NATIONAL TRAINING CENTER
AND FORT IRWIN

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

2006-2011

Natural and Cultural Resources Section
Environmental Division
Directorate of Public Works

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

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

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

National Training Center and Fort Irwin REVIEW

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PREFACE

World-Class Training for the World's Best Army- Now and for the 21st Century

- The National Training Center and Fort Irwin, California... the world's premier battlefield training installation.
- The National Training Center and Fort Irwin, California... home of some of the most fragile plant and wildlife communities in the nation and a keystone of the Mojave Desert ecosystem.

Two of the concerns that the NTC and Fort Irwin have are: training troops to win on battlefields around the globe and conserving the diverse natural resources present at Fort Irwin. The National Training Center and Fort Irwin is proving that the two missions are compatible.

The U.S. Army's National Training Center has been providing the world's most realistic, bloodless training battlefields since its inception in 1979. As proven in the Mideast deserts, training received at the NTC and Fort Irwin aids soldiers and other members of the U.S. Armed Forces to protect the American way of life. The mission of Fort Irwin has changed over the past six decades... anti-aircraft, armor, mechanized, and today's total battlefield training. However, training opportunities at the National Training Center and Fort Irwin are world-class today, even better than the superb training over past decades.

Imagine habitat for a complex ecosystem with hundreds of plant and animal species inhabiting 755.606 acres, with only seven year-round sources of water. Fort Irwin is a major player in the Mojave Desert Ecosystem Program and other regional initiatives. Some species found there are known from nowhere else in the world.

This Integrated Natural Resources Management Plan is the National Training Center and Fort Irwin's plan of action for the conservation of natural resources entrusted to the U.S. Army. The plan is for a five-year period, but the philosophy behind it is for a much longer period of time. The Training Center will conserve its biological diversity and make sound decisions regarding the use of natural resources to support the military mission and needs of the region and the nation.

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

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EXECUTIVE REPORT

"We do not own this land; we are caretakers of the land and the plant and animal species that inhabit it. The American people entrust the land to our care, and we shall fulfill their trust. We shall conserve and protect these resources for the future."[1]

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on the National Training Center and Fort Irwin, California (hereinafter called the NTC and Fort Irwin or Training Center) from 2006 through 2011. The program conserves the NTC and Fort Irwin's land and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP also helps ensure the maintenance of quality training lands to accomplish the NTC and Fort Irwin's critical military mission on a sustained basis and to ensure that natural resource conservation measures and Army activities on mission land are integrated and consistent with federal stewardship requirements.

Environmental Compliance

Preparation and implementation of this INRMP are required by the Sikes Act (16 U.S.C. 670a *et seq*.), Department of Defense Instruction 4715.3 (*Environmental Conservation Program*), Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), and Army Memorandum (21 March 1997), *Army Goals and Implementing Guidance for Natural Resources Planning Level Survey (PLS) and Integrated Natural Resources Management Plan (INRMP)*. This INRMP was prepared using *Guidelines to Prepare Integrated Natural Resources Management Plans for Army Installations and Activities* (U.S. Army Environmental Center, 1997), as modified by Forces Command[2]. This INRMP helps the NTC and Fort Irwin comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, air quality, and wildlife management in general. This plan describes how the NTC and Fort Irwin will implement provisions of AR 200-3 and local regulations, principally NTC Reg. 200-1 (*Environmental Protection and Enhancement at NTC*), NTC Reg. 420-3 (Hunting), and portions of NTC Reg. 350-3 (*Range Regulation*).

This INRMP has the signatory approval of the U.S. Fish and Wildlife Service. This signature approval includes agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

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

- Wildlife management, land management, and wildlife-oriented recreation;

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

[2] FORSCOM Memorandum. 26 June 97. Guidelines to Prepare Integrated Natural Resource Management Plans (INRMPs) for Army Installations and Activities.

- Fish and wildlife habitat enhancement or modifications;
- Wetland protection, enhancement, and restoration where necessary to support fish, wildlife, or plants;
- Integration of, and consistency among, the various activities conducted under the INRMP;
- Establishment of specific natural resource management goals and objectives and time frames for proposed actions;
- Training use of natural resources, by the public, to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- Enforcement of applicable natural resource laws;
- No net loss in the capability of military installation lands to support the military mission of the installation;
- Regular review of this INRMP and its effects, not less often than every five years;
- Exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- Priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish and wildlife.

The INRMP will address compliance with the following additional legal mandates:

National Environmental Policy Act of 1969
Endangered Species Act of 1973
National Historic Preservation Act of 1966 (as amended through 1992)
Archaeological Resources Protection Act of 1979
American Indian Religious Freedom Act of 1978
Native American Graves Protection and Repatriation Act of 1990
Federal Noxious Weed Act of 1974
Clean Water Act of 1978
Clean Air Act (as amended through 1990)
Federal Insecticide, Fungicide, and Rodenticide Act
Protection of Wetlands, 1977, Executive Order 11990
Migratory Bird Treaty Act of 1918
Executive Order 13112, Invasive Species

Scope

The INRMP will provide the basis and criteria for protecting and enhancing natural resources using watershed, landscape, and ecosystem perspectives, consistent with the military mission. The INRMP defines the level of management and provides the vehicle by which the Army participates in developing regional planning efforts under the West Mojave Coordinated Management Plan.

Fort Irwin is central to the Mojave Desert ecosystem. Fort Irwin's large size, its range of elevations, and its diverse geology foster exceptional biological diversity. Fort Irwin's location in the center of the Mojave Desert places it at a crossroads for the transmission of genetic material among populations and the emigration of species from neighboring deserts.

Provisions of the INRMP apply to each directorate, command, and tenant unit at the NTC and Fort Irwin (including the Active Army, Army National Guard, Army Reserve Component, contractors (government and private), private groups, spouses and dependents, and individuals who either directly or indirectly use

the installation's natural resources) as well as rotational commands, units, and outlying detachments of personnel assigned or attached to the installation. This INRMP is an integral part of the NTC and Fort Irwin Installation Master Plan.

Relationship to the Military Mission

Fort Irwin has been used for antiaircraft, armored, and mechanized training for regular Army and National Guard units since 1940. Fort Irwin was selected as the National Training Center for the U.S. Army in 1979. The NTC provides the critical edge in training brigade-level units in highly realistic combat situations. This facility is unique in the world and played a major role in the development of tactics and the training used successfully in Operation Desert Storm.

Battlefields, landing fields, target arrays, logistics corridors, storage areas, ranges, support areas, and safety buffer areas on the Training Center comprise a bloodless laboratory where American Army forces can test both soldiers and equipment to practice and perfect the principles of engagement for tomorrow's armed conflict. The area is also habitat for over 462 species of Mojave Desert plants and home to hundreds of species of animals. This document defines the constituents and establishes the methods by which natural resources management will be accomplished along with the military mission. The NTC and Fort Irwin military mission requires quality training lands, which involves considerable interaction with the installation's natural resources.

This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The INRMP also describes recreational opportunities associated with natural resources to the NTC and Fort Irwin community, thus supporting the Army commitment to both Quality of Life and Communities of Excellence programs.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate the NTC and Fort Irwin's military mission, nor does it replace any requirement for environmental documentation of the military mission at the Training Center.

Partnerships

This document was prepared in partnership and cooperation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG), representing the federal and state wildlife regulatory agencies, respectively. Additionally, because of their involvement in the preparation of the West Mojave Coordinated Management Plan, the Bureau of Land Management (BLM) played a significant role in data procurement, management assistance, and consultation in the production of this INRMP. Other partners in this effort include universities and other federal and state agencies.

Much data and information within this INRMP was compiled through the efforts of personnel associated with the Integrated Training Area Management (ITAM) program and Mojave Desert Ecosystem Program (MDEP). Implementation of projects contained herein, as well as the need for additional data to better define species ranges and impacts of military actions, will require the continued cooperation and assistance from ITAM and MDEP personnel.

Neighboring Department of Defense installations (Edwards Air Force Base, Marine Corps Air Ground Combat Center at Twenty-nine Palms, Marine Corps Logistics Base at Barstow, and Naval Air Weapons

Station at China Lake) provided advice, information, and suggestions to improve the document and resulting management strategies to improve ecosystem-wide segments of the INRMP. Finally, the natural resource, real property management, and mission operations staffs of U.S. Army Installation Management Agency, Fort Sam Houston, TX provided information and guidance to ensure the adequacy of the INRMP.

Planned Major Initiatives

This INRMP includes a description of ongoing and planned natural resources programs and projects at NTC and Fort Irwin. Most of these will either be continued or completed. The most significant projects within this INRMP include:

- Rehabilitating and protecting lands to support military training;
- Implementing an ecosystem management philosophy that provides biodiversity conservation;
- Monitoring flora, fauna, soils, and water quality;
- Implementing a geographic information system to allow better decisions regarding use and management of NTC and Fort Irwin natural resources;
- Protection of sensitive natural resources areas;
- Managing endangered species and their habitats to ensure compliance with the Endangered Species Act;
- Restoring eroded lands and affected habitats;
- Providing an effective integrated pest management program;
- Protecting and conserving wetlands;
- Informing soldiers and other members of the NTC and Fort Irwin community of the value of installation natural resources and means to conserve those resources;
- Implementing a comprehensive outdoor recreation program;
- Protecting cultural resources while conducting natural resources management; and
- Using National Environmental Policy Act (NEPA) to conserve natural resources.

Monitoring INRMP Implementation

US Army Installation Management Agency and other interested parties will evaluate the INRMP through monitoring programs, including the Environmental Compliance Assessment System, Army Compliance Testing System, and annual reviews. The list of INRMP goals and objectives in Appendix 16.4 can provide a basis for evaluating plan implementation.

The success of individual programs included in the INRMP will be evaluated by the effectiveness of programs in question. For example, the raven control program will be evaluated by the reduction in numbers of ravens in the landfill as well as the reduction in the amount of raven predation of desert tortoises in the wild. The ITAM program will be evaluated by the effectiveness of individual component programs.

Benefits

- **Military Mission Benefits:** Implementation of this INRMP will maintain the quality of training land. It will enhance mission realism through the perpetuation of more realistic training lands. It will

reduce maintenance costs and improve health and safety and the ability for long range planning at the NTC and Fort Irwin.

- **Environmental Benefits:** The INRMP provides the basis for the conservation and protection of natural resources. It will help reduce vegetation loss and soil erosion due to military activities. It will reduce the potential for environmental pollution. It will provide biodiversity conservation. Plan implementation will increase overall knowledge of the operation of the NTC and Fort Irwin ecosystem through surveys and research.
- **Other Benefits:** Troop environmental awareness will be enhanced while training at the NTC and Fort Irwin. Both community relations and the NTC and Fort Irwin's environmental image, internal and external to Defense, will be enhanced. Quality of life for the NTC and Fort Irwin community will be improved. INRMP implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

Summary

The INRMP outlines steps required to meet Department of Defense, U.S. Army, and Fort Irwin's legal and moral obligations to provide for the stewardship of the natural resources on the NTC and Fort Irwin while enabling the accomplishment of the military mission. The INRMP has been generated through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for the NTC and Fort Irwin, the U.S. Army, and the Department of Defense throughout the Mojave Desert ecosystem.

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1.0 GOALS, COMPLIANCE, STRATEGIES, AND COOPERATIVE PROGRAMS

Army Environmental Vision Statement

The Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission[3].

The Army's commitment to natural resources management is reflected in the U.S. Army Environmental Strategy into the 21st Century, which focuses on responsibly managing Army lands to ensure long-term natural resource productivity so the Army can achieve its mission. This Army commitment to natural resources management is emphasized in Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), which requires that Integrated Natural Resources Management Plans be developed and maintained for all Army installations.

This chapter discusses NTC and Fort Irwin overall strategies for managing natural resources as part of the installation mission. These are discussed in local, regional, and national contexts. Additionally, the chapter discusses the overall integration of NEPA documentation within this INRMP.

The Command and staff of the NTC and Fort Irwin are committed to environmental stewardship as an integral part of the mission at Fort Irwin. This commitment is evidenced by support of past environmental programs and their full support of this Integrated Natural Resource Management Plan.

It is important to understand the relationship between the natural resources program and the NTC and Fort Irwin as a whole. A comparison of NTC and Fort Irwin mission, vision, goals, and core values with the mission, goals, and objectives of the natural resources program helps identify this relationship.

1.1 The NTC Mission, Vision, Goals, and Core Values[4]

Mission

Provide tough, realistic, joint and combined arms training focused at the battalion task force and brigade level, to assist commander in developing trained, competent leaders and soldiers, while preparing units for success on the modern battlefield. Identify unit training deficiencies and provide necessary feedback to improve the force. Take care of soldiers, civilians, and family members. Keep pace with Army Transformation.

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

[4] *Fort Irwin, The National Training Center*, a color brochure provided by the Public Affairs Office, NTC and Fort Irwin, CA.

Vision

The National Training Center and Fort Irwin is an enduring installation dedicated to provide a realistic training environment focused on honing warfighting skills of soldiers and leaders in a force projection army for the 21st Century battlefield, while providing quality of life for soldiers, civilians, and family members.

Goals

- Train the force.
- Develop the National Training Center as a realistic training environment and an enduring installation.
- Provide quality of life for the entire Fort Irwin community.

Core Values

World-Class Training for the World's Best Army- Now and for the 21st Century

- Customer Service
- Standards
- Learning Environment
- Professional Competency
- Stewardship
- Sense of Community

1.2 NTC and Fort Irwin Natural Resources Mission, General Goals, and General Objectives

Mission

Provide professional management and stewardship of natural resources at the National Training Center and Fort Irwin while providing opportunities for multiple compatible uses of natural resources, complying with environmental laws and supporting the military mission.

Below are general NTC and Fort Irwin natural resources goals and objectives used to attain them. These objectives, and those more specific in chapters 8-14, serve as a checklist to monitor the success of the INRMP. Some objectives fit more than one category. When this occurs, the most-fitting category was chosen.

Goal 1. Provide quality natural resources as a critical training asset upon which to accomplish the military mission of the NTC and Fort Irwin.

Objective 1. Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on the NTC and Fort Irwin.

Objective 2. Maintain high quality training lands through range monitoring and damage minimization, mitigation, and rehabilitation (*i.e.*, execution of the Integrated Training Area Management program).

Goal 2. Comply with laws and regulations that pertain to management of NTC and Fort Irwin natural resources.

Objective 1. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

Objective 2. Protect, restore, and manage sensitive species and wetlands.

Objective 3. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

Objective 4. Ensure NTC and Fort Irwin's natural resources program is consistent with the protection of cultural and historic resources.

Objective 5. Implement this INRMP within the framework of Army policies and regulations.

Objective 6. Protect and manage threatened and endangered species and critical habitat in accordance with the Endangered Species Act, NEPA, AR 200-3, DoD Directive 4715.3, USFWS regulations and agreements, and other applicable laws or guidance from higher headquarters. Follow the NTC ESMP (Endangered Species Management Plan), which directs the management of federally-listed threatened and endangered species. Consider species listed by the State of California in the natural resources management program, and comply with the California Environmental Quality Act (CEQA).

Goal 3. Manage natural resources on the NTC and Fort Irwin to assure good stewardship of public lands entrusted to the care of the Army.

Objective 1. Use adaptive ecosystem management strategies to protect, conserve, and enhance native fauna and flora.

Objective 2. Monitor and manage soils, water, vegetation, and wildlife on the NTC and Fort Irwin with a consideration for all biological communities and human values associated with these resources.

Objective 3. Manage leased out military lands (*i.e.*, the Goldstone Complex) to protect and enhance their natural resources.

Objective 4. Ensure the NTC and Fort Irwin natural resources program is coordinated with installation organizations, other agencies, and conservation organizations with similar interests.

Goal 4. Improve the quality of life of the Fort Irwin community through quality natural resources-based recreation opportunities.

Objective 1. Provide opportunities for outdoor recreation, such as hunting, picnicking, camping, nature study, equestrian activities, etc.

Objective 2. Provide conservation education opportunities.

1.3 Support of Installation Goals

Implementation of this INRMP will support the mission, vision, goals, and core values of the NTC and Fort Irwin. The natural resources/ITAM team at the NTC and Fort Irwin is committed to supporting the military mission, providing stewardship of resources entrusted to the Army, enhancing the quality of life of the Fort Irwin community, and being a valued member of the overall NTC and Fort Irwin team. Implementation of this INRMP will demonstrate those qualities.

1.4 Compliance Requirements

DoD Instruction 4715.3 and AR 200-3 require that integrated natural resource management plans be developed and maintained for DoD and Army lands. Other pertinent regulations and legislation relevant to natural resources management are listed below.

Public Law 85-624	Fish and Wildlife Coordination Act
Public Law 96-561	Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation: Amends Public Law 86-797 (Sikes Act)
Public Law 94-579	Federal Land Policy and Management Act of 1976
Public Law 89-669	Fish and Wildlife Conservation Act
Public Law 90-465	Conservation Programs on Military Reservations
Public Law 93-205	Endangered Species Act of 1973, as amended
Public Law 95-632	Endangered Species Act of 1973 (1978 amendments)
Public Law 86-70	Bald Eagle Protection Act, as amended
Public Law 93-366	Non-game Act
Public Law 91-190	National Environmental Policy Act
Public Law 92-522	Federal Water Pollution Control Act Amendments of 1972
Public Law 90-583	Noxious Plant Control Act
Public Law 93-629	Federal Noxious Weed Act of 1973
Public Law 93-452	Conservation and Rehabilitation Program on Military and Public Lands
Public Law 93-408	Youth Conservation Corps Act of 1972, amended
Public Law 95-524	Comprehensive Employment and Training Act Amendments 1978
Title 16 U.S. Code 703-711	Migratory Bird Species Act
Title 10 U.S. Code 2667	Leased, Non-excess Property
Title 10 U.S. Code 2671	Military Reservations and Facilities
Title 16 U.S. Code 590	Soil Conservation
Title 16 U.S. Code 1271	National Trails System Act of 1968
Executive Order 11991	Protection and Enhancement of Environmental Quality: Amends Executive Order 11514
Executive Order 11989	Off-Road Vehicles on Public Lands
Executive Order 12608	Protection of Wetlands: Amends Executive Order 11990
Executive Order 13045	Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13112	Invasive Species
Executive Order 12902	Energy Efficiency and Water Conservation at Federal Facilities
Executive Order 131148	Environmentally and economically beneficial practices on federal landscaped grounds
DoD Instruction 4715.3	Environmental Conservation Program
DoD Directive 6050.2	Use of Off-Road Vehicles on DoD Lands
DoD Instruction 5000.13	Natural Resources
AR 200-1	Environmental Protection and Enhancement
AR 200-2	Environmental Effects of Army Action (NEPA)
AR 200-3	Natural Resources, Land, Forest, and Wildlife Management:
AR 350-4	Integrated Training Area Management (ITAM)
NTC Reg. 200-1	Environmental Protection and Enhancement at NTC
NTC Reg. 350-3	Range Regulation
NTC Reg. 420-3	Hunting

The California Environmental Quality Act (CEQA) is a state law requiring public agency decision-makers to document and consider the environmental implications of their actions. CEQA applies to all government agencies in California, including the NTC and Fort Irwin. Unlike NEPA, CEQA is not a procedural statute. It contains substantive provisions requiring agencies to deny approval of a project with significant adverse effects when feasible alternatives or feasible mitigation measures can substantially lessen such effects.

1.5 Biodiversity Conservation and Ecosystem Management

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels including ecosystem diversity, species diversity, and genetic diversity. The Department of Defense has developed *A Department of Defense (DoD) Biodiversity Management Strategy* (The Keystone Center, 1996). This Strategy identifies five reasons to conserve biodiversity on military lands:

(1) ***Sustain natural landscapes*** required for the training and testing necessary to maintain military readiness;
(2) ***Provide the greatest return on the Defense investment*** to preserve and protect the environment;
(3) ***Expedite the compliance process*** and help avoid conflicts;
(4) ***Engender public support*** for the military mission; and
(5) ***Improve the quality of life*** for military personnel.

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

- Support the military mission;
- Use joint planning between natural resources managers and military operations personnel;
- Integrate biodiversity conservation into INRMP, ITAM, and other planning protocols;
- Involve internal and external stakeholders up front;
- Emphasize the regional (ecosystem) context;
- Use adaptive management;

- Involve scientists and use the best science available; and
- Concentrate on results.

The Department of Defense (DoD Instruction 4715.3, *Environmental Conservation Program*) describes ecosystem management as, "*a process that considers the environment as a complex system functioning as a whole, not a collection of parts, and recognizes that people and their social and economic needs are a part of the whole*". The Department of Defense goal with regard to ecosystem management is, *"To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations*."

U.S. Army Forces Command (FORSCOM) has published an ecosystem management policy[5], which expands on Department of Defense principles and guidelines. Some important policies applicable to the NTC and Fort Irwin include:

- Emphasize native plants, especially indicator species (*e.g.* endangered species).
- Planning should be at the land association or land type scale while management should be at the training area or watershed scale. Care should be taken to prevent creation of island populations, which deplete gene pools.
- Commodity production shall be a tertiary consideration. Primary goals are to support the military mission while protecting endangered species and their habitat.
- It is critical to establish a regional consortium of all potentially affected parties.
- Adaptive management is a critical aspect of ecosystem management.
- The installation Master Plan must serve as the umbrella plan for integration of all other installation plans, including the INRMP.
- None of the current conservation management tools are to be categorically excluded from use.

The NTC and Fort Irwin will use ecosystem management to guide its program in the next five years and beyond. This management strategy enables the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Adaptive management is an important component of ecosystem management. Adaptive management involves implementing the best option, testing that option's results, and modifying implementation accordingly.

1.6 Regional Cooperative Programs

The following regional land use or planning initiatives potentially influence natural resources management at the NTC and Fort Irwin:

Desert Tortoise Recovery Plan. The objective of this USFWS recovery plan is to delineate reasonable actions that are required to protect, recover, and eventually de-list the desert tortoise *(Gopherus agassizii)*. Actions needed to accomplish the recovery of this species include protection and conservation of existing

[5] FORSCOM Policy Memorandum 200-97-1, 1997, *Implementation of Ecosystem Management*.

populations and habitat, development and implementation of management plans, environmental education to inform the public of the status of the desert tortoise, and research to monitor and guide the recovery of this species (USFWS, 1994). The natural resources staff has integrated these actions into their natural resources management strategy.

The desert tortoise was listed as a threatened species in April 1990. The recovery plan outlining actions needed to recover and protect the species was finalized in 1994. In 1993, 25,000 acres on the NTC and Fort Irwin were placed off-limits due to presumed high levels of desert tortoise. In 1995 this area was designated critical habitat by the USFWS. The land expansion process, currently being negotiated with the USFWS, will allow the Army to train on designated critical habitat within the expanded NTC. To mitigate for this loss of tortoises and habitat, the Army will translocate tortoises from southern and western expansion areas to safe refugia, will purchase high quality tortoise habitat to serve as refugia, and will take additional steps suggested by the USFWS to protect the long-term survival of the desert tortoise.

California Desert Conservation Area Plan. Section 601 of the Federal Land Policy and Management Act of 1976 requires the BLM to develop a plan for long-term protection and administration of public lands in the California desert. FLPMA requires this plan, called the California Desert Conservation Area Plan, to take into account multiple use management and sustained yield principles in providing for resource use and development, including maintenance of environmental quality, rights-of-way, and mineral development. The California Desert Conservation Plan was finalized in 1980 and establishes general guidance for management of all BLM-administered lands in the California desert (Bureau of Land Management, 1997).

West Mojave Coordinated Management Plan. The West Mojave Coordinated Management Plan is a comprehensive, interagency planning effort for the conservation of biological resources in the West Mojave region. In 1992 agencies within the West Mojave planning area established a multi-agency team for preparing this plan with BLM designated as the lead agency. The West Mojave Coordinated Management Plan is a cooperative effort involving many different agencies:

- Five military installations (NTC and Fort Irwin, Naval Air Weapons Station China Lake, Edwards Air Force Base (AFB), Marine Corps Logistics Base in Yermo, and Marine Corps Air Ground Combat Center Twenty-nine Palms);
- Five federal managers (BLM, National Aeronautics and Space Administration Goldstone Deep Space Communication Complex, National Park Service (NPS), U.S. Geological Survey (USGS) Biological Resources Division, and Boron Prison);
- Six State of California agencies (Department of Transportation, Energy Commission, CDFG, Department of Parks and Recreation, State Lands Commission, and the University of California Reserve System);
- One special district (Indian Wells Valley Water District);
- Five counties (Inyo, Kern, Los Angeles, Riverside, and San Bernardino); and
- 11 incorporated towns and cities (Adelanto, Apple Valley, Barstow, California City, Hesperia, Lancaster, Palmdale, Ridgecrest, Twenty-nine Palms, Victorville, and Yucca Valley).

The West Mojave Coordinated Management Plan[6] will provide a consistent and streamlined regional program for compliance with the California and federal endangered species acts. Products of the West

[6] Memorandum: Steering Committee Meeting; Proposed Task Group Process, to Steering Committee from Bill Haigh, Project Manager, August 14, 1998.

Mojave Plan will be programmatic incidental take permits and biological opinions, as appropriate, issued to participating cities, counties, and state and federal agencies by the CDFG and the USFWS. Incidental take permits and biological opinions will set forth a program for mitigating and minimizing impacts to species listed as endangered, threatened, or rare under the California Endangered Species Act and the federal Endangered Species Act. Each incidental take permit or biological opinion will identify choices of mitigation measures which can be implemented by project proponents seeking discretionary permits from the participating agencies. Plants and animals for which such measures and/or fees are required are to be covered by the West Mojave Plan.

The West Mojave Plan is also developing measures to mitigate impacts to unlisted plants and animals. These can be adopted by participating agencies through the mechanism of pre-listing agreements. An agency, which executes a pre-listing agreement with CDFG or USFWS, is assured that in the event the species is later listed, no additional measures (barring unforeseen circumstances) will need to be adopted. From the time the pre-listing agreement is executed, the species involved receives coverage from CDFG and/or USFWS.

The first draft of the West Mojave Plan (BLM 2003a) describes a habitat conservation plan as its preferred alternative, and lists six additional alternatives. DoD installations in the West Mojave will support the West Mojave Plan to the extent that it does not conflict with the military mission. Natural resources management decisions made by the NTC and Fort Irwin will be influenced by opinions of regional agencies, but implementation of the INRMP is the compliance requirement for Defense installations with regard to natural resources planning and implementation.

Northern and Eastern Mojave Planning Effort. The Northern and Eastern Mojave Planning Effort will provide a regional perspective for the management of federal lands and will update agency-specific management plans to reflect changes made by the California Desert Protection Act of 1994. The Northern and Eastern Mojave interagency planning team consists of representatives from the National Park Service, BLM, and USFWS. Cooperating agencies include the Bureau of Indian Affairs; NTC and Fort Irwin; Naval Air Weapons Station China Lake; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; CDFG; California State Parks; California Department of Transportation; State Lands Commission; California State Historic Preservation Office; Nevada State Historic Preservation Office; San Bernardino, Inyo, and Mono counties in California; Clark, Nye, and Esmeralda counties in Nevada; and the Timbisha/Shoshone, Mojave, and Chemehuevi Native American Tribal Councils. The draft Northern and Eastern Mojave Desert Management Plan (BLM 2003b) describes alternatives and contains an EIS analyzing these alternatives.

The Training Center's eastern boundary is the western boundary of the Northern and Eastern Mojave Planning Effort. As a result of the land expansion process discussed in Section 2.2, the NTC and Fort Irwin is becoming an active partner in this project

Mojave Desert Ecosystem Program. The Mojave Desert Ecosystem Program (MDEP) is a regional planning program in the Mojave Desert. Objectives of the program are to connect environmental databases at the five military installations in the Mojave Desert with those residing at various Department of the Interior; other federal land agencies; and regionally associated state, county, and local government agencies, academic institutions, and private organizations. The ecosystem database will be maintained on a Geographic Information System (GIS). Participants in the MDEP are:

- Department of Defense: NTC and Fort Irwin, Naval Air Weapons Station China Lake, Edwards AFB, Nellis AFB, MCAGCC Twenty-nine Palms, and Marine Corps Logistics Base at Barstow; and
- Department of Interior: BLM, National Park Service, USFWS, USGS Biological Resources Division (formerly the National Biological Service), U.S. Bureau of Mines.

California Desert Manager's Group. The California Desert Manager's Group meets quarterly. The MDEP DoD Coordinator is the DoD co-chair and a voting member of this Group. This Group originated as part of the California Innovative Laboratory with membership from each BLM District and each National Park. Military participation was invited when the MDEP (then an Initiative) was formed under the DoD.

1.7 Integrated Training Area Management

Integrated Training Area Management (ITAM) is an Army-wide program to provide quality training environments to support the Army's military mission. The ITAM program was initiated with the realization that Army training lands were being degraded to the point where their capabilities to sustain military missions were in jeopardy. ITAM, as part of the Sustainable Range Program, provides Army range managers with the capabilities to manage and maintain training lands by integrating mission requirements with environmental requirements and environmental management practices. ITAM includes inventorying and monitoring land conditions, integrating training requirements with training land carrying capacity, educating land users to minimize adverse impacts, providing for training land rehabilitation, and providing standard Geographic Information System (GIS) mapping and spatial analysis capabilities.

The ITAM program at the NTC and Fort Irwin was begun in 1990 and was the responsibility of the Directorate of Public Works (DPW). In 1995 proponency of this program changed from DPW to G3-Training, consistent with Army-wide changes.

A geographic information system (GIS) was fielded at the NTC and Fort Irwin by the ITAM program in 1992. A GIS is an organized collection of computer hardware, software, spatial data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information. The ITAM program maintains an extensive collection of spatial data for NTC and Fort Irwin including soils, surface hydrology, wildlife distribution, vegetation, transportation system, topography, archaeology, cultural resources, and special features involving natural resources management programs as well as training-related data layers.

The ITAM program includes the following five component areas (modified from *Sustainable Range Program* (Draft AR 350-XX, Office of the Deputy Chief of Staff for Operations and Plans, 2003)):

- The Training Requirements Integration (TRI) component is a decision support procedure that integrates NTC and Fort Irwin military training requirements for land use with natural resources conditions and capabilities to support these requirements.
- The Range and Training Land Assessment (RTLA) component is used to inventory and monitor the long-term effects of military activities on the physical and biological resources of the NTC and Fort Irwin.
- The Geographical Information System (GIS) component provides centralized access to spatial data, cartographic support, and spatial analysis to support both training land managers and natural resource managers.

- The Sustainable Range Awareness (SRA) component improves land user understanding of the impacts of their activities on the environment and educates land users to avoid unnecessary damage to the training land.
- The Land Rehabilitation and Maintenance (LRAM) component includes programming, planning, designing, and executing land rehabilitation and maintenance projects to support and sustain the military mission.

As part of the ITAM budgetary and planning process, NTC and Fort Irwin has been designated a Category I installation. Category I installations are the largest installations, with most critical training missions, and with greatest environmental sensitivities to missions.

Goals and objectives specific to ITAM are found in the ITAM Program Strategy, Section 2.1 (Office of the Deputy Chief of Staff for Operations and Plans, 1995). These are incorporated into objectives within this INRMP. ITAM program components are described in sections 8.1.1 – *Range and Training Land Assesment*, 9.1 - *Coordinated Planning*, 9.8 - *Land Rehabilitation and Maintenance*, 9.13 - *Training Requirements Integration*, 11.1 - *Military Personnel Awareness*, and 16.3.2 - *Geographic Information System*. The NTC and Fort Irwin ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000) includes ITAM projects for FY 01 through FY 05, the ITAM 5 Year Plan was revised and updated in 2005 to complement the INRMP, the Range Development Plan (RDP), and the Installation Master Plan.

1.8 INRMP and NEPA Integration

This INRMP includes an Environmental Assessment (EA). This section describes the general layout of the integration between the INRMP and the documentation needed to comply with the National Environmental Policy Act (NEPA) of 1969.

1.8.1 Purpose, Need, and Rationale

The NTC and Fort Irwin proposes to implement its Integrated Natural Resources Management Plan 2006-2011 at Fort Irwin, California. The purpose of the EA is to analyze the INRMP and identify any potentially significant environmental effects. This is in accordance with NEPA, the Council on Environmental Quality regulations, and Army Regulation (AR) 200-2, *Environmental Analysis of Army Actions* (29 March 2002).

AR 200-2 is the regulation the Army uses to establish policy, procedures, and responsibilities for assessing environmental effects of Army actions. AR 200-2 specifically states that development of management plans, including natural resource management plans, requires the preparation of an Environmental Assessment.

The Department of Defense (DoD) now requires that NEPA documentation be included in the management plan in order to reduce repetition of effort, time delays, and increased cost. The Council on Environmental Quality (CEQ) regulations allows NEPA documents to be combined with other agency documents to reduce paperwork and duplication (40 CFR 1506.4). These regulations encourage agencies to focus on the purpose of NEPA analysis - better decision-making.

To streamline this process and alleviate drawbacks associated with preparing separate documents, this INRMP and its associated NEPA analysis have been combined into a single document. This integration satisfies the requirements of AR 200-2 and AR 200-3, as well as supports the intent and spirit of NEPA.

This combined INRMP/EA documents existing natural resources practices and can be used as an effective tool for future planning and decision-making purposes.

A discussion of alternatives is within each section in Chapters 8 through 14. Each management program is discussed under the two contexts of the Proposed Action and Other Management Options. Environmental consequences of implementing this plan are in Chapter 17. The Finding of No Significant Impact (FONSI) is in Appendix 17.8.

1.8.2 Scope

The proposed action is restricted to implementation of the INRMP. Environmental effects of implementing this plan on the NTC and Fort Irwin are the focus of environmental assessment aspects integrated into this plan.

1.8.3 Impact Analysis

The analysis process involved the review of installation natural resources-related data collected by the NTC and Fort Irwin, other governmental agencies, and private organizations. The process involved interviews with NTC and Fort Irwin personnel responsible for natural resources management, military mission planning, outdoor recreation, and installation maintenance.

1.8.4 Alternatives

There are issues that will not be considered in alternative analyses sections as they take precedence over almost all management options. First and foremost, NTC and Fort Irwin's military mission must not be compromised. Therefore, options, such as removing large valley-floor areas from maneuver training that would inhibit the installation from performing its mission, will not be considered. The exception would be the adoption of restrictions or alterations to standard operating procedures to comply with laws, such as the Endangered Species Act (ESA).

Second, the issues of safety and security must not be compromised. Safety and security are high priorities at the NTC and Fort Irwin and are directly related to maintaining the military mission. Therefore, management options, such as opening the Training Center to unrestricted access for hunting or off-highway vehicles will not be considered.

1.8.4.1 Proposed Action

The NTC and Fort Irwin proposes to fully implement its INRMP, 2006-2011 as partial mitigation for environmental effects of the military mission. This plan presents information on the management of natural resources on the NTC and Fort Irwin. It also describes the setting, defines land management units, and describes how these units will be managed to sustain ecological functions, protect endangered and other wildlife species, provide sustained military use, and support outdoor recreational uses. Major emphasis will be placed on proactive management to reduce the potential for negative environmental impacts due to the installation’s military mission.

1.8.4.2 Compliance Alternative

The Compliance Alternative is to implement portions of the INRMP to maintain compliance with laws. Compliance with laws, such as the ESA, Clean Water Act (CWA), and NEPA, would ensure implementation of some programs but would ignore other programs within the INRMP.

Passage of the Sikes Act in 1997 requires INRMPs to include programs such as fish and wildlife, land, and forest management; fish-and wildlife-oriented recreation; fish and wildlife habitat management; sustainable public use of natural resources; etc. (see Executive Report). The Sikes Act further requires implementation of programs identified within the INRMP. Therefore, each program within the INRMP is compliance driven. Thus, the compliance alternative is not viable as it is identical to the Proposed Action of full implementation of the INRMP. This alternative will not be further discussed in analysis sections.

1.8.4.3 Other Management Options

Virtually every major natural resources program at the NTC and Fort Irwin (wildlife, ITAM, pest management, etc.) has many options other than ones selected for the INRMP. For example, there are many different strategies with regard to desert ecosystem rehabilitation, just as there are numerous options for monitoring training lands and a wide variety of wildlife water devices. As inherent with integrated programs, many of these interact with each other. For example, changing the fire protection policy from 100% protection to let-burn would drastically affect vegetative and faunal resources, and impacts would be different among plant and animal species.

Possible options create almost countless potential combinations, each of which could be an alternative to the proposed action. Various laws, compliance documents, Army regulations, etc. prohibit the implementation of many of these possibilities. For example, intensive training on critical habitat is not a viable option due to public law and Department of Army policy. On the other hand, selecting management techniques for rehabilitating damaged land is an option, and there are many choices. The same would be true of changing the monitoring program for vegetation condition trends or changing the wildlife water program.

This Other Management Options alternative will be discussed as the alternative action following each management section. Environmental Assessments do not focus on alternatives as much as Environmental Impact Statements. Thus, discussions will often be somewhat general and brief.

1.8.4.4 No Action

The No Action alternative would be to not manage natural resources on the NTC and Fort Irwin. This is not a viable alternative. Laws and Executive Orders on endangered species, water quality, federal land management, outdoor recreation, wetlands, etc., as well as DoD and Department of Army (DA) policies, preclude the No Action alternative. This alternative will not be further discussed.

2.0 LOCATION AND ACREAGE

2.1 Location and Neighbors

The NTC and Fort Irwin is located in the central Mojave Desert approximately 38 miles northeast of Barstow in San Bernardino County, California (Figure 2.1). The installation is bordered on the west by China Lake Naval Air Weapons Station, by Death Valley National Park and a small strip of BLM land on the north, by BLM wilderness study areas and by the Silurain Valley on the east, and by the Alvord Mountains on the south. The land to the south is mostly BLM land with small, interspersed parcels of privately owned land. Fort Irwin Road is the only paved road that provides access to the NTC, intersecting with Interstate 15 approximatly 37 miles (59.5 km) to the south. Interstate 15 provides the major east-west travel route linking Los Angeles and Las Vegas. The majority of Fort Irwin's civilian work force resides in Barstow and the City of Yermo to the east of Barstow.

2.2 Acreage, Acquisition, and Expansion Lands

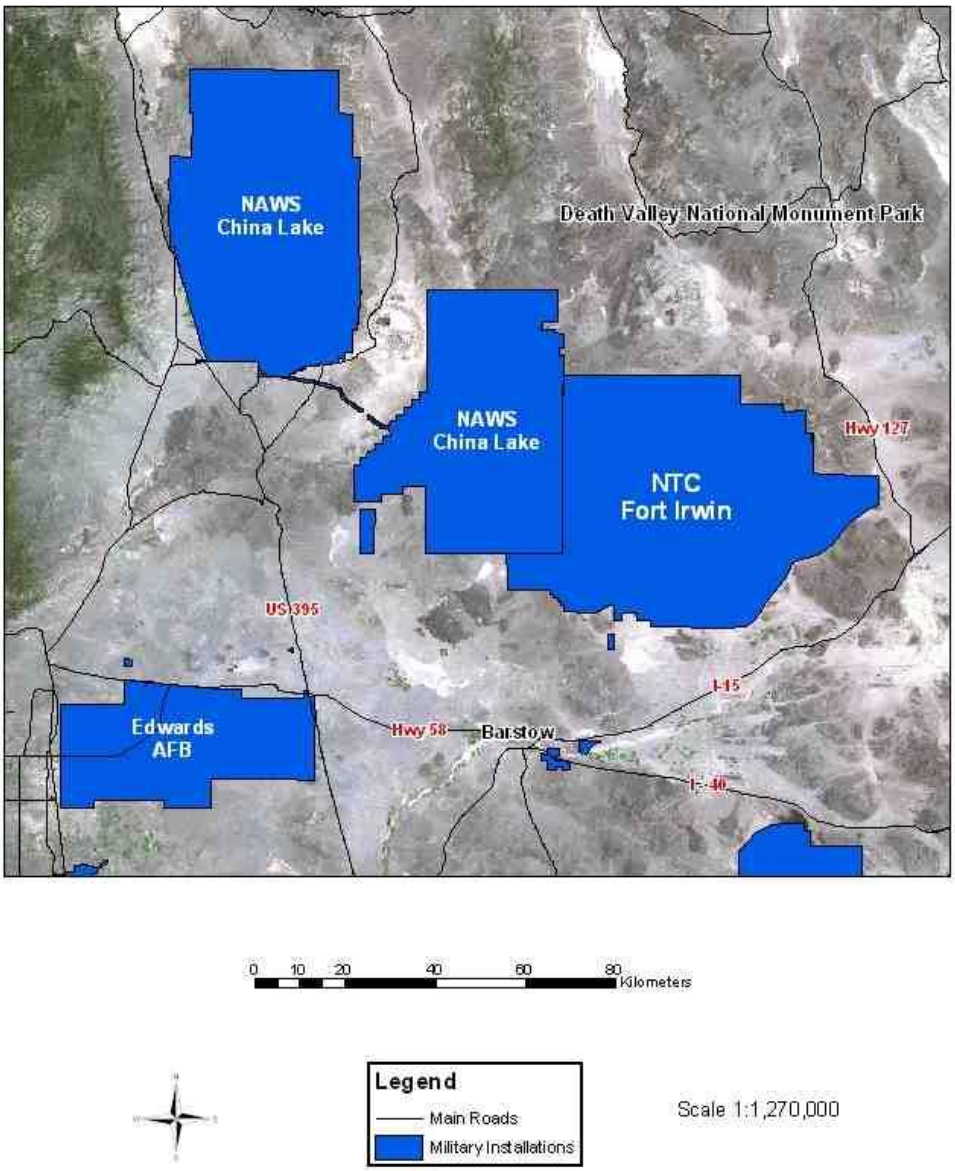
Through the years Congress has continued to acquire the lands making up present-day Fort Irwin from public and private use. The NTC and Fort Irwin occupies 755,606 acres (305,783 hectares). Included in this acreage are the eastern and western land expansion areas that came under the proprietorship of the Army in 2001. This 118,674-acre area cannot be used for military training until NEPA (National Environmental Protection Act) regulatory requirements have been completed.

Of the total acreage, 402,223 acres (53% of the total) are not available for military maneuvers, the most critical factor within of the Training Center military mission. The following areas are not available for maneuver (U.S. Army, NTC and Fort Irwin, 1997a; Charis Corporation, 2003):

Leach Lake Gunnery Range	92,625 acres	(37,484 hectares)
Goldstone Complex	33,241 acres	(13,452 hectares)
Cantonment Area	15,314 acres	(6,197 hectares)
Non-trafficable (>20% slope)	139,631 acres	(56,507 hectares)
Environmental off-limits	23,971 acres	(9,701 hectares)
Archeological off-limits	3,250 acres	(1,315 hectares)
Recreational Area	7,166 acres	(2,900 hectares)
Total	402,223acres	(162,774 hectares)

The NTC and Fort Irwin is in the process of expanding its boundaries so that it can improve its military training mission to provide realistic training to entire brigades or Units of Action (UOA). The expansion process began in the 1980s. Several aternative land expansions have been proposed. The description of the need for additional training areas and the expansion alternatives are summarized in Charis (2003). On January 11, 2002, President George W. Bush signed the Fort Irwin Military Lands Withdrawl Act of 2001 (Public Law 107-107) into law. This legislation withdrew approximately 110,000 acres of land, formerly managed by the BLM, for military use. Subsequent surveys and GIS analysis indicated that the proposed expansion area covers 118,674 acres, including 70,045 acres in the Western Expansion (Superior Valley) and 48,629 acres in the Eastern Expansion (East Gate).

Figure 2.1: Location of the National Training Center and Fort Irwin, California



Map Produced by D.P.W. July 2003

2.3 Installation History

In 1940 President Roosevelt withdrew lands for War Department use to establish an anti-aircraft firing range by Executive Order 8507. The Mojave Anti-Aircraft Range (Camp MAAR) was activated on August 8, 1940, and soldiers first occupied the post during June 1941. On November 4, 1942 the reservation was renamed Camp Irwin after Major General George Leroy Irwin, Commander of the 57th Field Artillery Brigade during World War I. During World War II the camp trained soldiers for deployment to various theaters of war and was the holding area for prisoners of war from the European Theater. The post was put on surplus status on September 8, 1947, and the property was transferred to the War Assets Administration on October 13, 1948.

Camp Irwin was reactivated on July 16, 1951 for the Korean Conflict and was under the command of the Sixth Army, headquartered at the Presidio in San Francisco, California. Camp Irwin was redesignated as the Fort Irwin Armor and Desert Training Center on August 1, 1961, and the status of the installation was upgraded to a permanent Class I installation. Fort Irwin was again closed in January 1971 and placed into caretaker status under the jurisdiction of the California Army National Guard. In August 1979 Fort Irwin was selected as the site for the Army's National Training Center. The U.S. Army resumed operation of Fort Irwin in January 1981. The first NTC training exercise took place April 13, 1981, but major force-on-force exercises did not begin until January 17, 1982.

The NTC and Fort Irwin has been used for anti-aircraft, armored, and mechanized training for both regular Army and California Army National Guard units since 1940. The NTC and Fort Irwin provides critical capacity for training brigade-level units in highly realistic combat situations. This facility is unique in the world and played a major role in the development of tactics and training of troops in the combat battle tactics and operations used successfully in all America's conflicts since its inception – including Operations Desert Shield and Storm, Operation Iraqi Freedom and Operation Enduring Freedom.

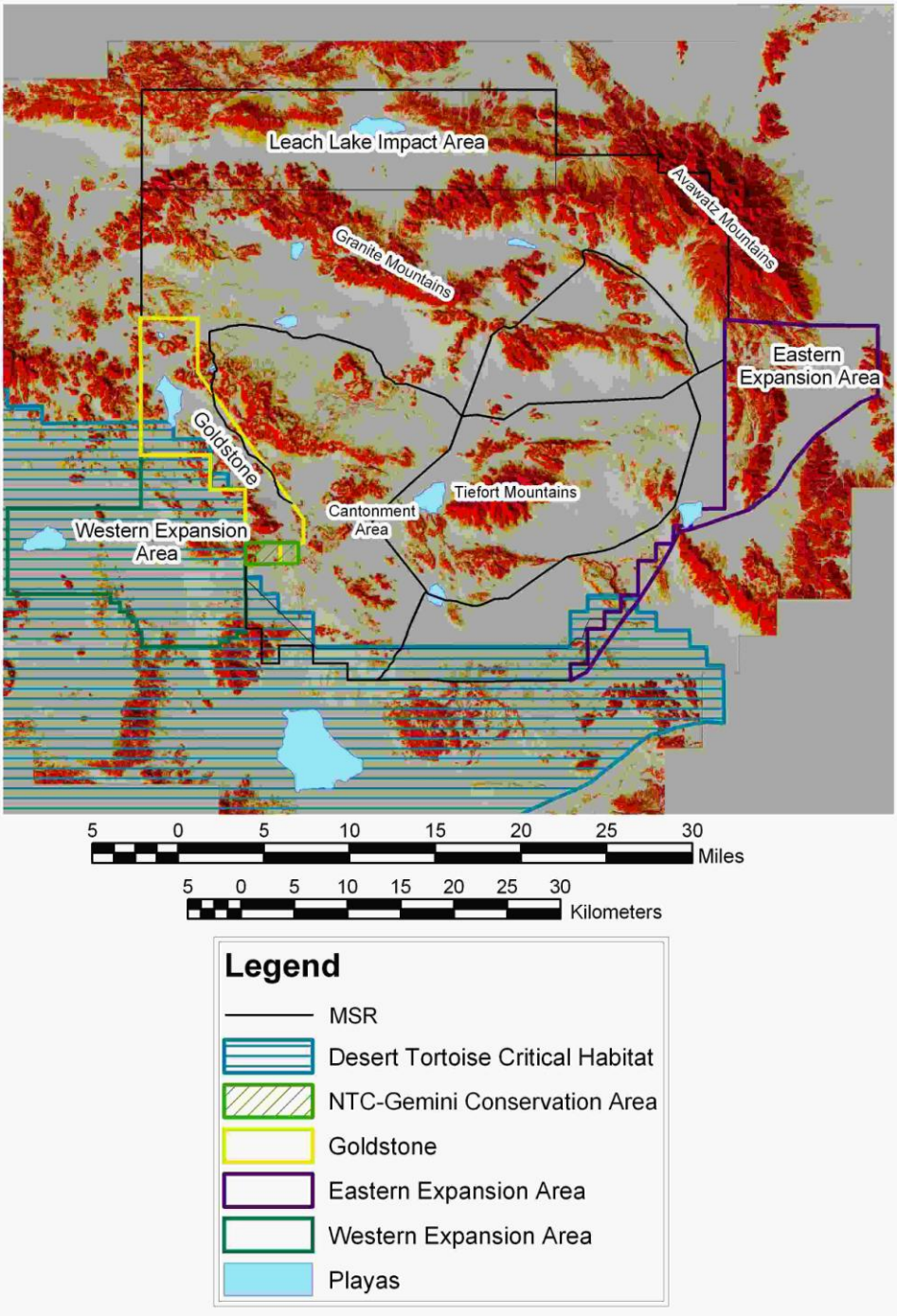
2.4 Satellite Installations

Due to the lack of adequate hanger space for maintenance, the NTC and Fort Irwin has leased a portion of the Barstow-Daggett Airport for military operations of its helicopter maintenance facility. Barstow-Daggett is located east of Barstow, and about 35 miles south of the installation.

