Historic Preservation Act of 1 974 (AHPA)
	American Indian Religious Freedom Act of 1978 (AIRFA)
	Archeological Resources Protection Act (ARPA, PL 96-95)
	Native American Graves Protection and Repatriation Act (NAGPRA, PL 101-601)
	National Historic Preservation Act (NHPA, PL 89-655)
	National Historic Preservation Act (NHPA, PL 89-655)
Army Regulation	Army Regulation 200-4
Federal Regulation	Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, its implementing regulation (36 CFR 800)
Executive Order	Executive Order 1 3007 *Indian Sacred Sites*
	Executive Order 1 1 593 *Protection and Enhancement of the Cultural Environment*
	Executive Order 13175 *Consultation and Coordination with Indian Tribal Governments*
DoD Instruction	DoD Interactions with Federally-Recognized Tribes (DoDI 471 0.02)
Kentucky Regulations	KRS Chapter 1 64.705-.735, Archaeology
	KRS Chapter 381.765, Human Burials
	KRS Chapter 525.1 1 5, Violating Graves

6.10.1.1 CULTURAL RESOURCES MANAGEMENT

The KYARNG completed a statewide ICRMP for all property managed by the KDMA, including the DTC (Brent, 2003). An ICRMP is a five-year plan required by AR 200-1 and DoDI 4715.3 for compliance with applicable federal laws and regulations concerning cultural resources. The ICRMP is a component of the installation master plan, and functions as a decision document for cultural resources management actions and specific compliance procedures. The plan's purpose is to integrate cultural resources requirements with ongoing mission activities so the availability of mission essential properties and acreage is maintained and compliance with requirements is achieved. The ICRMP is currently being updated.

The KYARNG is currently meeting all responsibilities associated with the above regulations through correspondence with the Kentucky SHPO. KYARNG/DMA has fulfilled its section 106 and 110 requirements at DTC by completing a Phase I archaeological survey at the training facility. This survey indicated there were 13 sites potentially eligible for listing in the National Register. Five of these sites are within the main maneuver area of the training site, which restricts certain military training activities with the potential for ground disturbance. In the event that ground disturbing activities are required at DTC, consultation with the SHPO will be conducted.

Cultural resources management policies are described in **Table 34.** SOP 4 and 6 in the Kentucky statewide ICRMP apply to natural resources management at DTC.

TABLE 34. KYARNG CULTURAL RESOURCES STANDARD OPERATING PROCEDURES APPLICABLE TO NATURAL RESOURCES MANAGEMENT AT DTC

TOPIC		POLICY
1	**SOP #4: Inadvertent Discovery**	In the event that archaeological deposits are encountered during any construction or excavation activities, the activity must stop and the Environmental Program Manager/Cultural Resources Manager (EPM/CRM) must be notified. If bone is present within the deposit, the EPM/CRM will ensure a qualified professional accompanies him/her to the work site to assist in identification of the materials as human remains. Because of the potential for archaeological deposits to contain Native American human remains or cultural materials, failure to report discovery of archaeological deposits may result in violation of NAGPRA, ARPA and other related federal and state laws resulting in fines and penalties against the KYARNG/DMA. Follow procedures in the ICRMP for: Situation #2: Construction and maintenance activities, including but not limited to digging, bulldozing, clearing-and-grubbing, maintaining earth berms, and roadwork conducted by KYARNG troops. Situation #3: Construction and maintenance activities, including, but not limited to digging, bulldozing, clearing-and-grubbing, maintaining earth berms, and roadwork conducted by contractors. Situation #4: Artifacts found in eroded areas, gullies, dirt trails, or road cuts on DMA property.
2	**SOP #6: New Construction**	Ensure no disturbance or destruction of significant archaeological resources. Known archeological sites should be managed as avoidance areas (no digging). Follow Procedures in the ICRMP.

6.10.1.2 NATIVE AMERICAN CONSULTATION

If the existence of Traditional Cultural Properties (TCP) becomes known, the KYARNG will comply with EO 13175 *(Consultation and Coordination with Indian Tribal Governments),* EO 1 3007 *(Indian Sacred Sites),* and the NHPA of 1 996 as amended.

6.11 NATURAL RESOURCES LAW ENFORCEMENT

Many aspects of integrating the training mission with natural resources management require effective enforcement if they are to be successful. Such programs as hunting/fishing access controls, protection of wetlands, water pollution prevention, rare species protection, and others are very dependent on law enforcement.

The DTC is within the jurisdiction of the TAG of Kentucky. The Criminal Laws of the Commonwealth of Kentucky are in effect within the boundaries of the training site. The DTC Training Site NCOIC has jurisdiction and responsibility over the training site. All of the DTC, local state, and federal laws and regulations, discussed in previous sections will be enforced. KYARNG personnel may call upon KDFWR or the Kentucky State Police to issue hunting and fishing citations.

6.11.1 ENVIRONMENTAL STEWARDSHIP

Environmental stewardship at DTC is a moral and legal obligation for all users to carefully and responsibly use and manage the land and resources of the training site. When leaders and soldiers alike can adopt an attitude of ownership and environmental stewardship of the training site, the natural resources will be more effectively conserved and sustained for future training use. True environmental stewardship and awareness must trickle down from TAG through the Training Directorate to each commander and soldier within the KYARNG. Command emphasis is necessary to convey the seriousness of environmental stewardship.

6.11.2 ENVIRONMENTAL AWARENESS

Environmental awareness, through the distribution of educational materials, is a useful natural resources management tool, as it educates land users on the sound environmental stewardship of natural and cultural resources and reduces the potential for inflicting avoidable impacts and/or incurring legal violations. Environmental awareness applies to soldiers, other services using Army lands, installation staff, other land users, and the public. It also encompasses efforts to inform environmental professionals of Army and installation mission and training activities (DA, 1999). These efforts are designed to improve their understanding of the effects of their mission, training, or activity on natural resources and environmental sensitive areas at the DTC.

Environmental awareness also serves to educate the public and garner their support by effectively communicating the nature of the military mission at DTC and the level of success of natural resources management at the site. When military users and the public are informed and educated about "easily understood" management practices (such as reseeding) as well as "misunderstood" management practices (such as restrictions on field operations or access), they tend to lend more support than opposition to the practice.