The NTC and Fort Irwin has also leased a portion of Southern California International Airport (former George Air Force Base) to use as a troop landing facility. Rotational troops are flown to George Air Force Base and then bussed an hour and fifteen minutes to the Training Center. Prior to using George Air Force Base, troops landed in Las Vegas, which was a three-hour bus ride.

The NTC and Fort Irwin also includes two sections of land to the northeast of Coyote Lake, which is about two miles south of the southwestern corner of the installation. This land was purchased as a potential future water withdrawal site for the installation. A study is currently underway to evaluate the feasibility of using these water rights at Fort Irwin.

Figure 2.2: Major Features of the National Training Center and Fort Irwin



3.0 MILITARY MISSION

"*Success in the information age will go to those who have the courage to challenge themselves, who constantly innovate, and learn to adapt as they go.*"

General Gordon R. Sullivan, former Army Chief of Staff

3.1 Overview

The mission of the NTC and Fort Irwin is to provide tough, realistic training for Army brigade combat teams under full battle conditions. The conditions are are closely designed to closely replicate those of actual combat. The climate and terrain in the California high desert is harsh and severe; this serves to intensify the stress and fatigue for soldiers and equipment. Exercises at the NTC and Fort Irwin expose soldiers, many for the first time, to a level of stress unequaled outside of actual combat. As a result, the training at the NTC and Fort Irwin gives unit leaders and their soldiers an opportunity to train as they will fight, make mistakes, learn from them, survive, and win. This uniqueness of the NTC and Fort Irwin is a critical component of its mission. The large, instrumented battlefield provides continuous and real-time feedback and heightens learning at all levels. The NTC and Fort Irwin also serves as a laboratory and data source for training, doctrine, organization, and equipment. The NTC and Fort Irwin is America's premier war-fighting training center and has served as the model for two other US Army training centers (at Fort Polk, Louisiana and in Europe) and for numerous similar training centers in allied countries

3.1.1 Mission of NTC and Fort Irwin

Ten rotations, each consisting of an Army brigade combat team of three combat battalions and all support units (approximately 4,500 soldiers), come to the NTC and Fort Irwin annually for intensive combat training against an opposing force. Each training rotation closely replicates the movement of the brigade to an austere theater of war, combat operations and post combat recovery and re-deployment. During their 31-day stay at the training center, rotational units experience seven days of staging and prep operations, 14 days of field combat training, including both force-on-force and live-fire training and ten days of post-combat regeneration. Units are equipped with the Multiple Integrated Laser Engagement System (MILES). MILES uses eye-safe laser "bullets" to simulate the lethality and realism of the modern tactical battlefield. The system is highly valued for its ability to accurately assess battle outcomes and teach soldiers the skills required to survive in combat. The California Army National Guard often trains on weekends between scheduled NTC and Fort Irwin training rotations. During other stages of field training the brigades also conduct large-scale, live fire operations that allow the brigade to employ the full range of organic and supporting weapons, from rifles to bombs and rockets from Air force aircraft.

The training mission at the NTC and Fort Irwin normally consists of intensive simulated combat scenarios between opposing and friendly forces. These combat scenarios are generally divided into high intensity combat (HIC) and mission rehearsal exercises (MRE), depending on the mission requirements of the training unit. HIC scenarios train units for high intensity, big unit combat, such as that seen in Desert Storm and the ground maneuver phase of OIF. MRE scenarios are designed to prepare deploying units for overseas operations with a lower direct combat level, such as those that are occurring in OIF and OEF. Supplemental forces, such as outside units of foreign language speaking contractors are often brought in to increase the training intensity of the rotation. The 11th Armored Cavalry Regiment, NTC's Opposing Force (OPFOR), is thoroughly trained in the threat tactics and doctrine that support each type of training scenario. The NTC OPFOR consists of two maneuver battalions. The armor battalion is normally equipped

with the M1A1 main battle tank, and the mechanized infantry battalion is equipped with the M2 Bradley Fighting Vehicle. For HIC training during rotations the two OPFOR battalions are combined and organized as a Mechanized Infantry Brigade. The OPFOR operates at a strength of approximately 2,364 soldiers, 265 tracked vehicle (tanks and Armored Personnel Carriers), and 635 wheeled vehicles. OPFOR tracked vehicles and support equipment are visually modified with fiberglass panels to represent threat forces (appear similar to actual enemy equipment). For MRE rotations the OPFOR is organized into very decentralized organizations that portray civilians, irregulars, coalition forces, and other elements that would be seen in theater.

The OPFOR's opponent is the training unit, an Army brigade normally referred to as the BLUFOR. The combined strength of a rotational unit is approximately 4,500 soldiers using 500 tracked vehicles and 1,000-wheeled vehicles. Most vehicles used by the BLUFOR are brought in from the rotational unit's home station during each rotation.

The group that controls the tempo and focus of the NTC's training mission is the Observer Controllers (OCs), who come from the NTC Operations Group stationed at the NTC. The OCs function as coaches and mentors for various battle scenarios and provide observations, feedback and instruction to ensure attainment of the BLUFOR training objective. They are in the field with the BLUFOR to observe, analyze, and counsel units on their performance throughout the planning, preparation, and execution of all missions. The OCs also assess "casualties" from simulated battlefield scenarios and weapon systems not represented by the MILES system. The size of this group is approximately 640 personnel, 42 tracked vehicles, and 500 wheeled vehicles.

Much of the realism of the force-on-force battle scenarios is dependent on the MILES system. In these simulated battles, eye-safe laser beams replace bullets, missiles, and artillery projectiles. All weapons on the battlefield are equipped with a small device that emits a pulse of light energy when activated by a blank but noisy round. All tactical vehicles and soldiers are equipped with multiple sensors to detect laser hits. Laser hits on a specific target are distinguished as a "near-miss", a "hit", or a "kill". Laser signals are coded to replicate the destructive power and range of the weapon doing the firing. In other words, a rifle or machine gun laser cannot kill a tank; a TOW or tank cannon coded laser is necessary. However, a sniper with a rifle can kill a tank commander if his head is exposed. A killed target is out of the battle, and weapons are programmed not to function after a kill. The OCs possess "green keys" to reactivate killed targets.

As realistic and effective as the MILES system is for simulating combat with tanks, armored personnel carriers, missiles, and between infantry, in some cases it cannot realistically address other potent battlefield weapons, such as minefields, artillery, mortars, aircraft strikes, anti-aircraft guns, and chemical weapons. Some of this combat is adjudicated by special instrumentation systems, but the judgment and assessments of the OCs are also critical. The OCs carry a pistol-sized master controller gun capable of "killing" any vehicle or soldier.

All spatial and temporal battlefield information generated by the MILES system and enhanced by additional detailed data from remote video cameras and OC observation is sent to, analyzed, interpreted, and displayed through computers and video monitors located in the Operations Center in the cantonment area. This complete analysis of force-on-force exercises under near-combat conditions is the most important facet and unique experience of the NTC. The complete analysis is provided to the visiting unit after each mission down to the platoon level and as a take-home package to enhance future training at their

home station. The ability to achieve such a level of teaching, experience and battle drill proficiency without suffering casualties is one of the primary factors for the battlefield success of the US Army.

Most live-fire training takes place in an extensive network of automated targets in the northern part of the Fort Irwin training area. Machine guns, rifles, and the cannons of tanks and armored personnel carriers are able to fire live ammunition in a very realistic, unconstrained manner, unlike range operations. Hellfire missiles, 2.75-inch rockets, and TOWs can also be fired, but other missile and rocket systems retain their MILES eye-safe laser capabilities because of the cost of these projectiles. During live fire exercises, maneuvering units must cross minefields and negotiate concertina wire and other obstacles as they engage the enemy. Sequential pop-up targets simulate progressive movement by the enemy, including alternating frontal and flank views to simulate movements around obstacles or responses to terrain contours.

Another live-fire complex is the much smaller multi-range Fort Irwin Range Complex located on Goldstone Road just east of the Goldstone Deep Space Communication Complex, which contains Ranges 1 through 8A. This range complex is used for small arms fire (rifle, pistol, and shotgun), both light and heavy machine guns (7.62 mm and 0.50 cal), grenade launchers, tank main gun, and Bradley 25 mm main gun, mortars, antitank missiles, and hand grenades. Most large projectiles are not explosive but are inert (training) or high velocity sabot rounds.

3.1.2 Post Population and Major Troop Units

Active duty military personnel assigned to the NTC and Fort Irwin include 4,765 soldiers supported by 708 Department of the Army, 276 non-appropriated fund, and 2,725 other (primarily contractors) civilian workers.[7] There are approximately 5,000 military dependents living on the installation. About 70,000 troops annually train during monthly rotations and during weekend Reserve Component exercises at the post. The 11th Armored Cavalry Regiment is a US Army Forces command unit stationed at Fort Irwin. This unit provides soldiers for the OPFOR.

3.2 Relationships Between Natural Resources and the Military Mission

"The conservation of natural resources and the military mission will not be mutually exclusive".[8]

Commanders need to train in the kind of environment that they can expect to see in combat. In order to do that, the training environment must be maintained in as natural condition as possible.

Fort Irwin comprises approximately 1,254 square miles in the Mojave Desert and, as such, has typical flora and fauna of a desert ecosystem. This area is characterized by mountainous terrain with steep slopes and deep dissected alluvial fans. There are several large valleys which are used for tank maneuvers with mountains, hills, and valleys adding additional "concealment points" for ambushes. The flora of the

[7] Per the NTC Public Affairs Office, MAJ Clearwater, 5 January 2005

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

Mojave Desert consists mainly of Creosotebush Scrub, characterized by short (usually less than five feet tall) sparse vegetation (Gibson et al. 1994).

The Mojave Desert ecosystem is fragile at best. The area typically receives approximately three to four inches of rain a year. Soils develop very slowly in the harsh conditions of desert environments and may not be replaced for centuries following disturbance (Phillips, Brandt, and Reddick, Inc., 1981). Desert soils are extremely vulnerable to disruption, and once disturbed, can be easily eroded by wind and water. Desert soils are also highly vulnerable to compaction. For this reason, it is NTC and Fort Irwin policy for tracked vehicles to remain on tank trails and roads except when engaged in a battle. Roads and tank trails, which are necessary for rapid deployment of equipment and personnel, are subject to flash floods, especially in the unusual intense summer rainstorms.

3.2.1 Compatibility Issues

The purpose of this section is to identify potential conflicts and incompatibility between the conservation efforts of the natural resources and their uses and the military mission. Potential conflicts may be spatial, temporal, or residual/indirect in nature. Spatial conflicts may occur when areas within the NTC and Fort Irwin contain natural resources that limit military use, when military activity disrupts a critical natural resource, or when more than one natural resource occurs within an area resulting in different management objectives. Temporal conflicts may occur when two parties intend to use an area at the same time or when planned uses are not optimized with respect to biological issues (*e.g.*, activity periods of protected species). Residual/indirect conflicts may occur when incidental noise, pollution, and fugitive dust, for example, have an effect on natural resources or their planned use.

Because military training is the cardinal use of the NTC and Fort Irwin natural resources, efforts are made to minimize these conflicts. Occasionally, conflicting military goals and conservation mandates preclude military activities at specific locations. This INRMP and other management plans address these conflicts. The following methods have been developed to avoid and minimize potential and existing conflicts.

Vegetative Resources

Nine vegetation communities have been identified on the NTC and Fort Irwin (Section 6.6.1). The extent of these associations varies dramatically, based on elevation, water availability, topography, soil content, and other abiotic factors. Each vegetation association supports a diverse assemblage of wildlife; some wildlife species are specific to a vegetation type, whereas others are distributed throughout the Training Center and occur in all vegetation types.

Potential conflicts with the acceptable stewardship of military lands will be minimized through active management and inherent limiting effects of the terrain. Gunnery ranges and impact zones are generally off-limits; springs and other areas of high biological diversity are restricted; and measures to protect populations of endangered species have been developed. Most force-on-force training maneuvers are confined by the natural topography; slopes greater than 20 percent are not used extensively, and mountainous terrain is largely avoided. Fort Irwin's creosotebush community receives the highest degree of impact from military maneuvers. This vegetation type dominates the Mojave Desert and will not be significantly reduced in extent by training impacts.

Desert Tortoise and Other Listed Species

The Federal Endangered Species Act of 1973, as amended, requires lands under the jurisdiction of the DoD (in this case the Army) to conserve listed species. As defined in the Act, conservation is the use of all methods and procedures necessary to bring any listed species to the point where protections provided by the Act are no longer necessary. Section 7 of the Act requires the Army to formally consult and confer with the USFWS if any action by the Army may affect a listed species or critical habitat. Pursuant to these requirements and the presence of the federally listed desert tortoise (*Gopherus agassizii*) on the NTC and Fort Irwin, the Army has engaged in formal consultation with the USFWS to develop measures to avoid and minimize impacts to the desert tortoise.

The Biological Opinion issued by the USFWS (2004), superseding the 1995 Biological Opinion (USFWS, 1995), to the Army identifies the Terms and Conditions under which the Army may train under its current mission on the NTC and Fort Irwin while remaining in compliance with the Act. As such, potential conflicts between desert tortoise conservation and NTC and Fort Irwin military use of training lands have been addressed to the satisfaction of both parties. To fulfill its responsibilities under sections 7(a)(1) and 7(a)(2) of the Act, the Army should review any future action that is not specifically covered by the biological opinion 1-8-95-F-16R to determine its effects on the desert tortoise, and if the action may affect the desert tortoise, should consult with the USFWS under section 7 of the Act.

An endangered species management plan addressing potential conflicts and recommendations for management of the desert tortoise and other sensitive wildlife and botanical resources is being developed to address conflicts between these sensitive resources and the military mission on the NTC and Fort Irwin. This plan includes projects for the southwestern willow flycatcher and least Bell's vireo, which likely only use the NTC and Fort Irwin during migration, and the recently listed Lane Mountain Milkvetch. It also includes projects for the State-listed Mohave ground squirrel, alkali mariposa lily, and the desert cymopterus, as well as projects that will generally benefit other avian species and bats. The Army will determine if implementation of its programmatic management plan, proposed endangered species management plan, and its feral burro management plan, will affect the southwestern willow flycatcher, the least Bell's vireo, and the Lane Mountain milkvetch. If future actions conducted to implement these management plans would affect listed species, the Army should consult with the Service under section 7 of the Act.

Cultural Resources

An Integrated Cultural Resources Management Plan (SAIC, 1998) was developed to address conflicts between the numerous cultural resources, both identified and as yet undiscovered, within the NTC and Fort Irwin and the military mission. Chapter 13 discusses the protection of cultural resources as related to implementation of this INRMP.

Outdoor Recreation

Outdoor recreation opportunities are available to support the NTC and Fort Irwin community quality of life, consistent with available natural resources and compatibility with the military mission. Chapter 12 describes outdoor recreation programs on the NTC and Fort Irwin. The following methods to avoid and minimize potential conflicts between outdoor recreation and the military mission have been developed:

When ***Desert Explorers Club*** activities are planned on base, the following regulations are to be followed:

- Military operations take priority over any planned activities.

- If trips are planned within the military operation area, arrangements must be made with Range Control prior to commencement of the activity.
- If a trip is planned for a down-range area, children are permitted only when accompanied by a parent or legal guardian after attending a range safety briefing.

As with all private organizations and unofficial activities on the installation, activities are permitted at the discretion of the Installation Commander. The organization must also follow the policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Hunting must be accomplished in accordance with NTC Regulation 420-3, which includes the following to preclude interference with the military mission:

- Hunting is permissible on base recreation areas when in season.
- Hunter access control is the responsibility of Directorate of Community Activities.

An ***Off-Highway Vehicle*** (OHV**)** area, north of the intersection of Barstow Rd. and NASA Rd, was constructed in spring, 2003. The area is open for use any time during official posted hours. OHV users will be required to check in with Out-Door Recreation before and after activities. In addition, users must comply with all sign postings and off-limits boundaries.

Although the ***High Desert Equestrian Club*** is not recognized as an official outdoor recreation activity, potential safety problems may exist with equestrian-related recreational activities. If all horseback riding activities are restricted to the area designated by Range Control, no conflicts are expected to occur between equestrian and military training activities. However, there are still safety concerns for horseback riders and other outdoor recreation enthusiasts. No comprehensive plan exists for the proper coordination of recreational activities. Additionally, no safety procedures are in place for any equestrian or other outdoor recreation activity in case of accidents resulting in serious injury.

3.2.2 Effects of the Military Mission on Natural Resources

Due to the limited rainfall, plants of the Mojave Desert grow very slowly. A large creosote bush about five feet tall with a five-foot wide spread may be over 50 years old. Removal of this type of vegetation for camouflage or driving over it during battles would leave a void in that area which would not be replaced for many decades.

Driving a tank across previously undisturbed desert leaves a mark which remains for decades and destroys desert crusts. The NTC and Fort Irwin is home to the federally-threatened desert tortoise. This slow moving reptile is vulnerable not only to crushing by vehicles, but also to habitat reduction. Repeated military exercises have reduced the habitat of the desert tortoise significantly in the most heavily trained areas. Similarly, military training poses a threat to the federally endangered Lane Mountain milkvetch. This rare and very narrow endemic of the central Mojave Desert grows in the Western Expansion Area.

Threats and impacts for each federally listed species are described in Section 9.5.

Mountainous areas of the installation are less affected by training than are the areas with less than 20 percent slope. Areas above 20 percent slope are not conducive to large-scale military training and are relatively undisturbed, with exception that some vehicles use slopes up to 50 percent, which often creates trails. These steep areas tend to harbor displaced species from more heavily used training areas.

Many impacts of the military mission on natural resources occurred prior to implementation of the ITAM program at the Training Center. ITAM is beginning the task of rehabilitating damaged sites and making recommendations about the manner in which training is conducted with regard to minimizing damage. However, the backlog of damaged areas is extensive and recovery is slow.

3.2.3 Effects of Natural Resources or Their Management on the Military Mission

The NTC and Fort Irwin command and staff are determined to complete the military training mission successfully, and an integral part of that mission is good environmental stewardship. The land expansion process calls for using desert tortoise critical habitat within the NTC for rotational training. To mitigate for this loss of tortoises and habitat, the Army will translocate tortoises from southern and western expansion areas to safe refugia, will purchase high quality tortoise habitat to serve as refugia, and will take additional steps suggested by the USFWS to protect the long term survival of the desert tortoise (U.S. Army 2004).

When a soldier encounters a desert tortoise, he/she is instructed to stop activities and call the Environmental Division for guidance in dealing with the animal. If the animal is in danger and activities allow the biologist to go to the site, the biologist will inspect the animal and move it from harms way. If circumstances will not permit the biologist to visit the site, the soldier (or unit) is instructed on how to move the animal (U.S. Army 2004).

There are permanent and intermittent springs on the installation. Water is vital to any desert ecosystem, and as such, the springs have been placed off-limits to all training. The NTC and Fort Irwin educates field personnel about the off-limits nature of spring locations as part of major briefings prior to each military exercise to avoid impacts by military equipment and personnel on natural and cultural resources associated with spring areas. The NTC and Fort Irwin erects fencing and metal crossbars at portions of these springs likely to be approached by wheeled and tracked vehicles to reduce accidental intrusion into and subsequent damage to these resources.

Playas (except Red Pass Lake and Langford Lake) are off-limits and avoided by military personnel because of potential impacts to associated biological and cultural resources, and dust problems associated with their use. Additionally, due to the playas' potential to generate finely divided particulate matter (PM 10), they are avoided during military maneuvers. This material can cause health and safety hazards as well as precipitate fines and notices of violation under the Clean Air Act.

3.3 Future Military Mission Impacts on Natural Resources

Current maneuver space is inadequate primarily due to modern tactics and doctrine. Foreign forces and potential adversaries influence the modern U.S. war fighting doctrine, known as Joint Operations. The static front lines of World War II and Korea have given way to the fluid 100-mile-deep rear, main, and forward battle areas of the Persian Gulf. From training at the NTC and experiences in Operation Desert Storm, it is obvious that a successful modern Army must be very mobile and train on far more land than its predecessors.

3.3.1 Acquisition of Additional Land

There is a significant shortfall in the amount of trainable land at NTC and Fort Irwin, particularly considering rapidly evolving weaponry and battlefield tactics (Land Use Requirements Study, Appendix A, U.S. Army Corps of Engineers, Los Angeles District, 1996). The Army has proposed the acquisition of additional training land for the NTC and Fort Irwin (U.S. Army Corps of Engineers, Los Angeles District, 1996), as discussed in Section 2.2. In December of 2003, the President of the United States signed the 2003 Defense Appropriation Act, which withdrew approximately 110,000 acres of land for use by the US Army at Fort Irwin. This land will be available for mechanized training upon completion of the necessary environmental documentation.

Land acquisition will have an impact on natural resources, particularly sensitive species. In general, training gradually removes vegetation, biodiversity, topsoil, and soil structure. These resources reestablish naturally over long periods of time, and attain equilibrium with natural perturbation. However, areas used repeatedly for training can approach full removal of vegetation. Use of both Eastern and Western Expansion Areas will impact the desert tortoise and the Lane Mountain milkvetch. Specific threats to both species are found in Section 9.5.

3.3.2 Unit Changes

There are no projected significant unit changes for the permanent party at the NTC and Fort Irwin. However, inherent to the installation's mission, visiting training units will continue to come from military installations throughout the Army, including its allies. In recent years Reserve Component units have played an increasingly important role in America's military strategy. Thus, Reserve Component units are and will continue to use the NTC and Fort Irwin on a more intensive basis than in the Training Center's early years.

3.3.3 Training Scenario Changes

The Training Center is in the process of making substantial changes to training scenarios to better prepare soldiers for changing world conditions and threats. This process, to one degree or another, will always be ongoing. Such changes in training scenarios can significantly change the impacts of training on the environment.

4.0 FACILITIES

The NTC and Fort Irwin consists of the cantonment area, training ranges, down range support facilities, and desert training areas. Downrange training facilities consist of a live-fire area, live fire target ranges, pop-up target ranges, and force-on-force training areas, where MILES-equipped personnel and vehicles engage in bloodless battles. Chapter 7 further describes these areas.

4.1 Transportation System

A rail system is used to bring equipment to the railhead at Yermo, CA, northeast of Barstow, where it is off-loaded and driven up the Manix Trail to the NTC, a journey of approximately 27 miles (43 km). Remaining equipment and supplies are trucked to the installation by commercial trucking companies, traveling 35 miles (56 km) to Fort Irwin from Interstate 15 just east of Barstow on Fort Irwin Road, a two lane, black-top road. The rail system poses no direct threats or impacts to any listed species.

The Army provides a subsidized bus system for military and civilians to reduce traffic on Fort Irwin Road. Buses run Monday through Friday in the early morning and evening from Victorville and Barstow, where ridership averages about 400 people a day. There are several car pools for the rest of the 2,500 civilian work force and military personnel who do not live on the installation.

4.2 Water

The NTC and Fort Irwin consumes an average of 2.5 million gallons (9.5 million liters) of water per day (mgd). About 60,000 gallons (227,400 liters) per day of this demand are used outside the cantonment area for field activities involving troop maneuvers. Based on the *Water Basin Development Plan* (Wilson F. So & Associates, 1989), projections of daily demand will increase to 3.75, 4.11, and 4.36 mgd by the years 2000, 2020, and 2040, respectively.

The *Water Basin Development Plan* (Wilson F. So & Associates, 1989) was prepared to analyze water uses and project future uses that would not deplete the available resources. It was estimated that approximately 1,550 acre-feet of rainfall recharge groundwater basins per year. Based on this recharge rate, different scenarios for water use were analyzed. The Plan recommends a 35-year groundwater development scenario of 1,300 acre-feet for Bicycle Basin, 1,500 acre-feet for Langford Basin, and 1,500 acre-feet for Irwin Basin. These usage rates would extend the production longevity of the basins into the future while meeting estimated future base demands. More accelerated production rates could degrade aquifer sedimentary characteristics and raise pumping costs for diminishing groundwater resources in local basins.

The NTC and Fort Irwin has finalized a Water Master Plan to aid in planning for future water demand at the installation and provide recommendations for meeting projected water supply needs of the permanent and transient base population. The approved water supply project involves development of three new production wells in Langford Basin to meet anticipated future water demands.

The NTC has recently completed two wells downrange to provide water for non-potable uses – one near the Red Pass airfield and one near Tiefort City. Coyote Basin is believed to contain substantial groundwater resources, and basin recharge may be significantly supplemented by water leaking across the Manix Fault from the Newberry aquifer. Groundwater withdrawals that greatly exceed recharge rates may adversely affect the future rate of Coyote Basin recharge and hence reduce the life of the aquifer. Although the NTC and Fort Irwin has withdrawn two public land sections overlying Coyote Basin groundwater resources for water production purposes, it currently does not draw from Coyote Basin and is not likely to initiate immediate use of this basin. The need for future water development may be delayed by water conservation measures that reduce demand within the cantonment area and extend the production life of Bicycle, Langford, and Irwin aquifers.

Water supplies for the installation are high in fluoride. The base has a reverse osmosis treatment system to reduce fluoride levels in drinking water.

4.3 Wastewater System

The NTC and Fort Irwin operates and services a wastewater treatment facility within the cantonment area. The facility was originally permitted in 1981 (Board Order 6-81-49, now Board Order No. 6-93-42A1) and has a 2.0-mgd plant design capacity. It is permitted by the California Regional Water Quality Control Board as a zero discharge system; therefore, no discharge to surface watercourses occurs.

The base wastewater treatment facility services both the cantonment area and portable field latrines. Portable field latrines are serviced regularly, and their contents are returned to the plant for processing during off-peak hours. The base wastewater facility was designed to support a daily population of 10,000. The original system consisted of a collection system that conveyed the wastewater to two primary clarifiers, a heated anaerobic sludge digester, and a grease pit. Wastewater solids were conveyed to a sludge drying area, and the liquid effluent was discharged to oxidation ponds for evaporation and sometimes used as emergency fire water. In 1995 a new wastewater treatment plant was constructed. The old oxidation ponds have been put on stand-by. Prior to the modifications, reeds, rushes, and other aquatic and semi-aquatic vegetation suitable for wildlife habitat were translocated to a nearby standing effluent pond to provide continuous habitat for resident avian species.

The NTC Wastewater Treatment Plant is a secondary treatment facility. The system consists of a primary treatment system, which screens out major debris, and a secondary system where water is treated through an extended aeration system, secondary clarification and chlorine contact tanks. The secondarily treated water is then pumped and sent through sprinklers over a 40-acre site. This water percolates through the soil.

A tertiary treatment plant could greatly reduce the TDS in the groundwater, including refitting the infrastructure to use the water for irrigation. The project will require a large amount of acreage to handle the 2.0 million gallons of water per day of effluent that the system produces. Possible uses for the water would be a golf course, a water resource for vegetated windbreaks along tank trails, and watering athletic fields and lawns. A feasibility study to install a tertiary treatment system and reclaim the water for irrigation of cantonment area has been completed, and the permit applied for through the Division of Health Services (DHS). This project has proceeded through the NEPA/CEQA process.

4.4 Storm Water Drainage System

Storm water is an important facet of environmental management at the NTC and Fort Irwin as significant rainfall events can generate enough storm water to inundate the Wastewater Treatment Plant. The installation has developed a storm water management plan (Radian Corporation, 1995). Implementation of this plan is the responsibility of the DPW Compliance Section and is not a natural resources function at the installation.

4.5 Projected Changes in Facilities

The NTC and Fort Irwin will continue modernization of facilities during the next five years. A Live Fire facility was constructed three miles east of Drinkwater Lake, and consists of a 7,000 square-foot facility is a two-story building. Several MOUT (Military Operations on Urban Terrain) facilities are being constructed downrange. When completed they will range in size up to a square kilometer, and will resemble small third world villages. Also, several cave complexes have been built out of large cement culverts for cave warfare training. The NEPA process has been used to minimize impacts on natural resources.

Changes since 1998 include the construction of a hotel to accommodate visitors, contractors, and temporary duty billets. The hotel has 180 rooms, which are projected to be at 80% capacity most of the time. Other new/modernized facilities changes include a 300-person barracks, 557th Maintenance facility, MATES facility, hazardous waste facility, Fire Department building, 300-person Child Development Center, Education Center, live-fire bunker, and rotational wash facility.

Construction that is in progress, or about to begin, includes major upgrades to Range 1, and the construction of 200 additional military housing units within the cantonment area. The NEPA process has been or will be used to minimize negative environmental effects of these proposed projects.

In FY 99-00 a heliport was constructed at Barstow-Daggett Airport to replace leased facilities. The project included an 85,000 square-foot hanger and a 7,000 square-foot administrative building, both were constructed on existing footprints. There are other projects planned to modernize this facility. The NEPA documentation and tortoise surveys associated with this project have been completed.

4.6 Effects of Facility Operation on Listed Species

Operation of these facilities poses no potential threats or impacts to listed species. These facilities are operated within the urbanized cantonment area, outside the habitat for listed species.

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5.0 RESPONSIBLE AND INTERESTED PARTIES

5.1 National Training Center and Fort Irwin

5.1.1 Commanding General

The Commanding General commands the NTC and Fort Irwin and implements policies and directives of the Department of the Army and the U.S. Army Forces Command (FORSCOM). The Commanding General bears ultimate responsibility for mission of the NTC and Fort Irwin. The Commanding General derives support from all other commands on the installation. Acting through the Command Group, personal and special staff, directors, and separate commanders, the Commanding General is responsible for (Department of the Army, 1995):

- Planning land utilization to avoid or minimize adverse effects on environmental quality and provide for sustained accomplishment of the mission;
- Ensuring the functioning of an Installation Environmental Quality Control Committee;
- Ensuring ongoing and timely coordination of current and planned land uses between mission, natural resources, environmental, legal, and master planning;
- Ensuring all installation land users are aware of and comply with procedures and requirements necessary to accomplish objectives of this INRMP together with laws, regulations, and other measures designed to comply with environmental quality objectives; and
- Appointing a natural resources management professional as the Installation Natural Resources Coordinator.

5.1.2 Garrison Commander

The Garrison Commander serves as the principal assistant to the Commanding General for the management of Fort Irwin. The Garrison Commander supports the Commanding General and the NTC mission by directing all aspects of garrison operations, and by providing services for the NTC training range. Services directed by the Garrison Commander are primarily staffed by civilians, and include environmental services, such as hazardous waste, air quality monitoring, and natural and cultural resources management. As such, the Garrison Commander is responsible the following:

- Implementation of the INRMP and all of its goals and objectives;
- Providing for funding and staffing of natural resource management professionals and other resources required to effectively manage natural resources on the installation;
- Entering into appropriate cooperative plans (16 USC 670a) with State and Federal conservation agencies for the conservation and development of fish and wildlife, soil, outdoor recreation, and other resources;
- Inspecting and reviewing mitigation measures that have been implemented or recommended for the protection of natural resources as prescribed in environmental documentation in accordance with AR 200-2;
- Appointing a natural resources management professional as the Installation Natural Resources Coordinator.

5.1.3 Directorate of Public Works

The Director of Public Works (DPW) will maintain an organization with resources needed to accomplish the INRMP and, acting through the Chief of the Environmental Division, is responsible for (Department of the Army, 1995):

- Developing and implementing programs to ensure the inventory, delineation, classification, and management of all applicable natural resources to include: wetlands, scenic areas, threatened and endangered species, sensitive and critical habitats, and other natural resource areas of special interest;
- Providing for the training of natural resources personnel;
- Implementing this INRMP;
- Reviewing all environmental documents (*e.g*. environmental impact assessments and statements and remedial action plans) and construction designs and proposals to ensure adequate protection of natural resources, ensuring that technical guidance as presented in this INRMP is adequately considered;
- Coordinating with local, state, and federal governmental and civilian conservation organizations relative to natural resources management for the NTC and Fort Irwin;
- Managing all phases of the natural resources program for the NTC and Fort Irwin with appropriate natural resources management personnel; and
- Administering all aspects of the installation pest control program.

The ***Natural and Cultural Resources Manager*** carries out DPW responsibilities for the integrated management of natural resources on the NTC and Fort Irwin addressed in this INRMP, including desert ecosystem management and implementation of NEPA.

More specific responsibilities of the Natural and Cultural Resources Section include:

- General enhancement of wildlife habitat;
- Ensuring compliance with state and federal laws and regulations involving natural and cultural resources;
- Using natural resources management to support the military mission;
- Protecting land investments from depreciation by adopting land use practices based upon soil capabilities;
- Administering the hunting program;
- Implementing general wildlife management and research;
- Maintaining and implementing the INRMP;
- Maintaining a trained, professional staff;
- Ensuring enforcement of federal, state, and installation laws and regulations pertaining to natural and cultural resources;
- Cooperating with state and federal natural and cultural resources agencies;
- Implementing the Integrated Cultural Resources Management Plan;
- Protecting and, whenever possible, enhancing wetlands;
- Minimizing erosion;
- Maintaining the Integrated Pest Management Plan and serving as the NTC and Fort Irwin Pest Management Coordinator; and

- Protecting threatened and endangered species by:
- Species inventorying and monitoring,
- Habitat protection and enhancement,
- Ecological research initiatives,
- Recovery planning and implementation,
- Regional coordination, and
- Conserving populations of threatened and endangered plants and their habitats, and
- Implementing the Endangered Species Management Plan.

The ***Mojave Desert Ecosystem Program (MDEP),*** a multi-agency program housed in Barstow, CA. supports the NTC and Fort Irwin by serving as a tool to conduct sound, scientifically based decision-making for sustainable land management across the entire Mojave ecoregion. Developed as a Department of Defense Legacy Resource Management Program in cooperation with the Department of Interior, MDEP is responsible for:

- Establishing a broad based partnership among federal, state, local, and academic entities for the sharing of scientific data,
- Building, maintaining, and updating a comprehensive scientific database of geomorphic, vegetation, soil, climate, transportation, hydrographic, ownership, and land use data for the Mojave desert,
- Developing, maintaining and updating a remotely sensed imagery database
- Incorporating partner collected natural resource, cultural, paleontological, hazmat, and spring/riparian and other relevant data into the scientific database,
- Developing and maintaining an internet accessible Geographic Information System allowing access to available data for comparative analysis in land management decision making.

The ***Compliance Program Manager*** is not responsible for implementing this INRMP. However, some programs within the Compliance Section directly or indirectly affect natural resources management on NTC and Fort Irwin, including:

- Drinking water and wastewater treatment,
- Surface and storm water protection,
- Air quality management,
- The solid waste and recycling program, and
- Pollution prevention measures.

5.1.4 Deputy Commander, Chief of Staff

The Deputy Commander, Chief of Staff, acting through the G3-Training, is the principal assistant to the Commanding General for planning, estimating, coordinating, integrating, and supervising: military training, short and long-range mission and mobilization planning, troop movements, aviation operations, range operations, nuclear biological and chemical plans, operations and training, operational security, intelligence, counterintelligence and security activities, emergency operations, special events and ceremonies, and force modernization and integration activities.

The ***G3*** provides access to ranges to accomplish provisions of this plan, assists in enforcing considerations within range regulations and is directly responsible for implementation and/or support of portions of this INRMP which directly affect or interact with training responsibilities including:

- Operating and maintaining NTC and Fort Irwin ranges, associated training facilities, field training sites, and range equipment;
- Preparing, maintaining, and enforcing the Range Regulation;
- Providing ITAM program management and funding for the NTC and Fort Irwin;
- Providing input to FORSCOM for ITAM program users requirements;
- Managing the GIS database to ensure support for all installation programs that rely on GIS data layers; and
- Coordinating with DPW on training activities that may affect wildlife, the desert ecosystem, wetlands, or cultural resources.

The ***ITAM Program Manager*** is responsible for implementation of the ITAM program, as broadly described in Section 1.7 and as individual components in Chapters 8, 9, 11, and 16.

The ***Military Personnel Adjutant General***, under the DCCS, will act to determine that effective natural resource management is an identifiable function and is specifically accountable in the performance evaluation at each command level, in accordance with DoD Directive 4700.4, 25 Jan 89, Section E.3.c.

5.1.5 Directorate of Community Activities

The Director of Community Activities (DCA) establishes procedures and governs installation outdoor recreation activities, including hunting (AR 215-1). Programs that particularly affect the NTC and Fort Irwin natural resources include equestrian programs, off-road cycling, and golf. Responsibilities include:

- Planning and implementing the installation Outdoor Recreation Program (AR 215-2);
- Supervising and maintaining outdoor recreation activities;
- Oversee the hunting program; and
- Collecting fees and charges for various outdoor recreation activities.

5.1.6 Public Affairs Office

The Public Affairs Office is responsible for promoting an understanding of the NTC and Fort Irwin among its various publics and providing professional public affairs advice and support to installation leaders and activities. The Public Affairs Office is an important component of the natural resources program for the NTC and Fort Irwin, especially in disseminating information critical to the success of the program.

5.1.7 Staff Judge Advocate

The Staff Judge Advocate provides legal advice and counsel and services to Command, Staff, and subordinate elements of the NTC and Fort Irwin. Specific Staff Judge Advocate responsibilities with regard to integrated natural resource management include:

- Conducting legal research and preparing legal opinions pertaining to interpretation and application of laws, regulations, statutes, and other directives;

- Coordinating with the Department of Justice, Litigation Division of the Office of the Judge Advocate General, and other Governmental agencies on matters pertaining to litigation for the Federal Government;
- Advising the DPW on compliance with NEPA, especially with regard to management of endangered species on the NTC and Fort Irwin; and
- Advising the G3 on laws and regulations that affect training land use, management, and compliance.

5.1.8 Inspector General

The installation Inspector General will determine whether the provisions of DoD Instruction 4715.3 are being adequately accomplished on the NTC and Fort Irwin in accordance with this Plan and appropriate Army regulations.

5.1.9 Other Installation Organizations

Implementation of this Plan will require assistance from other directorates and organizations. Such organizations include the Directorate of Contracting (procurement), Provost Marshal (law enforcement), commanders of major subordinate organizations, and commanders of tenant units and activities.

5.2 Other Defense Organizations

5.2.1 U.S. Army Installation Mangement Agency, Southwest Region

The U.S. Army Installation Management Agency, Southwest Region, located in San Antonio, Texas, is responsible for providing command and technical supervision of the NTC and Fort Irwin's Natural and Cultural Resources programs by:

- Assisting with program implementation and conducting staff visits to NTC and Fort Irwin,
- Reviewing outdoor recreation plans for compatibility with the Installation Master Plan and natural resources management plans and programs,
- Ensuring that effective natural resources stewardship is an identifiable and accountable function of management, and reviewing and approving this INRMP as the Final Approving Authority.

5.2.2 U.S. Army Forces Command

The U.S. Army Forces Command (FORSCOM), located at Fort McPherson, Georgia, is responsible for providing command and technical supervision of the NTC and Fort Irwin's natural resources program by (Department of the Army, 1995):

- Insuring planning land utilization to avoid or minimize adverse effects on environmental quality and provide for sustained accomplishment of the mission;

5.2.2 Army Environmental Center

The Army Environmental Center, located at Aberdeen Proving Ground, Maryland, provides oversight, centralized management, and execution of Army environmental programs and projects. It has support

capabilities in the areas of NEPA, endangered species, cultural resources, ITAM, environmental compliance, and related areas.

5.2.3 U.S. Army Corps of Engineers

5.2.3.1 Los Angeles District

The U.S. Army Corps of Engineers, Los Angeles, California assists the NTC and Fort Irwin by administering contracts for outside or other agency support and administering wetland permits in accordance with Section 404 of the Clean Water Act. These contracts include those involved with sensitive species surveys and others.

5.2.3.2 Norfolk District

The U.S. Army Corps of Engineers, Norfolk, Virginia has assisted NTC and Fort Irwin with contractor personnel to function within the cultural resources program and the MDEP and assists with contracting for certain projects, such as this INRMP.

5.2.3.3 Sacramento District

The U.S. Army Corps of Engineers, Sacramento, California has assisted the NTC and Fort Irwin with contracts for various surveys and support for the MDEP.

5.2.4 U.S. Army Environmental Awareness Resource Center

The Environmental Awareness Resource Center provides material for the Environmental Awareness program within ITAM. The NTC and Fort Irwin have extensively used this support, and this service is likely to continue to be used during 2006-2011.

5.2.5 Other Military Installations

The NTC and Fort Irwin coordinates and cooperates with other military installations within the Mojave Desert on numerous programs, including the MDEP. Installations often involved with the NTC and Fort Irwin in these efforts include Edwards Air Force Base, Marine Corps Air Ground Combat Center at Twenty-nine Palms, Marine Corps Logistics Base at Barstow, and Naval Air Weapons Station at China Lake. These five Department of Defense installations have formed a team (Planning and Coordination of Interagency Desert Environmental Resource Managers [PACIDERM]) which meets quarterly to coordinate and discuss land use issues of mutual interest. The MDEP DoD Coordinator is the Executive Secretary of PACIDERM, and the Natural and Cultural Resources Manager at the NTC and Fort Irwin is the Training Center representative. These installations have many mutual interests, particularly involving ecosystem management of the Mojave Desert, as evidenced by regional initiatives identified in Section 1.6.

5.3 Other Federal Agencies

5.3.1 U.S. Department of Interior

5.3.1.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS), Region 1, has a field station at Ventura, California, which provides technical advice and regulatory guidance for management of natural resources on the NTC and Fort Irwin, particularly endangered and threatened species. Department of Army Regulation 200-3, Chapter 11, provides guidance to be followed by the NTC and Fort Irwin when dealing with the USFWS for endangered species management. The USFWS is a partner in the MDEP and other regional initiatives and cooperative ventures with Training Center.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 5.3.1.1 contains specific items of agreement among the USFWS, California Department of Fish and Game, and the NTC and Fort Irwin, as required by the Sikes Act. This INRMP, and the ESMP (U.S. Army 2004) on which many of its goals are based, have been written to comply with USFWS directives for managing sensitive species at the NTC (USFWS 2004).

5.3.1.2 U.S. Geological Survey

The U.S. Geological Survey, via the Biological Resources Division, has supported the NTC and Fort Irwin for raven management, desert tortoise surveys, and similar projects. The U.S. Geological Survey is a partner in the MDEP and other regional initiatives and cooperative ventures with the NTC and Fort Irwin.

5.3.1.3 National Park Service

The National Park Service manages Death Valley National Park, whose southern boundary is about one mile north of the northern boundary of the NTC and Fort Irwin. Death Valley National Park is a partner in the MDEP and other regional initiatives and cooperative ventures with the Training Center. The NTC and Fort Irwin has used two facilities at Joshua Tree National Park for the propagation of grasses and shrubs for the LRAM component of the ITAM program.

5.3.1.4 Bureau of Land Management

The BLM has responsibility for vegetation management of all withdrawn lands at the NTC and Fort Irwin. However, management authority has been handed to the NTC and Fort Irwin through a memorandum of understanding (MOU). The Army accomplishes much of the on-the-ground management of these resources, but BLM retains oversight roles. In 1996 BLM removed tamarisk from Bitter Springs as a reimbursable project. The BLM is a partner in the MDEP and other regional initiatives and cooperative ventures with the NTC and Fort Irwin.

5.3.2 U.S. Department of Agriculture, Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) conducted soils surveys on 95% of the NTC and Fort Irwin. In FY 96 the NRCS assisted the installation with a subjective evaluation of options for dust control. The NRCS conducts some cooperative ventures with the NTC and Fort Irwin.

5.3.3 National Aeronautics and Space Administration (NASA)

The NASA Goldstone Deep Space Communication Complex and satellite tracking facility uses 33,241 acres on the western edge of the NTC and Fort Irwin. Goldstone has its own environmental program, including endangered species management. However, the Army has ultimate responsibility for natural and

cultural resources management on Goldstone. Goldstone and the NTC and Fort Irwin environmental personnel have close working relationships.

Goldstone has very limited use for military activities and thus serves as a control for comparison purposes with other portions of the NTC and Fort Irwin. This has been particularly useful for evaluating effects of military activities on the desert tortoise. The NTC and Fort Irwin ITAM program has Range and Training Land Assessment sites on Goldstone to facilitate this control-treatment arrangement.

5.4 State Agencies

5.4.1 California Department of Fish and Game

The California Department of Fish and Game (CDFG) is responsible for management of most fish and wildlife within the State, including those on federal lands. The CDFG maintains a California Natural Diversity Database (CNDDB), which is useful for management of natural resources at the NTC and Fort Irwin. The CDFG is particularly interested in monitoring a herd of bighorn sheep that move through the northeastern portion of the installation, and they have an interest in chukar management since the bird is a major game species in the Mojave Desert. The agency also is responsible for maintaining a list of State-sensitive species, some of which are found on the NTC and Fort Irwin.

The CDFG is a signatory cooperator in implementation of this INRMP. Appendix 5.3.1.1 contains specific items of agreement among the CDFG, USFWS, and the NTC and Fort Irwin, as required by the Sikes Act.

5.5 Universities

Regional universities have provided specialized expertise to help manage natural resources on the NTC and Fort Irwin. California State University Dominguez Hills and Colorado State University began RTLA monitoring at the Training Center. The University of California, Los Angeles Botany Department conducted Lane Mountain milkvetch and other plant surveys on the installation as well as plant research. The University of California, Riverside has conducted insect surveys, and San Diego State University has supported the ITAM program with rehabilitation projects. John Carroll University, Ohio evaluated relationships between cryptogamic crusts and revegetation. The Desert Research Institute is studying soil hydrology and mapping geomorphology on the installation. California State University, San Bernardino, is studying the conservation genetics of the Lane Mountain milkvetch. The University of Redlands is involved in desert tortoise research. The NTC and Fort Irwin will continue to use university expertise to assist with its natural resources programs during 2006-2011.