Environmental awareness will be employed at the DTC by promoting troop awareness, through the distribution of educational materials, maintaining and/or developing strong community relations, and by encouraging public involvement.

6.11.2.1 TROOP AWARENESS

The policies and guidelines set forth throughout this INRMP as well as any of the established KYARNG SOPs were designed to educate troops training at DTC about natural resources on the training site, including water, air, noise, and plant and animal life. The Training Site NCOIC conducts advance party environmental briefings and post-training reviews to ensure troops training at DTC adhere to the appropriate policies and guidelines. Each unit environmental compliance officer will be involved in incorporating the information in this INRMP into training plans to minimize effects of troop activities on natural resources.

6.11.2.2 EDUCATIONAL TRAINING TOOLS

A *Leader and Soldier Field Card* has been developed for DTC for use by trainers in the field. However, this training tool is in need of updating. Updating the *Leader and Soldier Field Card* is included as a project in this INRMP. The updated field card will consist of condensed information contained in other Environmental Awareness materials, such as the INRMP or any other applicable KYARNG SOPs. The field card should include a brief description of the installation and a list of "Dos and Don'ts" with particular emphasis on training area protection, erosion control, and cultural resources protection.

During the planning period, state and Federal agencies (i.e., the NRCS, USFWS, KDFWR, and KSNPC) will be a valuable source of information for the Environmental Office and Training Site Personnel through fact sheets, site visits, and regular workshops offered throughout Kentucky. Annual updates from these agencies can be a source of new technology and management techniques to aid in implementing a successful natural resources management program.

6.11.2.3C0MMUNITY RELATIONSAND PUBLIC INVOLVEMENT

There are many ways to educate the public about activities at DTC and promote good community relations at the same time. The local newspaper, *The Barbourville Mountain Advocate,* and local radio stations are excellent means of sharing information and promoting new programs.

Newspaper articles and public service announcements can reach a diverse audience, and can be specifically designed to impress one or more categories of receivers. Awards presented to KYARNG personnel are a good topic for such articles/announcements. Newspaper picture features can enhance understanding of the natural resources and be easily understood by most people. Specific examples of article topics include: natural communities on the training site; use of native species for revegetation and habitat enhancement; working with other agencies, etc. All contact with media staff should be coordinated with the PAO in Frankfort.

SECTION 7: MANAGEMENT GOALS AND OBJECTIVES

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it meets the requirements of the Sikes Act and if it contributes to the conservation and rehabilitation of natural resources on military installations. Goals and objectives presented within this chapter for future natural resources management at the DTC were updated in accordance with this review. Previous chapters that presented important background information on resources, current conditions, and management issues at the DTC were used to formulate natural resources management goals. Goals listed in **Table** 35 below express the KYARNG's vision of the desired condition of the DTC's natural resources. These goals are supported by objectives and projects, which provide management strategies and specific actions to achieve these goals. **Table 36** in **Section 8.0** presents a list of planned projects and how they relate to the following goals and objectives. All projects are subject to funding availability.

TABLE 35. MANAGEMENT GOALS AND OBJECTIVES FOR DTC

MANAGEMENT GOAL		OBJECTIVES
1	Manage natural resources to ***support the military mission*** in a manner consistent with the KYARNG Environmental Management System and in compliance with Federal and State laws, Army regulations and policies.	OBJECTIVE 1.1: Initiate programs and projects that enhance the training land and training opportunities and/or unnecessarily limit training land availability. OBJECTIVE 1.2: Continue to educate DTC users regarding the natural resources and their part in ensuring sustainable use of the site. OBJECTIVE 1.3: Maintain sustainable, realistic terrain for military training and identify environmental constraints to land use so that military training can be matched to ecosystem carrying capacity. OBJECTIVE 1.4: Ensure that KYARNG activities at the DTC remain in compliance with environmental, cultural, and historic regulations as well as INRMP policies. OBJECTIVE 1.5: Implement this INRMP within the framework of Army policies and regulations using the NEPA process to make informed decisions regarding natural resources. OBJECTIVE 1.6: Ensure feedback from training officers is incorporated into natural resource planning and management.
2	***Coordinate mission requirements and land maintenance activities*** to minimize land impacts from training,	OBJECTIVE 2.1: Evaluate potential impacts of proposed training, and modify training if necessary to prevent impacts to natural resources. OBJECTIVE 2.2: Maintain records of the type of training that occurs in various areas to correlate site conditions and training site use.
3	Manage ***fish and wildlife resources*** in a manner compatible with the military mission and within the limits of the natural habitat.	OBJECTIVE 3.1: Maintain natural ecosystems favorable for indigenous fish and wildlife populations. OBJECTIVE 3.2: Conduct planning level surveys to monitor flora and fauna species at DTC. OBJECTIVE 3.3: Provide small game (rabbit and squirrel) hunting opportunities to guardsmen and their families, and recreational fishing opportunities within the constraints of the military mission regulations.
4	Protect, restore, and maintain populations of ***rare plant and animal species*** in comoliance with Federal and state laws and regulations.	OBJECTIVE 4.1: Coordinate and conduct threatened and endangered species surveys and survey methodologies with appropriate state and Federal agencies through master cooperative agreements. OBJECTIVE 4.2: Maintain updated records and maps of rare, threatened, and endangered plant and animal species locations at the DTC. OBJECTIVE 4.3: Schedule only compatible training activities in areas known to contain federally threatened and endangered species, if any. OBJECTIVE 4.4: When appropriate, identify site-specific habitat requirements and develop short and long-range management

TABLE 35. MANAGEMENT GOALS AND OBJECTIVES FOR DTC

MANAGEMENT GOAL		OBJECTIVES
		strategies for threatened and endangered species.
5	Protect, maintain, and improve ***soil and water quality*** in accordance with state and Federal laws and regulations to sustain the overall condition of the DTC training lands.	OBJECTIVE 5.1: Plan, design, and implement activities in cooperation with Federal, state, and local regulatory authorities to minimize soil loss and site degradation. OBJECTIVE 5.2: Implement BMPs when conducting land management activities. OBJECTIVE 5.3: Control or eliminate runoff and erosion, and rehabilitate eroded areas through sound vegetative and land management practices.
6	***Protect and maintain riparian, wetland, and aquatic habitats*** in accordance with state and Federal laws and regulations while adhering to ecosystem principles management for water quality enhancement, wildlife food and cover, and aquatic habitat.	OBJECTIVE 6.1: Proactively manage wetlands during the environmental planning process, avoiding potential impacts to the maximum extent possible. OBJECTIVE 6.2: Protect riparian forests and wetlands from disturbance during routine land management projects and military training activities on the site by maintaining SMZs and buffer zones. OBJECTIVE 6.3: Monitor effects of military training on wetlands through site reconnaissance to ensure compliance with SMZs. OBJECTIVE 6.4: Maintain current maps of wetlands at the DTC. OBJECTIVE 6.5: Conduct planning level surveys as needed.
7	Maintain the ***grassland habitats*** for the purposes of military training, wildlife food and cover, and soil stabilization.	OBJECTIVE 7.1: Conduct flora and vegetation community planning level surveys as needed. OBJECTIVE 7.2: Monitor grassland bird populations to ensure management goals are being met. OBJECTIVE 7.3: Monitor and rehabilitate, as needed, grassland communities at DTC periodically for training impacts. Objective 7.4: Maintain the existing mowing/haying activities at DTC in conjunction with the site specific agricultural lease. OBJECTIVE 7.5: Control invasive exotic species using IPM methods and strategies for the purpose of improving and sustaining training area lands and eradication of exotic species. Objective 7.6: Use environmental awareness and training site SOPs to educate troops about sustaining grassland ecosystems.
8	Maintain the ***forest resources*** for the purposes of military training, wildlife food and cover, and watershed protection.	OBJECTIVE 8.1: Maintain forests in a condition that minimizes threat to safety and human health. Objective 8.2: Maintain current stand conditions in forest ecosystems along and around waterways with SMZs currently meeting state standards for BMPs. Objective 8.3: Monitor animal and plant populations dependent on the forest resources in cooperation with KSNPC, KDFWR, and Partners in Flight to ensure management goals are being met. Objective 8.4: Protect potential bat roosting and foraging habitat by enforcing policies within this INRMP, which require USFWS consultation prior to cutting living or dead standing trees. OBJECTIVE: 8.5: Manage and monitor for non-native and invasive insect species that pose a threat to forest resources. OBJECTIVE 8.6: Complete a forest inventory to determine present stocking levels of trees within the forest ecosystem. OBJECTIVE 8.7: Coordinate all forest management actions with the USACE prior to implementation. OBJECTIVE 8.8: Provide areas within DTC forests for military training purposes (concealment for assembly areas) and wildlife foraging and roosting habitat. OBJECTIVE 8.9: Control kudzu occurring within DTC, particularly along

TABLE 35. MANAGEMENT GOALS AND OBJECTIVES FOR DTC

MANAGEMENT GOAL		OBJECTIVES
		the roadside near the entrance to the installation.
9	***Use IPM practices*** that maximize safety and minimize pesticide use and potential hazards to humans, wildlife and their environments.	OBJECTIVE 9.1: Comply with all Federal, state, and local laws and regulations pertaining to pest management and pesticide use on the training site. OBJECTIVE 9.2: Support and adhere to the KYARNG Pest Management Plan. OBJECTIVE 9.3: Apply the most effective management strategies when populations of invasive exotic species exceed defined levels. Pest management will be achieved by non-chemical control (e.g., using mechanical or biological methods) whenever feasible and economical. OBJECTIVE 9.4: Prevent the further introduction of noxious plant and animal species to the training site to the greatest extent possible.
10	***Maintain public access*** within the constraints of the military mission, site security need, and sound ecological principles.	OBJECTIVE 10.1: Provide hunting opportunities for Guard and their family members and fishing opportunities for public and military users at the DTC, compatible with the military mission.
11	Continue to ***develop and maintain a GIS system*** providing efficient data storage, retrieval, and presentation to facilitate fully informed management decisions.	OBJECTIVE 11.1: Continue to collect GIS data throughout the training site, and revise existing files within the GIS database as more current data becomes available. OBJECTIVE 11.2: Update GIS hardware/software as technology advances and performance demands necessitate. OBJECTIVE 11.3: Ensure adequate technical staff are available and trained in new methods to maintain current GIS databases and manage information needs.
12	***Educate site users*** about environmental concerns and responsibilities to minimize resource damage and instill a sense of pride and stewardship responsibility.	OBJECTIVE 1 2.1: Brief decision-makers about DTC natural resources program. OBJECTIVE 1 2.2: Develop and distribute information to units, leaders, soldiers, civilian employees, and other installation users to improve their understanding of impacts of their activities on the environment. OBJECTIVE 1 2.3: Conduct advance party briefings and post-training reviews to ensure troops training at DTC adhere to the appropriate policies and guidelines.
13	***Form communication links*** with other agencies, organizations, and the public to share information and aid in decision-making.	OBJECTIVE 1 3.1: Involve the surrounding community in the DTC natural resources program. OBJECTIVE 1 3.1: Ensure the DTC natural resources program is coordinated with other agencies and conservation organizations with similar interests.
14	***Protect and Preserve Cultural Resources*** in accordance with state and Federal laws and regulations.	OBJECTIVE 14.1: Comply with Federal, state, and local laws and regulations pertaining to cultural resources found on the training site. OBJECTIVE 14.2: Adhere to guidelines presented in the KYARNG ICRMP and in particular SOPs 4 and 6.

SECTION 8: NATURAL RESOURCES PROGRAM IMPLEMENTATION

The KYARNG depends on natural resources for the sustainability of many training programs, and will continue to manage the natural resources at the DTC to ensure sustainable usage. The updated INRMP is not intended to impair the ability of the KYARNG to perform its mission. However, the updated INRMP does identify usage restrictions on sensitive attributes such as wetlands and T&E species.