5.6 Contractors

The NTC and Fort Irwin uses contractors for many programs associated with natural and cultural resources, including plan preparation, large cultural resources surveys, and dust control. Contractors are heavily used to provide on-site personnel to help implement natural and cultural resources programs, including ITAM, cultural resources management, and natural resources management. Contractors currently staff both the ITAM program and the Natural Resources program. The use of contract personnel is anticipated to increase during 2006-2011.

5.7 Other Interested Parties

General public interest in natural resources management at the NTC and Fort Irwin is high, in part due to ongoing land expansion activities. There were over 1,000 written responses to the draft EIS (U.S. Army Corps of Engineers, Los Angeles District, 1996). However, no particular environmental group has expressed a long-term sensitivity to actions occurring at the installation.

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6.0 NATURAL RESOURCES AND CLIMATE

6.1 Topography

The NTC and Fort Irwin is located in the Mojave Desert physiographic province. In the Mojave, high mountain peaks and ridges separate broad alluvial fans and wide, flat valleys. Large basins without external drainage develop playas (very flat, dry lakebeds). The average elevation of the Mojave Desert is approximately 2,500 feet (762 m) above mean sea level (msl). Individual peaks of isolated mountain areas on the Training Center reach elevations of up to 6,153 feet (1,876 m) above msl.

6.2 Geology

Rock formations at the NTC and Fort Irwin span a vast period of geologic time from the Precambrian (over 600 million years ago) to the Holocene (11,000 years ago to present). A thick sequence of sandstone, shale, and limestone was deposited during the Precambrian period and subjected to regional metamorphism and igneous intrusion during the late Precambrian and early Paleozoic periods. The region received thick marine sediments, including massive limestone deposits, from inland seas that inundated the region during the Paleozoic through the Triassic period. Before the end of the Mesozoic era, seas withdrew from the region, and large tectonic movements caused sediments to be folded, faulted, and intruded.

In the early Tertiary period the region was subjected to renewed deformation as the area was uplifted. This period was marked by extensive and deep erosion and creation of localized basins. A variety of sediment/rock types were produced, with some providing extensive fill in the ever-deepening basins. Events of the Quaternary period formed the topography seen today, and the Pleistocene experienced renewed movement along major faults, including upwarps of landmasses with attendant folding and faulting.

A complex assemblage of consolidated rock types in the region forms mountains and hills and underlies alluviated valleys at depth. The Avawatz Mountains consist of a complex assemblage of pre-Tertiary granitic and metamorphic rocks, Paleozoic sediments, Triassic metasedimentary and metavolcanic rocks, Tertiary sediments, and Tertiary volcanic rocks. The intersection of the Garlock and Death Valley fault zones along the northeastern flanks of the Avawatz Mountains is generally responsible for this stratigraphic complexity. Salt and gypsum deposits occur along this fault zone in the Avawatz Mountains.

A heterogeneous assemblage of igneous, metaigneous, and metasedimentary rocks spanning a long period of pre-Tertiary geologic time forms the basement complex (bedrock) in the Alvord Mountains. Tertiary volcanic rocks and associated continental sedimentary sequences, including rocks of the Upper Barstow Formation, overlie the basement complex. Continental sediments are primarily composed of arkosic sandstone and conglomerate interbedded with this sequence of silt, clay, and tuff. Volcanic rocks consist of basalt flows that are interbedded with continental sedimentary rocks.

Within the NTC and Fort Irwin area along the Garlock Fault zone, the Quail Mountains are made up of undifferentiated Mesozoic granitic and metamorphic rocks. North of the fault zone, the Quail Mountains primarily consist of Tertiary volcanics. Unconsolidated deposits within the installation include alluvium, aeolian (dune) sand, and playa deposits. Alluvium consists of unconsolidated deposits of clay, silt, sand, and gravel. In some areas the alluvial material is highly sorted, resulting in clean sands and gravels that are

prolific water-bearing units. Other poorly sorted alluvial deposits contain large amounts of fine-grained material, including silts and clays. Alluvium increases in thickness from edges of basins to their central floors.

Alluvial deposits are generally heterogeneous, with coarse sands and gravels occurring in stringers and lenses, intercalated with finer grained sediments. The heterogeneity of the alluvium has important hydrologic implications and can result in localized artesian conditions as clays and silt lenses confine the layers of coarse-grained water-bearing sediments. Alluvial valley fill forms the most important water-bearing unit in the study area.

Several dry lakes (or playas) occur within the NTC and Fort Irwin. Playa deposits accumulated from material in shallow bodies of water that covered lower portions of closed valleys during floods. The thickness of deposits underlying many of these dry lakes is unknown; however, playa deposits of the Mojave Desert range from a few feet to as much as 100 feet thick. Topographic, seismic, and gravitational data layers on the natural resources GIS database are available at various scales to facilitate land management decision-making.

6.2.1 Seismicity

Principal faults bounding the Mojave Desert are the San Andreas Fault to the southwest and the Garlock Fault to the northwest. The internal wedge between these faults defines the Mojave Desert and is generally referred to as the "Mojave block."

The eastern part of the NTC is near the intersection of the Death Valley and Garlock fault zones. One major branch of the Garlock fault zone roughly coincides with the north-to-northeast face of the Avawatz Mountains. The Garlock Fault is one of the major east-west trending faults in southern California. The Garlock Fault has historically exhibited seismicity along its western extension where it displaces Holocene age alluvium. It is a strike-slip fault with left-lateral displacement and separates the Basin and Range Province from the Mojave Desert Province. Along the eastern portion of the fault, only minor seismicity has been observed.

The Death Valley Fault is a right-lateral, strike-slip fault and extends along the northeastern Avawatz Mountains and eastern Soda Mountains. Segments of the Death Valley Fault have exhibited evidence of Holocene movement.

The Mule Spring Fault extends the length of the northern Avawatz Mountains and separates Tertiary and Quaternary sedimentary strata from the diorite basement. Shutter ridges, perched stream gravels, and other surficial tectonic expressions indicate very recent activity along the Mule Spring Fault.

The historically active Manix Fault roughly parallels Interstate 15 slightly south of the NTC and Fort Irwin. Other Quaternary faults in the area include an unnamed fault between East Cronese Lake and Red Pass Lake, numerous northwest-trending faults in the Soda Mountains, and a fault along the northwest flanks of the Silurian Hills (Jennings, 1992).

Like most of southern California, the NTC and Fort Irwin has experienced moderate seismicity in the recent past. A general increase in the amount of seismic activity has been documented in the Mojave Desert region following the 7.5 (surface wave magnitude) "Landers" earthquake and 6.5 "Big Bear" earthquake of June 28, 1992. Two historic epicenters were in the Silurian Hills, the larger of which had a

Richter magnitude of at least 4.5 (Dames and Moore, 1991). In addition, epicenters of several earthquakes of magnitude 3.0 to 4.4 have been located in the Avawatz Mountains. Maximum credible earthquakes along either the Garlock or Death Valley fault zone in the Training Center area could result in ground acceleration in excess of 0.3 g (Dames and Moore, 1991).

6.2.2 Petroleum and Minerals

Although minerals exist on the NTC and Fort Irwin, no mining or exploration is carried out within the original NTC boundaries due to the exclusion signed by President Roosevelt in the 1940s. An active iron mine is located within the East Expansion Area, and will be purchased and sealed before military training begins. The installation has known gold reserves and potentially has silver. There are no known petroleum reserves. Geothermal resources are not hot enough to have commercial value (M. Quillman, personal communication).

6.3 Soils

The NTC and Fort Irwin is in the Mojave Desert portion of the Basin and Range Province, which is dominated by broad alluvial basins stretching between mountain ranges. Eroded mountaintops of outcropping bedrock rise above alluvial fans and valleys filled with sediment.

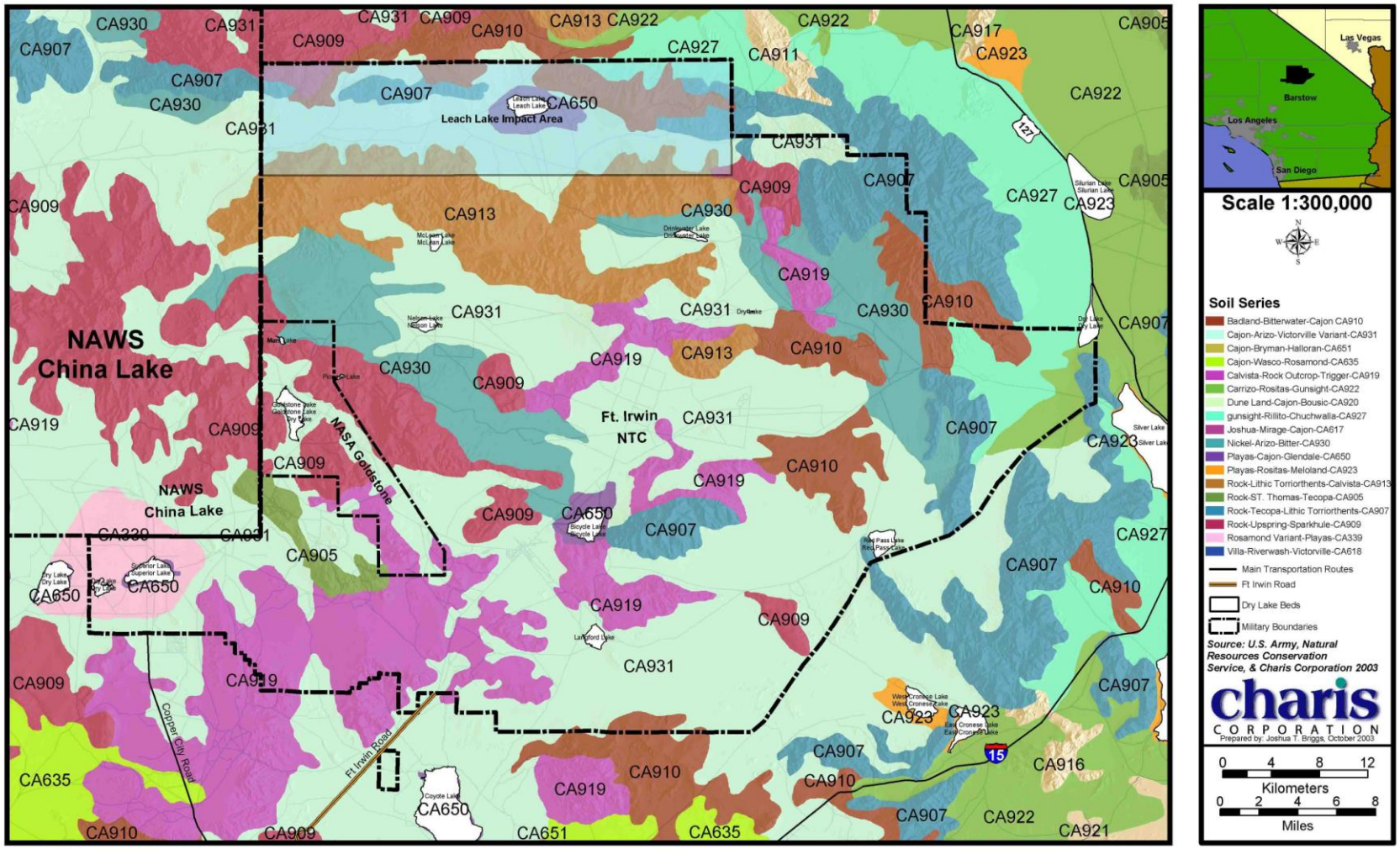
Detailed soil surveys have been conducted by the NRCS, formerly known as the Soil Conservation Service (SCS), on approximately 95 percent of the Training Center (NRCS 2000). These data have been digitized and made available on the GIS database for land use decision-making. Other soils information consists of data sets from the NRCS State Soils Geographic database at a 1:500,000 scale and partial coverages on selected regions made by summarizing more detailed soil maps. Where detailed soil maps are not available, soils information is derived from assembled geology, topography, vegetation, and climate data, as well as satellite imagery. Soils of the NTC and Fort Irwin are shown at Figure 6.3.

Soils develop very slowly in the harsh conditions of desert environments and may not be replaced for centuries following disturbance (Phillips, Brant, and Reddick, Inc., 1981). Desert soils are extremely fragile and vulnerable to disruption, which results in wind and water erosion. Desert soils are also highly vulnerable to compaction.

Hardened soil crusts form on clay or silty desert soils by the biological activity of resident bacteria, algae, and lichens. Cryptogamic crusts stabilize surface integrity and resist wind and water erosion from both drops and water flows. These crusts fix atmospheric nitrogen in low quantities, making it available to desert flora. Vehicles disturb cryptogamic crusts, making the soil vulnerable to erosion by wind and water. The time required for these soils to develop and their recovery rates are unknown. Several studies at the NTC & Ft. Irwin investigated the use of inoculating soils to promote the formation of cryptogamic crusts, but found that growth rates were too slow for this to be of value as a rehabilitation technique.

Patches of "desert pavement" are found at the Training Center and throughout the greater Mojave Desert. Desert pavement may include many different soil associations; however, it is usually characterized by a surface crust of pebbles and rocks, often rendered dark and shiny, which protects fragile desert soils from further erosion. Once removed, this crust requires several thousands of years to reform.

Figure 6.3. Soils of the National Training Center and Fort Irwin, California.



The coarsest depositional materials derived from mountainous parent rock are generally found on upper regions of high plains; the finest materials are along valley floors. Soils of upper bajadas (coalescent alluvial fans along bases of mountain ranges) consist of coarse gravels grading into loamy gravels toward the toe of alluvial fans. Soils of lower bajadas grade from sandy loams to finer loamy materials. Playas located at the bottom of basins accumulate silts and clays and generally develop saltpans.

Higher mountains of the NTC and Fort Irwin are excessively drained, very stony or rocky, sandy loams to sands that are derived from nearby parent material. These soils develop on strongly sloping to very steep upland slopes of 9 to 75 percent. Rock outcrops cover 30 to 90 percent of the ground surface area. Where present, soil depth is seldom more than 10 inches (25.4 cm).

Desert soils that develop on the alluvial fill at the Training Center are generally light in color, deficient in phosphorus and nitrogen, and lacking in organic matter. Except on river terraces and a few other older alluvial landforms, soils have little profile development.

6.4 Water Resources

6.4.1 Surface Water

Surface water resources within the NTC and Fort Irwin and its vicinity are scarce. No perennial watercourses exist in this region. Washes descending from mountains and other elevated landforms provide intermittent channels that route surface runoff downgrade into topographical depressions (playas) where temporary or ephemeral lakes are formed. This water accumulation occurs during times of greater than average precipitation and can be expected to occur at least once each decade.

During heavy runoff events, water in washes carries sand, gravel, cobbles, and even boulder-sized rocks as part of the bedload transport. Deposition of this bedload material across areas of less steep terrain has resulted in the formation of alluvial fans commonly observed in this area. Significant subsurface flows may occur in the unconsolidated sand and gravel channel deposits found in washes and alluvial fans, even after surface flows have ceased. Local groundwater recharge may occur along washes because of this subsurface water movement. Without a drainage outlet, surface water in shallow ephemeral lakes is lost through groundwater percolation or evaporation.

The only naturally occurring permanent surface water resources on the NTC and Fort Irwin are six springs and one watershed that produce meager to small quantities of water. Several types of intermittent surface water resources are present on post. Four intermittent springs produce little to no water during summer, depending on the seasonal amount of rainfall. All streams are intermittent, and all naturally occurring standing water is ephemeral, occurring only during and immediately after heavy rains or thunderstorms. Another spring, Jack Spring (NK 220898), is located approximately 100 yards (91 m) south of the NTC's southern border.

When surface flow due to high intensity rainfalls occurs, the water soon percolates into the sandy soil of dry washes and/or collects on any of the 10 playas at the NTC and Fort Irwin. The playas range in size from 340 acres (136 hectares) to 1,297 acres (519 hectares). Standing water on playas, a result of low infiltration rates in evaporated clay lakebeds, is a short-lived phenomenon. Evaporation of playa waters results in precipitation of alkali salts at or near the surface of the playa.

Springs

Permanent Springs	Map Coordinates
Bitter Spring	NK 518982
Cave Spring	NK 516329
Devouge Spring	NK 382256
Garlic Spring	NK 327984
Leach Spring	NK 152342
Two Springs	NK 330335
Hellwind Canyon	NK 181338
Intermittent Springs	**Map Coordinates**
Arrastre Spring	NK 545350
Desert King Spring	NK 260312
Panther Spring	NK 390251
No Name Spring	NK 377228

6.4.2 Groundwater

Few water wells have been drilled at the NTC and Fort Irwin, but the U.S. Geological Survey has mapped the Irwin Basin Aquifer and some of the Bicycle Lake Aquifer. Historically, groundwater was withdrawn from wells at Denning Spring in the Avawatz Mountains, Riggs Mine in the southwest Silurian Hills, and the southeast end of Silurian Dry Lake (Mendenhall, 1909). Bicycle, Irwin, and Langford basins are used to supply current water needs of the NTC and Fort Irwin. The Army has purchased two sections of land for water rights in Coyote Basin. This land could be developed as a groundwater resource for the NTC, if required.

These four basins are all bow-shaped aquifers filled with water-bearing unconsolidated deposits. Three producing wells have been drilled in Bicycle Basin, three in Langford Basin, and five in Irwin Basin to meet the NTC's current water needs (U.S. Army, National Training Center and Fort Irwin, 1988). Depth to groundwater in each of these basins is between 200 and 500 feet (60-152 m). Several additional wells have been drilled in remote areas of the NTC range since 1998. Section 4.2 further describes sources of water at the NTC and Fort Irwin.

Total dissolved solids (TDS) are a growing concern of the Training Center. The quantity of total dissolved solids in irrigation water is not remarkable, but the TDS in the soil are being leached through the soil to the water table, where the NTC and Fort Irwin draws its water. The level of TDS is elevated in the water table near the 40-acre (16-hectare) leaching area. A plume of TDS approaching 700 ppm (1,000 ppm is the legal limit) is spreading through the Training Center water table (Quillman, personal communication, 1996).

6.5 Climate

Hot summers, mild winters, infrequent rainfall, and moderate winds characterize the climate of the NTC and Fort Irwin. The Training Center has installed a network of 16 remote sensing weather stations to better monitor weather conditions over the entire installation where localized weather changes are often dramatic. Data are collected every 15 minutes and tabulated and stored within a GIS. Weather data can be portrayed on the GIS and used to help evaluate effects of military actions on the resource base.

6.5.1 Precipitation

Rainfall at the NTC and Fort Irwin varies considerably in both time and space. Rainfall averages 3.9 inches (7.4 cm) per year. Relative humidity is typical of the high southeastern Mojave Desert area and is low in the summer (except during infrequent rain storms). Mean monthly relative humidity ranges from a high of 54 percent in January to a low of 22 percent in June (MBA, Inc., 1991).

6.5.2 Temperature

Monthly mean temperatures at the installation, as determined from long-range climatic data at the Barstow/Daggett Airport and Bicycle Lake Army Air Field within the NTC and Fort Irwin, range from 48 to 89° Fahrenheit (F) (9 to 32° Celsius (C)) with a record maximum mean of 104°F (40°C) and a minimum mean of 36°F (2°C).

6.5.3 Winds

Regional winds are primarily influenced by the Sierra Nevada and Transverse mountain ranges, the distance inland from coastal northwest winds, and inland winds that flow out across the high desert plains from the Los Angeles Basin. Regional winds are typically from the southwest with a yearly average speed of about 10 miles (16 km) per hour. The U.S. Army Corps of Engineers, Los Angeles District (1996) includes a wind rose as Figure 3.8-1.

Winds blowing across State Highway 127, east of the boundary of the NTC and Fort Irwin, show a dominant airflow to the east. Dust generated by Training Center maneuvers normally parallels Interstate 15 and passes north of Baker. During winter, strong turbulent winds sometimes occur, often accompanying frontal systems, and can reach speeds of 25 to 60 mph (40 to 96 km/h). Dust storms often accompany these strong winds.

6.6 Flora

The Mojave Desert is divided into five floristic regions (Rowlands *et al.*, 1982). The NTC and Fort Irwin is located in the Central Region, near its border with the Southwestern and South-Central regions. The Central Region is expected to have the fewest species because it is the smallest of the five regions and has only a few mountain peaks. Gibson et al. (1994) identified 464 species of plants on the installation. Their survey emphasized the area surrounding 200 Range and Training Land Assessment (formerly Land Condition Trend Analysis) transects and is not comprehensive. The Avawatz Mountains in the northeastern corner of the NTC and Fort Irwin are the only peaks above 5,248 feet (1,600 m), rising to 6,117 feet (1,865 m). Topographic relief in the form of mountains and incised bajadas increases structural and microclimatic characteristics of an area and therefore increases floral diversity.

6.6.1 Vegetation Communities

Vegetation communities on the NTC and Fort Irwin were categorized based on the qualitative scheme developed by Holland (1986). The following discussions of vegetation communities rely heavily on recent reports by Gibson *et al.* (1994) and Chambers Group, Inc. (1994).

Mojave Creosote Bush Scrub

Creosote bush scrub, an association dominated by the large shrub creosote bush (*Larrea tridentata*), is the most common vegetation type in the region, dominating about 70 percent of the Mojave Desert (Holland, 1986). Likewise, creosote bush scrub is the most widespread community of the NTC and Fort Irwin, occurring throughout the range below 3,600 feet (1,100 m) on alluvial slopes, valley floors, and mountain slopes (Gibson *et al*., 1994). A sub-association of this vegetation type is described as the creosote-burrobush association based on the codominance between creosote bush and burrobush (*Ambrosia dumosa*). Burrobush is a much smaller shrub that may often be numerically more abundant than creosote bush, but canopy cover and volume is generally dominated by creosote bush. Griffith (1993) found burrobush to be more abundant than creosote bush on the NTC and Fort Irwin, occurring on 99.5 percent of the plots surveyed (compared to 47.9 percent for creosote bush). In localized sites creosote bush may represent the only woody species; however, it is conspicuously absent around playas because of high salinity (Wallace and Romney, 1972) and/or dense fine-textured basin soils low in oxygen (Lunt *et al*., 1973). Creosote bush and burrobush size and vigor are strongly influenced by water availability, and the largest individuals are characteristically found along edges of washes and roads. Many subdominant shrubs occur in creosote bush scrub, including range rhatany (*Krameria erecta*), silver cholla (*Opuntia echinocarpa*), Anderson's boxthorn (*Lycium andersonii*), desert straw (*Stephanomeria pauciflora*), wishbone bush (*Mirabilis bigelovii*), and cheesebush (*Hymenoclea salsola*). At higher elevations subdominants include California buckwheat (*Erigonum fasciculatum*), hopsage (*Grayia spinosa*), winter fat (*Krasheninnikovia lanata*), and bladdersage (*Salazaria mexicana*).

Blackbrush Scrub

Creosote bush scrub is replaced by blackbrush scrub (*Coleogyne ramosissima*) above elevations of 3,600 to 5,900 feet (1,100 to 1,800 m). Blackbrush scrub occurs on upper alluvial fans and mountain slopes. It often occurs as monotypic stands; however, on the NTC and Fort Irwin it grows with a number of shrubs, including turpentine bush (*Thamnosma montana*), Mormon tea (*Ephedra nevadensis*), goldenbush (*Ericameria linerifolia*), hopsage, and needle grass (*Achnatherum speciosum*). Scattered junipers (*Juniperus californica*) occur as a canopy for blackbrush scrub and are discussed separately below. Blackbrush scrub occurs on slopes above Drinkwater Springs in the Granite Mountains and in higher elevations of the Avawatz Mountains in the vicinity of Cave Springs.

Mojave Mixed Woody Scrub

Mojave mixed woody scrub is a heterogeneous assemblage of shrubs that grows in steep, rocky, granitic, or volcanic slopes. The lack of a dominant shrub species makes it difficult to clearly categorize this scrub type into the more common communities. Mixed woody scrub at the NTC and Fort Irwin consists of some of the most interesting perennial flora. Species include many cacti, Spanish bayonet (*Yucca schidigera*), and species of *Brickelia*, *Ericameria*, *Ephedra*, and *Encelia*. Examples of this scrub type on granitic soils occur in southern passes in Leach Lake Gunnery Range and steep slopes of the Avawatz and Granite mountains.

Mojave Desert Wash Scrub

Mojave desert wash scrub is a low, shrubby, diverse community occurring in open washes, arroyos, and canyons throughout the desert. Periodic flooding in these areas maintains the open character of this community. Representative shrubs include spiny senna (*Senna armata*), rayless encelia (*Encelia frutescens*), cheesebush, desert almond (*Prunus fasciculata*), indigo bush (*Psorothamnus arborescens*),

and sandpaper plant (*Petalonyx thurberi*). In some areas this community may have scattered small tree species.

Saltbush Scrub

Saltbush scrub is characterized by the dominance of one or more species of saltbush. Saltbush scrub is associated with moderately alkaline soils toxic enough to inhibit most desert shrubs that occur in the creosote bush scrub. It commonly occurs on lower bajada slopes and plains and around playas throughout most of the desert (Holland, 1986). Good examples of saltbush scrub can be found on playas along margins of dry lakes on the NTC and Fort Irwin. Common saltbushes include shadscale (*Atriplex confertifolia*), Mojave saltbush (*A. spinifera*), four-winged saltbush (*A. canescens*), and allscale (*A. polycarpa*). Other shrubs found in association with saltbush scrub include budsage (*Artemisia spinescens*), winterfat, hopsage, and Anderson's boxthorn. Typically, one strongly dominant species of saltbush is found in association with a smaller number of saltbush species in a particular area. The invasive Russian thistle (*Salsola tragus*), commonly known as tumbleweed, can often be found in saltbush scrub, especially in sandy areas. A large, dense stand of this species occurs in the southwestern portion of Langford Lake, around Drinkwater Lake, and in sandier portions of the Central Corridor.

Alkali Sink Scrub

Alkali sink scrub occurs where soil salinities are very high and, as such, supports only the growth of halophytic plants. Alkali sink scrub occurs on poorly drained, usually clay soils that have a high water table and high alkalinity. The only known site of alkali sink scrub on the installation is found within a narrow belt, west of Bitter Spring. Plant species that make up this community include iodine bush (*Allenrolfea occidentalis*), bush seepweed (*Suaeda mocquinii*), and saltgrass (*Distichlis spicata*).

Seeps and Springs

Unique assemblages of low-growing perennial herbs and phreatophytic trees and shrubs occur in the vicinity of permanently wet or moist soils around seeps and springs. These types of species occur at most springs at the NTC and Fort Irwin. The volume of water and nature of the seep or spring usually dictate the abundance and diversity of the vegetation. Emergent aquatic species may include common reed (*Phragmites australis*), cattails (*Typha*), rushes (*Juncus*), and sedges (*Scirpus*). Honey mesquite, desert willow (*Chilopsis linearis*), and species of willow (*Salix*) and cottonwoods (*Populus*) are also present. Screwbean mesquite (*P. pubescens*), a species less tolerant of salt, occurs at Paradise Springs along with honey mesquite. Both species of mesquite are found at Garlic Springs, where a rich assemblage of species occurs. Equally diverse, but very different, aquatic flora occur at Two Springs and the lower zone of Leach Spring. Saltcedar (*Tamarix ramosissima*), an invasive non-native species, is widespread in California deserts and was increasing its dominance at Bitter Springs, but recent control efforts (Section 9.4.2.1) are beginning to control and perhaps eradicate this species there.

Joshua Tree Woodland

Joshua tree woodland is open woodland that occurs on gentle alluvial slopes with well-drained sandy, loamy, or gravely soils. The Joshua tree (*Yucca brevifolia*) is usually the only native arborescent species and, when it occurs in higher densities, constitutes a woodland setting. Associated shrub species include creosote bush, bursage, California buckwheat, hopsage, bladdersage, and range rhatany. Joshua tree woodland is weakly developed on the NTC and Fort Irwin. It is best developed in the northern part of Goldstone and on bajada slopes in the Avawatz Mountains. There are extensive stands with large, many-

branched individuals in the Western Expansion Area.

Juniper Woodland

One stand of juniper woodland occurs on the NTC and Fort Irwin on the highest peak in the Avawatz Mountains. This community occurs on steep slopes and ridges and is a diverse assemblage of low shrubs and small juniper trees. Associated species include California buckwheat, blackbush, desert sandwort (*Arenaria macradenia*), and needle grass.

6.6.2 Floral Inventory

Gibson et al. (1994) summarized previous plant surveys on the NTC and Fort Irwin and combined these species lists with species discovered during RTLA surveys and pertinent species at the Rancho Santa Ana Botanic Garden to produce a checklist for the Training Center. This list included 425 native species and 39 introduced species from 57 families. This checklist has been expanded as new species have been discovered within the boundaries of the NTC and Fort Irwin.

6.6.3 Special Status Flora

Special status species are listed as threatened or endangered, proposed for listing, candidates for listing by the state and/or federal government, California species of concern, or designated as sensitive by the BLM. Also included are plants identified by the California Native Plant Society as rare, threatened, endangered, or of limited distribution in California.

There is one federally listed plant species on the installation, the Lane Mountain Milkvetch (*Astragalus jaegerianus*), which was listed by the USFWS as endangered on October 6, 1998. Lane Mountain Milkvetch is a perennial herbaceous legume threatened by grazing and vehicles and potentially by maneuvers at the NTC and Fort Irwin (Skinner and Pavlik, 1994). It occurs in Joshua tree woodland, mixed Mojave scrub, and creosotebush scrub in poorly developed sandy or granitic gravely soils. During a large survey in 2001, four major geographic populations, covering over 21,000 acres, were mapped (Charis 2002). A new population was discovered immediately south of the NASA Goldstone facility, and three previously known populations (Coolgardie Mesa, Paradise Valley, and Brinkman Wash) were found to be significantly larger than previously reported. Populations of Lane Mountain milkvetch were encountered at elevations from 3,100-4,200 feet above mean sea level, generally in areas of small ridges, shallow bedrock and granitic soils. These are areas in Mojave creosote bush scrub and Mojave mixed woody scrub communities with diverse shrub assemblages. Data on host plant specificity was also collected. The most common host shrubs for the Lane Mountain milkvetch were *Thamnosoma montana, Ambrosia dumosa, Eriogonum fasciculatum, Ericameria cooperii,* and *Ephedra nevadensis.*

Several California State Species of Concern are included within the Supplemental Draft Environmental Impact Statement (EIS) for the proposed Land Expansion (Charis 2003). The alkali mariposa lily *(Calochortus striatus)* is found in creosote brush scrub communities in the Mojave Desert. It is a small, erect member of the lily family (Liliaceae) standing 1-4 dm high with long narrow leaves extending from the base of the plant. The flower is bell-shaped with lavender petals that are strongly purple veined. The California Native Plant Society includes the species on its list IB. As an IB-listed species, it is considered equivalent to a state endangered species. It has been reported in the California Mojave Desert in small scattered populations in Kern, Los Angeles and San Bernardino counties. Its range extends to Las Vegas in western Nevada. Alkali mariposa lily grows in alkaline meadows and moist creosote bush scrub plant communities. It flowers in the spring between April and June. The alkali mariposa lily has been observed

at Two Springs (Gibson et al. 1994) and at Paradise Springs (Dave Charlton, Botanist, Charis Corporation).

Populations of Clokey's cryptantha (*Cryptantha clokeyii*) are uncommon, but have been observed in rocky areas surrounding Superior Valley and Paradise Valley (Silverman 2002). This CNPS 1B species is a small annual in the Boraginaceae family. Plants typically occur in gravelly areas of course colluvium substrate and are most frequently found on upper slopes. The entire suspected range of Clokey's cryptantha, except for Fort Irwin and the NTC, was surveyed in 2001 (Silverman 2002). A total of 414,010 plants were estimated for the 20 populations identified in the study. The number of plants estimated to be in the newly acquired western area of the NTC was 8,400, and the number in the original NTC was estimated to be 10,000. The largest population within the western portion of the study area extends across the Paradise Range onto Fort Irwin. Three smaller populations were identified in the Superior Valley and the Western Expansion Area north of the Paradise Range. Clokey's cryptantha has also been observed outside of the southwestern portion of the study area in the Calico Mountains near Irwin Road (CDFG 2002).

The small-flowered androstephium (*Androstephium breviflorum*) is a species that has been placed on List 2 of the CNPS Inventory. Small-flowered androstephium is a white-flowered perennial herb of the lily family (Liliaceae). In California, small-flowered androstephium primarily occurs in open sandy flats and bajadas at low to moderate elevations (Charis 2003).

The desert cymopterus (*Cymopterus deserticola*) is a CNPS 1B species, and is considered sensitive by the BLM (BLM 2003a). The desert cymopterus is currently (September 2003) under consideration for federal listing by the USFWS. This herbaceous perennial in the carrot family (Apiaceae) is found on deep, loose, well-drained sandy soil that occurs on alluvial fans and basins. It also occurs on stabilized low sand dune areas and occasionally on sandy slopes (Charis 2003).

One population of desert cymopterus is known from a site in the Superior Valley, located in the western portion of the study area just south of the NAWS China Lake boundary (CDFG 2002). Several additional populations, probably containing several thousand plants, were observed during a survey of the Superior Valley in April 2004 (Charis 2004).

6.6.4 Wetlands

The U.S. Congress enacted the Clean Water Act in 1972 to *restore and maintain the chemical, physical, and biological integrity of the Nation's waters*. Section 404 of the Clean Water Act delegates jurisdictional authority over wetlands to the Corps of Engineers and the Environmental Protection Agency. Waters of the United States protected by the Clean Water Act include rivers, streams, estuaries, and most ponds, lakes, and wetlands. The Corps of Engineers and the Environmental Protection Agency jointly define wetlands as *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*.

Wetlands are transitional areas between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes:

- At least periodically, the land supports predominately hydrophytes;
- The substrate is predominately undrained hydric soil; and/or

- The substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The National Wetlands Inventory includes the NTC and Fort Irwin, but it has not been ground-truthed nor has any formal wetlands inventory been made of the installation. All potential wetlands on the NTC – six springs and four seeps – are off-limits to military training, and their jurisdictional status is therefore irrelevant.

6.7 Fauna

In spite of its relatively uniform appearance, the NTC and Fort Irwin supports a variety of wildlife habitats when viewed on a smaller scale. Wildlife habitats are generally based on vegetation types (Section 6.6.1) that occur in a particular area. The installation consists primarily of creosote bush scrub habitat; however, each vegetation type contains similar faunal components and often supports species that occur more abundantly or solely in those habitat types. For example, the zebra-tailed lizard (*Callisaurus draconoides*) occurs in nearly all vegetation communities on the NTC and Fort Irwin, but it is more common in desert washes; the common night lizard (*Xantusia vigilis*) occurs almost exclusively in Joshua tree woodland.

Most wildlife species on the installation are adapted to desert scrub habitats that provide little cover and xeric conditions. However, seeps and springs provide perennial sources of water and a high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. Large mammals, such as the bighorn sheep (*Ovis canadensis nelsoni*), coyote (*Canis latrans*), and desert kit fox (*Vulpes macrotis*), use these water sources and return to them regularly; bats typically forage over these areas because of increased abundance of invertebrate prey. The continued use of springs by wild burros has resulted in highly disturbed areas that now require maintenance. Bird species that migrate in the spring and fall (and are not usually associated with the desert environment) may forage and rest in these areas as well as at the wastewater treatment area during their migration. The wastewater treatment area is also used by bat species, coyote, and other desert animals.

Rocky terrain, such as the Avawatz, Granite, and Tiefort mountains, as well as other mountainous and hilly ranges, provide habitat for many reptile, rodent, and bird species. Along with different vegetation communities that normally occur with increasing elevation in these ranges, differences in slope and aspect result in microhabitats that support different wildlife species. Notable species that occur in these areas include bats, which rely on rocky outcrops for roosting sites, and raptors, which use cliff faces and rocky ledges for roosting or nesting.

Playas provide little wildlife habitat because they are basically devoid of vegetation. They do contain, however, endemic microbiological communities of algae that support brine shrimp. Migratory waterfowl and large mammals may visit these areas after periods of heavy rainfall.

As is typical of most desert systems, large animal species are uncommon, widely dispersed, and often nocturnal. Smaller mammals and reptiles are highly adapted to harsh desert conditions, much more common, and often either secretive, nocturnal, or active for only short periods of the year. Birds are among the most conspicuous species, usually occurring in greatest concentration in the vicinity of washes and springs where more structured and complex vegetative assemblages occur. With some exceptions, wildlife species (such as birds and larger mammals) are generally more mobile and not limited to a single habitat type. Therefore, large portions of the NTC and Fort Irwin are likely used in the course of an organism's daily and seasonal activity patterns, particularly for larger and/or more mobile species. Some species (*e.g.*,

fish, amphibians, and some reptiles and mammals) are highly adapted for one habitat type and restricted to these specialized areas. Lack of specialized habitats likely contributes to the absence of native amphibian and fish populations on the installation.

Although wildlife surveys typically do not focus on invertebrate species, invertebrates are an essential component of desert ecosystems, providing food for numerous vertebrate species and acting as pollinators for a large number of plant species. The seasonal reproductive cycle of some insect species results in an "explosion" of the population in a relatively short period of time. This swarming of individuals provides an important prey base for insectivores, such as smaller birds, reptiles, amphibians, and bats.

Work begun in 1995 on the NTC and Fort Irwin by Pratt suggests that high levels of invertebrate diversity can be found in isolated areas. Because the diversity of insects is often correlated with the diversity of plants in an area, springs on the installation are particularly important to invertebrate populations. The Avawatz Mountains above 4,000 feet msl exhibit high levels of endemism for a number of insect species (G. Pratt, Dec. 12, 1996, personal communication with M. Quillman). The only known population of one subspecies of the square-spotted blue butterfly (*Euphilotes battoides ellisi*) occurs there.

Game (species that may be hunted) resources on the NTC& Fort Irwin are limited. Game species include the Gambel's quail, dove, chukar partridge, cottontail rabbit, jackrabbit, and coyote.

The NTC and Fort Irwin have a rich and diverse fauna. Various inventories have confirmed the occurrence of 194 birds, 36 mammals, 32 reptiles, 0 amphibians, and 1 fish species on the installation. An additional 92 vertebrate species are suspected to live or migrate through the installation, 73 of which are birds. The following sections summarize the biological diversity on the NTC and Fort Irwin. Each vertebrate taxonomic group is addressed. An inventory of all wildlife species known to occur on the installation is included in Appendix 6.7.

6.7.1 Mammals

Most desert mammals are nocturnal, but a few may be seen by day. Small mammals most frequently observed throughout the installation include the blacktailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), and whitetailed antelope squirrel (*Ammospermophilus leucurus*). Small rodent species include the desert kangaroo rat (*Dipodomys deserti*), Merriam's kangaroo rat (*D. merriami*), Panamint kangaroo rat (*D. panamintinus*), Great Basin kangaroo rat (*D. microps*), long-tailed pocket mouse (*Chaetodipus formosus*), little pocket mouse (*Perognathus longimembris*), desert pocket mouse (*Perognathus penicillatus*), deer mouse (*Peromyscus maniculatus*), cactus mouse (*P. eremicus*), canyon mouse (*P. crinitus*), grasshopper mouse (*Onychomys torridus*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and desert woodrat (*Neotoma lepida*) (RDN, Inc., 1995; USFWS, 1994; Recht, 1993, 1994, 1997). The Mohave ground squirrel (*Spermophilus mohavensis*) also occurs within the NTC and Fort Irwin. Also present is the Botta's pocket gopher (*Thomomys bottae*), but it is rarely seen due to its fossorial (underground) inhabitance.

Larger mammal species on the Training Center include the badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), grey fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*). The kit fox and coyote are expected to occur throughout the post, whereas the others are localized and fairly rare. Other large mammals on the NTC and Fort Irwin are the Nelson's bighorn sheep (*Ovis canadensis nelsoni*) and feral burros.

Abandoned mines, natural caves, trees, and manmade structures throughout the installation provide

potential roosting habitat for bats. Bats also use the many cliff faces and rocky ledges of mountain ranges as sites for roosting, and they have the potential to use Joshua trees as night roosts. Eight bat species were detected on the NTC and Fort Irwin during recent surveys by Brown (1994, 1995); however there are 14 species of bats whose range overlaps Fort Irwin's boundaries. The western pipistrelle (*Pipistrellus hesperus*) and California myotis (*Myotis californicus*) were the two most commonly observed species. Bat species observed on the post are listed in Appendix 6.7 with other wildlife species.

6.7.2 Birds

Brydolf (1997) confirmed a total of 182 species, including 41 families representing 16 orders on the NTC and Fort Irwin. This list is included in Appendix 6.7.

Most bird species that occur on the NTC and Fort Irwin are representative of creosote scrub habitat. Some common bird species include the black-throated sparrow (*Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), and greater roadrunner (*Geococcyx californianus*). The verdin (*Auriparus flaviceps*) and black-tailed gnatcatcher (*Polioptila melanura*) are more common in desert wash systems.

The greatest bird activity is concentrated in the immediate vicinity of water. NTC and Fort Irwin springs as well as the wastewater treatment ponds are a valuable resource to most resident and migratory bird species. Not only is there increased structural diversity of the vegetation and habitat, but invertebrates that become abundant in the vicinity of springs during spring and summer provide an important food source to resident species. Representative birds include the house finch (*Carpodacus mexicanus*), phainopepla (*Phainopepla nitens*), northern mockingbird (*Mimus polyglottos*), and song sparrow (*Melospiza melodia*). Numerous birds occur as winter or summer residents or migrants that occur only during brief periods in the spring and fall. Some common species include the yellow-rumped warbler (*Dendroica coronata*), Hutton's vireo (*Vireo huttoni*), cliff swallow (*Hirundo pyrrhonata*), ruby-crowned kinglet (*Regulus calendula*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), golden eagles (*Aguila chrysaetos*), and prairie falcons (*Falco mexicanus*) are some raptors that occur on the installation. Many raptor species use cliff faces and rocky ledges of mountain ranges as sites to roost or nest. Owl species that occur on the NTC and Fort Irwin include the burrowing owl (*Speotyto cunicularia*), barn owl (*Tyto alba*), and short-eared owl (*Asio flammeus*).

The southwestern willow flycatcher (*Empidonax traillii extimus*) and the least Bell's Vireo (*Vireo bellii pusillus*) are the only federally listed passerine bird species likely to occur within the NTC. Information on these species is located in section 6.7.6. Almost all of the other bird species that occur on the NTC are protected under the Migratory Bird Treaty Act (MBTA). A summary of the MBTA is located in section 9.6.4.2.

6.7.3 Fish

Although numerous active perennial springs are located on the Training Center, no documentation exists of native fish species occurring in any springs. The introduced mosquitofish (*Gambusia affinis*) occurs in Garlic Springs. No other native, introduced, or non-native fish species are known to occur on the installation.

6.7.4 Reptiles and Amphibians

Thirteen lizard species, 15 snake species, and one tortoise species have been observed on the NTC and Fort Irwin. These are listed in Appendix 6.7.

One amphibian species is likely to occur on the NTC and Fort Irwin; however, it has not been observed to date. The red-spotted toad (*Bufo punctatus*) is a widespread species that occurs in a variety of habitats, including desert oases and springs. Fifty tadpoles were observed just beyond the far northeastern border of the installation in a man-made cement wading pool at the Sheep Creek Spring Biological Research Station in the foothills of the Avawatz Mountains (Chambers Group, Inc., 1992b). One individual was observed at Paradise Springs in the Paradise Range just beyond the southwestern border of the NTC and Fort Irwin (MBA, Inc., 1991). No amphibians have been observed on the Training Center; however, any active spring (occurrence may be restricted at some springs by water quality) could support amphibian species, even springs that are active only part of the year.

Rich, diverse reptilian populations known to occur on the post are characteristic of those found in creosote scrub habitat. Some diurnal lizards are widespread, while others are habitat specialists. Widespread species include zebra-tailed lizards (*Callisaurus draconoides*), side blotched lizards (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), and western whiptails (*Cnemidophorus tigris*). Other lizard species that are widespread but less abundant include the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislezenii*), and desert iguana (*Dipsosaurus dorsalis*). Habitat specialists include the collared lizard (*Crotaphytus collaris*), chuckwalla (*Sauromalus obesus*), long-tailed brush lizard (*Urosaurus graciosus*), and common (desert) night lizard (*Xantusia vigilis*) (Morafka, 1993; Morafka, 1997; Brown and Nagy, 1997). There are two populations of Mojave fringe-toed lizard (*Uma scoparia*) (California species of special concern), on the NTC and Fort Irwin. The main population is found in the dunes just north of Bitter Springs (Morafka, 1997). The other population is in the dunes just east of Red Pass Lake.

The desert tortoise (*Gopherus agassizii*) occurs in varying densities throughout the area (MBA, Inc., 1991; Chambers Group, 1992c; Chambers Group, 1992d). This species is listed as threatened by the USFWS and requires special management considerations. Information on this species is presented in Section 6.7.6.

Common snake species include the coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), western patch-nosed snake (*Salvadora hexalepis*), western shovel-nosed snake (*Chionactis occipitalis*), and sidewinder (*Crotalus cerastes*) (MBA, Inc., 1991; Chambers Group, Inc., 1992b; Brown and Nagy, 1997). Less common species include the blind snake (*Leptotyphlops humulis*) and ground snake (*Sonora semiannulata*). Unlike lizards, most of which are primarily diurnal, most snake species on the installation are nocturnal.

6.7.5 Other Faunal Species

The NTC and Fort Irwin has begun to study its invertebrate species, particularly insects, and part of those studies involve basic inventory. Invertebrates are essential components of the desert ecosystem, and the case can be made that without these basic ecosystem building blocks (invertebrates), most animals and many, if not most, plants could not exist on the installation. Pratt and Alley (1997) evaluated the use of invertebrates as indicators of the effects of military use on the installation, using the Langford Impact Zone as a study area. They identified 17 arthropod species in the study area, and there likely are more than 4,000 invertebrate species on the installation. Species identified are included in Appendix 6.7.

6.7.6 Special Status Fauna

Special status faunal species are listed as threatened, endangered, proposed for listing, candidates for listing by the state and/or federal government, California species of concern, or designated as sensitive by the BLM. The installation lies wholly in the Mojave Desert and, as such, could be home to many species of birds found in the Mojave Desert. The West Mojave Coordinated Management Plan (WMCMP) (Conservation Agencies, 1995) lists many species of birds in the Mojave Desert. This management plan includes the list of NTC and Fort Irwin-confirmed and WMCMP-possible species, so habitat modeling can be used to predict if species listed in the WMCMP could be found at the NTC and Fort Irwin. Below species summaries are adapted from the WMCMP.

6.7.6.1 Federal- and/or State-listed Threatened or Endangered Fauna

Federal Endangered: any species officially listed by the U.S. Fish and Wildlife Service that is in danger of extinction throughout all or a significant portion of its range.
Federal Threatened: any species officially listed by the U.S. Fish and Wildlife Service that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

California Endangered: any species officially listed by the California Fish and Game Commission that is in danger of extinction throughout all or a significant portion of its range.
California Threatened: any species officially listed by the California Fish and Game Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Peregrine Falcon (*Falco peregrinus anatum*)

Legal Status. Federal Endangered - October 1970
State Endangered - June 1971
Federally Delisted – August 1999

This subspecies of peregrine falcon is found primarily in the western United States. During winter they can be found throughout most of California. Summer range is more restricted to northern California, along the coast from Santa Barbara northward, and in the Sierra Nevada Mountains. Peregrines are uncommon winter migrants to the West Mojave. A peregrine falcon was observed at Bitter Springs in 1997 (Brydolf, 1997).