Implementation of this updated INRMP will be realized through accomplishment of specific goals and objectives as measured by completion of projects described within this INRMP. An INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects and activities;
- Ensures sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP;
- Coordinates annually with cooperating agencies;
- Documents specific INRMP action accomplishments undertaken each year.

8.1 ANNUAL WORK PLANS

8.1.1 WORKPLANS

Natural resources management includes recurring activities and special projects. Recurring activities are generally performed by KYARNG Environmental staff. Projects can be done by Environmental staff, agencies such as KSNPC, or contracted. Planned projects to be funded during this planning period (2008-201 3) are detailed in **Table 36.**

The Environmental staff performs site reconnaissance biannually, which includes the following recurring activities, among others.

- Cool Season Site Reconnaissance - Note eroded areas and rehabilitate them if they are in need of repair, maintain and/or add Siebert staking or equivalent for riparian areas and wetlands, note diseased or damaged trees that could pose a safety hazard and address.
- Warm Season Site Reconnaissance - Inspect hemlock stands for hemlock woolly adelgid, inspect Virginia pine stands for pine bark beetle activity; implement IPM as needed for insect pests, note eroded areas and rehabilitate them if they are in need of repair, note diseased or damaged trees that could pose a safety hazard and address.

TABLE 36. 2008-2013 PLANNED IMPLEMENTATION PROJECTS

(SUBJECTTO FUNDING AVAILABILITY)

PROJECT		LOCATION	OBJECTIVE# (SECTION 7)	DESCRIPTION	LEGAL DRIVERS	FUNDING TYPE	PROGRAM DATE
1	Recurring Maneuver Damage Costs	Throughout	2.1, 2.2, 2.5, 5.1, 5.2, 5.4, 6.2, 7.3	Funds used as necessary to restore disturbed or eroding areas from training. Includes replanting native grasses and other species recommended by KDFWR and NRCS, fertilizer, lime, seed and mulch for proactive maintenance of military maneuver areas.	CWA, AR 200-1	ITAM	2008-2013
2	Environmental Awareness	Throughout	1.4, 13.1, 13.2, 13.3, 14.1	Funds used for Leader and Soldier Field Card for DTC and other environmental awareness related materials.	Army Policy, AR 200-1, ESA, CWA	VENN /ITAM	2008-2013
3	Vegetation Control	See Figure 6 for grassland areas	1.3, 2.4, 7.6, 9.3	Funds will be used as needed for mowing and brush plowing to maintain areas used for maneuver training and other areas inhibited and/or restricted by vegetation. Control to focus on active management of tree-of-heaven, kudzu, johnsongrass, autumn olive.	Noxious Weed Act, KRS 217.541 et seq., KRS 249; KRS 25, Army Policy, AR 200-1	VENN /ITAM	2008-2013
4	Planning Level Surveys	Throughout	2.1, 3.2, 4.1, 7.1, 8.3	Funds used to update biological inventories and rare species lists if additional property is acquired.	ESA, AR 200-1	VENN	2008-2013
5	Forest Inventory & Mgmt. Plan Update	See Figure 6	1.1, 1.3, 8.1, 8.4, 8.6	Conduct Forest Inventory at the DTC to develop specific management prescriptions and identify areas needing rehabilitation or restoration.	Army Policy, AR 200-1	VENN	2010
6	Bat Planning Level Survey	Throughout	1.4, 2.3, 3.1, 4.1,4.4	Conduct mist net surveys to determine if Virginia big-eared bats or Indiana bats utilize DTC forests. Mist net surveys will be conducted in consultation with the USFWS. *(Project will be implemented only if trees need to be cut on the training site.)*	ESA, 50 CFR402, SAIA, 1 6 USC 67A, AR 200-1, Policy Memo DAIM-ED-N	VENN	N/A *
7	Revegetation with Native Species	Throughout	3.1, 5.1, 5.4, 7.3, 7.5, 8.1	Funds used to prepare planting areas, seeding, soil amendments, and follow-up monitoring as needed.	Army Policy, AR 200-1	VENN	2008-2013
8	Maintain Agricultural Lease	Throughout	1.1, 1.5	Funds used to coordinate with the USACE to maintain the existing lease for local farmers to manage hay resources on ATS.	Army Policy, AR 200-1	VENN	2008-2013
9	Minor Forest Products Sale Program	Throughout	1.1, 1.5	Funds used to coordinate with the USACE license officer to explore development of a Minor Forest Products Sale Program.	Army Policy, AR 200-1, AR 405-90	VENN	201 1-2013
10	Program Wide Resources	Throughout	3.1, 5.1, 5.2, 7.3, 9.2, 9.3	Funds used for the purchase of seeder and commercial mower to maintain training site lands.	Army Policy, AR 200-1	RTLP/ VENN	2008-2013

N/A * - Project 5 will only be implemented if trees need to be cut on the training site.

8.1.2 FUNDING

Implementation of this updated INRMP is subject to availability of annual funding. Where projects identified in the plan are not implemented due to lack of funding, or other compelling circumstances, the installation will review the goals and objectives of this updated INRMP to determine whether adjustments are necessary.

The following discussion of funding options is not all-inclusive of funding sources. Since many funding sources rely on a variety of grant programs, award criteria and amounts can change considerably from one year to another. Funding through grant programs can occur on a one-time award, annually, or in multiples of years.

8.1.2.1 FEDERAL NGB FUNDS

The NGB is the primary source of funding to support management of natural resources at the EKTS-HV through a master cooperative agreement with the KYARNG.

For some projects, the installation requests project validation and funding through the NGB-ARE STEP program, with requests completed by the KYARNG Environmental Office in Frankfort, KY. The NGB provides funding for natural resource surveys, environmental monitoring projects, and compliance-related projects.

The NGB Army Installations Division (NGB - ARI) provides funding for the personnel, equipment, and supplies in support of the KYARNG CFMO. This office is involved in planning, scheduling, and oversight of training; maintenance of roads and trails, vegetation management and pest management; facilities infrastructure; and military construction planning; all of which are critical to the natural resources management program.

A five-year ITAM Work Plan is used to channel ITAM funding requests from the KYARNG, through NGB, to the U.S. Army's Office of the Deputy Chief of Staff for Operations (ODCSOPS). In addition to maintaining key personnel and natural resources data collection efforts, the ITAM work plan budget will fund a number of projects of major importance to maintaining, preserving, and protecting the natural resources at EKTS-HV. The annual ITAM Work Plan is the basis for identifying installation ITAM resource requirements and for allocating funding to support installation core capabilities. ITAM funds cannot be used for:

- correcting environmental statutory compliance requirements;
- performing routine range maintenance, modifications, or Sustainment, Restoration, and Maintenance (SRM) responsibilities;
- performing Army Conservation Program requirements, such as PLSs; and;
- adding additional GIS data layers that are not a part of the ITAM requirement (DA, 2005).

8.1.2.2 OTHER FEDERAL FUNDS

The NRCS manages the Federal Domestic Assistance Program (Plant Materials for Conservation) that assembles, evaluates, selects, releases, and introduces into commerce and promotes the use of new and improved plant materials for soil, water, and related resource conservation and environmental improvement programs.

Program initiatives under the CWA provide funding through several sources. The USEPA's Office of Water sponsors those projects related to the CWA. Available funding may support programs such as cost-sharing for overall water-quality management (e.g., monitoring, permitting, and enforcement), lake water quality assessments and mitigation measures, and implementation of

non-point source pollution control measures. Refer to the USEPA's Office of Water funding website for potential sources of funding: http://www.epa.gov/ ater/funding.html.

The Legacy Resource Management Program provides financial assistance to DoD efforts to conserve natural and cultural resources on Federal lands. Legacy projects could include regional ecosystem management initiatives, habitat preservation efforts, archeological investigations, invasive species control, and/or flora or fauna surveys. Legacy funds are awarded based on national visibility. Project proposals are submitted to the program.

8.1.3 PRIORITIES AND SCHEDULING

The STEP database will be used to validate projects and determine funding priority. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. The DTC projects and schedules are listed in **Table** 37.

Recurring requirements include projects and activities needed to cover the recurring administrative, personnel, and other costs necessary to meet applicable compliance requirements (Federal and State laws, regulations, Presidential EOs, and DoD policies), or that are in direct support of the military mission. Recurring costs include manpower, training, supplies; hazardous waste disposal; operating recycling activities; permits and fees; testing, monitoring and/or sampling and analysis; reporting and record keeping; maintenance of environmental conservation equipment; and, compliance self-assessments.

Current compliance includes projects and activities needed because an installation is currently or will be out of compliance if projects or activities are not implemented in the current program year. Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential effects of the military mission on conservation resources;
- Planning documents;
- Baseline inventories and surveys of natural and cultural resources (historical and archaeological sites);
- Biological assessments, surveys, or habitat protection for a specific listed species;
- Mitigation to meet existing regulatory permit conditions or written agreements;
- Wetland delineations in support of subsequent jurisdictional determinations and consequent permitting;
- Efforts to achieve compliance with requirements with deadlines that have already passed;
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those projects and activities needed that are not currently out of compliance but would be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Examples include:

- Compliance with future requirements that have deadlines;
- Conservation and GIS mapping to be in compliance;
- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives;

- Wetlands enhancement, in order to achieve the EO for "no net loss" or to achieve enhancement of existing degraded wetlands;
- Public education programs on the importance of protecting archaeological and natural resources;
- Lower priority projects include those that enhance conservation resources of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature. These projects are generally funded after those of higher priority. Examples of lower priority projects include:
- Community outreach activities, such as "Earth Day" and "Historic Preservation Week" activities;
- Educational and public awareness projects, such as interpretive displays, oral histories, "Watchable Wildlife" areas, nature trails, wildlife checklists, and conservation teaching materials;
- Biological assessments, surveys, or habitat protection for a species;
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action;
- Re-interment of Native American remains on DoD managed or controlled land;
- Management and execution of volunteer and partnership programs.

8.2 NATURAL RESOURCES MANAGEMENT STAFFING

Natural resources program oversight and INRMP implementation is conducted through the KYARNG Environmental Office. Training for KYARNG personnel, as well as others participating in management of natural resources, will be practical and job-related. All training programs will involve at minimum a review of legal compliance requirements, applicable DoD/DA regulations, pertinent State and local laws, and current scientific and professional standards as related to the conservation of natural resources. The following annual workshops, professional conferences, and classes are excellent means of obtaining interdisciplinary training for natural resources managers:

- North American Wildlife and Natural Resources Conference
  http://www. wildlifemanagementinstitute.org/pages/main.html
- Defense Environmental Network Information Exchange (DENIX) http://www.denix.mil/;
- Army Training Support Center - http://www.atsc.army.mil/;
- National Military Fish and Wildlife Association - http://www.nmfwa.org/;
- USACE Wetland Delineation Courses - http://www.hnd.usace.army.mil/to/pindex.html;
- Locally-available training through the Cooperative Extension Service, universities, professional and trade organizations, State government, and commercial businesses.

Conferences and workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Personnel will be trained in related environmental fields, as appropriate. NEPA training will be required of all supervisory personnel and those who review or prepare NEPA documents.

8.3 REVIEW AND COORDINATION REQUIREMENTS

8.3.1 REVIEW FOR OPERATION AND EFFECT

Not less than every five years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented to meet the intent of the Sikes Act of contributing to the conservation and rehabilitation of natural resources at the DTC. The review will be conducted by the three cooperating parties to include the commander responsible for the INRMP, the Regional Director of the USFWS, and Director of the KDFRW. These agencies all have technical representatives who actually conduct the review.

The review for operation and effect will either conclude the INRMP is meeting the intent of the Sikes Act and it can be updated and implementation can continue; or that it is not effective in meeting the intent of the Sikes Act to conserve natural resources while providing for no net loss in training capability, and it must be revised. Mutual agreement of the review for operation and effect must be obtained from the Regional Director of the USFWS, and Director of the KDFWR. This may be achieved via a signed letter, a jointly executed memorandum, or in some other way that reflects mutual agreement.