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)
Willow Flycatcher (*Empidonax traillii*)

Legal Status. Southwestern Willow Flycatcher - Federal Endangered - 1995
Willow Flycatcher - State Endangered - 1991

The southwestern willow flycatcher breeds in riparian woodland habitats with willows, cottonwoods, and/or alders. A single willow flycatcher (subspecies unknown) was observed in mid-spring in the Hellwind Canyon drainage system (located in the Leach Lake Impact Area) during general wildlife surveys conducted there in 1993 and 1994 (USFWS, 1994). During avian surveys conducted on the NTC and Fort Irwin in spring 1994, several *Empidonax* species were observed during walking transects at two locations in the Avawatz Mountains in juniper and creosotebush dominant habitat, and near Bitter Springs (Brydolf,

1996). A transient willow flycatcher (subspecies unknown) was observed at King Springs during 2003 avian surveys (Galvin 2003). The southwestern willow flycatcher is a summer resident in the region and is not expected to occur regularly on the Training Center because of a lack of appropriate habitat. It may occur during brief periods of migration at springs and riparian areas (Chambers Group, Inc., 1998).

Least Bell's Vireo (*Vireo bellii pusillus*)

Legal Status. Federal Endangered - 1986
State Endangered - 1980

The least Bell's vireo is a summer resident in the region and breeds in riparian habitat; it prefers areas of dense mulefat with an overstory of willows. In 1986 a least Bell's vireo was observed on Fort Irwin at Bitter Springs (Brydolf, 1996). This species is not expected to occur regularly on the NTC and Fort Irwin because of the lack of suitable habitat. It may occur near springs for brief periods during migration.

Desert Tortoise (*Gopherus agassizii*)

Legal Status. Federal Threatened - April 1990
State Threatened - June 1989

The desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Sonoran deserts; its range roughly approximates the distribution of creosote bush scrub. The desert tortoise spends much of the year underground to avoid extreme temperatures during summer and winter. It constructs and maintains single-opening burrows, of which there may be several within an individual's home range. The desert tortoise is active in the spring, summer, and autumn when daytime temperatures are below 90°F (32°C). Most activity occurs during spring and early summer.

The USFWS determined that the Mojave population of the desert tortoise warranted listing in response to documented population declines over large portions of its range. The decline is thought to be due to a number of reasons, including upper respiratory tract disease exacerbated by the stress of several drought seasons, loss of habitat, predation by ravens, livestock grazing, and direct disturbance by humans. The USFWS emergency-listed the desert tortoise on August 4, 1989 and officially listed the Mojave population as federally threatened in April 1990 (USFWS, 1990).

The desert tortoise on the NTC and Fort Irwin is well studied. Numerous surveys have been conducted over the years to document the distribution and estimated size of tortoise populations throughout the installation (Chambers Group, Inc., 1994; Krzysik and Woodman, 1991; Woodman and Goodlett, 1990). The desert tortoise is known to occur throughout the Training Center in low to moderate numbers with the highest concentration along the southern boundary (Chambers Group, Inc., 1996a).

California Black Rail (*Laterallus jamaicensis coturniculus*)

Legal Status. State Threatened - 1971

The California black rail is a very uncommon, local breeder inhabiting marshes, swamps, and wet meadows. Two large disjunct populations occur in California: one in the San Francisco Bay area and other along the Colorado River drainage in Imperial County. A black rail was observed at the wastewater treatment ponds on the NTC and Fort Irwin during fall 1994 (Brydolf, 1994; 1997), but it has not been seen since. The occurrence of this species in the central Mojave Desert is extremely unusual.

Swainson's Hawk (*Buteo swainsoni*)

Legal Status. State Threatened - 1983

The Swainson's hawk was once a widespread breeder in the non-forested areas of northern California and the Central Valley. Conversion of the Central Valley and other grassland areas from pastureland to cropland has probably been a major factor in the population's decline (Remsen, 1978). The Swainson's hawk winters in South America. This species is migratory and is not expected to occur regularly at the NTC and Fort Irwin or forage in the area for prolonged periods. It has been observed at Bitter Springs (Brydolf, 1997).

Mohave Ground Squirrel (*Spermophilus mohavensis*)

Legal Status. State Threatened - 1971

The Mohave ground squirrel generally occurs in habitat that consists of large alluvial filled valleys with deep fine- to medium-textured soils vegetated with creosote scrub, shadscale scrub, or alkali sink scrub in the absence of desert pavement and shallow eroded soils (Aardahl and Rouch, 1985). The species is primarily granivorous, foraging on annual grasses and forbs within creosote scrub and shadscale scrub. Recent reports of Mohave ground squirrel populations at the NTC and Fort Irwin are from the Goldstone area and immediately east of the Gary Owen impact area (RDN, Inc., 1995). These surveys were concentrated in the northern and eastern portions of the installation; other populations of Mohave ground squirrels may occur in areas with suitable habitat yet to be surveyed. Previous surveys indicated the presence of this species at 12 sites, including several in the vicinity of Goldstone Lake, the Echo site, Nelson Lake, Bicycle Lake, Drinkwater Lake, the north end of Lucky Fuse, and Lizard Gulch (Krzysik, 1991). The present status of these populations is unknown.

6.7.6.2 Other Special Status Fauna

Other special status faunal species are proposed for listing, candidates for listing, California species of concern, or designated as sensitive by the BLM. This list is steadily growing for the Mojave Desert region. Including the above listed species, the list (October 1998) includes 98 plant or animal species either on the NTC and Fort Irwin or occurring in the Mojave Desert ecosystem. The WMCMP is being regularly updated with this information, and the Mojave Desert Ecosystem Program is also a source of information on these species.

The draft Endangered Species Management Plan (Chambers Group, Inc., 1998) lists 36 faunal special status species (including the threatened or endangered species listed in Section 6.7.6.1, with exception of the peregrine falcon) that are either confirmed or likely on the installation. Brydolf (1997) has confirmed the following avian California Species of Special Concern on the installation: white-faced ibis, sharp-shinned hawk, Cooper's hawk, northern harrier, ferruginous hawk, golden eagle, California gull, black tern, burrowing owl, long-eared owl, Vaux's swift, vermillion flycatcher, Bendire's thrasher, crissal thrasher, Le Conte's thrasher, loggerhead shrike, gray vireo, Virginia's warbler, yellow warbler, and yellow-breasted chat. The golden eagle is a fully protected species by the California Fish and Game. The NTC and Fort Irwin will continue to monitor the status of these important species and take actions to protect them whenever possible.

6.7.7 Pest Species and Feral Animals

Pest management programs are described in Section 9.11.

Dogs and Cats

Feral (wild) populations of domestic cats and dogs are not a significant management problem on the Training Center. Cats are not likely to survive in the arid desert environment because of the lack of cover and water; therefore, they do not likely significantly impact native wildlife populations. In addition, cats that stray too far from the cantonment area are likely preyed upon by coyotes. Feral cat numbers are probably very small and restricted to the cantonment area.

Feral dogs may occur in small packs near the cantonment area. Most smaller dogs will likely become the prey of coyotes, but larger dogs may successfully join a coyote pack or group. Impacts to native wildlife populations from feral dogs are likely to be minimal because they are not well adapted to life in the desert environment. Feral dogs are more dependent on resources provided by humans than their wild canid counterparts.

Coyotes

Coyotes are wide-ranging animals that commonly occur in a variety of habitat types, including severely disturbed areas and urban edges. They frequently dig for rodents and other prey species and readily dig up refuse buried at bivouac sites. They are a nuisance at the cantonment area where they take advantage of foods in the form of trash and pet dogs and cats. This is especially true at the post landfill where coyotes dig up the buried trash and spread it around. In doing so it makes the refuse more accessible to other pest species like the raven. Both the Installation Integrated Pest Management Plan (DOA, 2003) and the draft Endangered Species Management Plan (DOA, 2003) for the NTC and Fort Irwin have specific recommendations for management and control of coyotes on the installation.

Burros

Many negative impacts caused by burros in the desert arise from alteration of the soil. The creation of frequently used trails, wallows (dust baths), and congregation of herds around water sources lead to lower water infiltration rates and increased compaction. In addition to soil impacts, burros directly affect vegetation and wildlife. Burros eat nearly every species of woody plant and can consume more than native herbivores (bighorn sheep). With the destruction of vegetation comes the reduction of forage, shade, and escape cover, which are important requirements affecting short- and long-term survival of many wildlife species.

A Feral Burro Management Plan was developed in 1982 in cooperation with the BLM and the China Lake Naval Air Weapons Station to eliminate feral burro herds on their respective lands. This project, which was very successful, continued until 1991. However, two populations totaling approximately 70 feral burros now occur on the NTC and Fort Irwin in the Leach Lake area and at Bitter Springs. There is also a burro population in the Western Expansion Area of unknown size. The burros are a management concern because of negative impacts on soils, vegetation, and water quality.

Common Ravens

Ravens are native birds in the Mojave Desert; however, their numbers have increased significantly over the past several decades as a result of expanding human use of the desert. Raven populations have grown

beyond the natural carrying capacity of the desert environment because of resources provided by humans. These resources have included food (landfills), water (wastewater treatment ponds), and nest and perch sites (trees, utility lines, fences, and buildings). Food and water subsidies have increased raven survivorship during the summer and winter when resources would otherwise be low. In certain areas of the Western Mojave, raven populations have increased 1500% from 1968 to 1992 (Boarman and Berry 1994). Because ravens are known to prey on juvenile desert tortoises, increases in raven numbers could have negative impacts on the desert tortoise populations on the NTC and Fort Irwin.

There are five areas on the NTC where conditions are conducive to increasing the raven populations or where ravens pose a significant threat. Those areas are the cantonment area, the landfill, the wastewater treatment ponds, the area south of the 90 grid line, and the various training areas. The cantonment area, the landfill, and the wastewater treatment ponds are areas that help proliferate the raven population. The cantonment area provides many nesting and perching locations as well as supplemental food and water. Because of the year round availability of food, the landfill receives, by far, the greatest use by ravens of any area in the cantonment area (Chambers 1996). Ravens are especially numerous at the landfill during winter and summer, when natural food supplies are at their lowest. This food subsidy likely helps to increase survivability of ravens resulting in an increased population. Although the landfill has been fenced to prevent entry by coyotes, coyotes are still entering the area through open gates and digging up garbage after it had been covered with dirt, thus exposing it to ravens. The wastewater treatment pond is also a major attraction site for ravens, although it receives significantly less use than the landfill (Chambers Group 1996). The site provides ravens with a year round source of water and tamarisk trees for roosting. The site receives heaviest use by ravens in the summer when natural water supplies are at their lowest.

The southern boundary contains some of the least disturbed land on the NTC, relatively high densities of desert tortoises, and comparatively low numbers of ravens (Chambers Group 1996). Foraging ravens from the cantonment may prey on juvenile tortoises in the area. Ravens are attracted to the remote training areas chiefly when soldiers are bivouacked, and are attracted to any food, water, and any trash left by soldiers. Efforts to control raven population on the NTC are listed in Section 9.11.

7.0 LAND USE AND MANAGEMENT UNITS

7.1 Land Uses

Primary land uses at the NTC and Fort Irwin can be divided into five overall areas: the NTC Downrange Operations Area, Cantonment Area, Leach Lake Gunnery Range, Goldstone Deep Space Communications Complex and Land Expansion Areas. Figure 2.2 shows these major land areas and the three training corridors and their impact areas within the Downrange Operations Area. Acreages[9] of these units are shown in the box.

NTC Downrange Operations Area*	501,551 ac (202,972 ha)
Leach Lake Gunnery Range	92,625 ac (37,484 ha)
Goldstone Complex	33,241 ac (13,452 ha)
Cantonment Area	15,314 ac (6,197 ha)
Western Expansion	70,045 ac (28,346 ha)
Eastern Expansion	48,629 ac (19,679 ha)
Total Land	761,405 ac (308,130 ha)

* Includes acreages not available for training due to environmental, cultural, and recreational constraints.

7.1.1 NTC Downrange Operations Area

The NTC portion of Fort Irwin is divided into three regions, each representing a major training area. Task force live-fire exercises are conducted primarily north of the Granite Mountains (the northern corridor). South of the Granites and north of Tiefort Mountain is the central corridor, and south of the Tiefort is the southern corridor. The majority of force-on-force maneuvers take place in the central corridor. The southern corridor is used primarily for staging and also for maneuver training (U.S. Army, National Training Center and Fort Irwin, 1993). The southern corridor includes about 20,000 acres of desert tortoise critical habitat, which significantly reduces the corridor's value for military training. Impact areas that receive the majority of live fire during training exercises are restricted-access and/or no-digging restricted, and force-on-force training is excluded from these areas. The four impact areas are Langford Lake, Lucky Fuse, Nelson, and Garry Owen.

7.1.2 Cantonment Area

The cantonment area is located in the southwestern portion of the NTC and Fort Irwin. Day-to-day operations, administrative activities, family housing and neighborhood parks, barracks, maintenance yards, indoor recreation, restaurant facilities, and equipment posts are located in this area. Recreation and other facilities within the cantonment area operate independently of military activities on the installation except that facility use depends primarily on the rotational schedule of NTC troops.

The cantonment area is nearly completely developed. The extent and quality of the landscaping varies, especially among the housing facilities where residents maintain their own yards. Some facilities are landscaped and are regularly maintained, while others either are not landscaped or need maintenance.

[9] Acreages may differ from other published reports due to different measuring and categorization systems.

7.1.3 Leach Lake Gunnery Range

The Leach Lake Gunnery Range covers most of the northern portion of the NTC and Fort Irwin and the Leach Lake Basin. Since 1967 this Range has been used by the U.S. Air Force (and the U.S. Navy and U.S. Marine Corps) year-round for air-to-air and air-to-ground gunnery and as an east-west, low-level flight corridor. Virtually all types of U.S. military aircraft (fighters and bombers) use Leach Lake. Air Force use averages 18 days monthly (U.S. Army, National Training Center and Fort Irwin, 1993).

The Leach Lake Gunnery Range is extensively contaminated with unexploded ordnance, which has been deposited since World War II. Unexploded ordnance ranges from 2,000-pound bombs to highly sensitive cluster bombs. The Range is undergoing large-scale unexploded ordnance removal.

7.1.4 Goldstone Deep Space Communications Complex

The NASA Goldstone Deep Space Communications Complex and satellite tracking facility is operated by the Jet Propulsion Laboratory. There are few military training options available on Goldstone, but it has significant value in terms of natural resources, primarily due to virtually no land impacts beyond facilities and roads. During critical NASA missions at Goldstone, military use is curtailed almost completely, and some restrictions include other portions of the Training Center. The NTC and Fort Irwin has ultimate responsibility for the management of natural resources on Goldstone, but NASA has its own environmental program for the area.

7.1.4 Land Expansion Areas

The Land Expansion Areas consists of two parcels: the western (Superior Valley) and eastern (East Gate) expansion areas. These parcels were Congressionally withdrawn from the jurisdiction of the BLM and transferred to the jurisdiction of the Army under the authority of the *Fort Irwin Military Withdrawal Act of 2001*. Currently, these areas are off-limits to military training. Pending completion of environmental review, these parcels will be used by military units, including ground and air elements.

The Superior Valley parcel is situated west to southwest of Fort Irwin and contains 70,045 acres. It is bounded on the north by the NAWS China Lake, on the south by the Paradise Range, and on the west by Superior Dry Lake.

The East Gate parcel is primarily in the Silurian Valley and is separated from the rest of Fort Irwin by the rugged Avawatz Mountains. This parcel includes 48,629 acres directly east of and contiguous with Fort Irwin. In addition, expansion would add approximately 23,103 acres of land south of the NTC to land used for military training. Most of this land is currently owned by the NTC, but is protected as desert tortoise critical habitat. The remainder of southern expansion is land bordering the Boulder Utility Corridor to the southeast of the NTC.

In general, both the Superior Valley and East Gate parcels would be used primarily for staging and logistical support; however, the Army may also use these areas for heavy maneuvers. Use of the UTM 90 area would allow mechanized brigades to connect to the Superior Valley via an expanded southern corridor.

7.1.5 Surrounding Land Use

Figure 2.1 indicates land use areas adjacent to the NTC and Fort Irwin. The installation is bordered to the west by China Lake Naval Air Weapons Station. Lands at China Lake adjoining the NTC and Fort Irwin are used for air-to-ground gunnery and a variety of research, development, testing, and evaluation of Navy air weapons. With exception of the aerial gunnery range on the southern edge of China Lake, most of the area has few ground-disturbing impacts, and there is a requirement for a highly controlled emission environment (both dust and electronic) on station to support research requirements.

Death Valley National Park borders the NTC to the north. The portion of Death Valley National Park bordering the NTC is designated as wilderness area and is protected under the Wilderness Protection Act of 1964. National Park lands are highly protected with few uses that negatively impact natural resources (U.S. Army Corps of Engineers, Los Angeles District, 1996).

To the east, the Training Center is bordered by multiple use BLM land interspersed with state school lands. The area adjacent to the northeastern corner of the NTC and Fort Irwin is the Avawatz Mountains WSA (Wilderness Study Area). To the southeast, the NTC borders a large power transmission line and the Soda Mountains WSA. The East Expansion Area subsumes the South Avawatz Mountains WSA. Most of these BLM lands are designated Limited Use with two small northeastern-adjacent parcels designed as moderate use (controlled balance between higher intensity use and protection). There are two BLM Areas of Critical Environmental Concern near the NTC's eastern boundary: Denning Springs is just northeast of the northeastern corner of the NTC, and Salt Creek is east of state highway 127 in the northern Silurian Valley. Much of the Soda Mountains WSA is within a BLM-administered grazing lease (U.S. Army Corps of Engineers, Los Angeles District, 1996).

To the south of the NTC and Fort Irwin is mostly BLM land with small, interspersed parcels of privately-owned land and a few State school land parcels. BLM land to the immediate south is designated as moderate use, and BLM land to the southwest is designated as limited use. BLM lands to the southwest of the NTC and Fort Irwin are within two BLM-administered grazing leases (U.S. Army Corps of Engineers, Los Angeles District, 1996).

7.2 Management Units

7.2.1 Training Areas

Figure 7.2.1 shows training areas on the NTC and Fort Irwin. The installation recently reconfigured its traditional 22 training areas into 68 training areas.

7.2.2 Natural Resources Management Areas

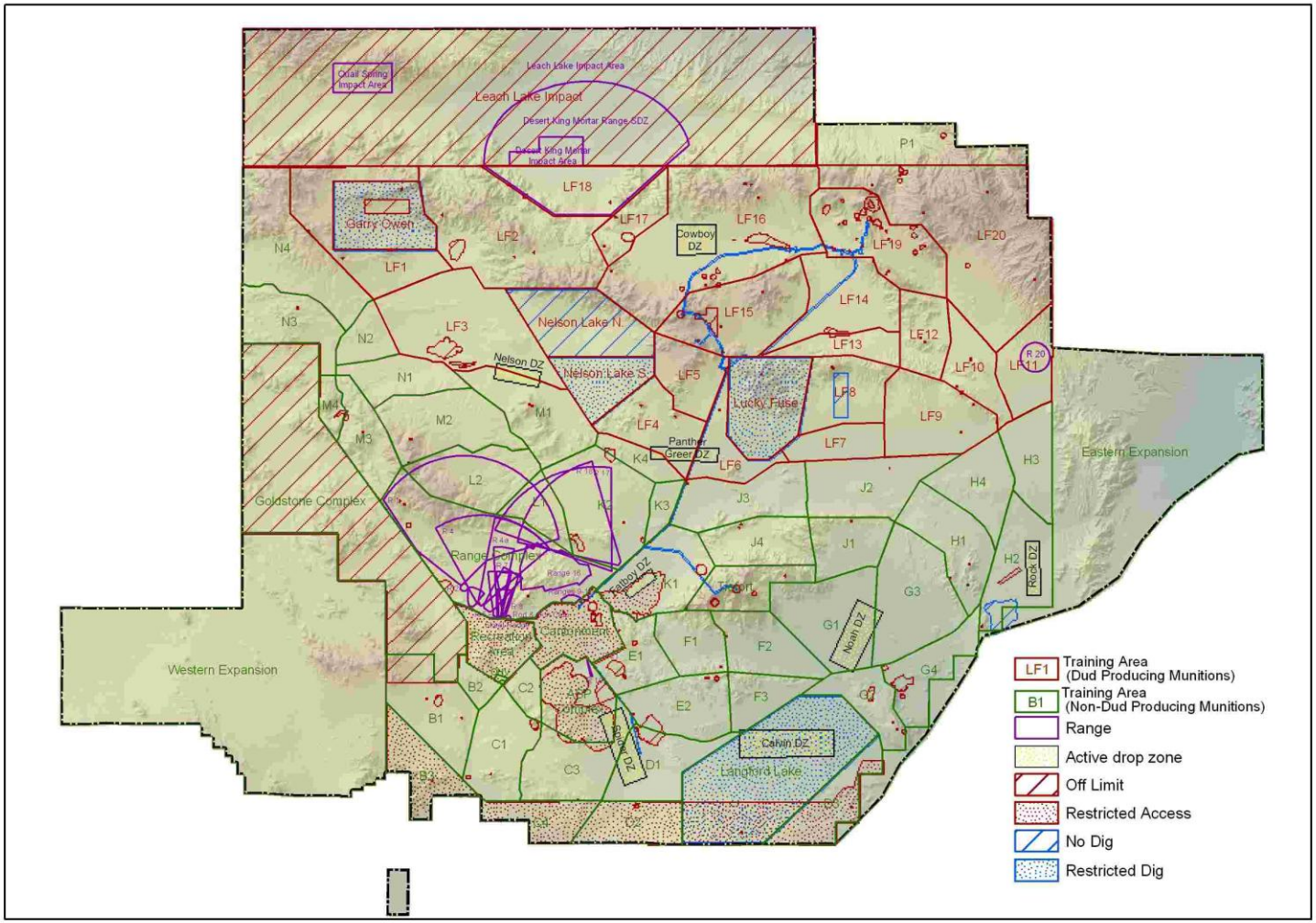
Training areas are recognized by military units, and their use is tightly controlled. Since much of the management of natural resources is dependent upon activities associated with military training, there is little reason to impose management area boundaries differing from training area boundaries for natural resources management. Thus, training areas are the basic management unit at NTC and Fort Irwin.

7.3 Proposed Expansion Areas

Beginning in 2001, the East and West Expansion Areas came under the management of the NTC and Fort Irwin. Management of Expansion Areas is similar to the previous BLM multiple use policy. Army Military Police patrol both East and West Expansion Areas to prevent illegal mining activity and illegal

off-road vehicle use. Future use of Expansion Areas for military training is dependent on environmental review specified by NEPA. Currently, a Supplemental Draft Environmental Impact Statement (that modifies the Draft Environmental Impact Statement of 1997, addressing Southern Expansion) is in draft form. This INRMP assumes a continued policy of multiple use for Expansion Areas. If military training is allowed after environmental review, this INRMP will be updated.

Figure 7.2.1. Training Areas on the National Training Center and Fort Irwin, California.



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8.0 INVENTORY AND MONITORING

The first step in biodiversity protection is to prepare an inventory, or itemized list of taxa in an ecosystem. This process has been ongoing for many years on the NTC and Fort Irwin, primarily driven during early years by the Endangered Species Act and more recently by implementation of the ITAM program. This INRMP continues the process of conducting basic inventories of the installation's natural resources. In general, these have been termed Planning Level Surveys, and they are high-priority projects in the budgeting system.

Monitoring is used to identify trends (or absolute numbers if needed) of individual species or higher associations of species, such as vegetation cover types or plant communities. Monitoring is generally performed on a regular basis and often targets species with high economic or human-use values, endangered species, and indicator species of overall ecosystem health.

The NTC and Fort Irwin ITAM program initially collected inventory data and later conducted studies to determine plant and animal speciesthat might be indicators of ecosystem degradation resulting from military activities. ITAM currently monitors vegetation and soil parameters on permanent plots to determine trends in the condition of training lands over time and identify rehabilitation needs. The NTC and Fort Irwin natural resources program inventories and monitors soil, water, and endangered species. The DPW and ITAM staffs cooperate to collect and distribute natural resource information. Both inventory and monitoring data are used to evaluate general and site-specific ecosystem integrity. As such, they are used as integral building blocks to provide military trainers with recommendations on land use. The purpose of this process is to maintain or improve the land condition to sustain high quality training and protect vital resources.

The NTC and Fort Irwin's natural resources monitoring program utilizes a variety of techniques to assess land condition. Techniques are both qualitative and quantitative. There are monitoring plots located throughout post that are regularly sampled in addition to informal surveys. Quantitative plots are used to monitor long-term trends in land condition as they relate to training. The information is used in developing long- term training and management plans. Qualitative surveys rely mostly on the experience of field personnel and can be subjective. These qualitative surveys provide a quick assessment of an area, and management actions are prioritized based upon those assessments.

General Goal 1. Inventory NTC and Fort Irwin natural resources and regularly monitor resources that are indicators of overall ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

General Goal 2. Analyze inventory and monitoring data to implement an adaptive management strategy, using landscape level monitoring protocols.

General Goal 3. Provide data and other input to regional Mojave Desert conservation initiatives.

8.1 Flora Inventory and Monitoring

Goal. Inventory the NTC's and Fort Irwin's floral resources and monitor species or communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

8.1.1 Range and Training Land Assessment[10]

The application of Range and Training Land Assessment (RTLA) data will:

- Reduce the need for expensive land rehabilitation programs,
- Reduce some subjectivity from land management decisions,
- Help ensure the sustained availability and productivity of Army lands, and
- Provide input for implementing this INRMP and preparing NEPA and other environmental documents.

RTLA uses a wide array of natural resources data, such as soils, canopy cover, disturbance levels, etc., to determine condition of land and trends in that condition, emphasizing effects of the conduct of the military mission. Tazik et al. (1992) describe procedures for the standard RTLA plot inventory. During early years of RTLA implementation these procedures were modified for conditions at the NTC and Fort Irwin.

RTLA was initiated on NTC and Fort Irwin in 1990 with 200 allocated core plots for long-term comparisons. Core plots were allocated using vegetation and satellite imagery to produce a stratified random allocation. RTLA core plots were designed to be intensively monitored on a long-term basis. Frequency of intensive monitoring is dependent upon management objectives and the amount of change occurring annually on the installation. The 200 core plots were annually monitored using the long-term, intensive technique in 1990-93.

From 2000 to 2002, 162 of these original 200 plots along with 124 newly established plots were monitored with approximately a third of the sites visited each year. These 286 plots form the basis of continued monitoring in the future. With 47 of these plots located in the expansion areas. RTLA is currently establishing a baseline with which to document effects of military training as training activity begins. Current sampling protocls are described in the RTLA Manual (Hamilton, 2005 draft). NTC and Fort Irwin Between 1994 and 1997, RTLA efforts included the following general projects, lumped under the title of *Biological Monitoring and Environmental Impact Assessment* (Dominguez Hills Corporation, 1997):

Special Use Plots

Special use plots were used from 1995 through 1999 to evaluate land condition in locations other than the original RTLA sites and/or to use different monitoring protocols. They have primarily been used to quantify known military impacts on plants and animals to determine which plant and animal species abundance and condition changes are reliable indicators of effects of military training. Special use plots are typically laid out in a treatment and control array (high, medium, and low military impacts). Examples of these studies include Prigge and Ferrus-Garcia (1997), Gibson *et al*. (1997), Pratt and Alley (1997), Morafka (1997), Brown and Nagy (1997), Brydolf (1997), and Recht (1997).

Remote Sensing

Landsat imagery does not accurately portray vegetation in the Mojave Desert due to technology shortfalls involving the use of six widely spaced bands. A remote sensing study (Lee *et al*. 1997) on the NTC and Fort Irwin used SPOT panchromatic imagery and Landsat TM imagery to determine disturbed sites using

[10] Formerly called Land Condition Trend Analysis (LCTA).

surface reflectance. The ITAM program completed analysis of digital orthophotography from 1997 and 2001. The objective was to produce a classified disturbance map to help identify and prioritize LRAM projects and provide land condition trend information.

8.1.1.1 Proposed Action

Goal. Provide land managers and trainers with long-term assessments of changes in vegetative cover and botanical composition under varying levels and types of use.

Objective 1. Continue long-term monitoring on permanent plots during 2006 through 2011.

Objective 2. Use results from permanent plots for future ground-truthing analyses of new and existing remote sensing imagery.

Objective 3. Incorporate training activity data (from RFMSS and other sources) to link vegetation change to known military impacts.

Objective 4. Develop a model to predict effects of military training on vegetation and soils.

Objective 5. Use remote sensing (with ground truthing) to determine effects of military training (*i.e.*, change analysis).

Objective 6. Update the floral inventory as new species are found during RTLA and other surveys.

Objective 7. Utilize RTLA data to assist range and military personnel in planning downrange activities and facilities.

8.1.1.2 Other Management Options

The Sikes Act requires no loss in the capability of the lands to support the military mission. This, in turn, implies a legal requirement to monitor the effects of military activities. Thus, not monitoring is not a viable option. However, the degree to which RTLA is used provides options. The NTC and Fort Irwin is classified as a Class I installation in terms of ITAM implementation; thus, it is not feasible to expend a greater effort on RTLA. A lesser degree of implementation is possible, but this would not meet the needs of the installation. There are numerous other land condition monitoring programs used by other agencies, but none are specifically designed to monitor effects of military activities on desert landscapes. They would be less effective.

8.1.2 Flora Surveys

The most recent floral inventory was completed in 1993 (Gibson et al. 1994). This inventory was used to make a preliminary GIS map of vegetation associations. Since this time, most botanical research has focused on three topics: (1) the physiology of dust accumulation on vegetation; (2) the life history of the endangered Lane Mountain milkvetch; and (3) surveys for sensitive species, particularly the Lane Mountain milkvetch. The ITAM program censuses a subset of its permanent vegetation plots during the spring. All of these research and monitoring efforts have increased the number of plant species found on the installation. Herbarium mounts made by Gibson et al. (1994) are kept at the Directorate of Public Works-Environmental, Natural Resources Section, and are useful for identifying plants during RTLA surveys and other field projects.

8.1.2.1 Proposed Action

Goal. Identify flora of the NTC and Fort Irwin as part of the natural resources baseline data.

Objective 1. Update the flora inventory (including herbarium mounts) as new species are found during RTLA surveys, site-specific surveys, sensitive plant species surveys, and other projects.

Objective 2. Provide floral data to regional Mojave Desert initiatives, particularly the MDEP.

Objective 3. Inform the CNDDB of sensitive plants observed on the NTC during plant and tortoise surveys.

Objective 4. Develop and maintain a computerized plant checklist.

Objective 5. Create a vegetation map of NTC vegetation types that is congruent with a recently created map of the entire central and eastern Mojave region.

8.1.2.2 Other Management Options

There is no legal requirement for maintaining a floral inventory. Thus, the option to not maintain or expand this inventory is viable. At the other extreme, the Army could expend a great deal of effort specifically developing a more complete floral inventory. However, considering that the existing floral inventory is steadily growing as a by-product of other vegetative projects, the current level of inventory adequately supports the overall natural resources program.

8.1.3 Rare or Endangered Plant Monitoring

The Lane Mountain Milkvetch is the only federally-listed plant species on the installation. The NTC and Fort Irwin draft Endangered Species Management Plan (ESMP) (U.S. Army 2004) states that the USFWS will coordinate a monitoring program for the Lane Mountain milkvetch. Several extensive surveys have been conducted for the Lane Mountain milkvetch, and the distribution of this species has been carefully mapped (Charis 2002). It is possible that additional populations may be found, but highly unlikely. Future monitoring should focus on looking for new populations (range expansion), understanding the life history, reproductive biology, conservation genetics, and physiology of the species – information that can be used to conserve this narrowly endemic species.

8.1.3.1 Proposed Action

The range of the Federally-endangered Lane Mountain milkvetch is now known to be limited to a small area with distinct habitat (Charis Corporation 2002). However, it would not be out of the question to find an additional population in the Granite or Avawatz Mountains, because these areas were not thoroughly surveyed previously. Additional surveys within the NTC, conducted during tortoise surveys and RTLA sampling, would add to the body of knowledge on this rare endemic.

Extensive plant surveys were conducted throughout the NTC and Fort Irwin in 1994 (Gibson *et al.*). The alkali mariposa lily was observed northeast of Paradise Mountain Range but was not observed on the Training Center. The Mohave monkey flower has not been observed on or near the installation, despite several surveys that specifically targeted it. Potential habitat is found on the NTC. Surveys specific to

these two species on the NTC and Fort Irwin could resolve issues regarding their presence and the need for protection on the installation.

Goal 1. Identify all populations of Lane Mountain Milkvetch and Lane Mountain Milkvetch habitat on the NTC and Fort Irwin and establish baseline milkvetch population densities for each site.

Objective. Survey for Lane Mountain Milkvetch, both on and adjacent to the NTC and Fort Irwin. Large areas of suitable habitat in the Granite and Avawatz Mountains have never been surveyed. Conduct these surveys during the course of NEPA and desert tortoise related activities.

Goal 2. Monitor other federal-listed plant species if they are discovered on the NTC and Fort Irwin or added to the list.

Objective. Consult with the USFWS and establish survey and monitoring programs for other federal-listed plant species if they are discovered on the NTC and Fort Irwin or added to the list.

Goal 3. Monitor State-listed threatened, endangered, or species of concern plant species if they are discovered on the NTC and Fort Irwin or added to the list, as determined by available funding.

Objective 1. Identify all populations and habitat of alkali mariposa lily, androstephium, Clokey's cryptantha, and desert cymopterus on the NTC and Fort Irwin and record baseline samples of density and cover for each site.

Objective 2. Consider establishing survey and monitoring programs for State-listed plant species, in consultation with the CDFG, if they are discovered on the NTC and Fort Irwin or added to the list during 2006-2011.

8.1.3.2 Other Management Options

There are no other legal options for federally listed plant inventory and survey, such as the Lane Mountain Milkvetch. For State-listed species, such as the alkali mariposa lily and the Mohave monkey flower, the option to not survey or give any consideration to these species is viable. At the other extreme is the option to treat these species the same as federally listed species. This would be extremely expensive, could significantly affect the military mission, and would be contrary to Army policy (AR 200-3). Army funding would not be available to support this option.

8.1.4 Wetlands

The NTC and Fort Irwin has no particular need for wetland surveys since all potential wetland sites are well known and few in number. If any proposed activity has the potential to affect these areas, site-specific wetland surveys will be conducted to determine the presence of jurisdictional wetlands. Such proposed activities are unlikely considering the high degree of protection of wet areas on the installation.

8.1.4.1 Proposed Action

Goal. Maintain a baseline database on wetland resources at the NTC and Fort Irwin.

Objective. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are

proposed. Use the USGS NWI (National Wetland Inventory) to locate wetlands. Several springs in the Avawatz Mountains (Tin Cabin, Sam Clark, etc) that are within 1-2 kilometers of the NTC are listed in the NWI, but do not appear on topographic maps.

8.1.4.2 Other Management Options

There are no legal alternatives to conducting jurisdictional wetland surveys when proposed actions may affect wetlands. Considering that the NTC and Fort Irwin knows the locations of wetlands (jurisdictional or otherwise) on the installation, there is no need for additional wetland surveys.

8.2 Fauna Inventory and Monitoring

Fauna inventory and monitoring on the NTC and Fort Irwin are accomplished primarily as part of either the identification and protection of sensitive species (within DPW) or a search for indicators of the effects of military activities on the Mojave Desert ecosystem (within G3 Training). DPW, with assistance from Range Control, monitors the numbers of harvested (and hunter-observed) doves, rabbits, and chukars, but these are not valid estimates of population size or changes.

Goal. Inventory the NTC's and Fort Irwin's faunal resources and regularly monitor species that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

8.2.1 Species Other Than Federal- or State-listed Threatened or Endangered Species

8.2.1.1 Proposed Action

8.2.1.1.1 Mammals

Small mammals have been inventoried as part of a study evaluating the use of small mammal abundance and distribution as bioindicators of the impacts of military activities on desert habitats. Brown (1994) conducted a bat survey on the installation. Other small mammal surveys to date have either been part of ITAM (RTLA) implementation (RDN, Inc., 1995) or incidental observations as part of other activities.

The CDFG has been monitoring Nelson's bighorn sheep in the Avawatz mountain range. About half of the 76 individuals are radio-collared, and locations are recorded. The CDFG introduced two males to the population to improve the sex ratio, and the population has increased. This population moves on and off the NTC and Fort Irwin. The CDFG provides the Natural and Cultural Resources Program Manager a monthly report of this species' movements relative to the installation.

There are four bat species that are listed as species of special concern and occur on the installation. The 1994 and 1996 bat surveys (Brown) noted the presence of solitary Townsend's western big-eared bat (*Plecotus townsendii townsendii = Corynorhinus townsendii townsendii)* males, suggesting that a maternity colony is in the vicinity. The western mastiff bat (*Eumops perotis californicus)* was found in 1994. This species, the largest bat in North America, has also been found at Twentynine Palms Marine Corps Air Ground Combat Center. Male California leaf-nosed bats (*Macrotus californicus*) were identified during the 1996 survey and represented a disjunct range extension for the species. The big free-tailed bat (*Tadaria macrotis = Nyctinomops macrotus*) has not been seen at the NTC, but this colonial

species does have scattered populations throughout the Southwestern United States.

Objective 1. Cooperate with the CDFG to monitor Nelson's bighorn sheep.

Objective 2. Survey the 10 spring areas, which includes critical foraging habitat for bats, at least once during the 2006-2011 to determine changes in bat populations in these areas (Chambers Group, Inc., 1998).

Objective 3. Evaluate the option to survey mines around the perimeter of the NTC to locate maternity roosts of bats, particularly any of special concern or listed species (Brown, 1994).

Objective 4. Continue to add to the small mammal baseline inventory using observations and data from other field projects.

8.2.1.1.2 Birds

Birds have been inventoried using walking transects and spot birding as part of a study evaluating the use of bird abundance and distribution as bioindicators of the impacts of military activities on desert habitats (Brydolf, 1994; 1997). Spot birding plots are locations of special interest or unique habitats. Walking transects are a modification of the USFWS Breeding Bird Survey. Other avian surveys to date have either been part of ITAM (RTLA) implementation or incidental observations as part of other activities.

Objective 5. Survey the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), and any existing wastewater treatment ponds which includes crucial habitat for many sensitive avian species, at least once during the 2006-2011 period to determine changes in migratory bird populations in these areas (Chambers Group, Inc., 1998).

Objective 6. Continue to add to the avian baseline inventory using observations and data from other field projects.

Objective 7. Determine the presence or absence and distribution of the southwestern willow flycatcher, and least Bell's vireo on Fort Irwin.

8.2.1.1.3 Fish

Unless there becomes reason to suspect the presence of fish species, with exception of the introduced mosquitofish (*Gambusia affinis*) at Garlic Springs, on the NTC and Fort Irwin, there is no justification for inventory or monitoring of fish on the installation.

8.2.1.1.4 Reptiles and Amphibians

The only amphibian likely to occur on the NTC and Fort Irwin is the red-spotted toad (*Bufo punctatus*), but there are no projects planned to specifically survey for this species. Reptiles have been inventoried as part of studies evaluating the use of reptiles as bioindicators of the impacts of military activities on desert habitats (Morafka, 1993 and 1997; Brown and Nagy, 1997; McAller and Woodward 2004).

The Mojave fringe-toed lizard is found near Bitter Springs, in the dunes just east of Red Pass Lake, and on the dunes on the west side of the Whale. This species is closely related to the Coachella Valley fringe-toed

lizard (*Uma inornata*), which is State-listed as threatened. Thus, there is interest in the Mojave fringe-toed lizard, particularly in its genetic makeup. Other reptile surveys to date have either been part of projects involving the desert tortoise, ITAM implementation, or incidental observations as part of other activities.

Objective 8. Determine the distribution of the Mojave fringe-toed lizard on the NTC and Fort Irwin and determine if the two known populations are genetically identical.

Objective 9. Continue to add to the amphibian and reptile baseline inventory using observations and data from other field projects.

8.2.1.1.5 Invertebrates

Invertebrates have been inventoried as part of studies evaluating the use of these species as bioindicators of the impacts of military activities on desert habitats (Pratt and Alley, 1997). There has been no systematic survey for invertebrates on the installation with exception of this study. It is difficult to justify a general survey for invertebrates at this time.

Objective 10. Develop an invertebrate species list from the Pratt and Alley study (1997) and observations and data from other field projects.

8.2.1.2 Other Management Options

Surveys for species which are monitored for biodiversity purposes, such as bats at springs, could be decreased or dropped, or they could be increased in terms of geographical areas surveyed or survey intensity. It is a matter of budgets, personnel, and species priority, not legal requirements.

There are numerous other fauna inventory and monitoring techniques available for use in the Mojave Desert. These could be used to any degree on the NTC and Fort Irwin. However, considering declining DoD budgets and increasing mandatory compliance programs, it is unlikely that significantly more faunal surveys or monitoring programs can be justified for species that are not listed.

8.3 Water Quality Monitoring

8.3.1 Surface Water

The NTC and Fort Irwin has very limited surface water resources (Section 6.4.1), and with the possible exception of Garlic Springs, there is no reason to suspect that water quality parameters in these waters is other than normal for these types of water bodies. To date water quality of springs on the installation has not been monitored. All springs and seeps were surveyed for general condition in spring and summer, 2002 using a protocol developed by the Desert Managers Group. The survey will be conducted once a year. Garlic Springs in particular should be monitored closely because it is downstream of the Wastewater Treatment Plant. Secondary-treated wastewater is irrigated in designated areas; and there is some potential for specific contaminants to leach into the aquifers under certain conditions in this area.

8.3.1.1 Proposed Action

Goal. Ensure compliance with water quality standards.

Objective 1. Determine the water quality at Garlic Springs during the next five years, and if funding is available, conduct water quality studies at other springs on the installation.

Objective 2. Conduct a yearly survey of all springs and seeps using protocol developed by the Desert Managers Group.

8.3.1.2 Other Management Options

There is no legal requirement to monitor water quality in these springs. Therefore, the option not to monitor exists. There are many options with regard to the number of parameters to be tested and the sensitivity of the testing. At the other extreme is the option to monitor surface water quality of all springs and to monitor all possible parameters at very precise sensitivities.

8.3.2 Groundwater

Groundwater is discussed in sections 4.2 and 6.4.2. Groundwater monitoring and management are not natural resources responsibilities within the Army; and thus not a required part of this INRMP. Groundwater management is within the Compliance Section, Environmental Division, DPW.

A routine groundwater-monitoring program was implemented in April 1989 at the NTC and Fort Irwin. Since then, no groundwater quality contamination from toxic releases by base facilities or activities has been reported. Groundwater monitoring wells were installed at the Training Center's landfill, and a regular schedule of groundwater monitoring has been implemented.

Fuel and oil spills associated with in-field maintenance of support vehicles during military exercises are cleaned up by removing contaminated soils to the designated landfill storage area. Subterranean transport of contaminants is typically inhibited by low annual rainfall and depth of unconsolidated substrate above the groundwater table in recharge zones. Fuel and oil spills should not pose a significant threat to the groundwater.

Hazardous wastes and materials are accumulated, manifested, and transported off the NTC and Fort Irwin. The facilities where these activities take place are located throughout the Training Center and represent a potential source of groundwater contamination. Monitoring wells have not been installed to assess the magnitude of this concern. Base facilities that store or handle hazardous materials are discussed in detail within the Spill Prevention, Control, and Countermeasure Plan (U.S. Army Corps of Engineers, 1988).

8.4 Soils Inventory and Monitoring

The NTC and Fort Irwin has a third-order soil survey excluding expansion areas (NRCS 2000). No additional general soils surveys are planned. Studies have been conducted on changes in soil parameters with respect to disturbance on various soil types, and geomorphic mapping has been completed for approximately five USGS quadrangles within the NTC and Fort Irwin, but the literature citations and locations of these reports is not known.

8.4.1 Proposed Action

Goal. Use soil parameters to manage military activities, protect soil stability, rehabilitate training lands, and conserve wildlife habitat.

Objective 1. Use site-specific soil testing for natural resources programs such as training land rehabilitation and erosion control.

Objective 2. Use soil inventory data to make decisions regarding land use, rehabilitation options, and wildlife habitat management options.

Objective 3. Use landform and geomorphic data layers to further refine and improve the applicability of the soil survey data.

8.4.2 Other Management Options

Additional general soil surveys of the expansion areas are a viable option should funding become available. Not using data from the existing inventory is an option, but not one that is prudent in terms of compliance and stewardship.

9.0 NATURAL RESOURCES MANAGEMENT

This chapter includes management practices, which directly affect soil, water, vegetation, and fauna. It includes wildlife habitat management, grounds maintenance, training land management, and direct manipulations of wildlife. Other programs include endangered species management, fire management, special interest area protection, wetlands management, water quality programs, game harvest, and pest management.

9.1 Coordinated Planning

As discussed in Section 1.6, the NTC and Fort Irwin has much in common with other local, state, and federal agencies, municipalities, other military reservations, and other parties interested in the Mojave Desert. Cooperating with other organizations to develop an ecosystem management plan that encompasses the entire Mojave Desert is a significant commitment. In addition, divided responsibilities for various aspects of natural resources management at the NTC and Fort Irwin (Section 5.1) make coordinated intra-installation planning essential to create a fully integrated natural resources program.

9.1.1 Proposed Action

Goal 1. Use coordinated planning to manage natural resources to sustain the military training capability.

Objective. Coordinate NTC natural resources planning with military planning to support a sustainable military mission.

Goal 2. Promote and participate in regional planning for natural resources conservation at scales larger than the NTC and Fort Irwin.

Objective. Continue to coordinate with and support regional planning and programs, such as the Desert Tortoise Recovery Plan, California Desert Conservation Area Plan, West Mojave Coordinated Management Plan, Northern and Eastern Mojave Planning Effort, Mojave Desert Ecosystem Program, and the California Desert Manager's Group.

Goal 3. Use coordinated planning to fully integrate the natural resources program at the NTC and Fort Irwin.

Objective 1. Update the INRMP at least every five years or when major changes are made to the natural resources program. (This will require the next INRMP update to begin in 2010.)

Objective 2. Bi-annually update the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000), which has the following goals and objectives:

ITAM Goals

- Monitoring land condition.
- Integrating training requirements with land capacity.
- Providing for land rehabilitation and maintenance.
- Educating land users to minimize impacts.
- Preserving natural and cultural resources.

ITAM Objectives

- Sustain training lands to ensure their availability to support training indefinitely.
- Plan, program, and execute both repair and maintenance projects and reconfigure and redesign training areas to support sustainment of the land.
- Monitor resource conditions and determine trends in those conditions.
- Educate land users to prevent avoidable damage to the land and minimize unavoidable damage resulting from training and other mission activities.

9.1.2 Other Management Options

There is no reason not to coordinate the NTC and Fort Irwin natural resources program with other regional initiatives, and the installation is encouraged to do so via Army regulations and policies, as well as ecosystem management strategies. However, such coordination is not required, so it could be done at a lesser intensity or not at all. Since the installation participates in all appropriate regional planning efforts, a greater degree of coordination is not viable.

There is no reason not to internally integrate the NTC and Fort Irwin natural resources program, and the installation is encouraged to do so via Army regulations and policies, as well as ecosystem management strategies. The installation is legally mandated to update this INRMP at least every five years, and it is also mandated by Army policies to update its ITAM plan periodically. Thus, no viable alternatives exist for meeting Goal 2.

9.2 Forest Management

The NTC and Fort Irwin has very limited forest resources. NTC and Fort Irwin forest resources will be managed as part of programs described for the installation as a whole, rather than via a special forest management plan.

9.3 Agricultural Outleases

The NTC and Fort Irwin has no agricultural outleases. There are no plans to institute such leases since they are not compatible with the military mission or ecosystem management strategies.