If only minor updates are needed, they will be done in a manner agreed to by all parties. The updated INRMP will be reviewed by USFWS and KDFWR. A new NEPA review is not necessary for an update, and the existing INRMP can continue implementation, since it has previously undergone NEPA review. In this case, an Environmental Checklist and REC citing the previous NEPA document is needed.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and KDFWR concurrence on the revised INRMP is received. The KYARNG will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a more detailed review process similar to development of the initial INRMP to ensure KYARNG military mission, USFWS, and KDFWR concerns are adequately addressed and the plan meets the intention of the Sikes Act. Revisions will usually require a new NEPA analysis. An Environmental Assessment will be conducted as part of the revision process if determined necessary by KYARNG. Per DoD guidance, an INRMP update only needs to be available for public review if proposed actions “are expected to result in biophysical consequences materially different from those anticipated in the existing INRMP and are analyzed in an existing NEPA document.”

8.3.2 ANNUAL REVIEWS AND COORDINATION

Per DoD policy, the KYARNG reviews the INRMP annually in cooperation with the USFWS and KDFWR. The KYARNG will converse with the agencies annually to determine if changes or issues indicate the need for a meeting. If warranted, a meeting will be held with the USFWS and the KDFWR and documented by meeting minutes. If a meeting is not necessary, the conversation will be documented via email correspondence or record of conversation.

At this annual review, the need for updates or revisions will be discussed. If minor updates are needed, the requesting party will initiate the updates and, after agreement of all three parties, they will be added to the INRMP. If it is determined that major changes are needed, all three parties will provide input, and an INRMP revision and associated NEPA review will be initiated with the KYARNG acting as the lead coordinating agency. The annual meeting will be used to help expedite the more formal review for operation and effect and, if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual reviews, by the fourth year annual review a determination will be jointly made to continue implementation of the existing INRMP with minor updates or to proceed with a revision. If the parties feel the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

In accordance with the Army Guidance for Implementation of the SAIA, dated 25 May 2006, annual reviews shall at minimum verify that:

- Current information on INRMP conservation metrics as described in AEDB-EQ is available.
- All "must fund" projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP.
- All required coordination has occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.
- The INRMP goals and objectives are still valid.
- No net loss of training capability has occurred due to implementation of the INRMP in accordance with the Sikes Act.

As part of the annual review the KYARNG will specifically:

- Invite feedback from the USFWS and KDFWR on the effectiveness of the INRMP;
- Inform the USFWS and KDFWR which INRMP projects and activities are required to meet current natural resources compliance needs; and
- Document specific INRMP action accomplishments from the previous year.

Information for the annual reviews comes from the KYARNG environmental staff, KYARNG military leadership, cooperating agencies, project files, and Army Environmental Database Environmental Quality (AEDB-EQ) as applicable. Natural resources data and program and project information are available to cooperating agencies. They may request to see project folders or to have a site visit to view natural resources projects in progress at any time.

8.4 MONITORING INRMP IMPLEMENTATION

Conservation Metrics for Preparing and Implementing INRMPs were updated by the DUSD *Updated Guidance for Implementation of the Sikes Act Improvement Act.* Progress toward meeting these measures of merit is reported in the annual Environmental Quality Report (EQR) to Congress. Reporting requirements include:

- The installation name and state.
- The year the most recent INRMP was completed or revised.
- Date planned for the next revision.
- Was the INRMP coordinated with appropriate military trainers and operators?

- Were projects added to the INRMP as a result of comments from military trainers and operators?
- Were segments of the INRMP concerning the conservation, protection, and management of fish and wildlife resources agreed to by the USFWS Regional Director? (FWS coordination)
- Were projects added to the INRMP as a result of FWS comments?
- Has annual feedback been requested from the FWS?
- Has annual feedback been received from the FWS?
- Were segments of the INRMP concerning the conservation, protection, and management of fish and wildlife resources agreed to by the State fish and wildlife agency Director? (State coordination)
- Were projects added to the INRMP as a result of State comments?
- Has annual feedback been requested from the State fish and wildlife agency?
- Has annual feedback been received from the State fish and wildlife agency?
- Does the INRMP contain a list of projects necessary to meet plan goals and objectives, as well as timeframes for implementation of any such projects?
- Amount of money spent during reporting FY to implement the INRMP.
- Did the installation seek public comment on the draft INRMP?
- Were projects added to the INRMP as a result of public comments?

SECTION 9: BIBLIOGRAPHY

ABC,2000 — American Bird Conservancy. 2000. Partners in Flight Bird Conservation Plan for The Interior Low Plateaus (Physiographic Area 14).

ABC, unpublished report — American Bird Conservancy. Unpublished. Partners in Flight Bird Conservation Plan for The Northern Cumberland Plateau (Physiographic Area 21).

Barbour et al., 1 987 — Babour M.G., J.H. Burk, and W.D. Pitts, 1 987, Terrestrial Plant Ecology, The Benjamin/Cummings Publishing Company, Inc., Menlo Park, California.

Barnes, 1 995 — Barnes, T.G. 1995. Trees, Shrubs, and Vines that Attract Wildlife and Are Suitable for Kentucky landscapes. University of Kentucky Cooperative Extension Service, Lexington, Kentucky

Bower and Jackson, 1 981 — Bower, DE and WH Jackson. 1981. Drainage Areas of Streams at Selected Locations in Kentucky. Open File Report 81 -61. Geological Survey, United States Department of the Interior, Louisville, Kentucky.

Brent, 2001 — Brent, JE. 2001. Draft Integrated Cultural Resources Management Plan, Kentucky Army National Guard, Frankfort, Kentucky (draft July 2001). Kentucky Archaeological Survey, jointly administered by the University of Kentucky Department of Anthropology and the Kentucky Heritage Council. Report No. 43. Versailles, Kentucky.

Bryant et al., 1 993 — Bryant, W.S., W.C. McComb, and J.S. Fralish. 1 993. Appalachian Plateaus and Mountains in W.S. Martin, S. G. Boyce, and A.C. Echternacht (eds.) Biodiversity of the Southeastern United States. John Wiley and Sons, Inc. New York, New York.

CES, 1994 — Center for Earthquake Studies. 1 994. Major Earthquake Motion Intensity Map for Use with CUSEIS—Richter Magnitudes, Ms=7.0 to 7.9 Originating in the New Madrid Seismic Zone. Southeast Missouri State University, One University Plaza, Cape Girardeau, Missouri.