9.4 Habitat Management

Habitat management is accomplished through focused wildlife habitat management projects, training land rehabilitation, wetlands management, fire protection, erosion control, and similar programs. The following sections describe the focused wildlife habitat programs and projects. All other activities are described in their corresponding sections of the INRMP.

The purpose of habitat management is to enhance natural resources on which wildlife depends. This means increasing access to or amounts of food, cover, and water for desirable species while considering training requirements. It also entails limiting access to these resources for pest species (*e.g.* coyotes, burros, ravens). Habitat management is generally the responsibility of the DPW Natural Resources staff. When activities can also be considered training area improvements, as in the case of revegetation projects, the ITAM Office is the responsible entity.

9.4.1 Habitat Management Strategy and Goals

Strategy: Apply scientific knowledge and principles to manage and enhance wildlife resources as a direct reflection of habitat quality and quantity. Specific management goals are described in Seciton 3 of the ESMP (U.S. Army 2004).

General Goal 1. Utilize ecological functions and landscape level planning to alter limiting factors and promote priority endemic species.

General Goal 2. Base species management priorities on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

9.4.2 Wildlife Habitat Projects

Habitat management practices on the NTC and Fort Irwin are categorized as a means to discuss them. However, there is overlap within these sections as well as with other sections of this INRMP.

9.4.2.1 Seeps and Springs

Seeps and springs that occur on the Training Center support the most diverse assemblage of both plants and animals that occur on the installation. In addition to providing water for species that inhabit the NTC and Fort Irwin, they are invaluable for numerous migrating bird species that use these areas as stopover points during migrations. Springs are important for some federal- and/or State-listed threatened or endangered species. Until wetland delineation is performed, it will remain unknown whether springs meet the U.S. Army Corps of Engineers criteria as wetlands. The NTC recognizes that these areas are vital components to the desert ecosystem nonetheless.

Many desert species are dependent on natural springs and guzzlers for habitat requirements (red spotted toad, mosquito fish, bats, and aquatic insects), and these sites are the primary water sources for most larger wildlife species. Management of these critical areas is a priority. Most known springs and guzzlers were mapped and photographed in FY 97. The protection afforded springs is described in Section 9.13.1.2.

Saltcedar (tamarisk) is the highest priority for removal of invasive, non-native plants, in accordance with Executive Order 13112, *Invasive Species*. In 1996 the BLM assisted the Training Center with saltcedar removal at Bitter Springs, but some regrowth is occurring. Triclopyr® herbicide is particularly effective on this species. Recent efforts in concert with BLM, volunteer groups, and others has greatly reduced the presence of saltcedar, both on and off-post. However, the need still exists for tamarisk control along the length of the Bitter Spring wash system.

A potential conflict exists between saltcedar removal and protection of federally threatened and endangered riparian bird species that may nest in saltcedar. Two endangered birds could be found at the NTC and Fort Irwin, the southwestern willow flycatcher and the least Bell's vireo. Where potential habitat for riparian birds species is found, steps that decrease impacts on riparian birds must accompany saltcedar removal. Native riparian trees, such as desert willow, honey mesquite, and black willow will be planted and adult saltcedar (> 5cm basal diameter) will be removed gradually, over the course of several years. Young saltcedar (< 5cm basal diameter) do not provide potential habitat for riparian bird species, and can be removed in a single episode, without replacement.

Approximately 30 riparian trees, predominately mesquite and desert willow were planted in the Bitter Springs vicinity in 2002, and again in 2004. Planting was preliminary mitigation for the effects of tamarisk removal on the southwestern willow flycatcher and least Bell's vireo. Further mitigation includes additional native tree planting, reduction of tamarisk removal during nesting, gradual removal, and emphasis on removing small trees that are not used for nesting. Long-term success of planted trees has been poor. Mortality is the result of water stress and flooding.

The NTC and Fort Irwin recently evaluated (U.S. Army, National Training Center and Fort Irwin, 1997b) its springs. Several general comments were made in the report:

- Burro use was evident at Leach Springs, Two Springs, and Desert King Springs.
- All springs require monitoring, and continuing the off-limits status is required to retain functional springs.
- All require assessment of historical significance before work can be done.
- Off-limits markings, fences, etc should be checked after each rotation.

The following condition summaries were made in the report:

No Name Spring - Damaged and not functional.
Desert King Spring - Partially functioning; fence down.
Two Springs - Open water accessible to wildlife; fence needs repair; development potential.
Garlic Spring - Fence intact; basins dry; vegetation encroachment.
Bitter Spring - Tamarisk removal ongoing and surface water re-appearing.
Drinkwater Spring – Completely dry. All components destroyed by personnel and ordnance. No longer monitored.
Devouge Spring - Non-functioning; fence intact.
Arrastre Spring - All components destroyed; surface water not apparent.
Jack Spring - Functional with intact fence and open water. Trash and debris removed in spring, 2003, by DPW Natural Resources Section.

The report does not include Cave Spring, Hellwind Canyon, or Leach Spring. Recommendations are made for each spring evaluated. The report also includes a water development that was intact, but dry. It appears that this development could be restored.

9.4.2.1.1 Spring Maintenance

Objective: Maintain springs and seeps as essential components of the desert ecosystem.

- Increase the circumference of existing fences designed to exclude wild burros but allow access to desert bighorn sheep at springs in the Avawatz Mountains.
- Continue to actively remove invasive, non-native plant species from the vicinity of the springs. Section 9.11.1.2 further describes accomplishment of this objective.
- Renovate and maintain Jack Spring (NK 220898), approximately 100 yards (91 m) south of the installation's southern border, and its associated wetlands in coordination with the BLM.
- Implement repair recommendations in the 1997 spring evaluation report (U.S. Army, National Training Center and Fort Irwin, 1997b).

9.4.2.1.2 Other Management Options

There is no direct legal requirement to maintain or protect these springs. Thus, the installation could elect to do less, or even provide no protection of them in most cases. However, springs are important habitat to at least two federal-listed birds, and options, which could degrade their quality, must take this into account. The installation could elect to allow burros to continue to use the springs, but this would be counter to its goal of zero burros (see Section 9.11.1.1).

There is a new (1999) Executive Order 13112 requirement to identify, remove, and monitor invasive, non-native species. Thus, the removal of invasive species from spring areas is not optional provided it is done within budgetary limitations.

There is no requirement to assume responsibility for the maintenance of Jack Spring. The spring could be maintained entirely by the BLM. Due to the spring's location, this would be more difficult for BLM than for the NTC and Fort Irwin.

9.4.2.2 Wildlife Guzzlers

Guzzlers provide a permanent water resource that helps improve the value of the surrounding habitat for several wildlife species, including upland game species, such as chukars, Gambel's quail, and rabbits, and larger mammal species, such as coyotes and bobcats. The previous Natural Resources Management Plan (RMS Corp., 1982) recommended that five wildlife guzzlers be placed in predetermined locations on the NTC and Fort Irwin to collect and provide additional water sources for native wildlife. The CDFG installed guzzlers but exact locations were not communicated to the Natural Resources staff on the NTC. As such, the condition of the guzzlers is unknown at this time, with exception of one at Drinkwater Lake and one near Cave Spring (U.S. Army, National Training Center and Fort Irwin, 1997b). The guzzler at Drinkwater Lake is intact and operational with only slight repairs needed. The guzzler near Cave Spring is nonfunctional and may need replacement.

Guzzler locations should complement, rather than supplement, water available at springs. Remote locations in mountainous areas, where training activities are minimal and wary wildlife species such as the Nelson's bighorn sheep can be found, are ideal. As there are no springs within the expansion areas, no sites exist that would be suitable for guzzlers nor are there any current guzzlers located there.

9.4.2.2.1 Guzzlers

Objective: Provide artificial water sources to improve value of surrounding habitat for game species.

- Locate all guzzlers and assess their condition.
- Maintain or replace wildlife guzzlers in coordination with the CDFG.
- Construct fences designed to exclude wild burros but allow access to desert bighorn sheep at guzzlers in the Avawatz Mountains.
- Evaluate additional locations for guzzlers, particularly remote mountainous areas.

9.4.2.2.2 Other Management Options

There is no legal requirement to maintain or protect these guzzlers. There are some "purist" strategies that would preclude the use of artificial watering devices in the desert. Thus, the installation could elect to do less, or even no, protection of them. The installation could work with the CDFG to remove them. The installation also could elect to allow burros to continue to use the guzzlers, but this would be counter to its

goal of zero burros (see Section 9.11.1.1).

9.4.2.3 Endangered Species Habitat Projects

Since endangered species habitat projects are highly individual species-oriented, they are discussed in Section 9.6.2. This also allows for a more cohesive understanding of management programs designed for these species.

9.5 Threatened and Endangered Species Management

Section 9.5 contains all Goals, Objectives, and Actions listed in the NTC Endangered Species Management Plan (ESMP). The format of this section, and the definition of Goals and Objectives, answer several USFWS policy recommendations (USFWS 2004b). First, the goals attempt to meet FWS "PECE" guidelines for management of sensitive species, which requires (1) a conservation benefit to the species, (2) assurance that management will be implemented, and (3) assurance that management really works. Second, Section 9.5 follows an outline that facilitates oversight by the FWS. The subsection describing conservation goals is followed by subsections describing monitoring, implementation assurance, and adaptive management. Thus, for each conservation goal, there are correspondingly numbered sections explaining how the actions will be monitored, the funding for implementation, and management alternatives available in adaptive management.

9.5.1 General Conservation Goals

"Watched across long stretches of time, the species as metapopulation can be thought of as a sea of lights winking on and off across a dark terrain. Each light is a living population. Its location represents a habitat capable of supporting the species…As we scan the terrain over many generations, lights go out as local extinction occurs, then come on again as colonists from lighted spots reinvade the same localities." (Wilson 1992)

Military training with entire battalions of armored vehicles is an inherently destructive activity, and presents considerable challenge to sensitive species conservation. As the Eastern and Western Expansion Area come under use, further loss of sensitive species is imminent. However, planning that uses a broad perspective, considers long-range goals, and is based on ecological principles, can positively benefit sensitive species at the NTC. Using methods described below, and a firm commitment, conservation at the NTC can reignite some of the lighted spots in our region.

General conservation goals used to benefit sensitive species on the NTC are listed below in bold print. Following each general goal are several objectives, or means of attaining the goals. Many of these objectives were derived from the WMCMP, DTRP, LMMRP, INRMP, USFWS BO 1-8-03-F-48, and PEP. Actions needed to accomplish the objectives have been described for each species.

9.5.1.1 Protect Populations.

In times of environmental stress, viable populations become "sources" that resupply the sinking numbers of satellite populations. Recovery from perturbations and environmental variation increases as habitat protection increases, and monitoring ensures population viability over time.

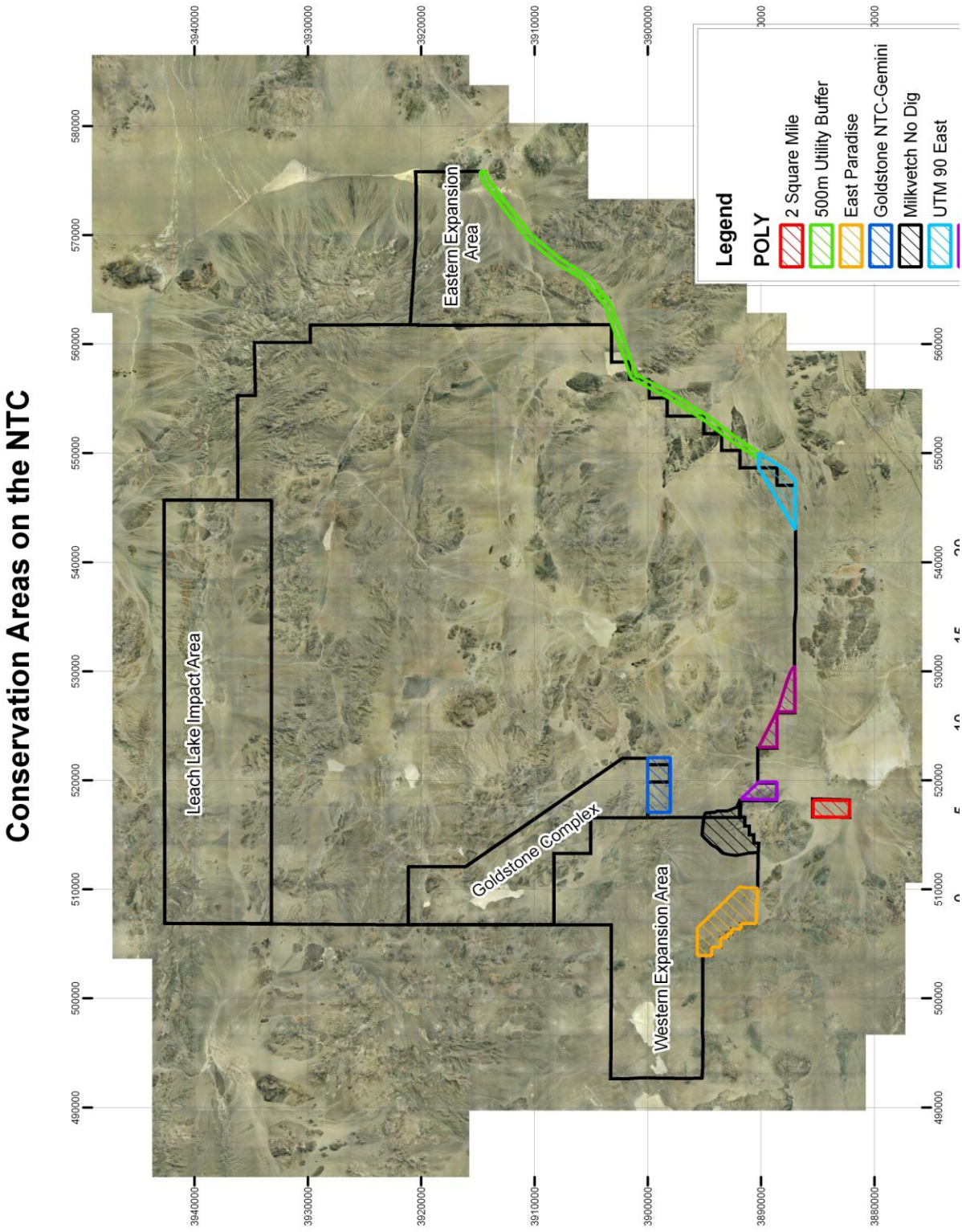

Figure 9.5.1. Proposed conservation areas on the NTC.

9.5.1.1.1 Conservation Areas

Conservation Areas. Conservation of suitable habitat is critical to the survival of high density populations capable of colonizing the surrounding area. Conservation areas located within the geographic range of sensitive species will be, or have already been, established (Figure 9.5.1). NTC conservation areas are fenced, signed, and off-limits to the military. Entry is permitted for research, monitoring, and land management purposes, only. These areas will provide safe havens that help ensure the survival of these species.

Restricted Areas. These areas restrict use, but not entry. The perimeter is signed, designated routes are marked, vehicles are restricted to existing dirt roads, and ground-disturbing activities, such as fox-hole placement, are prohibited. Proposed restricted areas are shown in Figure 9.5.1.

9.5.1.1.2 Long-term monitoring

Evaluating the status of these species will be difficult without a thorough knowledge of their populations and habitat. A long-term monitoring program is necessary to determine population trends and to alter management strategies accordingly. The program will allow land managers to track the response of these populations to conservation efforts. In order to accomplish this objective the following actions will be taken:

- Monitor sensitive species populations. Coordinate the monitoring programs with USFWS, BLM, and other federal agencies.
- Utilize a GIS (Geographic Information System) to archive yearly population trends.
- Publish the results of the monitoring program on a web page, such as the MDEP, that is accessible to the public.

9.5.1.3 Protect Habitat

All available means of reducing take and habitat loss are utilized, and all regulatory directives are strictly adhered to.

9.5.1.3.1 Reduce Take.

It is unlawful under the ESA to "take" threatened and endangered species without special exemption through federal and state permits. Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. The USFWS and CDFG should be consulted regarding any action that may affect these species. Any "take" should be properly documented and reported to the USFWS. In order to accomplish this objective the following actions will be taken:

- Pre-activity surveys and compliance monitoring will be conducted by authorized biologists for projects that may potentially impact sensitive species.
- Personnel who handle and relocate these species will be properly trained and receive authorization from the USFWS, and will use approved protocols.
- Potentially harmful activities, including all ground-disturbing construction and reclamation activities in potential habitat, will be monitored by personnel approved by the USFWS, or by personnel under the supervision of approved individuals.

- All potentially harmful activities will undergo NEPA and ESA compliant environmental review, and possible ESA Section 7 consultation with the USFWS.

9.5.1.3.2 Reduce Disturbance.

- Surface disturbance greatly impacts these species and their habitat. Disturbance leads to accidental tortoise deaths, crushing and breaking of milk-vetch and their host plants, habitat degradation, and fragmentation of populations. Traveling off road and on unauthorized routes has a similar adverse effect.
- Restore heavily damaged areas with contouring, erosion control, and native vegetation.
- Keep vehicles on roads and designated travel routes by placing Siebert-staked pickets and planting shrubs along road boundaries.
- Control erosion.
- Reduce fugitive dust, where possible.
- Install culverts to allow the underpass of wildlife and alleviate habitat fragmentation.

9.5.1.3.3 Erect Barriers and Fences.

- Barriers and fences help regulate authorized use and discourage unauthorized use. Tortoise fencing has been proven to reduce and even eliminate mortalities.
- Place desert tortoise proof fencing along major roads.
- Designated travel routes should be outlined with fencing to avoid any unnecessary incursions into adjacent habitat.
- Place exclusionary fencing around conservation areas, cultural sites, and springs and seeps

9.5.1.2 Adopt An Ecosystem Management Approach.

Ecosystem management is a broad perspective management philosophy that considers all relevant hierarchical levels and all relevant factors to conserve resources. One aspect of ecosystem management focuses on trends within the entire region that occur over long periods of time. The ecosystem approach recognizes that disease and global warming are as potentially threatening as road kill and habitat loss; and that long-term benefit from head start programs and linked refuges are equal to immediate benefits such as avoiding take and habitat loss. Regional planning integration, spearheading scientific research, controlling pests, and educating the public are objectives based on ecosystem management. The Department of Defense recognizes ecosystem management as a "best practice" for INRMP implementation (Horne 2005).

9.5.1.2.1 Integrate Management.

Management plans/programs, protocols, and guidelines are needed to protect, conserve and enhance populations with the objective to recover these species. Several regional plans and programs that influence the management of threatened and endangered species either have been implemented or are being developed. In addition, the NTC is in the process of creating and maintaining management plans. In order to accomplish this objective the following actions will be taken:

- Regional plans and programs include: MDEP, DMG, WMCMP, DTRP, LMMRP, RCCMP, USFWS Desert Tortoise Survey Protocol, USFWS Line Distance Sampling Protocol, Desert Tortoise Council Handling Guidelines, and the WMWMA (West Mohave Weed Management Association). All NTC

management plans, should be updated to support these regional management strategies and methods.
- NTC plans and programs are designed to compliment and support regional plans. NTC plans include: ESMP, INRMP, USFWS BO, LMP (NTC Landscape Management Plan), IPMP (NTC Pest Management Plan).

9.5.1.2.2 Education Programs.

Military bases are cities of transients who are often out of touch with the natural history of their surroundings. Education programs inform soldiers and the public about the presence of sensitive species, their natural history, threats, legal protection, and what can be done to protect these species.

- Conduct outreach events frequently. These programs successfully increase public awareness.
- Disseminate information packets, brochures, videos, as well as live and mounted specimens that inform the public of sensitive species.
- Develop well-defined operational procedures, and ensure their implementation.
- All military and civilian personnel that may come into contact with these species should receive awareness training.

9.5.1.2.3 Control Pests.

Landfills, sewage ponds, and litter attract predators of these species. These sites offer a source of subsidized food and water.

- Alter landfills and sewage ponds to reduce the number of predators utilizing these sites.
- Implement predator control programs. Participate in regional plans sponsored by the Desert Managers Group to control ravens and coyotes.
- Bag and dispose of all trash and food items generated by construction and maintenance activities.

9.5.1.2.4 Research.

Research programs and studies offer a means to monitor and guide the recovery of these species. It provides current data on the species status. Solutions are sought to aid in the recovery effort. This information is often shared with the scientific community. Knowledge is gained from research that allows for improved management strategies. Research should continue in order to gain a better understanding, improve management strategies, and facilitate the recovery of these species.

9.5.2 Lane Mountain Milkvetch

9.5.2.1 Threats

9.5.2.1.1 Species Threats.

- Small populations of the milkvetch, like those of other species, are vulnerable to extirpation simply by chance due to fluctuating environmental conditions and demographic stochasticity.
- Global climate change, leading to a change in vegetation community structure, precipitation regimes, increased abundance of non-native annual grasses, and other impacts that detrimentally affect Lane Mountain milkvetch habitat and populations.
- Mining (CNPS 2001).

- Vehicles (CNPS 2001).

9.5.2.1.2 Direct Threats from Military Training.

Military threats to the Lane Mountain milkvetch were identified by the USFWS as one reason for listing (USFWS 1998). Direct threats include:

- Crushing milkvetch and host plants with wheeled and tracked vehicles during military training. Tracked vehicles are particularly destructive. Military activities in the West Expansion Area will cause the direct loss of milkvetch in the Brinkman Wash/Montana Mine Population and the Paradise Valley Population (Charis 2003b).
- Loss of habitat caused by military activities. Both the US FWS (2004) and the Army (Charis 2003) assume that milkvetch habitat will be disturbed where it overlaps with military activities.

9.5.2.1.3 Indirect Threats from Military Training.

- Fugitive dust, which decreases milkvetch stem elongation (Wijayratne et al. 2004), and by extension, other growth and reproductive functions as well.
- Soil disturbance, resulting in increased soil erosion and soil compaction.
- Weed invasions associated with human disturbance and activity. Weeds may compete with the milkvetch and its host plants. In addition, weeds may increase the frequency and severity of range fires that kill the milkvetch and its hosts.
- Fragmentation of populations, consequently reducing genetic diversity and increasing the likelihood of extinction in small subpopulations.
- Indirect threats also include military support activities such as construction of training structures or caves, erecting radio towers, or laying fiber optic cable.

9.5.2.2 Goals, Objectives, and Actions for Conservation

9.5.2.2.1 Goal 1: Protect Populations.

The NTC will ensure long-term survival of milkvetch populations by protecting populations from military threats.

Due to its limited distribution and low numbers, Lane Mountain milkvetch needs protection from human disturbance to ensure long-term viability. Because military training will kill some milkvetch, conservation will be achieved by protecting large portions of the three populations located on the NTC.

Focusing on populations, rather than total number of individuals, is particularly appropriate for the Lane Mountain milkvetch because it is a narrow endemic. The species' entire distribution is limited to four populations, and two of these are located entirely within the NTC Western Expansion Area. Further, the species is limited to areas of specific habitat within this area (Charis 2002). Small populations of many species are known to undergo fluctuations in size, often to the point of population extinction (Wilson 1992, Primack 1995). Extinction can be followed by colonization from neighboring populations that act as "sources" (Pulliam 1988, Primack 1995). Therefore, maintaining the viability of some populations is a benefit to ensuring the long-term existence of a species, particularly when the primary threat to the species is a small distribution in the face of a fluctuating environment.

Objective 1 Maintain the NTC-Gemini Conservation Area adjacent to the southern boundary of the

Goldstone Deep Space Communications Complex. This 2,471-acre Off-Limits area was fenced in 2003, restricting most vehicle traffic. In October 2005, the eastern and western perimeter fences of this area were moved 500 m to the East, to the location shown in Figure 9.5.2. Most of the NTC-Gemini population of milkvetch is contained within this conservation area. Changes to this Conservation Area are contingent upon FWS approval during 5-year review.

Objective 2. Create and fence the 4,300-acre East Paradise Conservation Area. This conservation area contains 80 percent of the East Paradise population of milkvetch. A smaller land parcel to the west, the West Paradise Conservation Area, will be created on BLM lands. Both areas will be combined and designated as an ACEC by the BLM. Any changes to the East Paradise Conservation Area must be approved by the FWS during 5-year review.

Action Items for Objective 1 and 2:

- Complete preliminary barbwire fence by Fall 2005. Complete professionally installed fence, tortoise fencing, and dual berms, as specified in the Fencing Plan, before military training commences.
- Delineate the East Paradise Conservation Area on all NTC training maps, before training begins. (NTC-Gemini was added to the NTC training map in 2004.)
- Prohibit and eliminate all vehicular travel in the NTC-Gemini Conservation Area and East Paradise Conservation Area, with the following exceptions: (1) access for yearly monitoring, and research approved by the NTC Director of Natural Resources; (2) emergency vehicles, particularly those needed for wildfire control; (3) exceptional natural resource activities, such as feral burro roundups or cultural surveys, approved by the NTC Director of Natural Resources.
- Utilize observer/controller (O/C) teams to prevent unnecessary habitat destruction by rotational units unfamiliar with the terrain and travel routes. The observer/controller (O/C) teams are assigned to each command element of the rotational unit. The job responsibilities of the O/C are to find and reorient units unfamiliar with Fort Irwin and serve as mentors or coaches during actual training exercises.
- Artificially "kill" training personnel and their vehicles (i.e., disqualify them from further training for that mission) if they are found near controlled or off-limits areas. Rotational units are strictly controlled by using position location devices (PLD) to display their location within 33 feet. The complete instrument package for maneuver unit vehicles and personnel enables visual contact with units via remote video cameras.
- Incorporate information regarding the off-limits areas into environmental awareness briefings.

Objective 3. Create a 3,700-acre Brinkman Wash Restricted Access Area that contains 1,872 acres of Lane Mountain milkvetch habitat. This conservation area contains 51 percent of the Montana Mine population of milkvetch. Habitat disturbance on the remainder of the land occupied by the Montana Mine population will be unrestricted.

- Erect signs along the perimeter of the Restricted Access Area at approximately 100 m intervals.
- Erect restricted access signs along all routes that access the Brinkman Wash Restricted Access Area.
- Use vegetation , fencing, and siebert stakes to outline all open routes within the Restricted Access area, and maintain these features for the 5-yr life of the INRMP.
- Prohibit and eliminate mechanized training, combat ground disturbing activities, and off-road travel from the Restricted Access area for the life of the 5-yr INRMP.
- Non-combat ground disturbing activities, including the construction of small communication towers or observation decks, will be allowed. Conduct preactivity surveys and compliance monitoring, including protection for the Lane Mountain milkvetch, for any of the allowable ground disturbing activities within the Restricted Access area. Compliance monitors are qualified biologists that protect wildlife

and enforce environmental regulations on construction sites.
- Update all range training maps before training commences to show the Brinkman Wash Restricted Access Area.
- Use ITAM to restore damage to Lane Mountain milkvetch habitat.
- Proactively educate soldiers and personnel of the location of the Brinkman Wash Restricted Access Area.
- Before training begins, close all unnecessary and redundant routes within the Restricted Access Area using signage, vertical mulching, and restoration.
- Use OCs to prevent unnecessary habitat degradation to the Restricted Access Area by instructing inexperienced rotational units about the presence and restrictions of these areas.

Objective 4. Conserve milkvetch populations in the surrounding region. In particular, help the BLM minimize disturbance to the entire Coolgardie Mesa population of Lane Mountain milkvetch. These actions will be performed by the Army as mitigation for training in the Eastern and Western Expansion Areas.

- Purchase approximately 4,200 acres outside of the boundaries of Fort Irwin to place all known Lane Mountain milkvetch habitat into public ownership. This land will allow the creation of the West Paradise Lane Mountain milkvetch ACEC by the BLM. This action has been funded solely for conservation of the Lane Mountain milkvetch, although it will also benefit conservation of the desert tortoise, Barstow wooly sunflower, and other sensitive species found on Coolgardie Mesa.
- Contribute funds and/or labor to pay for route closure and rehabilitation actions in BLM proposed Lane Mountain milkvetch ACEC (Area of Critical Environmental Concern). The Army will contribute up to $500,000 towards this objective and the closing of roads in areas of milkvetch and desert tortoise habitat. This money is estimated to be able to close, rehabilitate and sign approximately 1,625 miles (2,615 km) of roads and trails detrimental to desert tortoise and Lane Mountain milkvetch survival and recovery. This action has been funded for both milkvetch and desert tortoise conservation, and the proportion of the $500,000 contributed solely to milkvetch is not specified.
- Participate in the development of the West Mojave Plan with regard to Lane Mountain milkvetch protection on lands outside of the NTC.

9.5.2.2.2 Goal 2: Conserve Habitat.

Objective 1. Protect and maintain habitat in the NTC-Gemini Conservation Area adjacent to the southern boundary of the Goldstone Deep Space Communications Complex.

- Actions are identical to 9.5.2.2.1 Goal 1 Objective 1.

Objective 2. Protect and maintain habitat in the East Paradise Conservation Area. This conservation area contains 80 percent of the East Paradise population of milkvetch. Changes to this Area are contingent upon FWS approval during 5-year review.

- Actions are identical to 9.5.2.2.1 Goal 1 Objective 2.

Objective 3. Conserve habitat in the Brinkman Wash Restricted Access Area.

- Actions include all actions in 9.5.2.2.1 Goal 1 Objective 3.
- Operators of heavy equipment will be accompanied by a qualified biologist when working within

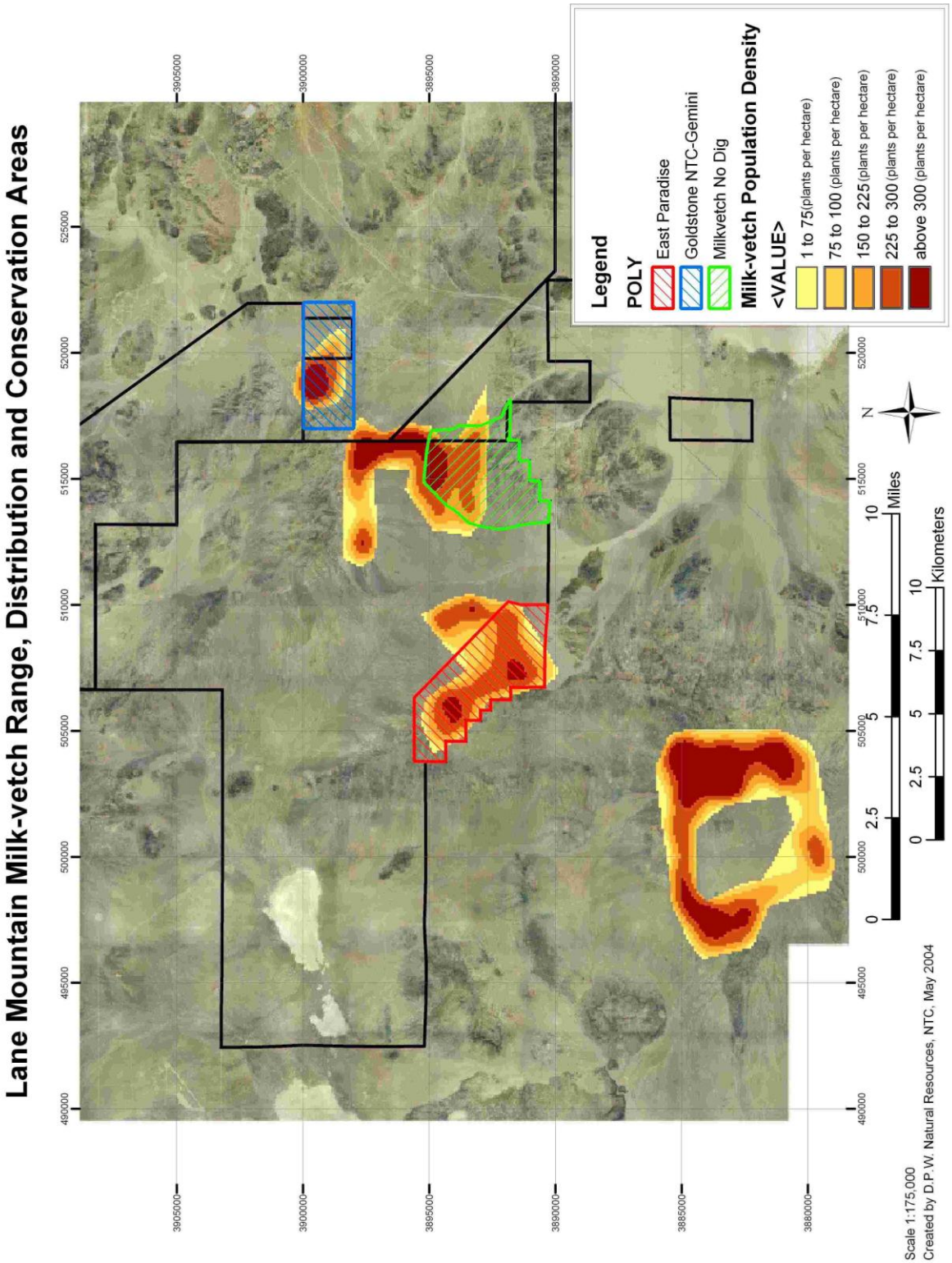

Figure 9.5.2: Lane Mountain Milkvetch range, distribution, and conservation areas.

- habitat. The biologist will survey ahead of any heavy equipment causing surface disturbance and reroute the equipment to avoid any impacts to these species.

Objective 4. Identify and conserve potential habitat for Lane Mountain milkvetch within the region. Potential habitat could be used to propagate the milkvetch if triggered by adaptive management.

- Identify and survey for small pockets of potential habitat, defined by soil, bedrock geology, and elevation, found within the original (before land expansion) boundaries of the NTC. The few surveys that have been conducted in these areas found fairly high disturbance levels and no milkvetch.
- If potential habitat for the Lane Mountain milkvetch is found on the NTC, attempt to reduce training in the area by reclassifying the area as "No Dig". If reclassification is possible and does not limit the Army's mission, erect signs and siebert stakes around the periphery of the area, and notify ITAM GIS so that the reclassification will appear on the next update of the range map.
- Using GIS, analyze environmental data (soil, topography, and remotely sensed images, such as aerial photography and satellite imagery) and identify potential habitat in the region, outside the original boundaries of the NTC.
- Conduct ad hoc surveys for the Lane Mountain milkvetch on potential habitat in the region, outside the original boundaries of the NTC.

Objective 5. Conserve host plants. Use the viability of host plants as an indicator of ecosystem health in milkvetch habitat.

- Collect and store site-specific seed from host plants. Use banked seeds to restore closed routes and other disturbed areas with milkvetch habitat.

Objective 6. Reduce dust. There is no way to eliminate dust without impairing the military mission. Unfortunately, USGS/BRD researchers have demonstrated that dust threatens milkvetch habitat and milkvetch plants

- Erect passive dust monitoring stations so that dust deposition can be monitored.
- Apply soil binders to main supply routes and battalion staging areas to reduce dust production.

Objective 7. Monitor and control invasive plants and weeds. Generally, competition from invasive species causes a decline in native species. Rare species, like the Lane Mountain milkvetch, are particularly susceptible to competitive exclusion by exotics.

The state of California appears to be particularly susceptible to invasion by exotic plants. New invasions are reported, and sometimes controlled, continually. The most recent invasion in the western Mojave Desert is the Sahara mustard (*Brassica tournifortii*). However, each year brings new threats that must be monitored to reduce potential impacts to the milkvetch populations.

- Actively participate in the West Mojave Weed Management Area, a consortium of federal land managers in the region. This organization tracks the spread of weeds and exotic species in the Western Mojave Desert, and coordinates weed control.
- Monitor and map the spread of exotic species in milkvetch habitat.
- Contingent on funds, perform weed and exotic species control at a level similar to other land management agencies. Perform intensive weed control and eradication efforts at milkvetch

conservation areas if weeds are found there.

9.5.2.2.3 Goal 3: Adopt an Ecosystem Management Approach.

Objective 1. Support research and monitoring that can be applied to milkvetch conservation. Research programs and studies will be tailored to monitor and guide the recovery of this species. The knowledge gained from research will lead to improved management strategies. In cooperation with the USFWS, the feasibility of species propagation will be researched. Additionally, management–oriented research on the demographics, life history, and ecology of the species will be considered for funding. Population modeling will also be considered to predict the long-term viability of this species.

- Conduct a symposium that brings together researchers and enables them to share research information on the Lane Mountain milkvetch.
- Give strategic help, and NTC access, to the following research projects: USGS-BRD milkvetch dust study (Dr. Leslie DeFalco); USFWS population modeling (Dr. McKeachern).
- Continue funding: Cal State San Bernardino population genetics (graduate student George Walker); UCLA life-history and seed viability (Drs. Barry Prigge and Rasoul Sharifi).
- Continue to monitor precipitation at five weather stations in milkvetch habitat. This information will help determine minimum precipitation necessary for milkvetch reproduction and growth.
- Investigate banking seeds and the feasibility of seed propagation of the species.

Objective 2. Actively participate in creating and enacting the Lane Mountain milkvetch Habitat Recovery Plan. This plan will be published by the FWS, and will stipulate how the milkvetch will be monitored and managed.

- Create a monitoring plan that is economically feasible and statistically defensible, and present the plan to FWS for review and approval by September 2005. This plan will address (in addition to other factors) the number, stratification, and location of permanent plots; an experimental design that incorporates a chronological baseline, reference plots in relatively undisturbed habitat; assessment of both reproductive and vegetative output; mortality and natality; and measurement of density.

Objective 3. Develop and contribute to regional, long-term management. The need for regional, or landscape, perspectives on conservation is a cornerstone of the ecosystem management approach to land management and conservation. "This approach …manages landscape elements in such a way as to collectively influence groups of species in a desired direction." (Meffe et al. 2002).

Almost half of all Lane Mountain milkvetch plants grow on BLM lands. These plants are currently unprotected, and are threatened by recreational off-road vehicles. Therefore, effective management for the long-term existence of the species requires coordination with the BLM and other regional planning agencies. One threat to the species is the vulnerability of small populations to environmental fluctuations. The threat of global warming and the explosion of the human population in the high desert add to environmental uncertainty and increase this threat to the milkvetch. Recognizing the threatening role of environmental fluctuation, ecosystem management includes research to better understand the response of the milkvetch to climate, and research to propagate the species horticulturally.

Several regional and local cooperative plans and programs relate to Lane Mountain milkvetch viability. As findings from research projects become available, they will contribute to appropriate management decisions. The natural resources staff is implementing, cooperating, or participating in the following plans and programs for this species:

- West Mojave Coordinated Management Plan. The objective of this management plan is to recover species listed as threatened and endangered and to prevent future listings under the California and federal ESA. It will function as a regional Habitat Conservation Plan (HCP) for the west Mojave Desert and will identify areas where species conservation will be emphasized (WMCMP 2003). The natural resources staff is participating in the development of this plan.
- Integrated Training Area Management (ITAM). The objective of this program is to provide quality training environments to support the Army mission. The program consists of four components: monitoring of physical and biological resources; integration of land use with natural resource capabilities; environmental awareness; use of spatial data for military and environmental planning; and planning, designing, and executing land rehabilitation. The natural resources staff provides support to the ITAM team in meeting the objectives of this program. The ITAM program benefits milkvetch conservation by (1) reclaiming damaged habitat, and by (2) maintaining a yearly vegetation baseline that can be used to determine milkvetch population viability.
- Mojave Desert Ecosystem Program. The objective of this program is to compile and distribute regional spatial data and scientific information in a Geographic Information System (GIS) format to facilitate the management of the Mojave Desert ecosystem. This program is a multi-agency federal partnership between the U.S. Department of Defense and the U.S. Department of Interior. The Program is used by desert land managers to manage land and make decisions that may impact the desert ecosystem (Jones and Stokes, 1999). The natural resources staff provides milkvetch data that is incorporated into a central MDEP database and shared with stakeholders. Conversely, MDEP layers are used to monitor milkvetch population, and to survey for additional milkvetch populations.
- Desert Managers Group. The objective of this organization is to establish a forum for government agencies that oversee the Mojave Desert ecosystem where they can address and discuss issues of common concern including threatened and endangered species. This form of cooperative management assists the agencies to achieve greater operational efficiency, enhance resource protection, and improve their service to the public (Jones and Stokes, 1999). The Fort Irwin natural resources staff is a key member of this organization. DMG activities in the last year include sponsoring a symposium on Mojave Desert ecology and restoration, and organizing a regional control program for ravens on public lands. Participation benefits milkvetch conservation by disseminating new milkvetch knowledge to regional land managers, particularly BLM managers who also must conserve the Lane Mountain milkvetch.

Objective 4. Educate the military and the public. The Natural Resources Section has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. In addition, the Natural Resources Section provides information to other groups at the NTC that conduct briefings. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. Briefings and education of the public benefits the milk vetch by explaining the need for protection, the means for protection, and specific locations of sensitive areas.

- Range Safety Training is a 2-hr class that must be taken yearly by all personnel going down range. There are no exceptions to receiving this training. Training includes a section on environmental stewardship, particularly sensitive species.
- The Observer/Controller (O/C) Academy includes a 1-hour course on natural and cultural resources training at Fort Irwin for all O/C personnel on post and rotational military police. Procedural information in the form of handouts and lectures is provided to all personnel. This program educates O/C's about the purpose and regulation of milkvetch conservation areas.
- The Opposing Forces (OPFOR) Academy is a monthly program for enlisted soldiers and Non Commissioned Officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural

Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and handouts on natural and cultural resources on post, as well as a take-home quiz to reinforce learning. This program teaches leaders and officers the purpose and regulation of milkvetch conservation areas.

- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on the NTC. Approximately 25 military and civilian personnel attend this class every other month. This program will educate the military and civilian personnel about the purpose and regulation of milkvetch conservation areas.
- A Rotational Unit Environmental Briefing Handbook is presented to all personnel attending O/C, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources. These field cards were amended in 2004 to include the Lane Mountain milkvetch and their conservation areas.
- Several times a year, a biologist from the Natural Resources Division assists in educating children on post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology including Lane Mountain milkvetch.
- The NTC provides opportunities for the public to learn about the natural resources program through participation in outreach events such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, CAIR Fair, Edwards AFB Open House, and a regional Military Appreciation Fair in Torrance, CA.
- The natural resources staff provides information and articles to the Fort Irwin Public Affairs Office to be published in the Post newspaper and aired on the Post television and radio stations to educate base personnel and the public. The Lane Mountain milkvetch will be included in these publications.

Objective 5. Assessment and reporting.

- Use the annual letter to FWS (November) as an opportunity to review the management of the Lane Mountain milkvetch.
- Coordinate the annual review with the BLM Botanist to assess the status of all four milkvetch populations.

9.5.2.3 Monitoring

9.5.2.3.1 Goal 1: Monitoring Needed To Protect Populations

Objectives 1 and 2 Monitoring associated with the creation of the NTC-Gemini and East Paradise Conservation Areas. The monitoring plan is described in detail in Appendix 9.5.2.

- Check fences protecting the NTC-Gemini and East Paradise Conservation Areas for breaches and habitat damage. Repair minor damage; report major damage to Army for discipline and repair. Report results to FWS annually. Fences will be checked following rotations that use the Western Expansion Area.
- Use ITAM to restore habitat damage caused by military vehicles breaching the fenced perimeter of Conservation Areas.
- Verify road closure in Conservation Areas by placing pressure-sensitive traffic counters along major roads (note: cost is approx. $350/counter x 6 counters = $2100.00). Vehicle track counts can be used in lieu of traffic counters if check points are inspected monthly and old tracks are swept clean after

each count.

- Check warning signs around the Brinkman Wash Milkvetch Restricted Access Area on an ad hoc basis, no less than twice a year.
- Monitor dust levels at the NTC. Report to San Bernardino County Air Quality Division. If feasible, monitor dust deposition near Conservation and Restricted Access Areas using passive samplers.
- Monitor road use in the Brinkman Wash Milkvetch Restricted Access Area. Report results to the FWS annually.
- Develop a long-term monitoring program (Appendix 9.5.2) in cooperation with the FWS that focuses on demographics, population trends, and threats.
    1) Identify all populations and habitat, and monitor them on a yearly basis. Due to natural yearly fluctuations, monitoring will compare current levels to several controls: previous censuses; baseline vegetation data collected by ITAM; and milkvetch reference areas that are relatively free of impacts.
    2) Previously tagged plants will be monitored each year to determine mortality. Milkvetch seedlings in the vicinity of tags will be counted.
    3) Use the MDEP GIS capabilities to serve as the data repository for monitoring trends.
    4) Utilize the results of the annual ITAM vegetation census in the Western Expansion Area to determine yearly vegetation response to climate.

Objective 3 Monitoring associated with the creation of the Brinkman Wash Restricted Access Area)

- Include the Brinkman Wash Restricted Access Area in the long-term monitoring program described in Appendix 9.5.2.
- Using GIS, aerial photography, and RTLA plot data, determine the baseline disturbance acreage of the Brinkman Wash Restricted Access Area. Conduct a yearly analysis of disturbance.
- Monitor roads and identify unauthorized routes after each rotation that uses the Western Expansion Area. Restore unauthorized routes using signs, vertical mulching, and ITAM restoration.
- Monitor siebert stakes and signs along relevant sections of the Restricted Access Area perimeter after each rotation that uses the Western Expansion Area. Replace or repair damaged signage, and report breaches requiring restoration. In many cases, this action can be performed while monitoring roads.
- Monitor restoration sites within the Restricted Access Area yearly. Cease monitoring when the site has reached its success threshold, specified *a priori* by ITAM.
- Perform vehicle counts using pressure-sensitive traffic counters along major roads (note: cost is approx. $350/counter x 6 counters = $2100.00) to determine if unauthorized ground disturbing activities are increasing or decreasing.

Objective 4. Monitoring associated with conserving plants and habitat in the surrounding region.

No field work is needed to monitor this objective. Land acquisition and road closure on private and BLM lands is mitigation for the land expansion process, and is not part of the Natural Resources Section scope of work.

- If additional populations of the Lane Mountain milkvetch, or its potential habitat, are discovered, monitor these populations and habitat with ad hoc yearly censuses. This does not apply to potential habitat within the Western Expansion Area that will be used for military training.
- Once a year, the Natural Resources Section will determine the status of private land that was marked for purchase and transfer to the public domain as part of mitigation for land expansion. The NTC SPO (Special Projects Office) should be able to provide this information.

- Once a year, the Natural Resources Section will determine the status of road closures in areas that contain potential habitat for the Lane Mountain milkvetch. The Barstow office of the BLM should be able to provide this information.
- Mitigation progress, including land acquisition and road closures, will be reported in the annual letter to the FWS.

9.5.2.3.2 Goal 2: Monitoring Needed To Conserve Habitat.

Objectives 1, 2 and 3. Monitoring associated with identification and conservation of habitat.

- Use aerial photography, and site inspection to monitor disturbance to milkvetch potential habitat on the NTC.
- Monitor shrub (host plant) density and cover in milkvetch habitat. Use RTLA plots to monitor disturbance to milkvetch potential habitat on the NTC. RTLA (Range Training Land Assessment) is a program conducted by ITAM that measures the ecological status of Army training lands. RTLA is standardized and coordinated throughout the USA. Use of the RTLA monitoring protocol makes it possible to share data and coordinate sampling with ITAM.
- Before training begins in the Western Expansion Area, use RTLA methodology to quantify a baseline of host plant density and cover in milkvetch habitat. Use this baseline to detect future declines in ecosystem health.

Objective 4. Conserve potential habitat in the region. There are no action items for this objective.

Objective 5. Conserve host plants. There are no action items for this objective.

Objective 6. Reduce dust.

- Monitor dust deposition in milkvetch habitat using passive dust collectors. Sixteen collectors will be monitored monthly. Collectors will be placed on the periphery of conservation areas, at least 1 km within the boundaries of conservation areas, and in a control area on Coolgardie Mesa.

Objective 4. Control invasive plants and weeds.

- Monitor invasive plants and weeds on the NTC, particularly in milkvetch habitat. Submit a copy of the annual report on invasive plants to the WMWMA and to the FWS in the annual letter.

9.5.2.3.3 Goal 3: Monitoring Needed For Ecosystem Management.

Objective 1. Monitoring associated with research support.

- Create a web site, accessible to the public that lists events relevant to the Lane Mountain milkvetch, and provides a download portal for reports relevant to the milkvetch. Restrict access to sensitive information, such as the precise UTM coordinates of known plants. Probably, the web site will be created in conjunction with the Mojave Desert Ecosystem Program.

Objective 2. Actively participate in creating and enacting the Lane Mountain Milkvetch Habitat Recovery Plan.

- Conduct a yearly census of Lane Mountain milkvetch, as described in the FWS Habitat Restoration Plan. The census described in the Restoration Plan will probably be identical the long-term monitoring plan in Appendix 9.5.2.

Objective 3. Develop and contribute to regional, long-term management. There are no action items needed to monitor this objective.

Objective 4. Educate the military and the public. There are no action items needed to monitor this objective.

Objective 5. Assess and report monitoring.

- Review the results of the annual population monitoring program (specified in the Lane Mountain Milkvetch Habitat Recovery Plan).
- Review the results of fence monitoring.

9.5.2.4 Adaptive Management

Adaptive management is a process that maintains environmental quality using management actions that are tailored to specific impacts. The ***adaptive management*** process begins with ***monitoring***; monitoring ***triggers*** review when environmental quality declines; and ***review*** produces ***actions*** targeting specific impacts.

Two types of review will be used. ***Internal adaptive review*** requires an immediate review of current management policy by the NTC Botanist, Ecologist, and Director of Natural Resources.

Interagency review takes place at least once a year with the FWS, following the NTC's submittal of an annual letter reporting the status of threatened and endangered species, and related information. The purpose of the annual meeting is to discuss research progress and monitoring trends, and to determine if changes in management are needed.

In addition, the FWS can request an ad hoc meeting to address issues requiring immediate action. Interagency review has not been used previously at the NTC, and it is not known how disagreement between the FWS and Army will be resolved.

Internal review can initiate any of the following actions, or additional actions not listed:

1. Improve fencing. To make fencing stronger, add cement foundations and additional strands of barbwire. In sandy and loose soil, pickets can be bolted together length-wise to create a long picket that can be driven 8-10 feet into the soil.
2. Improve visibility by adding siebert stakes to fence pickets.
3. Place concertina wire outside and adjacent to the existing fence.
4. Adopt stricter penalties for military units that breach fences.
5. Install detection devices along fences that are frequently breached.
6. Increase either the amount of rehabilitation, or the disturbance threshold that triggers it.
7. Increase broadcast seeding of banked host plants seeds within conservation areas.
8. Channel vehicle traffic, particularly in Brinkman Wash, using pickets, Siebert stakes, and vegetation planted along road boundaries.

Interagency review can initiate any of the following actions, or additional actions that are not listed:

1. Replant milkvetch from banked seed.

2. Increase existing programs, such as signage, education, outreach, or fence monitoring.
3. Find and protect additional populations on the NTC. This option is limited, because unprotected habitat in Brinkman Wash will become degraded after training begins.
4. Find and protect additional potential habitat for seed propagation.
5. Dust control on major military routes.
6. Increase participation in regional initiatives.

9.5.2.4.1 Goal 1 Adaptive Management Needed To Protect Populations

Objectives 1 and 2 Adaptive management associated with creating the NTC-Gemini and East Paradise Conservation Areas.

The following events will mandate internal review:

- Major fence breach requiring Army discipline and repair.
- Three fence breaches, regardless of size, during a single rotation.
- More than three fence breaches, regardless of size, in a six-month period.
- Unusually low precipitation when compared to the Western Regional Climate Center's 30 year average for Barstow, CA. The period of time being compared can be a season, a year, or multiple years. For example, a dry year would not trigger adaptive management because this is not unusual; but a year drier than 95% of the previous 30 years would trigger adaptive management.
- Significantly lower than expected numbers of milkvetch during annual monitoring.

Objective 3 Adaptive management associated with creating the Brinkman Wash Restricted Access Area.

- Unauthorized ground disturbing activities exceeding 2 acres within the Restricted Access Area, triggers internal review.
- Adjust rehabilitation techniques based on annual rehabilitation site monitoring.
- Conduct an analysis of disturbance to the Restricted Access Area using the baseline established in 9.5.2.3.1 Objective 3. Internal review is triggered if the amount of disturbed acreage exceeds 5% of baseline.

Objective 4. Adaptive management associated with conserving plants and habitat in the surrounding region.

This objective is mitigation for the land expansion process. Mitigation is tasked to the Special Project Office of the NTC, and not to the Natural Resources Section. The role of the Natural Resources Section in adaptive management is to (1) collect information on mitigation from BLM and SPO; (2) report mitigation progress in the annual letter to the FWS; and (3) act as liaison between the SPO and FWS if FWS finds mitigation progress lacking.

- Failure of the Army to complete mitigations, or to make reasonable progress over the course of a year, triggers interagency review, and may result in legal action.

9.5.2.4.2 Goal 2. Adaptive Management Needed To Conserve Habitat

Objectives 1-4. Create Conservation and Restricted Access Areas.

- Adaptive management is identical to 9.5.2.5.1 Goal 1 Objectives 1-3, respectively.

Objective 5. Adaptive management needed to conserve host plants. Significant decreases in cover to host plants in milkvetch habitat will trigger internal review.

- Decrease in the cover of Lane Mountain milkvetch host plants in Conservation and Restricted Access Areas to 80% of baseline or controls will trigger internal review. A monitoring plan (Appendix 9.5.2) shows how this figure should be calculated.

Objective 6. Reduce dust.

- A dust deposition rate of 50 g/m^2/month, measured with passive dust collectors, will trigger interagency review. This rate of fugitive dust accumulation is approximated from Dr. Lesley DeFalco's (USGS) research on the physiological impacts of dust deposition on leaves of the LMMV (Wijayratne, et al. 2004). An alternative method of monitoring dust is to measure the mass of dust adhering to LMMV leaves. Using this method, Dr. DeFalco's research suggests that about 10 g/m^2 of dust adhering to leaves will reduce shoot growth and should trigger interagency review.

Objective 7. Control invasive plants and weeds.

- Three years of increasing density of a weed species will trigger interagency review.
- The appearance of a new invasive plant species, and its continual increase in density over a three year period, will trigger interagency review.

9.5.2.4.3 Goal 3 Adaptive Management Needed For Ecosystem Management.

Objective 1. Support research, and monitoring that can be applied to milkvetch conservation.

- Use the Lane Mountain milkvetch web site, and the information it contains, to assess the current state of knowledge regarding the milkvetch. Failure of the web site (progress reports, research reports, symposium abstracts, and so forth) to address current threats to the Lane Mountain milkvetch will trigger interagency review.

Objective 2. Actively participate in creating and enacting the Lane Mountain Milkvetch Habitat Recovery Plan.

- Declines of 20% in the reproductive output or density of Lane Mountain milkvetch, as censused using the long term monitoring plan (Appendix 9.5.2), will trigger interagency review. Calculations of declines in milkvetch must reflect baseline (before military training) levels, long-term monitoring averages, climatic cycles, and comparisons with control populations.

Objective 3. Develop and contribute to regional, long-term management. There are no action items needed to adaptively manage this objective.

Objective 4. Educate the military and the public. There are no action items needed to adaptively manage this objective.

Objective 5. Reporting.

- Use the annual letter to FWS (November) as an opportunity to review the management of the Lane Mountain milkvetch.
- Review the results of the annual population monitoring program (9.5.2.3.2).
- Review the results of fence monitoring (9.5.2.9.5.1).
- Coordinate the annual review with the BLM Botanist to assess the status of all four milkvetch populations.

9.5.2.5 How Threats Are Addressed by Objectives and Actions

The following table shows how each threat in 9.5.2 is address by endangered species management goals, objectives, and actions. Where no specific action is listed, all actions planned for the objective will help mitigate the threat. In some cases, objectives and actions mitigate several threats.

Threat	Goal	Objective
Species Threats		
Chance extinction	Goal 1: Protect populations.	Obj. 1: Maintain the NTC-Gemini Conservation Area.
		Obj. 2: Create the East Paradise Conservation Area.
		Obj. 3: Create the Brinkman Wash Restricted Access Area.
	Goal 2: Protect habitat.	Obj. 1: Maintain the NTC-Gemini Conservation Area.
		Obj. 2: Create the East Paradise Conservation Area.
		Obj. 3: Create the Brinkman Wash Restricted Access Area.
	Goal 3: Maintain viability	Obj. 1: Support research and monitoring.
		Obj. 2: Create and enact the Habitat Recovery Plan.
		Obj. 3: Develop regional, long-term management.
Mining	Goal 1: Protect populations.	Obj. 4. Conserve populations in the surrounding region by placing all habitat into public ownership, and closing routes.
	Goal 3: Maintain viability.	Obj. 3: Develop regional, long-term management.

Vehicles	Goal 1: Protect populations.	Obj. 4. Conserve populations in the surrounding region by placing all habitat into public ownership, and closing routes.
	Goal 3: Maintain viability.	Obj. 3: Develop regional, long-term management.
		Obj. 4: Educate the military and public.
		Obj. 5: Coordinate with BLM botanist.

Direct Military Threats

Crushing during training	Partially mitigated by protecting areas with high density population.	
	Goals 1 & 2: Create conservation areas.	Obj. 1-3: Create two Conservation Areas and one Restricted Access Area..
Habitat destruction during training	Partially mitigated by continuing the search for more potential habitat, and by educating the public.	
	Goal 2: Protect habitat.	Obj. 4. Identify and conserve potential habitat.
	Goal 3: Maintain viabibility	Obj. 4. Educated the military and the public.

Indirect Military Threats

dust, erosion, compaction	Partially unmitigated. Goal 2: Conserve Habitat.	Obj. 6. Reduce dust using soil and dust binders when impacts trigger adaptive management.
	Goal 3: Maintain viability.	Obj. 1. Research by USGS-BRD (Dr. DeFalco) on dust impacts.
	Goal 3: Maintain viability.	Obj. 3. Use ITAM planning and rehabilitation to decrease impacts.
soil erosion and compaction	Goal 3: Maintain viability.	Obj. 3. Use regional-scale management, including ITAM

weeds	Goal 2: Protect habitat.	Obj. 7. Participate in MWMA; monitor and map the spread of exotics.
Global Climate Change	Goal 3: Maintain viability.	Obj. 1. Support research and monitoring, including conducting a symposium, assisting dust and population modeling research, funding population genetics research and life-history research, monitor precipitation, and bank seeds.
	Goal 3: Maintain viability.	Obj. 3. Regional, long-term management, including WMCMP, LCTA, MDEP, DMG.
Population fragmentation	Goal 2: Protect habitat.	Obj. 4. Identify and conserve potential habitat.
	Goal 2: Protect habitat.	Obj. 5. Conserve host plants.
	Goal 3: Maintain viability.	Obj. 1. Support life history research (Drs. Prigge and Sharifi) and population modeling (Dr McKeachern).
Crushing or habitat destruction from activity that is not military, or from minor construction projects.	Goal 2: Protect habitat.	Obj. 5. Conserve host plants. Collect and store site-specific seeds.
	Goal 3: Maintain viability.	Obj. 2. Create and enact a Habitat Recovery Plan.

9.5.2.6 Assurance of Program Facilitation

9.5.2.6.1 Funding

See Section 9.5.8

9.5.2.6.2 Personnel

See Section 9.5.8

9.5.2.6.3 Schedule (Projected costs reflect the proportion of work performed by staff members versus the

proportion performed by the NTC Field Crew.

Schedule	Action	INRMP Subsection	Personnel Hours per Year	Projected Cost
	Scheduled Tasks			
2004 - 2006	Fund research on effects of precipitation, life history, and seed propagation (Drs. Prigge and Sharifi).	9.5.2.2.2	Contracted	$115,000
2004-2005	Continue funding Cal State San Bernardino (Walker & Metcalf) with population genetics research.	9.5.2.2.2	Contracted	$67,000
2005	Convene a symposium that brings together LMMV researchers.	9.5.2.2.2	40	$1,600
2005	Create and fence the East Paradise Conservation Area.	9.5.2.2.1	640	$19,200
2006	Investigate seeding milk-vetch.	9.5.2.2.3	Contracted	$0.
2006	Create the Brinkman Wash Restricted Area Zone.	9.5.2.2.1	400	$10,000
2006	Channel vehicle traffic, particularly in Brinkman Wash.	9.5.2.2.3	32	$1,280
2007, 2009	Conduct periodic review of ITAM reclamation near LMMV.	9.5.2.2.3	4	$160
Sub-total (Scheduled)				**$214,240**
	Annual Tasks			
Annual	Coordinate with O/C Academy.	9.5.2.2.3	Army	
Annual (Spr, Fall Semester)	Outreach for grade-schoolers.	9.5.2.2.3	8	$320

Annual (May)	Conduct an annual census. Analysis will include comparison with previous censuses, control areas, and the annual ITAM vegetation baseline.	9.5.2.3.2	320	$12,800
Annual (May)	Create GIS layers from annual census, and distribute to MDEP and USFWS.	9.5.2.3.2	24	$960
Annual (November)	Submit annual report on damage, fence breaches, and current status of populations.	9.5.2.6	24	$960
Annual (November)	Review and Update LMMV sections of INRMP.	9.5.2.2.3	16	$640
Annual (November)	Review and adapt management strategies.	9.5.2.5.1	16	$640
	Monthly Tasks			
Monthly	Use O/C teams.	9.5.2.2.3	Army	
Monthly	Disqualify personnel training too close to LMMV.	9.5.2.2.3	Army	
Monthly	Brief OPFOR Academy.	9.5.2.2.3	Army	
Monthly	Coordinate with hazardous waste briefings.	9.5.2.2.3	Compliance Section DPW	$0
Monthly	Distribute Rotational Unit Environmental Briefing Handbook to each rotation.	9.5.2.2.3	ITAM	$0
Monthly	Check, maintain fences around all Conservation Area.	9.5.2.2.3	192	$3,840
	Continuous Tasks			

Continuouis	Natural Resources Section educational journalism.	9.5.2.2.3	8	$320
Continuous	Conduct preactivity surveys before reclamation.	9.5.2.2.3	8	$320
Continuous	Natural Resources Section outreach.	9.5.2.2.3	40	$1,600
Continuous	Give strategic help to researchers.	9.5.2.2.2	40	$1,600
Continuous	Monitor precipitation at five weather stations, and disseminate data to researchers.	9.5.2.2.2	48	$1,440
Continuous	Comply with NEPA and ESA; conduct Section 7 consultation when necessary.	9.5.2.2.3	694	$27,760
Continuous	Conduct preactivity surveys and compliance monitoring for LMMV.	9.5.2.2.3	24	$960
Continuous	Contribute to LMMV portion of WMCMP	9.5.2.2.2	16	$640
Continuous	Contribute to LMMV Recovery Plan.	9.5.2.2.2	40	$1,600
Continuous	Coordinate with Fort Irwin ITAM program re LMMV.	9.5.2.2.2	ITAM	$0
Continuous	Coordinate with MDEP, and share GIS data with them.	9.5.2.2.2	16	$640
Continuous	Participate in DMG re LMMV.	9.5.2.2.2	8	$320
Continuous	Participate in the WMWMA.	9.5.2.2.2	72	$2,880
Continuous	Monitor dust levels at Fort Irwin.	9.5.2.2.3	Air Quality	$0

Continuous	Monitor invasive plants on the NTC. Control invasives that pose a potential threat to the LMMV.	9.5.2.3.2	8	$320
Continuous	Update range training maps.	9.5.2.2.1	ITAM	$0
Sub-total (Annual, Weekly, and Continuous)				**$60,560**
Total				**$274,800**

9.5.3 Desert Tortoise.

9.5.3.1 Threats

9.5.3.1.1 Species Threats.

Populations of desert tortoise have been declining throughout their historic range because of direct threats including:

- habitat destruction and fragmentation
- localized extinctions
- increased numbers of subsidized predators, including ravens and coyotes.
- road kills
- spread of disease
- illegal collecting
- feral dogs
- military activities

9.5.3.1.2 Direct Threats from Military Training.

Military threats to the desert tortoise were identified by the USFWS in the biological opinion for the NTC's current mission at Ft. Irwin (1-8-95-F-16R). Direct threats include:

- Construction of structures and installations including staging areas, Forward Operating Bases (FOB), Military Operations in Urban Terrain (MOUT) sites, Fiber Optic Networks (FON), and caves for training structures.
- The crushing of desert tortoises and their burrows by wheeled and tracked vehicles. Tracked vehicles are particularly destructive. Military activities on current NTC lands as well as within the proposed Eastern and Western Expansion Areas will cause the direct loss of some desert tortoise individuals.
- Harassment: Natural tortoise behavior will be changed or restricted by relocation and by habitat degradation and fragmentation.
- Habitat loss: The land expansion process converts large portions of desert tortoise critical habitat into land used for military activities. This habitat will be destroyed where it overlaps military activities.

9.5.3.1.3 Indirect Threats

- Fragmentation of populations, consequently reducing genetic diversity and increasing the likelihood of extinction in small subpopulations.
- The increased attraction of subsidized predators caused by rising levels of anthropogenic activity.
- Weed invasions associated with human disturbance and activity may replace desert tortoise preferred forage material and increase the risk of fires.
- Global climate change, leading to changes in precipitation regimes may prolong drought, thereby altering vegetative forage and water availability.
- Fugitive dust, which may impact vegetation and leave tortoises with a reduced food supply. Dust may cause or exacerbate Upper Respiratory Tract Syndrome in tortoises.
- Indirect threats also include military support activites such as erecting radio towers or laying fiber optic cable.

9.5.3.2 Goals, Objectives, and Actions for Conservation

Section 9.5.1 described and justified management goals for the NTC. Because military training is inherently destructive to desert tortoises, conservation goals emphasize preserving entire populations, managing at the ecosystem level, and conducting research and educational outreach, rather than efforts that protect individual tortoises.

9.5.3.2.1 Goal 1: Protect Populations

Fencing of conservation areas, in conjunction with annual monitoring and adaptive management, ensures that desert tortoises will not go extinct at Fort Irwin, and that sources of young tortoises, capable of emigration and colonization of new areas, will exist in the future (Section 9.5.1.1).

Unfortunately, little of the current (2005) training area harbors desert tortoise populations and habitat sufficiently high in quality to justify creation of refugia. Within Fort Irwin, most tortoises are located within eight mostly disjunct populations. The largest of these populations is located on the southern boundary of Fort Irwin and supports the highest densities of desert tortoise populations. Other populations are located in the foothills of the Granite and Tiefort mountains. These steep areas, as well as isolated washes and canyons, are generally avoided by military vehicles and consequently provide a relatively safe area for tortoises. However, these areas are fragmented and isolated from larger, contiguous areas supporting tortoise populations. The long-term suitability of these refugia is limited due to their relatively isolated nature and small size. Still other populations exist within Goldstone Complex, Range 1, and East Gate. Tortoise densities have been estimated to range from zero (in those areas completely developed or extensively trained) to high (>50 tortoises per square mile) in some areas of critical habitat along the southern boundary of the NTC. The Cantonment area and its immediate vicinity do not support any desert tortoise populations, primarily due to the lack of habitat. Occasionally, tortoises may incidentally wander into the cantonment from the adjacent desert.

Habitat within the 90 gridline corridor, along the NTC's souther boundary, is the only habitat with sufficient quality to serve as refugia for tortoises. The 90 gridline corridor is the strip of land between UTM 90 N and the southern boundary of the NTC (UTM 86 N). This corridor was fenced and made off-limits to military training soom after this area was designated part of the Superior-Cronese Critical Habitat Unit by the FWS in 1994. This area consists of approximately 20,000 acres. Pending approval of the Expansion EIS, this area will be reopened to military training. After this area is reopened, only a portion of

the area below the 90 gridline will be protected as desert tortoise critical habitat (Figure 9.5.3.3). These areas will be off limits to all nonscientific anthropogenic activities including O/C access and orienteering practice, thereby establishing perpetual habitat for small populations of desert tortoises.

Objective 1. Create and fence a 963-acre conservation area, the UTM 90 Conservation Area Spur (Figures 9.5.3.1 – 9.5.3.3).

Objective 2. Create and fence a 1,600-acre conservation area, the UTM 90 Conservation Area West (Figures 9.5.3.1 – 9.5.3.3).

Objective 3. Create and fence a 2460-acre conservation area, the UTM 90 Conservation Area East (Figures 9.5.3.1 – 9.5.3.3).

- Fence the northern boundaries of these conservation areas with 3-strand barbwire and tortoise-proof fencing prior to training activity (Draft Fencing Plan 2004). The fencing will be located adjacent to a double ditch and berm. Fencing will prevent tortoises from entering training areas, as well as preventing unauthorized military incursions. The southern boundaries of the conservation areas are contiguous to the Superior-Cronese Critical Habitat Unit and will be fenced with barbwire, only, allowing tortoise movement between these areas (Figure 9.5.3.1).
- Tortoise-proof gates leading into conservation areas when tortoise-proof fencing is present. No gates are planned in the above 3 desert tortoise conservation areas because no mapped roads enter the areas from the north. However, 4 gates will be placed in the East Paradise (LMMV) Conservation Area and 2 in the 500-m utility buffer (ITS-Charis 2005).
- Outline the boundary with high visibility Siebert stakes at 30-meter intervals to prevent nocturnal fence breaches by military personnel.
- Erect off-limits signs at 100-meter intervals along the northern perimeter of the conservation areas to further aid in preventing accidental military incursions into conservation areas.
- Eliminate all mechanized training, ground disturbing activities, off-road travel, and/or unauthorized entry within these areas with the following exceptions: (1) access every 5 years for monitoring and research approved by the NTC Director of Natural Resources; (2) emergency vehicles, particularly those needed for wildfire control; (3) exceptional natural resource activities, such as feral burro roundups or cultural surveys, approved by the NTC Director of Natural Resources.
- Utilize observer/controller (O/C) teams to prevent unnecessary habitat destruction by rotational units unfamiliar with the terrain and travel routes. The observer/controller (O/C) teams are assigned to each command element of the rotational unit. The job responsibilities of the O/C are to find and reorient units unfamiliar with Fort Irwin and serve as mentors or coaches during actual training exercises.
- Artificially "kill" training personnel and their vehicles (i.e., disqualify them from further training for that mission) if they are found within 33 feet of controlled or off-limits areas. Position Location Devices (PLD) will strictly maintain rotational units to this distance. The complete instrument package for maneuver unit vehicles and personnel enables visual contact with units via remote video cameras.
- Update range training maps before military training commences to show all protected areas.

Objective 4. Create and barbwire fence the eastern boundary of 4560 acres in a 500-meter wide buffer to the north of the Boulder Utility Corridor extending from the eastern edge of the UTM 90 Conservation Area East to the eastern border of the Eastgate parcel (due to low densities of desert tortoises the northern boundary of this area will not be fenced) (Figure 9.5.3.2). The buffer is meant to prevent military incursions into the utility corridor. Although the area is not designed to be a conservation area, it has the secondary effect of protecting desert tortoise potential habitat.

Three-strand barbwire fencing will be placed 500 meters from the utility corridor along the boundary of the Eastern Expansion Area starting from the southeastern corner of the Eastern Expansion Area and continuing around the outer boundary of the Eastern Expansion Area (ITS-Charis 2005). Furthermore, a double ditch and berm will be created along this same boundary to prevent tank excursions from training areas. The berm and ditch has a slope less than 60%, which should not affect adult tortoise mobility. The barbwire fence will be placed on the berm between the double ditches. Approximately 20 km along the boundary will not be fenced due to terrain. Therefore, an estimated 37.3 km of fencing and berms will be needed. Desert tortoise-proof fencing will be placed from the UTM 90 Conservation Area East to the Whale. Desert tortoise-proof fencing along this boundary will be buried 12 inches below ground, extend 18 inches above ground, and have a mesh size of 1-inch wide by 2-inches high. Siebert stakes will be placed from the UTM 90 Conservation Area East to the Whale as well as along the southwestern border of the dry lake located at the northeastern corner of the Eastern Expansion Area (Figure 9.5.3.2).

- Outline the boundary with high visibility Siebert stakes at 30-m intervals to prevent nocturnal fence breaches by military personnel.
- Erect restricted access signs at 100-m intervals along the northern perimeter of the buffer to prevent accidental military incursions.
- Eliminate all mechanized training, ground disturbing activities, off-road travel, and/or unauthorized entry within the buffer, with the following exceptions: (1) access every year for monitoring and research approved by the NTC Director of Natural Resources; (2) emergency vehicles, particularly those needed for wildfire control; (3) exceptional natural resource activities, such as feral burro roundups or cultural surveys, approved by the NTC Director of Natural Resources.
- Utilize observer/controller (O/C) teams to prevent unnecessary habitat destruction by rotational units unfamiliar with the terrain and travel routes. The observer/controller (O/C) teams are assigned to each command element of the rotational unit. The job responsibilities of the O/C are to find and reorient units unfamiliar with Fort Irwin and serve as mentors or coaches during actual training exercises.
- Artificially "kill" training personnel and their vehicles (i.e., disqualify them from further training for that mission) if they are found within 33 feet of controlled or off-limits areas. Position Location Devices (PLD) will strictly maintain rotational units to this distance. The complete instrument package for maneuver unit vehicles and personnel enables visual contact with units via remote video cameras.
- Update range training maps before military training commences to show all protected areas.

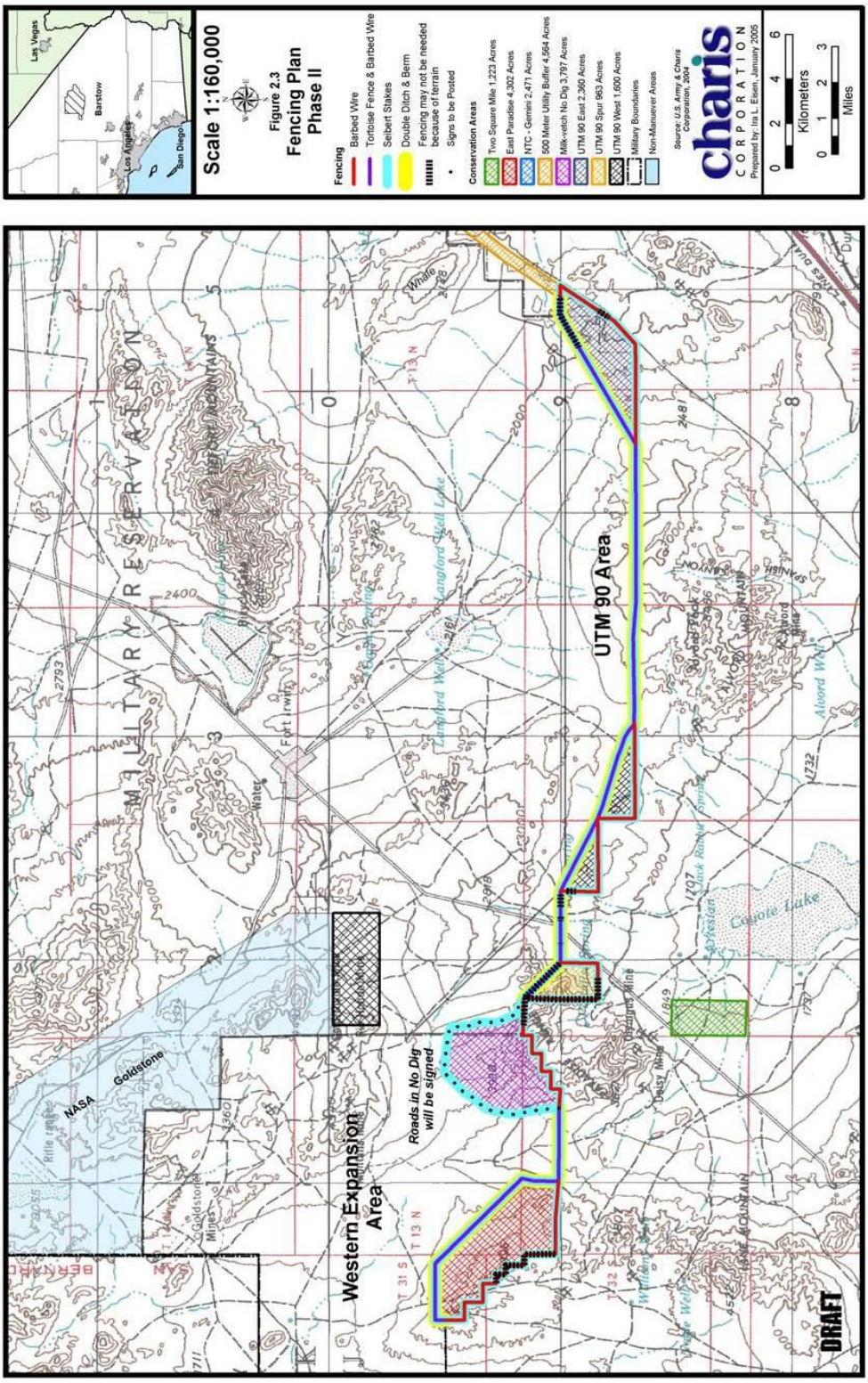

Figure 9.5.3.1. Types of fencing required by Objectives 1, 2, and 3 of Section 9.5.3.2.1.

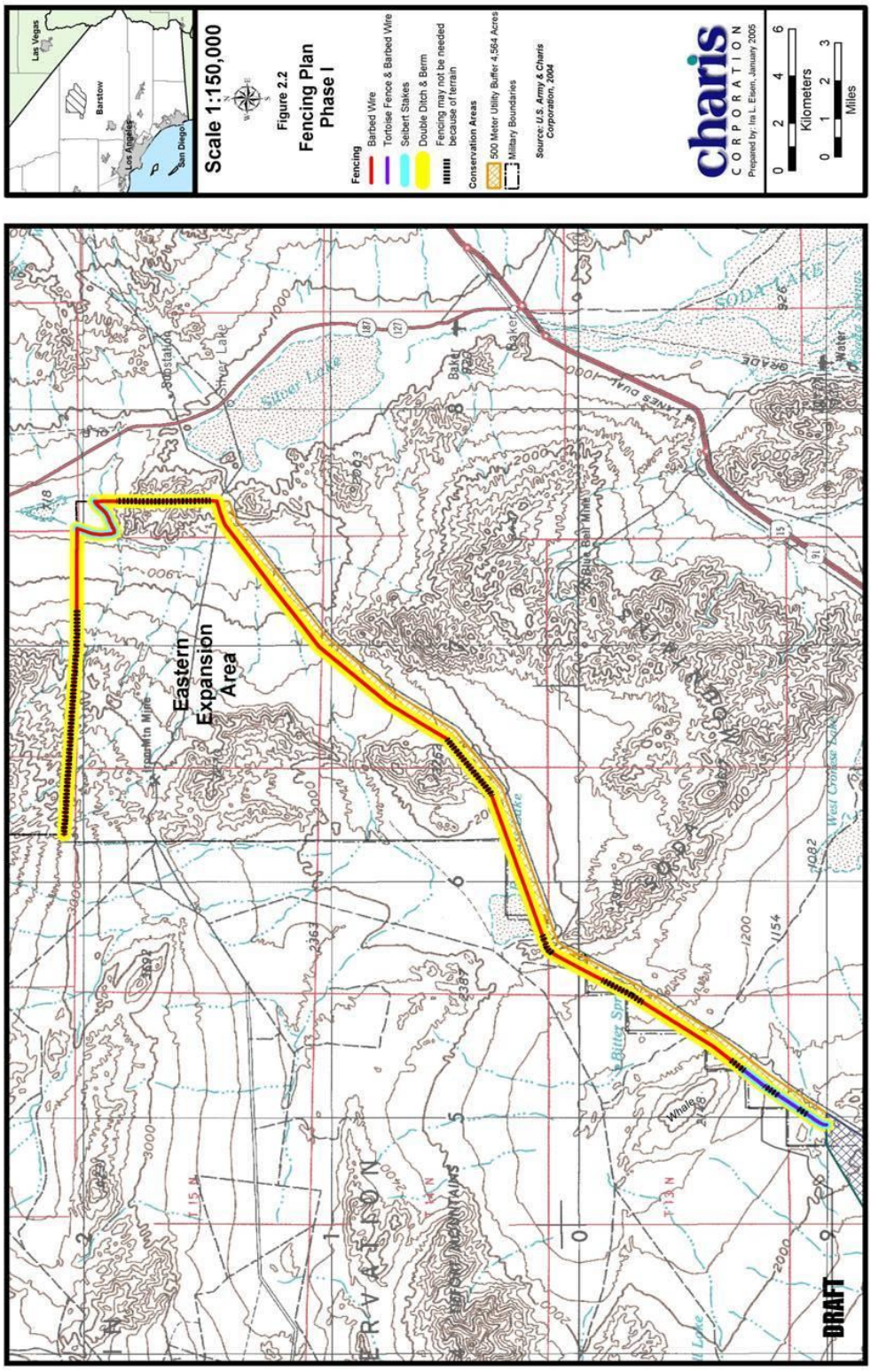

Figure 9.5.3.2. Types of fencing required by Objective 4 of Section 9.5.3.2.1

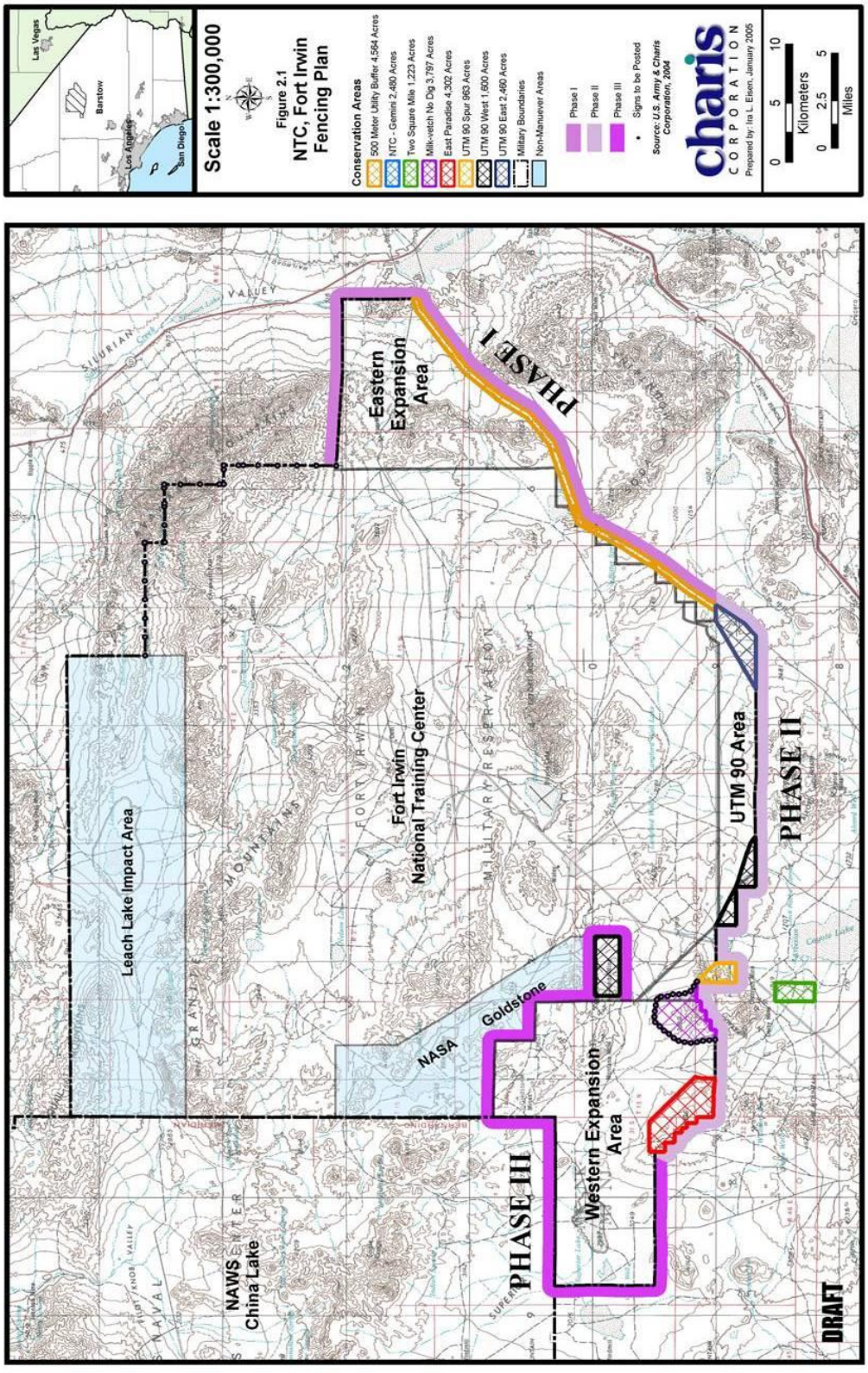

Figure 9.5.3.3. Conservation areas and fencing implementation schedule.

Objective 5. Minimize take.

- All translocation of tortoises will follow the FWS- and USGS-approved plan. All personnel will receive FWS authorization before handling tortoises.
- On NTC training ranges, only trained biologists, authorized by the Director of Natural Resources, shall conduct surveys for the desert tortoise or move them if they are in imminent harms way. These trained biologists have the authority to halt any action that might result in harm to the desert tortoise. Trained biologists may handle tortoises only when the tortoise is under imminent danger. Trained biologists will follow general handling protocols, such as avoiding exposure to harmful temperature extremes, relocation near shade, and wearing prophylactic gloves.
- The NTC shall present briefings to all army personnel, contractors, and other users of Fort Irwin. These briefings cover the locations of protection areas, protection measures enforced, and the importance of complying with the terms and conditions of the BO.
- The NTC shall insure that the travel corridors within the Manix Tank Trail and Goldstone Tank Trail are clearly marked to prevent the loss of desert tortoise habitat resulting from vehicle convoys straying from the trials. The corridor may be designated either with permanent or temporary markers that are set before each use.
- Escort all convoys using the Manix Tank Trail and Goldstone Tank Trail by a lead vehicle containing at least one observer (in addition to the driver). Observers shall be persons stationed at the NTC who are familiar with desert tortoises and their handling. The authorized biologists shall be responsible for training the observers in biology and handling of desert tortoises and shall maintain a list of Army personnel who are qualified to function as observers. Maximum speed on the Manix and Goldstone Tank Trails is 25 mph, a speed that permits the observer to detect any desert tortoises on the trail and remove the animal from harm's way. The convoy shall not proceed ahead of the observer at any time.

Objective 6. Install predator control measures to reduce the anthropogenic increases of predator population numbers.

Common raven populations have significantly increased in the Mojave Desert. Data from the USFWS Breeding Bird Survey Program covering 1968 to 1992 shows a tenfold increase in raven numbers in the Mojave Desert (Boarman and Berry, 1994). Conditions at the NTC are conducive to increasing the number of ravens in the desert. The presence of the NTC provides increased road kills, permanent water supplies at the wastewater treatment facility, a supplementary food supply at the landfill, and permanent structures that provide raven nesting and roosting sites.

Because ravens are known to prey on juvenile desert tortoises, any increase in the raven populations in the area could have negative impacts on the desert tortoise populations on the NTC.

In 2001, a common raven and coyote management plan and pest control standard operating procedure were developed to eliminate or reduce the population of ravens and coyotes at the post landfill.

- Informational stickers reminding personnel to keep trash bins covered at all times were placed on all trash receptacles.
- Waste management protocol is explained to civilian and military personnel attending the various education programs on post.
- Refuse at the landfill is bailed and covered with tarps daily to reduce the site's attractiveness to potential desert tortoise predators such as ravens and coyotes.

- Educational handouts that include information on the proper handling and disposition of trash are provided to all personnel on post.
- Tarpaulins are placed over trash hauled in from the field during training rotations, which helps to reduce the amount of wind blown trash lost in transit.
- The military has implemented a litter control program for the NTC cantonment. Soldiers are assigned to pick up trash throughout the Post on a daily basis, and dumpsters and receptacles are located throughout the cantonment.
- Trash generated at bivouac or training areas is immediately placed in covered containers and removed for disposal at the NTC & Fort Irwin landfill when the training unit leaves the area.
- Actively control raven numbers by shooting and/or nest and egg removal pending approval of a USFWS permit. The NTC possesses and utilizes a USFWS depredation permit with an annual take of 100 ravens at the landfill. Ravens will be removed with a shotgun with no larger than number 10 gauge shot in accordance with U.S. Fish and Wildlife protocol.
- Place netting underneath the shade structure roofs in the cantonment area where large groups of ravens are known to congregate. This will limit the amount of perching locations within the cantonment.
- Feral dogs are currently not a problem at Fort Irwin. If feral dogs become a problem they will subsequently be trapped and rehabilitated or euthanized.

9.5.3.2.2 Goal 2: Conserve Habitat

Objective 1. Purchase desert tortoise habitat outside of NTC lands. The DPW Natural Resource Section will not handle the accompanying actions necessary to fulfill this objective. These actions will be taken by the United States Army as partial mitigation for training in the Eastern and Western Expansion Areas.

Consolidate land ownership through the purchase of approximately 130,000 acres (52,610 ha) throughout the Superior-Cronese, Fremont-Kramer, and Ord-Rodman DWMAs. These lands will be placed in public ownership. Of the 130,000 acres, 96,166 acres currently belong to the Catellus Corporation, and the remainder belongs to private ownership.

Contribute funds and/or labor to pay for route closure and rehabilitation actions in prime desert tortoise habitat selected by the USFWS. The United States Army will contribute up to $500,000 towards this objective and the closing of roads in BLM proposed Lane Mountain milk-vetch Areas of Critical Environmental Concerns. This money is estimated to be able to close, rehabilitate and sign approximately 1,625 miles (2,615 km) of roads and trails detrimental to desert tortoise and Lane Mountain milk-vetch survival and recovery.

Purchase land and associated assests and improvements associated with four cattle grazing allotments in the West Mojave Desert. These are the Harper Dry Lake (26,315 acres), the Cronese Lakes (65,306 acres), the Cady Mountain (231,905 acres), and the Ord Mountain (154,853 acres) Allotments. Harper, Cronese and Ord contain 182,116 acres of desert tortoise critical habitat. As of October 2005, the US Army has purchased three allotments, but has not yet purchased the Ord Mountain allotment. If the estate of the recently deceased owner refuses to sell, the Army will purchase appropriate conservation land elsewhere.

Objective 2. Minimize disturbance and restore damage to training lands outside the conservation areas to a level suitable for the military mission.

- Use ITAM program to maintain militarily suitable levels of habitat quality and reduce dust levels and water erosion.

- Restrict vehicle movement by revegetating roadsides to minimize increases in road width. Normal combat trails are between 24 – 32 feet wide. Once the trail's width increases to 50 feet, revegetation will commence.
- A qualified biologist will accompany operators of heavy equipment when working within potential habitat. The biologist will survey ahead of any heavy equipment causing surface disturbance and reroute the equipment to avoid any impacts to habitat.
- Utilize observer/controller (O/C) teams to prevent unnecessary habitat destruction by rotational units unfamiliar with the terrain and travel routes.
- Artificially "kill" training personnel and their vehicles (i.e., disqualify them from further training for that mission) if they are found within 33 feet of controlled or off-limits areas.

9.5.3.2.3 Adopt an Ecosystem Management Approach

Objective 1. Develop and contribute to regional, long-term management.

The need for a regional or landscape perspective on conservation is a cornerstone of the ecosystem management approach to land management and conservation. Tortoises are threatened by their vulnerability to environmental fluctuations, disease, urban expansion, and military and recreational off-road vehicle travel. The threat of global warming and the explosion of the human population in the high desert add to environmental uncertainty and increase these threats to the desert tortoise. Threats to the desert tortoise cannot be addressed by protecting individual tortoises or small areas. Effective management for the long-term existence of the species requires coordination with the BLM, USFWS, and other regional planning agencies.

Several regional and local cooperative plans and programs influence the desert tortoise management on the NTC. As findings from research projects become available, they will contribute to appropriate management decisions.

- West Mojave Coordinated Management Plan. The objective of this management plan is to recover species listed as threatened and endangered and to prevent future listings under the California and federal ESA. It will function as a regional Habitat Conservation Plan (HCP) for the western Mojave desert and identifies areas where species conservation will be emphasized (WMCMP 2003). The natural resources staff is participating in the development of this plan.
- Desert Tortoise Recovery Plan. The objective of this USFWS (2001) recovery plan is to delineate reasonable actions that are needed to conserve and recover the desert tortoise. Actions needed to accomplish the recovery of this species include protection and conservation of existing populations and habitat, development and implementation of management plans, environmental education to inform the public of the status of the desert tortoise, propagation to restore the populations, and research to monitor and guide the recovery of this species. Once the plan is finalized, the natural resources staff will integrate these actions into their natural resources management strategy.
- Integrated Natural Resources Management Plan. The objective of this management plan, mandated by the Sikes Act and Army Regulation 200-3, is to guide the natural resources program on the NTC. The plan will assist in the conservation of natural resources and compliance with federal and state environmental laws including the ESA. The INRMP is updated by the NTC Natural Resources Section, and reviewed by the USFWS and CDFG, at regular intervals. The INRMP benefits desert tortoise conservation by providing a central location for current management requirements, and is updated regularly to include recent research results and directives from the USWFS and CDFG.
- Integrated Training Area Management. The objective of this program is to provide quality training

environments to support the Army mission. The program consists of four components, including monitoring of physical and biological resources, integration of land use with natural resources capabilities, environmental awareness, and planning, designing, and executing land rehabilitation and maintenance goals (Universe Technologies, Inc., 2000). The natural resources staff provides additional support to the ITAM team in meeting the objectives of this program. The ITAM program benefits desert tortoise conservation by reclaiming damaged habitat.

- Mojave Desert Ecosystem Program. The objective of this program is to compile and distribute digital mapping data and scientific information in a Geographic Information System (GIS) format to facilitate the management of the Mojave Desert ecosystem. This program is a multi-agency federal partnership between the U.S. Department of Defense and the U.S. Department of Interior. The Program is used by desert land managers to manage land and make decisions that may impact the desert ecosystem (Jones and Stokes, 1999). The natural resources staff provides desert tortoise data that is incorporated into a central MDEP database and shared with stakeholders. Conversely, MDEP layers are used to monitor desert tortoise populations, and to survey for additional desert tortoise populations.
- Desert Managers Group. The objective of this organization is to establish a forum for government agencies that oversee the Mojave Desert ecosystem where they can address and discuss issues of common concern including threatened and endangered species. This form of cooperative management increases operational efficiency, enhances resource protection, and improves the service to the public of participating federal and state agencies (Jones and Stokes, 1999). The Fort Irwin Director of Natural Resources is a key member of this organization. DMG activities in the last year include sponsoring a symposium on Mojave Desert ecology and restoration, and organizing a regional control program for ravens on public lands. Participation benefits desert tortoise conservation by disseminating new tortoise knowledge to regional land managers, particularly in the.
- West Mohave Weed Management Association. This organization tracks the spread of weeds and exotic species in the Western Mojave Desert, and coordinates weed control. Participation benefits the desert tortoise because invasive weeds increase fire hazard and reduce forage material.