Cowardin et al., 1 979 — Cowardin, LM, V Carter, FC Golet, and ET LaRoe. 1 979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Washington, DC.

Cumbie et al., 2004 — Cumbie, D.H., C. Galceran Jr., J.S. Dinger, S.E. Webb. 2004. Evaluation of Water Quality at the Kentucky Army National Guard Artemus Training Site, Knox County. Prepared for the Kentucky Department of Military Affairs for fulfillment of Master Agreement M-021 7241 8.

DA,1987 — Department of the Army. 1987. FM (35) Engineer Field Data.

DA,1999 — Department of the Army. 1999. Integrated Training Area Management Procedural Manual Implementing Draft. U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland.

EL, 1987 — U.S. Army Corps of Engineers Environmental Laboratory. 1 987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.

Fenneman, 1 938 — Fenneman, NM. 1938. Physiography of the Eastern United States. McGraw-Hill Company, New York, New York.

Gravatt et al., 1999 — Gravatt, D, D Martel, M Bishop, A Bishop, S McAnally, S Sutton, M Mauney. 1999. Delineation of Wetlands and Other Regulated Waters, Artemus Training Site, KY. U.S. Army Engineer Research and Development Center, Waterways Experiment Station, CEERD-ER-W.

Harker et al., 1 993 — Harker, D, S Evans, M Evans, and K Harker. 1 993. Landscape Restoration Handbook. Lewis Publishers, Boca Raton, Florida.

IPEUS, 2007a — Invasive Plants of the Eastern U.S. 2007. Musk thistle. Accessed 21 August, 2007. http://www.invasive.0rg/eastern/bi0c0ntr0l/l 8MuskThis tle.html

IPEUS, 2007b — Invasive Plants of the Eastern U.S. 2007. Chinese/European Privet. Accessed 21 August 2007. http://www.invasive.org/eastern/srs/CP_EP.html

Johnston and Nava, 1984 — Johnston, AC and SJ Nava. 1 984. Recurrence Rates and Probability Estimates for the New Madrid Seismic Zone, in Proceedings of the Symposium on "The New Madrid Seismic Zone," U.S. Geol. Survey Open File Report 84-770, 279-329.

KDFWR, 2007 — Kentucky Department of Fish and Wildlife Resources. Species Information, Accessed 4 March, 2007. http://www.kdfwr.state.ky.us/kfwis/specieslnfo/speciesl nfo.asp

KDFWR, 2006 — Kentucky Department of Fish and Wildlife Resources. Accessed 6 Dec., 2006. Kentucky 2006-2007 Hunting and KDMA, 2001 Kentucky Department of Military Affairs. 2001. Bi-Annual Report for Fiscal Years 1 999 and 2000. Frankfort, Kentucky.

KDOW, 1993 — Kentucky Division of Water. 1993. Methods for Assessing Biological Integrity of Surface Waters. Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Department for Environmental Protection, Water Quality Branch, Ecological Support Section. Frankfort, Kentucky.

Trapping Guide, http://www.kdfwr.state.ky.us/ navigation.asp? cid=527&NavPath=Cl 51.

KDMA, 2001 — Kentucky Department of Military Affairs. 2001. Bi-annual Report for Fiscal Years 1 999 and 2000. Frankfort, Kentucky.

KEPPC, 2006 — Kentucky Exotic Pest Plant Council. Accessed 27 Nov., 2006. Invasive Exotic Plant List, http://www.se- eppc.org/ky/list.htm.

KEQC, 2001 — Kentucky Environmental Quality Commission. 2001. 2000-2001 State of Kentucky's Environment, A report on environmental trends and conditions. Prepared by Leslie Cole, Erik Siegel, and Lola Williamson Lyle. Frankfort, Kentucky.

Keystone Center, 1 996 — Keystone Center, The, 1 996, Keystone Center policy dialogue on a Department of Defense biodiversity management strategy: final report. The Keystone Center, Keystone, Colorado.

Kilburn et al., 1 962 — Kilburn, C., W.E. Price, and D.S. Mull. 1962. Availability of Ground Water in Bell, Clay, Jackson, Knox, Laurel, McCreary, Owsley, Rockcastle, and Whitley Counties, Kentucky. Hydrologic Investigations Atlas HA-38. US Geological Survey. Washington, D.C.

KSNPC,2006 — Kentucky State Nature Preserves Commission. 2006. Kentucky Rare Plant Database, Knox County. Last updated April 2006. Accessed 21 May, 2007. http://eppcapps.ky.gov/nprareplants/search.aspx7county y=%20Knox

KYARNG,1993 — Kentucky Army National Guard. 1993. Preliminary Assessment Screening: Land Acquisition and Utilization of the Artemus Training Site, Knox County, Kentucky. Commonwealth of Kentucky, Department of Military Affairs. Frankfort, Kentucky.

KYARNG,1994 — Kentucky Army National Guard. 1994. Final Environmental Assessment: Land Acquisition and Utilization of the Artemus Training Site, Knox County, Kentucky. Commonwealth of Kentucky, Department of Military Affairs. Frankfort, Kentucky.

Laudermilk et al., 1 993 — Laudermilk, E.L., B.A. Winters, S McMurray, and R.R. Cicerello. 1 993. Field Notes/Sorting Sheets from the Cumberland River at Artemus Training Site. Kentucky State Nature Preserves Commission. Frankfort, Kentucky.

Littlefield and Yahn, 2006 — Littlefield, T.R., and B.D. Yahn. 2006. Biological Inventory: Eastern Kentucky Training Site - Artemus, Knox County, Kentucky 2006 Update. Kentucky State Nature Preserves Commission.

Love, 1 988 — Love, P.M. 1988. Soil Survey of Knox County and Eastern Part of Whitley County, Kentucky. United States Department of Agriculture, Soil Conservation Service.

McClure, 1995 — McClure, MS 1995. Managing Hemlock Woolly Adelgid in Ornamental Landscapes. Connecticut Agricultural Experiment Station Bulletin 925. Windsor, Connecticut.