Objective 2. Educate the military and the public

The Natural Resources Division at Fort Irwin has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. The Garrison Commander, Range Control, ITAM, and a team from the Natural Resources Division are currently conducting briefings. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. Education benefits the desert tortoise by giving the military and the public the need for protection, the means for protection, and specific locations of sensitive areas.

- Create a web site, accessible to the public that lists events relevant to the desert tortoise, and provide a download portal for reports relevant to the tortoise. Restrict access to sensitive information. Probably, the web site will be created in conjunction with the Mojave Desert Ecosystem Program.
- The Observer/Controller (O/C) Academy is a 1-hour course on natural and cultural resources training at Fort Irwin for all O/C personnel on post and rotational military police. The course includes a 1/2-hour audiovisual presentation. Specific procedural information in the form of handouts and lectures is provided to all personnel. This program will educate the O/C's about the purpose and regulation of desert tortoise conservation areas.
- The Opposing Forces (OPFOR) Academy is a monthly program for leaders and officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and handouts on natural and cultural resources on post, as well as a take-home quiz to reinforce learning. This program will educate the

leaders and officers about the purpose and regulation of desert tortoise conservation areas.

- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on the NTC. Approximately 25 military and civilian personnel attend this class every other month. This program will educate the military and civilian personnel about the purpose and regulation of desert tortoise conservation areas.
- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending O/C, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources. These field cards will be amended to include the desert tortoise and their conservation areas.
- Several times a year, a biologist from the Natural Resources Division assists in educating children on post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology including desert tortoise.
- The NTC provides opportunities for the public to learn about the natural resources program through participation in outreach events such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, CAIR Fair, Edwards AFB Open House, and Desert Explorer field trips. Desert Explorer field trips, which are led by biologists from the Natural Resources Division, cover topics such as geology, endangered and threatened species, including the desert tortoise as well as the natural history of other plants and animals of the Mojave Desert. Local Boy Scout troops participate in similar programs as part of their Eagle Scout program requirements.
- The natural resources staff provides information and articles to the Fort Irwin Public Affairs Office to be published in the post newspaper and aired on the post television and radio stations to educate base personnel and the public. The desert tortoise will be included in these publications.

Objective 3. Support research and monitoring of desert tortoise biology and ecology.

- Continue research at the FISS studying neonate and hatchling tortoise biology under the guidance of University of California, Los Angeles.
- Investigate the feasibility of using head starting and translocation as management options.
- Continue funding a head-starting project at Edwards Air Force Base. If current research finds that it is feasible, head-starting – the protection of hatchling tortoises during the stages of greatest mortality – could be used to repopulate depleted tortoise populations.
- Continue funding line distance sampling for the desert tortoise in the Superior-Cronese, Fremont-Kramer, and Ord-Rodman critical habitat units.

Objective 4. Continue to support and participate in the Desert Tortoise Translocation Plan. As requested by CDFG, the translocation plan is included in Appendix 9.5.3.

The Translocation Plan (Esque, et al. 2005) was developed by representatives from USGS, NTC, CDFG, and BLM, for the purpose of salvaging tortoises within expansion lands. If they are not translocated, most of these tortoises will eventually be killed by military training. The translocation plan is funded by the US Army; however, all actions will be carried out by USGS biologists and their subcontractors. Therefore, the NTC's responsibility is primarily funding, and secondarily oversight and field assistance.

- Increase or bolster desert tortoise populations near the NTC by translocating tortoises from expansion lands to high quality tortoise habitat. Use methods developed by biologists that are described in detail

in the translocation plan (Esque, et al. 2005).

- Check all tortoises for URTD, using the ELISA test. Remove infected tortoises to double fenced holding pens. Pens will be located within the UTM 90 East Conservation Area and the 500-m Boulder Utility Corridor buffer. Use infected tortoises for research and to supply head-start programs.
- Coordinate access to the NTC for biologists translocating tortoises.
- Use the translocation process on NTC expansion lands to increase scientific understanding of desert tortoise natural history and the effectiveness of translocation in general.

9.5.3.3 Monitoring

Monitoring includes both short term construction monitoring and also long term population monitoring. The long-term monitoring program was developed in cooperation with the USFWS. The monitoring plan focuses on demographics, population trends, and threats.

9.5.3.3.1 Goal 1: Monitoring Needed to Protect Populations

Objective 1, 2, and 3. Monitor conservation areas: UTM 90 Conservation Area Spur, UTM 90 Conservation Area West, and UTM 90 Conservation Area East.

- Check fences for breaches and damage after rotations that use the southern corridor. Repair minor damage; report major damage to Army for discipline and repair.
- Conduct TSC (Total Sign Count) surveys within the Conservation Areas to identify desert tortoise population trends. These surveys are not formally required by the FWS (Brian Croft, FWS, personal communication), but are highly advised.
- Check the double fencing around ELISA-positive holding pens at least twice a year. This will be done during the TSC survey of the UTM 90 East Conservation Area.
- Measure vegetative cover in tortoise conservation areas using ITAM RTLA methods. This will be done as part of the Lane Mountain Milkvetch Long-term Monitoring Plan.
- In 2001, line-distance sampling was initiated and will be continued every 5 years to determine population dynamics on public lands outside of Fort Irwin. This will be maintained for a duration not exceeding 30 years or 6 sampling events.
- Report all monitoring results to FWS annually.

Objective 4. Monitor the 500-meter wide buffer.

- Check fences for breaches and damage after rotations that use the southeastern area of the base.
- Check the double fencing around ELISA-positive holding pens at least twice a year. This will be done during the TSC of the UTM 90 East Conservation Area.
- Tortoise populations within the buffer will not be monitored. This area is not designed to be a "true" conservation area for desert tortoises; rather, this 500-meter buffer primarily prevents military incursion onto the Boulder Utility Corridor. The creation of potential habitat for tortoises is secondary.

Objective 5. Monitor take and efforts to minimize take.

- The NTC wildlife biologist will maintain a database of all tortoise take. The database includes such attributes as the date, location of remains (UTM coordinates), MCL length, sex, estimated cause of death, diagram of carapace damage if any is present, vegetation community type, pictures, and time of

death. Spatial data is then stored in a GIS to demonstrate all NTC tortoise take incidents and identify potential problem areas.
- All tortoise take is kept frozen and then sent to USGS personnel for a necropsy.
- All desert tortoise take is reported to USFWS in our annual report.

Objective 6. Monitor predators and predator control measures.

Beginning August 1 2005, responsibility for coyote control passed from Natural Resources Section to the Fort Irwin Military Police. Natural Resources provides the Police with backup and expertise. Details of the trap and release program may be changed, but the program will remain effective, because of the strong pressure from the San Bernardino County Health Department to keep coyotes out of the landfill.

- The Animal Control Unit monitors coyote and raven numbers at the landfill daily.
- Coyote live traps are monitored twice daily, once in the morning and just before the end of the working day. All trapped coyotes are relocated >25 miles north or east of cantonment.
- Animal control will attempt to monitor any returns of previously relocated coyotes. Sight recognition has proved adequate. Problem coyotes are euthanized by the NTC veterianarian. The trap and relocate program worked adequately during 2004-2005, and was sufficient to keep coyotes out of the landfill.

9.5.3.3.2 Goal 2: Monitor Habitat Conservation Measures

Objective 1. Monitor the purchase of desert tortoise habitat outside of NTC lands.

No field work is needed to monitor this objective. Land acquisition and road closure on private and BLM lands is mitigation for the land expansion process, and is not part of the Natural Resources Section scope of work.
- Once a year, the Natural Resources Section will determine the status of private land that was marked for purchase and transfer to the public domain as part of mitigation for land expansion. The NTC SPO (Special Projects Office) should be able to provide this information.
- Once a year, the Natural Resources Section will determine the status of road closures in areas that contain potential habitat for the desert tortoise. The Barstow office of the BLM should be able to provide this information.
- Mitigation progress, including land acquisition and road closures, will be reported in the annual letter to the FWS.
- No actions will be taken after the final purchase of the lands. The consolidated land parcels will be under the guidance and protection of the BLM.

Objective 2. Monitor efforts to minimize disturbance and restore damage to training lands outside the conservation areas.

- ITAM monitors the success of most reclamation that it undertakes. Sixty (60) percent survival is considered successful germination. Furthermore, invasive plants will be monitored within the immediate edge of the conservation areas adjacent to disturbed habitat. Monitoring will consist of periodic visual assessments and no formal survey will actually be conducted. If invasive plants (notably mustard spp.) appear to becoming a problem by displacing desert tortoise preferred annuals, Ft. Irwin will show due diligence in rectifying the problem.
- Monitor dust levels at the NTC. Report to San Bernardino County Air Quality Division. Dust may reduce net primary production of plants used by tortoises for cover and forage.

9.5.3.3.3 Goal 3: Monitoring needed to sustain an Ecosystem Management approach.

Objective 1. Monitor regional participation.

- The NTC will provide a description of its regional participation in its annual letter to the FWS.

Objective 2. Monitor educational programs.

- The NTC will provide a description of its educational programs in its annual letter to the FWS.

Objective 3. Monitor supported scientific research.

- The NTC will provide a description of the research it sponsors in its annual letter to the FWS.

Objective 4. Monitor the success of the desert tortoise translocation plan.

- Translocated tortoises will have transmitters attached and will be radio monitored monthly for five years (Esque, et al. 2005). Monthly monitoring will be compared with the mortality, dispersal, and fecundity of tortoises in unimpacted areas in the Mojave Desert to determine translocation success. As requested by CDFG, the translocation plan is included in Appendix 9.5.3.

9.5.3.4 Adaptive Management

Adaptive management is a process that maintains environmental quality using management actions that are tailored to specific impacts. The **adaptive management** process begins with **monitoring**; monitoring **triggers** review when environmental quality declines; and **review** produces **actions** targeting specific impacts.

Two types of review will be used. **Internal adaptive review** requires an immediate review of current management policies by the NTC Botanist, Ecologist, Desert Tortoise Coordinator and Director of Natural Resources. **Interagency review** takes place once a year, following the NTC's submittal of an annual letter reporting the status of threatened and endangered species, and related information. Interagency review has not been used previously at the NTC, and it is not known how disagreement between the USFWS and the Department of the Army will be resolved.

Internal review can initiate any of the following actions, or additional actions not listed:

- Improve fencing. To make fencing stronger, add cement foundations and additional strands of barbwire. In sandy and loose soil, pickets can be bolted together length-wise to create a long picket that can be driven 8-10 feet into the soil.
- Improve visibility by adding Siebert stakes to fence pickets.
- Place concertina wire outside and adjacent to the existing fence.
- Adopt stricter penalties for military units that breach fences.
- Increase either the amount of reclamation, or reduce the disturbance threshold that triggers review.
- Channel vehicle traffic, particularly in Brinkman Wash/ using pickets, Siebert stakes, and vegetation planted along road boundaries.

Interagency review can initiate any of the following actions, or additional actions that are not listed:

- Increase existing programs, such as signage, education, outreach, or fence monitoring.
- Install detection devices along fences that are frequently breached.
- Find and protect individual tortoises on the NTC. This option is limited, because unprotected habitat is only surveyed for tortoises prior to any new constructions or installations.
- Use a soil binding agent or tackifier to reduce dust on main travel routes.
- Increase NTC participation in regional management.
- Increase mitigation off-post.
- Begin an active pest and predator abatement program that excludes all coyotes and ravens from the landfill.

9.5.3.4.1 Goal 1 Adaptive Management for Protecting Populations.

Objectives 1, 2 and 3 Adaptive management for UTM 90 Conservation Area Spur, UTM 90 Conservation Area West, and UTM 90 Conservation Area East.

The following events will mandate internal review:

- More than three fence breaches, regardless of size, in a six-month period.
- More than three fence breaches per rotation.

The following events will mandate both internal and interagency review:

- Unusually low precipitation when compared to the Western Regional Climate Center's 30 year average for Barstow, CA. The period of time being compared can be a season, a year, or multiple years. For example, a dry year would not trigger adaptive management because this is not unusual; but a year drier than 95% of the previous 30 years would trigger adaptive management.
- Lower than expected numbers of tortoises found using TSC (Total Sign Count) techniques within the conservation areas. A 20% decline in the number of individuals averaged over all three conservation areas in a period of three consecutive years will trigger adaptive management.
- Significantly greater than expected dust concentrations reported by the San Bernardino County, Mojave Desert Air Quality Management District, in a quarterly report. Or, significantly higher dust accumulation in dust samplers within Lane Mountain milkvetch conservation areas, when compared to control dust samplers on Coolgardie Mesa. Locating dust samplers within desert tortoise conservation areas would increase costs and create unneeded human intrusions into the areas.

Objective 4. Adaptive management for the 500-m buffer adjacent to the Boulder Utility Corridor.

The following events will mandate internal review:

- More than three fence breaches, regardless of size, in a six-month period.
- More than three fence breaches per rotation.

Objective 5. Minimize take.

- Tortoise take for Fort Irwin is permitted annually by the FWS. Annual take that exceeds the number specified by the FWS will trigger interagency adaptive management.

Objective 6. Install predator control measures.

- Citation by the San Bernardino County Health Department for any wildlife related health infraction, particularly at the NTC landfill or regarding coyotes and ravens, will trigger internal adaptive management.
- Adaptive management actions for raven and coyote control have not been proposed. This is a regional problem that has yet to be solved. The NTC will consider actions proposed by the FWS.

9.5.3.4.2 Goal 2 Adaptive Management for Conserving Habitat.

Objective 1. Adaptively manage habitat conservation in the surrounding region.

- No actions. This objective is mitigation for the land expansion process. Mitigation is tasked to the Special Project Office of the NTC, and not to the Natural Resources Section. Failure of the Army to complete mitigations will result in legal action, and these actions will be outside the scope of adaptive management.

Objective 2. Minimize disturbance and restore damage to training lands outside the conservation areas.

- Training land restoration and revegetion performed by ITAM LRAM program follows a well-defined internal adaptive management protocol. Reclaimed land is surveyed in years following reclamation, and if the revegetation survival rate does not meet standards, subsequent plantings will occur until the 60 percent threshold is achieved.
- Notification in a quarterly report by the San Bernardino County, Mojave Desert Air Quality Management District, that air quality, particularly dust concentration, exceeds standards will trigger interagency adaptive management.

9.5.3.4.3 Goal 3 Adaptive Management for Ecosystem Management.

Objective 1. Develop and contribute to regional, long-term management.

- Failure of the NTC to participate regionally, or to report its participation in its annual letter to the FWS, will trigger adaptive management.

Objective 2. Create a web page that shares tortoise-related information with the public.

- Failure of the web site to inform the public about progress reports, research reports, symposium abstracts, and so forth will trigger interagency adaptive management.

Objective 3. Support research, education, and monitoring that can be applied to desert tortoise conservation.

- The NTC submits a letter to FWS every November that describes the status of sensitive species conservation on post. This annual letter will describe research, major educational activities, and monitoring activities. Failure to maintain an adequate level of ecosystem management activities will trigger interagency adaptive management.

Objective 4. Support the Desert Tortoise Translocation Plan, and the Desert Tortoise Recovery Plan.

- The Translocation Plan (Esque et al. 2005) lists specific thresholds and criteria that trigger interagency adaptive management. Generally, the threshold is a 20% decline in either translocated or recipient populations, compared with controls. The Translocation Plan is found in Appendix 9.5.3.
- The Recovery Plan is the result of an adaptive management process that continually updates the Plan with current knowledge about desert tortoise natural history. Participation in the Recovery Plan is itself a form of adaptive management.

Objective 5. Reporting.

- Use the annual letter to USFWS and CDFG (both sent in November) as an opportunity to review the management of the desert tortoise.
- Review the results of the line distance-monitoring program.
- Review the results of fence monitoring
- Coordinate the annual review with the BLM Wildlife Biologist to assess the status of the populations on the consolidated land purchases (Section 9.5.3.2.2, Objective 1).

9.5.3.3 How Threats Are Addressed by Objectives and Actions.

Threats	Goal and Objective	Actions
Habitat fragmentation	Maintain populations by creating conservation areas	
	Comprehensive approach using Regional Management	Participate in WMCMP, DTRP, MDEP, and DMG
	Comprehensive approach using Research	
	Protect existing habitat by erecting fences and signs	Fence conservation areas
	Implementation monitoring	Maintain fencing and signage. Report breaches and damage
	Protect existing habitat by erecting fences and signs	Erect restricted access signs
	Ecosystem Management by protecting habitat off post.	Consolidate land ownership and transfer to public, close routes, and buy grazing allotments.
Road Kills	Erect Barriers and Fences	Install tortoise-proof fencing along Ft. Irwin Road.
Chance Extinction	Research	Continue research at the FISS
	Research	Head starting and translocation

	Research	Continue line distance sampling
Disease	Research	Funding studies of tortoise disease, demography, behavior
Crushing individuals, burrows during training	Not mitigated	
Habitat destruction from military training	Partially mitigated.	
	Protect existing resources	
	Comprehensive approach using research	Research by UCLA and others
	Protect existing resources by avoiding take and habitat degradation	Document damage and report annually to FWS
	Protect existing resources by avoiding take and habitat degradation	
	Protect existing resources via education and outreach.	
	Protect existing resources by minimizing and restoring disturbance	Review ITAM revegetation
	Protect existing resources by minimizing and restoring disturbance	Restore heavy damage and contain vehicles to roads.
Crushing or habitat destruction from non-training activity.	Protect existing resources by avoiding take and habitat degradation	
	Protect existing resources by minimizing and restoring disturbance	Preactivity surveys and compliance monitoring
	Protect existing resources via education and outreach	
	Protect existing resources by minimizing and restoring disturbance	Review ITAM revegetation
	Protect existing resources by minimizing and restoring disturbance	Restore heavy damage and contain vehicles to roads.
Subsidized predators	Desert Tortoise Predation Control	Waste management practices and education
	Desert Tortoise Predation Control	Cover landfill with 6” of dirt.
	Desert Tortoise Predation Control	Utilize an annual USFWS permit to take 100 ravens

Feral dogs	Not mitigated	
Illegal collecting	Protect existing resources through education and public outreach	Public Outreach and Environmental Awareness briefings

9.5.3.6 Assurance of Program Facilitation

9.5.3.6.1 Funding

See Section 9.5.8

9.5.3.6.2 Personnel

See Section 9.5.8

9.5.3.6.3 Schedule (Some tasks are performed at a lower pay scale than others.)

Schedule	Action	INRMP Subsection	Personnel Hours per Year	Projected Cost
	Scheduled Tasks			
2004	Sexual selection study is currently being funded.	9.5.3.2.3	150	$6,000
2004	Utilize the USFWS raven take permit.	9.5.3.2.1	16	$640
2004	Cover landfill with 6" of dirt.	9.5.3.2.1	Landfill	
2005	Fence northern boundary of conservation areas.	9.5.3.2.1	Contracted	
2005	Grade road shoulders to prevent entrapment or impediment.	9.5.3.2.1	County	
2005	Road improvement.	9.5.3.2.1	County	
2005	Design and construct culverts to aid in tortoise use.	9.5.3.1.2	County	
2005	Install tortoise-proof fencing along Ft. Irwin Rd.	9.5.3.2.1	Contracted	
2005	Install raven netting to existing structures.	9.5.3.2.1	Contracted	

2005	Create a Desert Tortoise Management Team from Interagency personnel.	9.5.3.2.3	32	$1,280
2005-2006	Survey all translocation areas to establish current tort density.	9.5.3.3.1	Contracted	
2006	Translocate all tortoises within 90th gridline area.	9.5.3.2.2	684	$27,360
2006	USGS directed Desert Tortoise Translocation Activities	9.5.3.2.2	Contracted	$1,644,708
2006	Create four desert tortoise conservation areas along the southern boundary.	9.5.3.2.1	Contracted	
2006	Erect restricted access signs for N. boundary conserv areas.	9.5.3.2.1	24	$960
2006	Restrict vehicle use to roads.	9.5.3.2.1	16	$640
2006	Post 20 mph speed limit signs on all unpaved access roads.	9.5.3.2.1	16	$640
2006	Close unused routes within sensitive areas closed.	9.5.3.2.1	10	$400
2007	TCS surveys for tortoise densities.	9.5.3.3.1	1024	$40,960
Sub-total (Scheduled)			**$1,723,588**	

Annual Tasks

Annual	OPFOR Academy.	9.5.3.2.3	Army	
Annual	Education of school age children.	9.5.3.2.3	40	$1,600
Annual	Head Start program, including FISS, to augment tortoise propagation.	9.5.3.2.3	Contracted	
Annual	Management oriented research on demographics, life history, and ecology.	9.5.3.3.3	Contracted	

Annual	Population modeling research to maintain viability of species.	9.5.3.3.1	Contracted	
Annual (June)	Long term line-distance sampling.	9.5.3.2.3	Contracted	
Annual (November)	Incorporate an adaptive management program.	9.5.3.4.1	40	$1,600

Continuous Tasks

Continuous	Monitor translocated tortoises.	9.5.3.3.3	Contracted	
Continuous	Soil recontoured and revegetated.	9.5.3.2.2	ITAM	
Continuous	Construction monitoring.	9.5.3.2.2	480	$19,200
Continuous	Maintain Tortoise Educational Display at Jackrabbit Park.	9.5.3.2.3	312	$12,480
Continuous	Natural Resources Section outreach.	9.5.3.2.3	80	$3,200
Continuous	Publish and Promote environmental stewardship through Ft. Irwin radio and newspaper.	9.5.3.2.3	16	$640
Continuous	Educate NTC personnel and the public about waste removal.	9.5.3.2.1	32	$1,280
Continuous	Air cannon installation and maintenance at landfill.	9.5.3.2.1	Landfill	

Monthly Tasks (Cost is annualized.)

Monthly	Monitor fencing for breaches.	9.5.3.3.1	96	$23,040
Monthly	O/C Academy Briefing.	9.5.3.2.3	Army	
Monthly	LTP	9.5.3.2.3	Army	
Monthly	HAZMAT handling protocol briefing.	9.5.3.2.3	HazMat.	

Sub-total, Annual and Monthly Costs	**$63,040**
Total Costs (annualized)	$1,786,628

9.5.3.7 Reporting

- A report will be submitted to the FWS annually (November) that describes the status of populations, the impacts that they have sustained during the previous year, and significant conservation actions that have been used to conserve the species.

9.5.4 Mohave Ground Squirrel

9.5.4.1 Threats

9.5.4.1.1 Species Threats.

Mojave ground squirrels (MGS) have adapted to drought by postponing reproduction during periods of excessive dryness. As a result prolonged periods of drought may cause localized extinctions of MGS populations. Animals surviving in source locations usually repopulate these sink areas when juveniles disperse during more favorable times. However, due to urban sprawl, increased amounts of OHV travel, and a high military presence throughout MGS habitat, these sink areas may not be repopulated due to severe habitat fragmentation. Thus, these sources may become isolated islands of habitat that are extremely vulnerable to random environmental and climactic effects, fires, and diseases. Furthermore, habitat loss may reduce preferred forage and increase conspecific competition.

- Localized extinction
- Habitat fragmentation
- Drought
- OHV travel and recreation
- Urban sprawl

9.5.4.1.2 Direct Threats from Military Training.

Threats to the Mohave Ground Squirrel from military training were identified as one reason for state listing. Direct threats include:

- The crushing of individuals and burrows with wheeled and tracked vehicles. Tracked vehicles are particularly destructive.
- Loss of habitat: Habitat will be lost when it is used for military training. This includes areas in the Western Expansion Area and desert tortoise critical habitat south of the 90 grid line.
- Construction of structures and installations including staging areas, Forward Operating Bases (FOB), Military Operations in Urban Terrain (MOUT) sites, Fiber Optic Networks (FON), and caves for training structures.

9.5.4.1.3 Indirect Threats from Military Training.

- Military training removes vegetation and alters habitat. Thus, training reduces MGS forage and seed sources, removes protective structure, increases interspecific competition, and may lead to hybridization with the conspecific round tailed ground squirrel, which prefers sandy habitat.
- Military training inadvertently produces fugitive dust, and erodes and compacts the soil. These indirect effects degrade forage needed by the MGS.
- Military training will probably increase weed density and diversity. Weeds are spread during road grading and other ground disturbing activities, and weeds are known to disburse along roadways in the Mojave Desert. Weeds increase the potential for fire frequency and intensity; and they compete with plant species eaten by the MGS. Sahara mustard (*Brassica tournefortii*) and cheat grass (*Bromus madritensis* and *Bromus tectorum*) form monocultures that exclude natives, and increase fire intensity.

9.5.4.2 Goals, Objectives, and Actions for Conservation

9.5.4.2.1 Goal 1: Protect Populations.

Focusing on populations, rather than total number of individuals, is particularly appropriate for the Mohave ground squirrel because of its small population size and limited distribution. Small populations of many species are known to undergo fluctuations in size, often to the point of localized extinctions (Wilson 1992, Primack 1995). Extinction can be followed by colonization from neighboring populations that act as "sources" (Pulliam 1989, Primack 1995). Therefore, maintaining the viability of existing stable populations is beneficial to ensuring the long-term existence of a species, particularly when the primary threat to the species is a small distribution in the face of a fluctuating environment.

Objective 1. Create, protect, and maintain three conservation areas for the Lane Mountain milkvetch that will also protect populations of the MGS. The three conservation areas are described in Section 9.5.2.2.1: NTC-Gemini (2,471 acres), East Paradise (4,300 acres), and Brinkman Wash (3,700 acres). NTC-Gemini and East Paradise are fenced to exclude all military training; Brinkman Wash restricts military use to existing roads. Each of these three areas is within potential habitat of the MGS.

- Action items for Objective 1 are identical to the action items for Objectives 1-3 in Section 9.5.2.2.1.

Objective 2. Create, protect, and maintain two conservation areas for the desert tortoise that will also protect populations of the MGS. The two conservation areas are described in Section 9.5.3.2.1: UTM 90 sprur (963 acres), and UTM 90 West (1,600 acres). Both areas will be fenced to exclude military training. Both of these areas are wholly or partially with MGS potential habitat.

- Action items for Objective 2 are identical to the action items for Objectives 1 and 2 in Section 9.5.3.2.1.

Objective 3. Maintain the NASA / Goldstone Complex as a MGS conservation area that will remain off-limits to military training.

The Goldstone Complex is the focus of the NTC's Mohave ground squirrel management efforts because several studies have previously identified the presence of MGS within the complex. This area will remain

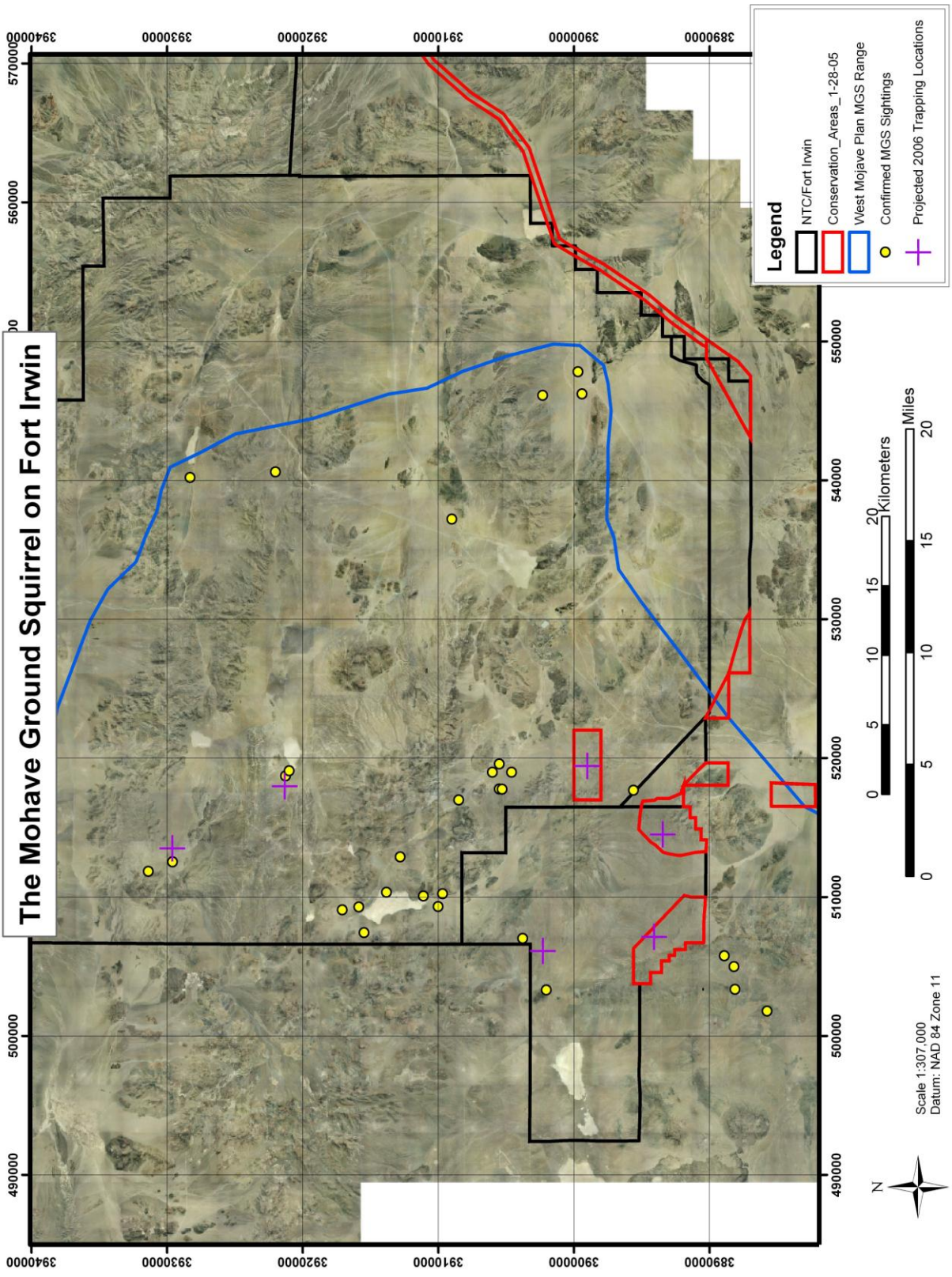

Figure 9.5.4.2. Proposed survey areas and existing MGS locations at NTC and Fort Irwin.

off-limits to military training with wheeled or tracked vehicles except on the tank trail that is used as a convoy route. The tank trail parallels a paved highway.The NASA / Goldstone Complex is a 33,030-acre area, much of it potential MGS habitat. A two-strand barbwire fence will be installed and maintained along the tank trail to prevent vehicles from accidentally straying into the surrounding area. Additionally, Siebert stakes will be placed approximately every 30 meters along the trail as an additional boundary marker.

Objective 4. Survey for the presence of the MGS on Fort Irwin.

- In the spring of 2006, intensively survey for the presence/absence of MGS within 8 sites in the NTC and Western Expansion Area (Figure 9.5.4.2). Three of the sites will be within the East Paradise, Brinkman Wash, and Gemini Conservation Areas. Three sites will be established in representative habitats in the Desert Cymopterus Conservation Area, Northwest of Nelson Lake, and on the Gary Owen Impact Area. Two trapping locations have not been selected.
- The Department of the Army has requested funding in the amount of $200,000 during the 2006 fiscal year to complete this survey.
- The sampling design (CDFG 2003) uses a grid of four rows of traps. There are 25 traps along each row, separated at 35 m intervals.
- Surveys will continue in 2007 and 2008, according to CDFG protocol (CDFG 2003).

Objective 5. If any MGS are found within the 6 surveryed areas, perform a more intensive survey of those areas to identify the density of MGS.

- After the initial trapping in 2006, MGS locations will be better understood. In 2007, the Army will provide funding to perform more intensive surveys to determine MGS densities in known MGS locations throughout the NTC, Goldstone, and western expansion lands. The number and locations of surveys will be contingent upon future funding.
- Data regarding survey methods and environmental variables will be recorded as recommended by Brooks and Matchett (2002).

9.5.4.2.2 Goal 2: Conserve Habitat.

Creating conservation areas specifically for MGS would limit the military's mission. However the proposed LMMV and desert tortoise conservation areas, as well as the NASA Goldstone Complex can serve as conservation areas because they are within the historical range of MGS, and will remain off limits to military training.

Objective 1. Protect and maintain habitat within conservation areas (Goal 1) before training begins. Funding and timelines for these actions appear in the desert tortoise and LMMV sections of the INRMP.

- Erect and maintain a barbwire fence around the NTC-Gemini, East Paradise, 90 Grid Line Spur, and 90 Grid Line West Conservation Areas. All conservation areas will be fenced using 2 strand barb wire, Siebert stakes, and pickets prior to any training activities.
- Erect restricted access signs at the perimeter of the Brinkman Wash Restricted Area.
- Close the Western and Eastern Expansion Areas to mining and off-road vehicular traffic.
- Control and monitor fugitive dust and invasive weeds (identical to 9.5.2.2.2 Objectives 6 and 7).

Objective 2. Enhance 15 acres of potential habitat within the East Paradise Conservation Area by broadcast seeding with preferred MGS forage. Dr. Phil Leitner, Cal State Stanislaus (personal

communication) has identified the NW section of the East Paradise Conservation Area as potential MGS habitat.

- Broadcast seed with spiny hopsage (*Grayia spinosa*), winterfat (*Krascheninnikovia lanata*), and a mixed assortment of native desert wildflower seeds within 15 acres of the East Paradise Conservation Area to increase the amounts of preferred MGS forage.
- Three separate areas will be enhanced with preferred MGS forage species. Each area will be 5 acres in size. These areas will be separated by no less than 5 acres. This will enable the maximum amount of MGS's to have access to good quality forage material. Creating three small "islands" of preferred plants should enable these preferred plants to colonize a wider area than would be possible with a single large enhancement plot.

Objective 3. Conserve potential habitat in the region by buying small parcels of land and consolidating them into contiguous public land. The Army has bought 99,000 acres (from Catelus), 87,000 of which is in desert tortoise critical habitat; and acquired the rights to 323,526 acres of grazing lands, 57,000 acres of which are in desert tortoise critical habitat. Additional lands (8,000 – 13,000 acres) will be bought for Lane Mountain milkvetch mitigation within the Coolgardie Mesa and East Paradise Mountain populations. The primary purpose of land consolidation is to reduce fragmentation and allow regional management of the Lane Mountain milkvetch and desert tortoise, although the action also benefits the MGS. There are no action items for this objective.

9.5.4.2.3 Goal 3: Adopt an Ecosystem Management Approach

The majority of Mohave ground squirrels occur on BLM lands. These individuals are threatened by illegal recreational off-road vehicles that is widespread and unenforced by the BLM. Therefore, effective management for the long-term existence of the species requires coordination with the BLM and other regional planning agencies.

Several regional and local cooperative plans and programs influence endangered species management on the NTC. Participation in regional planning benefits the ground squirrel by synchronizing NTC management with trends and expertise throughout this rare species' range.

Objective 1. Develop and contribute to regional, long-term management.

- A biologist from Fort Irwin, NTC will attend the annual Mohave ground squirrel TAG meeting to help develop and support long-term management.
- Attend any symposium that concerns the Mohave ground squirrel.
- Give strategic help, and NTC access, to researchers studying the Mohave ground squirrel.
- Implement or participate in the following plans and programs that affect the MGS:
  1) West Mohave Coordinated Management Plan. The objective of this management plan is to recover species listed as threatened and endangered and to prevent future listings under the California and federal ESA. It will function as a regional Habitat Conservation Plan (HCP) for the west Mojave Desert and identifies areas where species conservation will be emphasized (WMCMP 2003).
  2) Integrated Natural Resources Management Plan. The objective of this management plan is to guide the natural resources program on the NTC. The Sikes Act and Army Regulation 200-3 require preparation and implementation of this plan. The plan will assist in the conservation of natural resources and compliance with federal and state environmental laws including the ESA. The natural resources staff has implemented this plan.
  3) Integrated Training Area Management. The objective of this program is to provide quality-training

environments to support the Army mission. The program consists of four components including monitoring of physical and biological resources, integration of land use with natural resources capabilities, environmental awareness, and planning, designing, and executing land rehabilitation and maintenance goals. The natural resources staff provides additional support to the ITAM team in meeting the objectives of this program.

4) Mojave Desert Ecosystem Program. The objective of this program is to compile and distribute digital mapping data and scientific information in a Geographic Information System (GIS) format to facilitate the management of the Mojave Desert ecosystem. This program is a multi-agency federal partnership between the U.S. Department of Defense and the U.S. Department of Interior. It is intended to be used by desert land managers for land use and operational decisions that may impact the desert ecosystem (Jones and Stokes, 1999). The natural resources staff is directly involved in this program and provides data to be incorporated into this critical database.
5) Desert Managers Group. The objective of this organization is to establish a forum for government agencies that oversee the Mojave Desert ecosystem where they can address and discuss issues of common concern including threatened and endangered species. This form of cooperative management assists the agencies to achieve greater operational efficiency, enhance resource protection, and improve their service to the public (Jones and Stokes, 1999). The Fort Irwin natural resources staff is a key member of this organization.

Objective 2. Educate the military and the public.

The Natural Resources Division at Fort Irwin has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. The Garrison Commander, Range Control, ITAM, and a team from the Natural Resources Division are currently conducting briefings. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. The following NTC educational programs are in place:

- The O/C Academy is a 1-hour course on natural and cultural resources training at Fort Irwin for all OC personnel on post and rotational military police who escort troops along the Manix Tank Trail. The course includes a 1/2-hour audiovisual presentation. Specific procedural information in the form of handouts and lectures are provided to all personnel.
- The OPFOR Academy is a monthly program for leaders and officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and a handout on natural and cultural resources on post, as well as a take-home quiz to reinforce learning.
- The LTP is a 20-minute course presented one to two times each month to approximately 85 visiting officers who will be responsible for coordinating training maneuvers against OPFOR during their rotation. This course is provided at Fort Irwin approximately 90 days before the scheduled arrival of visiting forces for training exercises.
- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on Fort Irwin. Approximately 25 military and civilian personnel attend this class every other month.
- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending OC, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources.
- Several times a year, a biologist from the Natural Resources Division assists in educating children on

post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology.

- The NTC provides opportunities for the public to learn about the natural resources program through participation in base programs such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, Care Fair, Edwards AFB Open House, and Desert Explorer field trips. Desert Explorer field trips, which are led by biologists from the Natural Resources Division, cover topics such as geology, endangered and threatened species, and the natural history of plants and animals of the Mojave Desert. Local Boy Scout troops participate in similar programs as part of their Eagle Scout program requirements.
- The natural resources staff provides information to the Fort Irwin Public Affairs Office to be published in the Post newspaper and aired on the Post television and radio stations for Post personnel and the public.

Objective 3. Support research.

- If funding permits, contract a survey of the Coolgardie Mesa population to identify the presence/absence and/or density of MGS.

Objective 4. Assessment and reporting.

- Assess the status of MGS conservation yearly, and report this to the FWS and CDFG.

9.5.4.3 Monitoring

9.5.4.3.1 Goal 1: Monitoring Needed To Protect Populations.

Objectives 1 and 2. Monitor three Lane Mountain milkvetch and two desert tortoise conservation areas that will also protect the MGS.

- Actions are identical to monitoring the creation of Lane Mountain milkvetch conservation areas (Section 9.5.2.3.1) and monitoring the creation of desert tortoise conservation areas (Section 9.5.3.3.1).

Objectives 3. Monitor the NASA / Goldstone protected area.

- Monitor the fence along the tank trail within Goldstone monthly. Fix and report all breaches. Monitoring is not necessary if the western half of Fort Irwin was not used during the previous rotation, or if the tank trail was unused.

Objectives 4 and 5. Monitor the presence and density of MGS where it has been found on the NTC.

- After baseline presence is determined in 2008, the Army will monitor MGS and their habitat by using standard CDFG (2003) protocols every 3 years, beginning in 2011. Survey methods are summarized in ***Objective 4*** of 9.5.4.2.1. Only areas where MGS were found during the 2006-2008 baseline survey will be monitored.
- Monitor the density of the Fort Irwin population of MGS, using the above survey methods, beginning in 2011 and every three years thereafter.
- Consider funding management–oriented research on the demographics, life history, and ecology of the

species.
- Population modeling will also be considered to predict the long-term viability of this species.

9.5.4.3.2 Goal 2: Monitoring Needed To Conserve Habitat

Objective 1. Monitor MGS habitat quality, particularly perennial plant cover and invasive weeds, inside conservation areas.

- Use aerial photography and site inspection to monitor disturbance to MGS potential habitat in conservation areas. Inspection will performed on an ad hoc basis, in response to fence breaches, intensive training exercises, flooding, and so forth.
- Assess trends in perennial plant cover using ITAM RTLA methods, as described in Appendix 9.5.2, the Lane Mountain milkvetch long-term monitoring plan.
- Before training begins in the Western Expansion Area, use RTLA methodology to quantify a baseline density and cover of preferred MGS plants (spiny hopsage and winterfat) within milkvetch conservation areas. Use this baseline to detect future declines in MGS forage.
- Monitor invasive plants within potential habitat of the MGS. Invasive plants will be censused during the annual milkvetch monitoring.
- Monitor and report fugitive dust and invasive weeds, described in 9.5.2.3.2.

Objective 2. Monitor and assess the 15-acre habitat improvement project suggested by the FWS.

- Use RTLA line transects to measure the cover of seeded species for three years after seeding.

Objective 3. Monitor acquisition of private lands in the region. No action items are needed.

9.5.4.3.3 Goal 3: Monitoring Needed to Adopt an Ecosystem Approach.

Objective 1. Develop and contribute to regional, long-term management. There are no action items needed to monitor this objective.
Objective 2. Educate the military and public. There are no action items for this objective.

Objective 3. Support research. There are no action items for this objective.

Objective 4. Assess and report monitoring.

- Review the results of the monitoring program every third year with CDFG and USFWS.
- Review the results of fence monitoring.

9.5.4.4 Adaptive Management

Adaptive management is a process that maintains environmental quality using management actions that are tailored to specific impacts. The ***adaptive management*** process begins with ***monitoring***; monitoring ***triggers*** review when environmental quality declines; and ***review*** produces ***actions*** targeting specific impacts.

Two types of review will be used. ***Internal adaptive review*** requires an immediate review of current management policy by the NTC Botanist, Ecologist, and Director of Natural Resources.

Interagency review takes place at least once a year with the FWS, following the NTC's submittal of an annual letter reporting the status of threatened and endangered species, and related information. The purpose of the annual meeting is to discuss research progress and monitoring trends, and to determine if changes in management are needed. A copy of the annual letter will also be sent to CDFG.

In addition, the FWS can request an ad hoc meeting to address issues requiring immediate action. Interagency review has not been used previously at the NTC, and it is not known how disagreement between the FWS and Army will be resolved.

Internal review can initiate any of the following actions, or additional actions not listed:
Improve fencing. To make fencing stronger, add cement foundations and additional strands of barbwire. In sandy and loose soil, pickets can be bolted together length-wise to create a long picket that can be driven 8-10 feet into the soil.

1. Improve fencing. Add cement foundations and additional strands of barbwire. In sandy soil, bolt pickets together length-wise to create a long picket that can be driven 8-10 feet into the soil.
2. Improve visibility by adding siebert stakes to fence pickets.
3. Place concertina wire outside and adjacent to the existing fence.
4. Adopt stricter penalties for military units that breach fences.
5. Install detection devices along fences that are frequently breached.
6. Increase either the amount of rehabilitation, or the disturbance threshold that triggers it.
7. Increase broadcast seeding of preferred MGS plants within the conservation areas.
8. Channel vehicle traffic using pickets, Siebert stakes, and vegetation planted along road boundaries.

Interagency review can initiate any of the following actions, or additional actions that are not listed:

1. Replant MGS preferred plants from broadcast seeding.
2. Increase existing programs, such as signage, education, outreach, or fence monitoring.
3. Find and protect additional populations on the NTC. This option is limited, because unprotected habitat in the NTC will become degraded after training begins.
4. Find and protect additional potential habitat for seed propagation.
5. Dust control on major military routes.

9.5.4.4.1 Goal 1 Adaptive Management Needed To Protect Populations

Objectives 1 and 2. Adaptive management associated with creating the NTC-Gemini, Brinkman Wash, East Paradise, UTM 90 Spur, and the UTM 90 West Conservation Areas. The following events will mandate internal review:

- Major fence breach requiring Army discipline and repair.
- Three fence breaches, regardless of size, during a single rotation.
- More than three fence breaches, regardless of size, in a six-month period.

Objective 3. Adaptive management associated with maintaining NASA / Goldstone as an area that is off-limits to military training.

- Major fence breach requiring Army discipline and repair.
- Three fence breaches, regardless of size, during a single rotation.
- More than three fence breaches, regardless of size, in a six-month period.

- Unauthorized ground disturbing activities exceeding 2 acres within NASA / Goldstone.

Objectives 4 and 5. Adaptive management associated with the presence and density of MGS on the NTC.

- Reduction in the presence of the MGS within 5 protected conservation areas will result in Interagency Adaptive Management. Presence/absence will be established during the baseline survey, 2006-2008.
- Reduction in the density of MGS over the entire base, of 20% or more, will trigger Interagency Adaptive Management.
- Three years of consecutive drought (less than 3 cm/ water year).
- A 20% drop in the number of MGS, compared with a long-term average of at least three annual surveys.

9.5.4.4.2 Goal 2 Adaptive Management Needed To Conserve Habitat

Objective 1. Adaptive management for protecting MGS habitat quality, particularly perennial plant cover and invasive weeds.

- A decrease in the cover of all preferred MGS forage and seed source plants, combined, of 20%, will trigger Interagency Adaptive Management.
- Follow adaptive management guidelines for fugitive dust and invasive weeds described in 9.5.2.4.2, Objectives 6 and 7.

Objective 2. Forage and seed-source improvement of 15 acres. Monitor and assess improvement to 15 acres of MGS Habitat in the East Paradise Conservation Area. No adaptive management is required, because this action will only be performed one time.

Objective 3. Conserve potential habitat within the region.

This objective is mitigation for the land expansion process. Mitigation is tasked to the Special Project Office of the NTC, and not to the Natural Resources Section. Failure of the Army to complete mitigations, or to make reasonable progress over the course of a year, will result in legal action. Adaptive management is not required.

9.5.4.4.3 Goal 3: Adaptive Management Needed To Adopt an Ecosystem Management Approach.

Objective 1. Support regional, long-term management of the MGS.

- Use the MGS TAG group and meetings to assess the current state of knowledge regarding the MGS. Failure of this group to meet or coordinate activities will trigger interagency review.

Objective 2. Educate the military and the public.

- Failure of the NTC and Fort Irwin to continue the current level of outreach will trigger interagency review. Outreach activity will be summarized in the annual letter to the FWS.

Objective 3. Fund Research. This optional objective does not require adaptive management.

Objective 4. Reporting.

- Use the annual letter to FWS (November) as an opportunity to review the management of the MGS.
- Send a copy of the letter to CDFG.
- Review the results of the presence and density surveys, if they were performed.
- Review the results of fence monitoring.

9.5.4.5 Identification of Threats That Are Addressed by Objectives and Actions

The following table shows how each threat in 9.5.4.1 is address by endangered species management goals, objectives, and actions. Where no specific action is listed, all actions planned for the objective will help mitigate the threat. In some cases, objectives and actions mitigate several threats.