MDC, 2006 — Missouri Department of Conservation. Accessed 11 Dec., 2006. Missouri Vegetation Management Manual. Edited by T.E. Smith, Natural History Division, Missouri Department of Conservation, Jefferson City, Missouri, [updated 1 8 Sept., 2004]. http://mdc.mo.gov/nathis/exotic/vegman/

MDC, 2007 — Missouri Department of Conservation. Vegetation Management Guideline: Kudzu (Puereria lobata). http://mdc.mo.gov/nathis/exotic/vegman/fifteen.htm. Accessed 31 July, 2007.

Meffe & Caroil, 1 994 — Meffe, G.K. and C.R. Carroll, 1994, Principles of Conservation Biology, Sinauer Associates, Inc., Sunderland, MA.

Nakata Planning Group, 2002 — Nakata Planning Group. 2002. Real Property Development Plan, Kentucky Army National Guard, Submittal #2 (February 2002). Colorado Springs, Colorado.

NatureServe, 2007 — NatureServe, website accessed 04 March 2007. http://www.natureserve.org/explorer/.

PCA,2007a — Plant Conservation Alliance. 2007. Garlic Mustard. http://www.nps.gov/plants/alien/fact/alpel .htm

PCA, 2007b — Plant Conservation Alliance. 2007. Oriental Bittersweet. Accessed 21 August, 2007. http://www.nps.gov/plants/alien/fact/ceorl .htm

PSU,2004 — Pennsylvania State University. 2004. Managing Tree-of-heaven (Ailanthus altissima) on road sides. Accessed 21 August, 2007. http://vm.cas.psu.edu/Publications/FS_3_AILAL_v2.pdf

Reese and Ratti, 1 988 — Reese, K.P. and J.T. Ratti. 1988. Edge Effect: A Concept under Scrutiny. Transactions of the North American Wildlife and Natural Resources Conference 53: 127-1 36.

Rice, 1974 — Rice, D.D. 1974. Geologic Map of the Artemus Quadrangle, Bell and Knox Counties, Kentucky. United States Department of Interior, Geological Survey Map GQ 1207.

Science Daily, 2008 — *"Earthquake In Illinois Could Portend An Emerging Threat[1],* Science Daily News, 25 April 2008. Accessed via internet, 9 June 2008, http://www.sciencedaily.com/ releases/2008/04/0804241 71 35O.htm.

SEPPC, 2007 — Southeast Exotic Pest Plant Council, Chinese Yam. Accessed 21 August 2007. http://www.invasive.org/eastern/eppc/DIOP.html

SERCC,2007 — Southeast Regional Climate Center (SERCC). Historical Climate Summaries For Kentucky: Madisonville, KY (155067)- 6/1/1948 to 12/31/2005. Accessed 03 March 2007. http://www.dnr.sc.gov/climate/sercc/climateinfo/historical/historicaLky.html

UMCES, 2002 — University of Missouri-Columbia Extension Service. 2002. Noxious Weeds of Missouri, IPM 1014, Columbia, Missouri.

UMN Extension, 2007 — University of Minnesota Extension. Accessed 13 Feb., 2007. Wild cucumber and bur cucumber. Last updated October, 1 998. http://www.extension.umn.edu/yardandgarden/ygbriefs/h524cuke-wild-bur.html

USA-CERL, no date — U.S. Army Corps of Engineers Research Laboratory. V.E. Diersing, R.B. Shaw, S.D. Warren, and D.J. Tazik. No date. Criteria for Siting an Army Maneuver Installation: Natural Resource Considerations for Optimum Use. Champaign, Illinois.

U.S. Census Bureau, 2000 — U.S. Census Bureau. 2000. Statistical Abstract of the United States: The National Data Book. U.S. Department of Commerce, Economics and Statistics Administration. Washington, D.C.

USCHPPM, 1999 — U.S. Army Center for Health Promotion and Preventive Medicine-North. 1999. Integrated Pest Management Plan for Kentucky Army National Guard. Entomological Sciences Division. USCHPPM, Fort George G. Meade, Maryland.

USDA,2006 — U.S. Department of Agriculture. Last updated 30 June, 2006. Federal Noxious Weed List. Accessed 31 July, 2007. http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/index.shtml

USDA-NRCS, 1994 — USDA-Natural Resources Conservation Service. 1994. Resource Inventory and Conservation Plan, Kentucky Army National Guard, Eastern Kentucky Weekend Training Site, Powell County, Kentucky. U.S. Department of Agriculture, Lexington, Kentucky.

USEPA, 1 994 — U.S. Environmental Protection Agency. 1994. Integrated ecosystem protection research program: A conceptual plan, Working Draft, Washington, D.C.

USFS, 2007 — Hemlock Woolly Adelgid. Accessed 2 Jan., 2006. USDA Forest Service, Northeastern Area [updated 1 Dec., 2006]. http://www.na.fs.fed.us/fhp/hwa/.

USFWS, 2008 — U.S. Forest Service, Critical Habitat Designations, accessed via interned 04 June 2008, http://criticalhabitat.fws.gov/. Species profiles, accessed via internet 04 June 2008, http://ecos.fws.gov/speciesProfile/.

UK, 2006 — Townsend, L. and L. Rieske-Kinney. Accessed 7 Dec., 2006. Southern Pine Beetle. University of Kentucky Department of Entomology. http://www.uky.edu/Agriculture/Entomology/entfacts/trees/ef443.htm.

Weed Watch, 2007 — Weed Watch, Integrated Crop Management, Iowa State University Extension. Accessed 21 August 2007. http://www.ipm.iastate.edu/ipm/icm/2007/7-9/poison.html

White et al., 1995 — White, D, B Palmer-Ball, Jr., and E.L. Laudermilk. 1995. Biological Inventory: Eastern Kentucky Training Site-Artemus, Knox County, Kentucky. Kentucky State Nature Preserves Commission. Frankfort, Kentucky.

White and Laudermilk, 2002 — White, D.L. and E. Laudermilk. 2002. Update: Biological inventory: Eastern Kentucky Training Site - Artemus, Knox County, Kentucky. Prepared for Kentucky Department of Military Affairs.