Threat	**Goal and Objective**	**Actions**
Chance extinction	Maintain populations by creating conservation areas 9.5.4.2.1	
	Comprehensive approach using regional Management 9.5.4.2.2	Participate in WMCMP, MDEP, DMG, and WMWMA
	Comprehensive approach using research 9.5.4.2.2	
	Protect existing resources by erecting fences and signs 9.5.4.2.3	Fence conservation areas
	Protect existing resources by erect fences and signs 9.5.4.2.3	Maintain fencing and signage. Report breaches and damage
	Protect existing resources by erect fences and signs 9.5.4.2.3	Erect signage around the No-Dig Zone.
Mining	Avoid take and habitat degradation 9.5.4.2.3	Close NTC to public access.
Vehicles	Avoid take and habitat degradation 9.5.4.2.3	Close NTC to public access.
Crushing during training	Not mitigated	
Habitat destruction during training	Partially mitigated.	
	Protect existing resources	
	Comprehensive approach using research 9.5.4.2.2	
	Protect existing resources by avoiding take and habitat degradation 9.5.4.2.9.5	
	Protect existing resources by avoiding take and habitat degradation 9.5.4.2.9.5	

	9.5.4.2.3 Protect existing resources via education and outreach	
	Protect existing resources by minimizing and restoring disturbance 9.5.4.2.3	Review ITAM revegetation
	Protect existing resources by minimizing and restoring disturbance 9.5.4.2.3	Restore heavy damage, contain vehicles to roads.
Crushing or habitat destruction from non-training activity.	Protect existing resources by avoiding take and habitat degradation 9.5.4.2.3	
	Protect existing resources by minimizing and restoring disturbance 9.5.4.2.3	Preactivity surveys and compliance monitoring
	Protect existing resources via education and outreach 9.5.4.2.3	

9.5.4.6 Assurance of Program Facilitation

9.5.4.6.1 Funding

See Section 9.5.8

9.5.4.6.2 Personnel

See Section 9.5.8

9.5.4.6.3 Schedule

Schedule	Action	INRMP Subsection	Personnel Hours per Year
	Scheduled Tasks		
2005	Install a fence along Goldstone tank trail.	9.5.4.2.3	480
2006 (spring)	Conduct Mohave Ground Squirrel surveys.	9.5.4.2.3	Contracted
	Monthly Tasks		
Monthly	Monitor Goldstone tank trail fence.	9.5.4.3.1	96

9.5.5 Southwestern Willow Flycatcher

9.5.5.1 Threats

The USFWS has designated critical habitat for the southwestern willow flycatcher, a federally listed endangered species, under the authority of the Endangered Species Act of 1973. The designation of critical habitat was effective August 21, 1997. To facilitate the recovery of the species, 18 critical habitats have been identified, totaling 964 river kilometers (km) in Arizona, California, and New Mexico. None of the 18 critical habitats are located within the NTC.

9.5.5.1.1 Species Threats.

- The southwestern willow flycatcher is endangered because of the extensive loss of riparian vegetation along streams and rivers caused by cattle grazing, agriculture, flood control, and watercourse divergence.
- Brood parasitism by the brown-headed cowbird is also a significant factor contributing to the endangered status of the southwestern willow flycatcher.
- Predation is not known to be a significant threat to this species. Ravens, coyotes, and other subsidized predators on the NTC do not pose a threat to the species.

9.5.5.1.2 Threats from Military Training.

- There are no direct threats posed by military activities. All potential southwestern willow flycatcher habitat is completely protected on Fort Irwin, because all springs are off-limits to military activities.
- There are no direct impacts from military activities, because all flycatcher habitat is protected and fenced.
- Intrusion into off-limits spring areas by soldiers, burros, and cattle is an indirect impact.
- Removal of tamarisk, an invasive tree species is an indirect impact. The flycatcher can successfully nest and fledge young in tamarisk, and the USFWS considers it potential habitat for the species. (Susan Sfera, USFWS, personal communication, May 21, 2003.)

9.5.5.2 Goals, Objectives, and Actions for Conservation

The primary goal for the southwest willow flycatcher is to protect the species' potential habitat on post. This will benefit the southwestern willow flycatcher by minimizing the habitat loss and potential take on the NTC.

9.5.5.2.1 Protect Existing Resources

Due to the narrow habitat range of this species, all riparian lands are vital to its continued existence. All springs that occur on NTC lands will be properly managed to prevent the loss, fragmentation, or degradation of southwestern willow flycatcher habitat.

Protect NTC Springs and Seeps Fort Irwin springs are the focus of the NTC's southwestern willow flycatcher management efforts. The flycatcher occasionally uses NTC springs (Bitter, Garlic, and Cave) as a stop over during spring migration (Harmsworth & Associates 2003). Potential nesting habitat is found only at Bitter and Garlic Springs (Harmswort & Associates 2003), although it is unlikely the flycatcher will nest at these springs because of the relatively poor habitat. Indeed, no nesting flycatchers were observed in either 2003 or 2004 (Harmsworth & Associates 2004).

- Maintain off-limits designation. At present, all of the springs that occur on the NTC are designated off-limits to all military use (ESMP Figure 5). A two-strand barbwire fence has been constructed to

prevent intrusions into Bitter, Garlic and Cave Springs. Additionally, Siebert stakes have been placed approximately every 30 meters along these fences as a secondary boundary marker. Increase burro fencing at small springs and seeps throughout the NTC.

9.5.5.2.2 Minimize Disturbance and Restore Damage

- Use ITAM to assess and rehabilitate damage to springs that is caused by erosion, floods, cattle intrusions, and so forth. One of the goals of the ITAM program includes planning, designing, and executing land rehabilitation and maintenance.
- Remove tamarisk, an invasive species, to improve the quality of potential habitat.
- Plant native tree species at Bitter Springs to improve the quality of potential habitat, and to mitigate the temporarily damaging impacts of tamarisk removal.
- Postpone removal of larger tamarisk (stem diameter greater than 5 cm) until the planted native vegetation can grow to a height to support southwestern willow flycatcher nests.
- Maintain barriers and fences that exclude vehicles and cattle from riparian areas. All fences surrounding spring locations will be maintained after every rotation. Fencing will prevent SWWF habitat degradation on the NTC.
- Utilize US Army Observer/Controller teams to direct units away from these locations and to artificially "kill" trespassing units using the MILES system.

9.5.5.2.3 Adopt an Ecosystem Management Approach

Education and Public Outreach The Natural Resources Division at Fort Irwin has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. Briefings are currently being conducted by the Garrison Commander, Range Control, ITAM, and a team from the Natural Resources Division. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. Public outreach benefits the SWWF by minimizing habitat disturbance and direct mortality. The following NTC educational programs are in place:

- The O/C Academy is a 1-hour course on natural and cultural resources training at Fort Irwin for all OC personnel on post and rotational military police who escort troops along the Manix Tank Trail. The course includes a 1/2-hour audiovisual presentation. Specific procedural information in the form of handouts and lectures are provided to all personnel.

- The OPFOR Academy is a monthly program for leaders and officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and a handout on natural and cultural resources on post, as well as a take-home quiz to reinforce learning.

- The LTP is a 20-minute course presented one to two times each month to approximately 85 visiting officers who will be responsible for coordinating training maneuvers against OPFOR during their rotation. This course is provided at Fort Irwin approximately 90 days before the scheduled arrival of visiting forces for training exercises.

- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on Fort Irwin.

Approximately 25 military and civilian personnel attend this class every other month.

- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending OC, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources.

- Several times a year, a biologist from the Natural Resources Division assists in educating children on post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology.

- The NTC provides opportunities for the public to learn about the natural resources program through participation in base programs such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, Care Fair, Edwards AFB Open House, and Desert Explorer field trips. Desert Explorer field trips, which are led by biologists from the Natural Resources Division, cover topics such as geology, endangered and threatened species, and the natural history of plants and animals of the Mojave Desert. Local Boy Scout troops participate in similar programs as part of their Eagle Scout program requirements.

- The natural resources staff provides information to the Fort Irwin Public Affairs Office to be published in the Post newspaper and aired on the Post television and radio stations for Post personnel and the public.

Regional Planning Several regional and local cooperative plans and programs influence endangered species management on the NTC. The natural resources staff is implementing, cooperating, or participating in the following plans and programs for this species:

- Integrated Natural Resources Management Plan. The objective of this management plan is to guide the natural resources program on the NTC. The Sikes Act and Army Regulation 200-3 require preparation and implementation of this plan. The plan will assist in the conservation of natural resources and compliance with federal and state environmental laws including the ESA. The natural resources staff has implemented this plan. This plan is responsible for making all springs on the NTC off-limits to all personnel ensuring protection of southwestern willow flycatcher habitat on Fort Irwin.

- Integrated Training Area Management. The objective of this program is to provide quality-training environments to support the Army mission. The program consists of four components including monitoring of physical and biological resources, integration of land use with natural resources capabilities, environmental awareness, and planning, designing, and executing land rehabilitation and maintenance goals (Universe Technologies, Inc., 2000). ITAM is responsible for procuring native vegetation that is planted at the spring area after invasive species are removed.

- Mojave Desert Ecosystem Program. The objective of this program is to compile and distribute digital mapping data and scientific information in a Geographic Information System (GIS) format to facilitate the management of the Mojave Desert ecosystem. This program is a multi-agency federal partnership between the U.S. Department of Defense and the U.S. Department of Interior. It is intended to be used by desert land managers for land use and operational decisions that may impact the desert ecosystem (Jones and Stokes, 1999). The natural resources staff is directly involved in this program and provides data to be incorporated into this critical database. The MDEP is used as a clearinghouse for

information regarding the southwestern willow flycatcher and their habitats.

- Desert Managers Group. The objective of this organization is to establish a forum for federal and state government agencies that oversee the Mojave Desert ecosystem where they can address and discuss issues of common concern including threatened and endangered species. This form of cooperative management assists the agencies to achieve greater operational efficiency, enhance resource protection, and improve their service to the public (Jones and Stokes, 1999). The Fort Irwin natural resources staff is a key member of this organization. The Desert Managers Group is used as a forum to discuss issues surrounding the southwestern willow flycatcher and propose management strategies. Participation in the DMG complies with Presidential directives to manage the desert using ecosystem management.

9.5.5.3 Monitoring

9.5.5.3.1 Implementation Monitoring

- Check fences for breaches and habitat damage. Repair minor damage; report major damage to Army for discipline and repair. Report results to FWS annually. Fences will be checked following rotations located near Bitter, Garlic, and Cave Springs.
- Monitor dust levels at the NTC. Report to San Bernardino County Air Quality Division.
- Review management strategies annually to ensure methods are current and effective.

9.5.5.3.2 Effectiveness Monitoring

- The southwestern willow flycatcher will not be monitored annually on the NTC because this species does not breed at NTC springs. This decision is based on a survey conducted in 2003 (Harmsworth & Associates 2003) that determined potential habitat on the NTC was limited to Garlic and Bitter Springs. A follow-up survey in 2004 (Harmsworth & Associates 2004) determined that the species does not breed at either of the springs.
- Monitor the hydrology of NTC springs and the quality of surrounding habitat annually. Any habitat degradation or vegetation loss will be noted and reclaimed. Submit results of the annual springs survey to the Desert Managers Group.
- Conduct a focused survey for the southwestern willow flycatcher approximately every five years. The survey can be conducted by a trained staff member, or can be subcontracted if funding permits.
- Assess tamarisk removal annually. The success thresholds for this objective will occur in two phases. The first will be the complete removal of all tamarisk under 5cm diameter and native species revegetation. The second threshold is the complete removal of all tamarisk in the spring areas on post. If tamarisk regrowth is found during yearly monitoring, it will be removed and management will be reevaluated.

9.5.5.4 Identification of Threats That Are Addressed by Objectives and Actions

The following table shows how each threat in 4.9.5.2 is address by endangered species management goals, objectives, and actions. Where no specific action is listed, all actions planned for the objective will help mitigate the threat. In some cases, objectives and actions mitigate several threats.

Threat	Goal and Objective	Actions

Loss of riparian vegetation	Protect existing resources by protecting NTC springs and seeps. 9.5.5.2.1	Maintain off-limits designation.
	Protect existing resources by minimizing disturbance and restoring damage. 9.5.5.2.1	Restore native species by planting and removing tamarisk.
	Participate in regional planning. 9.5.5.2.2	
Brood parasitism	Not mitigated	
Intrusion into springs by soldiers, burros, and catltle.	Protect existing resources by protecting NTC springs and seeps. 9.5.5.2.1	Increase burro fencing at small springs and seeps.
	Protect existing resources by minimizing disturbance and restoring damage. 9.5.5.2.1	Maintain barriers and fences; monitor after rotations.
	Protect existing resources by minimizing disturbance and restoring damage. 9.5.5.2.1	Utilize Army Observer/Controller teams.
	Protect existing resources using education and public outreach. 9.5.5.2.1	
Tamarisk removal	Protect existing resources by minimizing disturbance and restoring damage. 9.5.5.2.1	Plant natve tree species.
	Participate in regional planning. 9.5.5.2.2	
	Protect existing resources by minimizing disturbance and restoring damage. 9.5.5.2.1	Postpone large tamarisk removal to keep some nesting sites available.

9.5.5.5 Adaptive Management

9.5.5.5.1 Annual Review

- Use the annual letter to FWS (November) as an opportunity to review the management of the southwestern willow flycatcher.
- Review the results of the annual NTC springs survey.
- Review the results of fence monitoring (4.9.5.4.1).
- Review the results of tamarisk removal, and the status of invasive species at springs.

9.5.5.5.2 Ad Hoc Review

- The following events will mandate an immediate review of current management policy by the NTC Botanist, Ecologist, and Director of Natural Resources: Major fence breach requiring Army discipline and repair; significant changes in hydrological flow; observation of a nesting southwestern willow

flycatcher by an experienced birder.

9.5.5.5.3 Possible Corrective Actions

- Ecological restoration following damage.
- Increase existing programs, such as signage, education, outreach, or fence monitoring.
- Increase burro control efforts by increasing the perimeter of burro fencing, or initiating and funding a BLM burro roundup.

9.5.5.6 Reporting

- A report will be submitted to the FWS annually (November) that describes the status of populations, the impacts that they have sustained during the previous year, and significant conservation actions that have been used to conserve the species.

9.5.5.7 Assurance of Program Facilitation

9.5.5.7.1 Funding

See Section 9.5.8

9.5.5.7.2 Personnel

See Section 9.5.8

9.5.5.7.3 Schedule

Schedule	Action	INRMP Subsection	Personnel Hours per Year
	Scheduled Task		
Fall 2004	Replant native vegetation.	9.5.5.2.1	80
	Annual Task		
Annual (June)	Conduct spring surveys	9.5.5.3.2	48
	Monthly Task		
Monthly	Monitor Fence around springs	9.5.5.3.1	80

9.5.6 Least Bell's Vireo

9.5.6.1 Threats

The USFWS has designated critical habitat for the least Bell's vireo, a federally listed endangered species, under the authority of the Endangered Species Act of 1973. No critical habitats is located within the NTC.

9.5.6.1.1 Species Threats.

- Parasitism by the non-native brown-headed cowbird (*Molothrus ater*) is probably the most significant factor in the decline of the Least Bell's Vireo.
- The least Bell's vireo is threatened by the extensive loss of riparian vegetation caused by cattle grazing, agriculture, flood control, and water course divergence along streams and rivers.
- Predation is not known to be a significant threat to this species. Ravens, coyotes, and other subsidized predators on the NTC do not pose a threat to the species.

9.5.6.1.2 Threats from Military Training.

- There are no direct threats posed by military activities. All potential least Bell's vireo habitat is completely protected on Fort Irwin, because all springs are off-limits to military activities.
- There are no direct impacts from military activities, because all least Bell's vireo habitat is protected and fenced.
- Intrusion into off-limits spring areas by soldiers, burros, and cattle is an indirect impact.
- Removal of tamarisk, an invasive tree species is an indirect impact. Tamarisk is nesting habitat for the vireo.

9.5.6.1.3 Existing Conservation Programs.

In 1994 the USFWS issued a Designation of Critical Habitat for the Least Bell's Vireo, a measure that is designed to contribute to the recovery of this listed species. In addition to the critical habitat designation, various Least Bell's Vireo monitoring and brown-headed cowbird trapping programs are in progress at known breeding sites in southern California. The USFWS has published a draft recovery plan in 1998 for this species.

9.5.6.2 Goals, Objectives, and Actions for Conservation

The primary goal for the least Bell's vireo is to protect the species' potential habitat on post. This will benefit the vireo by minimizing the habitat loss and potential take on the NTC. In addition, participation with regional organizations will alert the NTC about actions that could benefit the species.

9.5.6.2.1 Protect Existing Resources

Due to the narrow habitat range of this species, all riparian lands are vital to its continued existence. All springs that occur on NTC lands will be properly managed to prevent the loss, fragmentation, or degradation of least Bell's vireo habitat.

Protect NTC Springs and Seeps Fort Irwin springs are the focus of the NTC's least Bell's vireo management efforts. The least Bell's vireo occasionally uses NTC springs (Bitter, Garlic, and Cave) as a stop over during spring migration (Harmsworth & Associates 2003). Potential nesting habitat is found only at Bitter and Garlic Springs (Harmsworth & Associates 2003), although it is unlikely the least Bell's vireo will nest at these springs because of the relatively poor habitat. Indeed, no nesting least Bell's vireos

were observed in either 2003 or 2004 (Harmsworth & Associates 2004).

- Maintain off-limits designation. At present, all of the springs that occur on the NTC are designated off-limits to all military use (ESMP Figure 5). A two-strand barbwire fence has been constructed to prevent intrusions into Bitter, Garlic and Cave Springs. Additionally, Siebert stakes have been placed approximately every 30 meters along these fences as a secondary boundary marker. Increase burro fencing at small springs and seeps throughout the NTC.

9.5.6.2.2 Minimize Disturbance and Restore Damage.

- Use ITAM to assess and rehabilitate damage to springs that is caused by erosion, floods, cattle intrusions, and so forth. One of the goals of the ITAM program includes planning, designing, and executing land rehabilitation and maintenance.
- Remove tamarisk, an invasive species, to improve the quality of potential habitat.
- Plant native tree species at Bitter Springs to improve the quality of potential habitat, and to mitigate the temporarily damaging impacts of tamarisk removal.
- Postpone removal of larger tamarisk (stem diameter greater than 5 cm) until the planted native vegetation can grow to a height to support least Bell's vireo nests.
- Maintain barriers and fences that exclude vehicles and cattle from riparian areas. All fences surrounding spring locations will be maintained after every rotation. Fencing will prevent SWWF habitat degradation on the NTC.
- Utilize US Army Observer/Controller teams to direct units away from these locations and to artificially "kill" trespassing units using the MILES system.

9.5.6.2.3 Adopt an Ecosystem Management Approach

Education and Public Outreach The Natural Resources Division at Fort Irwin has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. The Garrison Commander, Range Control, ITAM, and a team from the Natural Resources Division are currently conducting briefings. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. Public outreach benefits the SWWF by minimizing habitat disturbance and direct mortality. The following NTC educational programs are in place:

- The O/C Academy is a 1-hour course on natural and cultural resources training at Fort Irwin for all OC personnel on post and rotational military police who escort troops along the Manix Tank Trail. The course includes a 1/2-hour audiovisual presentation. Specific procedural information in the form of handouts and lectures are provided to all personnel.

- The OPFOR Academy is a monthly program for leaders and officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and a handout on natural and cultural resources on post, as well as a take-home quiz to reinforce learning.

- The LTP is a 20-minute course presented one to two times each month to approximately 85 visiting officers who will be responsible for coordinating training maneuvers against OPFOR during their rotation. This course is provided at Fort Irwin approximately 90 days before the scheduled arrival of visiting forces for training exercises.

- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on Fort Irwin. Approximately 25 military and civilian personnel attend this class every other month.

- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending OC, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources.

- Several times a year, a biologist from the Natural Resources Division assists in educating children on post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology.

- The NTC provides opportunities for the public to learn about the natural resources program through participation in base programs such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, Care Fair, Edwards AFB Open House, and Desert Explorer field trips. Desert Explorer field trips, which are led by biologists from the Natural Resources Division, cover topics such as geology, endangered and threatened species, and the natural history of plants and animals of the Mojave Desert. Local Boy Scout troops participate in similar programs as part of their Eagle Scout program requirements.

- The natural resources staff provides information to the Fort Irwin Public Affairs Office to be published in the Post newspaper and aired on the Post television and radio stations for Post personnel and the public.

Regional Planning Several regional and local cooperative plans and programs influence endangered species management on the NTC. The natural resources staff is implementing, cooperating, or participating in the following plans and programs for this species:

- Integrated Natural Resources Management Plan. The objective of this management plan is to guide the natural resources program on the NTC. The Sikes Act and Army Regulation 200-3 require preparation and implementation of this plan. The plan will assist in the conservation of natural resources and compliance with federal and state environmental laws including the ESA. The natural resources staff has implemented this plan. This plan is responsible for making all springs on the NTC off-limits to all personnel ensuring protection of least Bell's vireo habitat on Fort Irwin.

- Integrated Training Area Management (ITAM). The objective of this program is to provide quality-training environments to support the Army mission. The program consists of four components including monitoring of physical and biological resources, integration of land use with natural resources capabilities, environmental awareness, and planning, designing, and executing land rehabilitation and maintenance goals (Universe Technologies, Inc., 2000). ITAM is responsible for procuring native vegetation that is planted at the spring area after invasive species are removed.

- Mojave Desert Ecosystem Program. The objective of this program is to compile and distribute digital mapping data and scientific information in a Geographic Information System (GIS) format to facilitate the management of the Mojave Desert ecosystem. This program is a multi-agency federal partnership

between the U.S. Department of Defense and the U.S. Department of Interior. It is intended to be used by desert land managers for land use and operational decisions that may impact the desert ecosystem (Jones and Stokes, 1999). The natural resources staff is directly involved in this program and provides data to be incorporated into this critical database. The MDEP is used as a clearinghouse for information regarding the least Bell's vireo and their habitats.

- Desert Managers Group. The objective of this organization is to establish a forum for federal and state government agencies that oversee the Mojave Desert ecosystem where they can address and discuss issues of common concern including threatened and endangered species. This form of cooperative management assists the agencies to achieve greater operational efficiency, enhance resource protection, and improve their service to the public (Jones and Stokes, 1999). The Fort Irwin natural resources staff is a key member of this organization. The Desert Managers Group is used as a forum to discuss issues surrounding the least Bell's vireo and propose management strategies. Participation in the DMG complies with Presidential directives to manage the desert using ecosystem management.

9.5.6.3 Monitoring

9.5.6.3.1 Implementation Monitoring

- Check fences for breaches and habitat damage. Repair minor damage; report major damage to Army for discipline and repair. Report results to FWS annually. Fences will be checked following rotations located near Bitter, Garlic, and Cave Springs.
- Monitor dust levels at the NTC. Report to San Bernardino County Air Quality Division.
- Review management strategies annually to ensure methods are current and effective.

9.5.6.3.2 Effectiveness Monitoring

- The least Bell's vireo will not be monitored annually on the NTC because this species does not breed at NTC springs. This decision is based on a survey conducted in 2003 (Harmsworth & Associates 2003) that determined potential habitat on the NTC was limited to Garlic and Bitter Springs. A follow-up survey in 2004 (Harmsworth & Associates 2004) determined that the species does not breed at either of the springs.
- Monitor the hydrology of NTC springs and the quality of surrounding habitat annually. Any habitat degradation or vegetation loss will be noted and reclaimed. Submit results of the annual springs survey to the Desert Managers Group.
- Conduct a focused survey for the least Bell's vireo approximately every five years. The survey can be conducted by a trained staff member, or can be subcontracted if funding permits.
- Assess tamarisk removal annually. The success thresholds for this objective will occur in two phases. The first will be the complete removal of all tamarisk under 5cm diameter and native species revegetation. The second threshold is the complete removal of all tamarisk in the spring areas on post. If tamarisk regrowth is found during yearly monitoring, it will be removed and management will be reevaluated.

9.5.6.4 Identification of Threats That Are Addressed by Objectives and Actions

The following table shows how each threat in 9.5.6.1 is address by endangered species management goals, objectives, and actions. Where no specific action is listed, all actions planned for the objective will help mitigate the threat. In some cases, objectives and actions mitigate several threats.

Threat	Goal and Objective	Actions
Loss of riparian vegetation	9.5.6.2.1 Protect existing resources by protecting NTC springs and seeps.	Maintain off-limits designation.
	9.5.6.2.1 Protect existing resources by minimizing disturbance and restoring damage.	Restore native species by planting and removing tamarisk.
	9.5.6.2.2 Participate in regional planning.	
Brood parasitism	Not mitigated	
Intrusion into springs by soldiers, burros, and catltle.	9.5.6.2.1 Protect existing resources by protecting NTC springs and seeps.	Increase burro fencing at small springs and seeps.
	9.5.6.2.1 Protect existing resources by minimizing disturbance and restoring damage.	Maintain barriers and fences; monitor after rotations.
	9.5.6.2.1 Protect existing resources by minimizing disturbance and restoring damage.	Utilize Army Observer/Controller teams.
	9.5.6.2.1 Protect existing resources using education and public outreach.	
Tamarisk removal	9.5.6.2.1 Protect existing resources by minimizing disturbance and restoring damage.	Plant natve tree species.
	9.5.6.2.1 Protect existing resources by minimizing disturbance and restoring damage.	Postpone large tamarisk removal to keep some nesting sites available.

9.5.6.5 Adaptive Management

9.5.6.5.1 Annual Review

- Use the annual letter to FWS (November) as an opportunity to review the management of the least Bell's vireo.
- Review the results of the annual NTC springs survey.
- Review the results of fence monitoring (9.5.6.9.5.1).
- Review the results of tamarisk removal, and the status of invasive species at springs.

9.5.6.5.2 Ad Hoc Review

- The following events will mandate an immediate review of current management policy by the NTC

Botanist, Ecologist, and Director of Natural Resources: Major fence breach requiring Army discipline and repair; significant changes in hydrological flow; observation of a nesting least Bell's vireo by an experienced birder.

9.5.6.5.3 Possible Corrective Actions

- Ecological restoration following damage.
- Increase existing programs, such as signage, education, outreach, or fence monitoring.
- Increase burro control efforts by increasing the perimeter of burro fencing, or initiating and funding a BLM burro roundup.

9.5.6.5.4 Reporting

- A report will be submitted to the FWS annually (November) that describes the status of populations, the impacts that they have sustained during the previous year, and significant conservation actions that have been used to conserve the species.

9.5.6.7 Assurance of Program Facilitation

9.5.6.7.1 Funding

See Section 9.5.8

9.5.6.7.2 Personnel

See Section 9.5.8

9.5.6.7.3 Schedule

Schedule	Action	INRMP Subsection	Personnel Hours per Year
	Scheduled Task		
Fall 2004	Replant native vegetation.	9.5.6.2.1	80
	Annual Tasks		
Annual (June)	Conduct spring surveys	9.5.6.3.2	48
	Monthly Tasks		
Monthly	Monitor Fence around springs	9.5.6.3.1	80

9.5.7 Desert Cymopterus

9.5.7.1 Threats

9.5.7.1.1 Species Threats.

- Urbanization (CNPS 2001), habitat destruction, and fragmentation. The desert cymopterus (DC) is no longer found at Rabbit Springs in the Lucerne Valley, one of the sites where this species was originally discovered. Presumably it has declined elsewhere in its range, particularly in areas of recent population growth, such as Victorville and Antelope Valley.
- Vehicles (CNPS 2001).
- Sheep grazing (CNPS 2001). Although grazing probably impacts the DC, it is likely that DC seeds are dispersed in sheep dung. This would explain the location of large populations near rural human populations at Edwards Air Force Base, Hinkley, and Superior Valley. (Although Superior Valley, particularly Goldstone ghost town, is not presently grazed, it was actively grazed in the past. The Goldstone wells were used to water the sheep.)

9.5.7.1.2 Direct Threats from Military Training

Crushing of plants by vehicles, particularly tracked vehicles.

9.5.7.1.3 Indirect Threats

- Habitat destruction.
- Deposition of fugitive dust.

9.5.7.2 Goals, Objectives, and Actions for Conservation

9.5.7.2.1 Goal 1: Protect Populations

Objective 1. Maintain the Desert Cymopterus Conservation Area in the Western Expansion Area. This area was fenced with barbed wire in June 2004. It protects a 346-acre area (140 hectares), and at least 366 DC individuals.

- Erect Off-Limits signs.
- Maintain the fence.
- Assure that the DC Conservation Area appears on range maps of the Western Expansion Area.

Objective 2. Protect DC populations in the surrounding area.

- Fund a survey of the DC in the Superior Valley area, outside of the NTC Land Expansion boundary.

9.5.7.2.2 Goal 2: Conserve Habitat.

Objective 1. Protect habitat within the DC Conservation Area.

- Actions for this objective are identical to 9.5.5.2.1 Goal 1 Objective 1.

Objective 2. Identify potential habitat for the DC within the Western Land Expansion.

- Using GIS, analyze environmental data (soil, topography, and remotely sensed images, such as aerial photography and satellite imagery) and identify potential habitat in the region, particularly the Western Expansion Area.. Exclude from potential habitat those areas that have sustained significant disturbance.
- Conduct ad hoc surveys for the DC on potential habitat.
- Minimize disturbance to potential habitat on the NTC.

Objective 3. Monitor and control invasive plants and weeds. Generally, competition from invasive species causes a decline in native species. Rare species, like the DC, are particularly susceptible to competitive exclusion by exotics.

The state of California appears to be particularly susceptible to invasion by exotic plants. New invasions are reported, and sometimes controlled, continually. The most recent invasion in the western Mojave Desert is the Sahara mustard (*Raphanus tournifortii*). However, each new year brings new threats that must be monitored to reduce potential threats to the milkvetch populations.

- Actively participate in the West Mojave Weed Management Area, a consortium of federal land managers in the region. This organization tracks the spread of weeds and exotic species in the Western Mojave Desert, and coordinates weed control.
- Monitor, map, and reduce the spread of exotic species in milkvetch habitat.

9.5.7.2.3 Goal 3: Adopt an Ecosystem Management Approach.

Objective 1. Monitor the health of the DC in the Western Expansion Area.

- Design and conduct an annual census that can be performed in 1-2 days.
- Use cumulative data from the annual census, and information about water-year precipitation, to assess the status of the DC population.

Objective 2. Locate additional desert cymopterus populations and habitat in the region. The Army predicts that this species is far more numerous and widespread within Superior Valley than has been documented (Charis 2004).

- Conduct a survey in the region surrounding the Western Expansion Area in 2005 to identify additional cymopterus populations and potential habitat. This survey is being conducted by the BLM, but has not been completed (as of May 2005).

Objective 3. Study the natural history of the DC. The greatest single biological unknown for the DC is reproduction. Plants do not appear to produce fertile seeds (Charis 2004). Botanical surveyors report that the dryer the water-year, the fewer the number of plants. In addition, they observe that the phenology of the species is related to precipitation events, rather than to calendar date. A study is needed to quantify the relationship between precipitation and DC growth.

- Study, or encourage others to study, the natural history of this species.

Objective 4. Educate the military and the public. The Natural Resources Section has implemented a series of educational briefings and handouts explaining the sensitive resources on the NTC. In addition, the Natural Resources Section provides information to other groups at the NTC that conduct briefings. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources. Briefings and education of the public benefits the milk vetch by explaining the need for protection, the means for protection, and specific locations of sensitive areas.

- Range Safety Training is a 2-hr class that must be taken yearly by all personnel going down range. There are no exceptions to receiving this training. Training includes a section on environmental stewardship, particularly sensitive species.
- The Observer/Controller (O/C) Academy is a 1-hour course on natural and cultural resources training at Fort Irwin for all O/C personnel on post and rotational military police. The course includes a 1/2-hour audiovisual presentation. Specific procedural information in the form of handouts and lectures is provided to all personnel. This program educates O/C's about the purpose and regulation of

conservation areas.

- The Opposing Forces (OPFOR) Academy is a monthly program for leaders and officers of the opposing forces, who are currently stationed at Fort Irwin. The Natural Resources Department personnel propose to eventually include enlisted personnel in this training program. The materials provided in the OPFOR Academy include presentations, and handouts on natural and cultural resources on post, as well as a take-home quiz to reinforce learning. This program teaches leaders and officers the purpose and regulation of conservation areas.
- All civilian and military personnel working with potentially hazardous materials are required to receive a briefing on hazardous waste management. This briefing includes a 1/2-hour presentation on cultural and natural resources occurring on the NTC. Approximately 25 military and civilian personnel attend this class every other month. This program educates personnel about the purpose and regulation of conservation areas.
- A Rotational Unit Environmental Briefing Handbook is presented to all personnel attending O/C, LTP, OPFOR, and Hazardous Waste training. At the start of each rotation all soldiers receive a Soldier's Field Card summarizing critical information about natural resources. These field cards will be amended to include the desert cymopterus conservation area.
- Several times a year, a biologist from the Natural Resources Division assists in educating children on post by visiting the Fort Irwin Elementary School, providing information and class lectures on desert ecology including the desert cymopterus.
- The NTC provides opportunities for the public to learn about the natural resources program through participation in outreach events such as Safety Day, Earth Day, Armed Forces Day, Barstow Street Fair, CARE Fair, Edwards AFB Open House, and a regional Army Appreciation Fair in Torrance, CA.
- The natural resources staff provides information and articles to the Fort Irwin Public Affairs Office to be published in the Post newspaper and aired on the Post television and radio stations to educate base personnel and the public. All NTC sensitive species will be included in these publications.

Objective 5. Assessment and reporting.

- Use the annual letter to FWS (November) as an opportunity to review the management of the DC.
- Coordinate the annual review with the BLM Botanist to assess the status of all DC populations in the Harper Valley and Superior Valley region.

9.5.7.3 Monitoring

9.5.7.3.1 Goal 1. Monitoring Needed To Protect Populations.

Objective 1. Maintain the DC Conservation Area

- Check fences protecting the DC Conservation Area.for breaches and habitat damage. Repair minor damage; report major damage to Army for discipline and repair. Report results to FWS annually.
- Use ITAM to restore habitat damage caused by military vehicles breaching the fenced perimeter of Conservations Area.

Objective 2. Develop and implement a long-term monitoring plan to assess the viability of the DC population within the Conservation Area.

- Create six randomly placed transects, 10 m x 50 m. Count all DC within each transect. Tag the first 10 plants in each transect. Record the presence/absence of these plants in subsequent years.
- Create six study plots, approximately 0.25 hectares in size, in locations where DC was seen in the 2004 Charis survey. Count all DC within each transect. Tag the first 10 plants in each transect. Record the presence/absence of these plants in subsequent year.

- If possible, monitor DC in a control area. Use the NTC-funded 2005 BLM survey in Superior Valley to identify control areas.
- Assess the population health and viability of DC using (1) comparisons to the baseline censused in 2004 – 2006, and using (2) comparisons to control populations in the Superior Valley.

9.5.7.3.1 Goal 2. Monitoring Needed To Protect Habitat.

Objective 1. Reduce dust.

- Monitor dust deposition in DC habitat using passive dust collectors. Collectors will be monitored monthly and compared to baseline collectors in locations that are not near military training.

Objective 2. Control invasive plants and weeds.

- Monitor invasive plants and weeds on the NTC, particularly in DC habitat. Submit a copy of the annual report on invasive plants to the WMWMA and to the FWS in the annual letter.

9.5.7.3.2 Goal 3. Monitoring Needed for Ecosystem Management.

Objective 1. Design and implement a long-term monitoring program.

- Census 6 randomly located belt transects within the DC Conservation Area. Count the number of DC within each transect annually.
- Census 6 rectangular plots, approx. .25 hectares, located in areas of dense DC growth. Count the number of DC within each plot annually.
- Tag and GPS the first 10 individual DC plants within each transect and plot. Return annually and count presence or absence. Use these data to determine long-term mortality and life history.

9.5.8 Assurance of Program Facilitation – All Sensitive Species

9.5.8.1 Personnel

- DPW -Environmental has a long-term contract to provide staff to aid in completing conservation goals. This staff consists of a botanist, a wildlife biologist, two ecologists, a NEPA coordinator, two animal control specialists, and a two-man field crew. This team of conservation specialists deals with day-to-day activities on Fort Irwin. These activities include new construction project monitoring, pre-activity clearances, as well as surveys to record condition of natural resources. A generalized list of these projects and projected costs are delineated in Table 2.
- This endangered Species Management Plan (ESMP) is incorporated into the Fort Irwin Integrated Natural Resources Management Plan (INRMP). The INRMP includes a more defined list of conservation goals and objectives, and their associated cost and time requirements.

9.5.8.2 Scheduled Actions

Species	INRMP Section	Objective / Action	Date
LMMV	9.5.2	Fund research on effects of precipitation, life history, and seed propagation (Drs. Prigge and Sharifi, UCLA).	**2004 - 2006**
LMMV	9.5.2	Continue funding Cal State San Bernardino (Walker & Metcalf) with population genetics research.	**2005-2006**

DC	9.5.7	Fund a survey for the presence of the desert cymopterus or its habitat in areas surrounding the Western Expansion Area.	**2005**
DT	9.5.3	Funding provided for DT sexual selection study.	**2004**
DT	9.5.3	Utilize the USFWS raven take permit to reduce subsidized predators.	**2004**
LMMV	9.5.2	Create and fence the East Paradise Conservation Area.	**2005**
LMMV	9.5.2	Begin a long-term monitoring program for the Lane Mt milkvetch.	**2005**
LMMV	9.5.2	Investigate seeding milkvetch.	**2005-2006**
LMMV	9.5.2	Convene a symposium that brings together LMMV researchers.	**2005**
DT	9.5.3	Fence northern boundary of conservation areas.	**2005**
DT	9.5.3	Grade road shoulders to prevent entrapment or impedment of desert tortoises within Goldstone Complex	**2005**
DT	9.5.3	Road improvement projects including gravel compaction and dust contol measures within Goldstone Complex	**2005**
DT	9.5.3	Design and construct culverts to aid in tortoise use within Goldstone Complex	**2005**
DT	9.5.3	Install raven netting to existing structures	**2005**
DT	9.5.3	Create a Desert Tortoise Management Team from Interagency personnel.	**2005**
DT	9.5.3	Install a 2-strand barbwire fence & Siebert stakes along Goldstone tank trail.	**2005**
DT	9.5.3	Install tortoise-proof fencing along Ft. Irwin Rd.	**2005**
MGS	9.5.4	Conduct Mohave Ground Squirrel surveys	**2005 (spring)**
LMMV	9.5.2	Create the Brinkman Wash No-Dig Zone.	**2006**
LMMV	9.5.2	Channel and direct vehicle traffic from unprotected yet sensitive areas, particularly in Brinkman Wash.	**2006**
DT	9.5.3	Translocate all tortoises within 90th gridline area.	**2006**
DT	9.5.3	Erect restricted access signs for N. boundary conserv areas.	**2006**
DT	9.5.3	Restrict vehicle use to existing dirt roads	**2006**
DT	9.5.3	Post 20 mph speed limit signs on all unpaved access roads	**2006**
DT	9.5.3	Close unused routes w/I sensitive areas	**2006**
SWWF	n/a	Replant native vegetation at disturbed spring and seep areas	**2006**
LMMV	9.5.2	Conduct periodic review of ITAM reclamation near LMMV.	**2007**
LMMV	9.5.2	Convene a symposium that brings together LMMV researchs.	**2007**
DT	9.5.3	TCS surveys for tortoise densitites	**2007**
LMMV	9.5.2	Conduct periodic review of ITAM reclamation near LMMV.	**2009**

9.5.8.3 Costs

Estimated Project Costs

Estimated Project Costs*#

Project	FY 05	FY 06	FY 07	FY 08	FY 09	Totals
GS Biologist Salaries	$195	$205	$215	$226	$237	$1,078

Desert Tortoise Surveys	$200	$150	$150	$150	$150	$ 800
Predation Rate Studies	$80	$80	$80	$80	$80	$ 400
Tortoise Translocation Study	$1500	$1500	$1500	$800	$800	$6,100
Fences and Off-limits Signs	$100	$500	$500	$100	$100	$1,300
Adaptive Management	0	$500	$500	$500	$500	$2,000
Update Pest Management Plan	$5	$5	$5	$5	$5	$ 25
Contractor Salaries	$1,209	$1,269	$1,333	$1,399	$1,470	$6,680
Pest Species Abatement	$150	$150	$160	$160	$160	$ 780
Endangered Plants & Animals	$150	$190	$200	$225	$225	$ 990
NEPA Documentation	$100	$100	$100	$100	$100	$ 500
Land Management Assistance	$100	$100	$100	$50	$50	$ 400
Other Mitigation	0	$1,512	$1,500	$2,738	0	$5,750
T & E Species Research	$100	$100	$100	$50	$50	$ 400
Limiting Factors	$45	$100	$50	$50	$50	$ 295
Exotic Vegetation Control	$10	$50	$50	$50	$50	$ 210
Totals	$3,949	$6,517	$6,550	$6,691	$4,036	$27,743

* Funding in thousand of dollars.
# Funding for cultural resources projects is included in the Integrated Cultural Resources Management Plan.

9.6 Fish and Wildlife Population Management

General Goal. Maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

9.6.1 Game Management

Game populations are not specifically managed on the NTC and Fort Irwin. Hunting pressure and success are such that the sport has no known significant impact on populations of game species. Hunting is more viewed as using small portions of game resources rather than managing game populations. Chapter 12 describes procedures to manage hunting.

9.6.1.1 Proposed Action

Goal. Maintain game species to produce harvestable surpluses on a sustained basis.

Objective 1. Survey huntable populations of game species prior to each hunting season and use information to establish hunting seasons.

Objective 2. Continue to provide hunting opportunities within CDFG regulations and requirements of the military mission at the NTC and Fort Irwin.

9.6.1.2 Other Management Options

While there is no legal mandate to provide hunting, the Sikes Act requires that outdoor recreation be part of this INRMP. Both the committee language for the 1997 amendments to this Act and Army regulations (AR 200-3) require the installation to evaluate the use of hunting within the constraints of the military mission and consistent with protection of natural resources and maintenance of quality hunting conditions. The game management program at the NTC and Fort Irwin is limited but consistent with laws and regulations. The option to reduce or eliminate game management is available, particularly if the needs of the military mission become more exclusive. The option to increase game management is available, but not consistent with the requirements of the military mission or demand for hunting.

9.6.2.6 State-protected Species

General Goal. Consider State-protected species in all Army actions, per Army Regulation 200-2.

9.6.2.6.1 Proposed Action

Mohave Ground Squirrel

Management of the Mohave ground squirrel appears in Threatened and Endangered Species Management, Section 9.5.4. However, the squirrel is not presently listed as federally threatened or endangered.

Alkali Mariposa Lily

Since the alkali mariposa lily has not been confirmed on the NTC and Fort Irwin (there is an unconfirmed collection from Two Springs), the development of specific protective and management objectives will be dependent upon results of surveys for this species (Section 8.1.3.1). The alkali mariposa lily typically occurs in alkaline meadows and moist creosote brush scrub plant communities. Thus, measures to protect listed species, particularly spring areas, will protect potential habitat for this species of concern. The following measures will provide protection for potential habitat:

Goal. Use measures established for federal-listed species to provide protection for possible habitat for the alkali mariposa lily.

Objective. Implement measures to protect crucial habitat for the willow/ southwestern willow flycatcher and least Bell's vireo (sections 9.6.2.3 and 9.6.2.4) since these habitats may be occupied by the alkali mariposa lily.

Clokey's cryptantha

At the present time, the military does not train on cryptantha habitat, and does not threaten the cryptantha.

Goal. Collect more information on the distribution and abundance of Clokey's cryptantha that can be used to conserve the species when the army begins training in the W. Expansion Area.

Objective 1. Collect distribution information on this cryptic species, particularly its overlap with the Lane Mountain milkvetch.
Objective 2. Minimize maneuver training in areas with slopes greater than 20%.

Small-flowered androstephium

At the present time, military training does not threaten androstephium.

Goal. Collect more information on the distribution and abundance of the androstephium that can be used to conserve the species when the army begins training in the Eastern Expansion Areas.

Objective 1. Monitor known populations of these species before military training ensues. Use this information as baseline data.

Objective 2. Survey potential habitat within the NTC to locate all existing populations.

Objective 3. Survey potential habitat adjacent to the NTC to locate nearby populations.

Desert cymopterus

Management of the desert cymopterus appears in Threatened and Endangered Species Management, Section 9.5.2, although this plant species is not presently listed as federally threatened or endangered, it is listed as a CA state 1b species (rare, threatened, or endangered).

9.6.2.6.2 Other Management Options

The NTC and Fort Irwin is not legally required to specifically manage State-listed species. Thus, even though Army regulations require consideration for these species, the above programs specifically for three State-listed species are not required to be implemented. However, with the exception of the possible establishment of additional refugia for the Mohave ground squirrel, projects described for these species are also required for federal-listed species. Thus, as described in discussions of Other Management Options for the federal-listed species, options are only available after consultation with the USFWS.

There is no requirement for additional refugia for the Mohave ground squirrel. The same is true of not using steep slopes for military activities. Thus, the installation has the option to drop these projects or to reduce their scope to any degree. These options would, however, reduce the degree of protection afforded this species and increase the potential for future federal listing.

9.6.3 Furbearer/Predator Management

Trapping is not permitted on the NTC and Fort Irwin. Section 9.11.1.1 describes programs to reduce desert tortoise predation by coyotes and ravens.

9.6.4 Other Species Management

Most species management on the NTC and Fort Irwin is directed towards listed species, primarily due to

their compliance requirements. However, these compliance-featured species comprise a very small part of the installation biodiversity. Fortunately, measures for listed species also benefit many other species of wildlife on the installation.

Special interest area habitat protection measures (Section 9.12), wildlife habitat programs (Section 9.4), wetlands management (Section 9.6), water quality management (Section 9.7), LRAM (Section 9.8), wildfire protection (Section 9.11), Training Requirements Integration (Section 9.13), and effective environmental awareness programs (Chapter 11) will benefit non-game species in general, consistent with ecosystem management strategies.

9.6.4.1 Birds

Inventory and monitoring projects for birds are described in Section 8.2.1.1.2. Protection and management for the willow/southwestern willow flycatcher (Section 9.6.2.3) and least Bell's vireo (Section 9.6.2.4), in particular, are extremely important to the management and protection of most avian species that use the NTC and Fort Irwin (Chambers Group, Inc., 1998).

9.6.4.1.1 Proposed Action

Goal. Use measures established for federal-listed species to provide protection for birds that use the NTC and Fort Irwin.

Objective. Implement measures to protect critical and crucial habitat and minimize take for the desert tortoise, willow/southwestern willow flycatcher, least Bell's vireo, and Lane Mountain Milkvetch (sections 9.6.2.2, 9.6.2.3, 9.6.2.4, and 9.6.2.5, respectively). These habitats are also valuable habitat for birds in general, and the take minimization measures will also benefit many bird species.

9.6.4.1.2 Other Management Options

The NTC and Fort Irwin is not legally required to specifically manage nonfederal-listed species. Thus, above programs for birds in general are not required to be implemented. However, projects described for these species are also required for federal-listed species. Thus, as described in discussions of Other Management Options for federal-listed species, options are only available after consultation with the USFWS. The Migratory Bird Treaty Act does offer protection to most of the birds that occur on the NTC and Fort Irwin. This act prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit.

9.6.4.2 Migratory Bird Management

Most of the birds that occur on the NTC and Fort Irwin are migratory species and therefore require further discussion. These birds are either permanent residents of Fort Irwin, use the resources here on a seasonal basis, or pass by on seasonal migrations. As a result of documented population declines, migratory birds are the subject of an international conservation effort. As an integral part of the NTC and Fort Irwin ecosystem and a good indicator of overall ecosystem health, migratory birds on post must be managed effectively and in accordance with all state and federal laws.

The main law protecting migratory birds is the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711), an international agreement between the United States, Canada, and Mexico to protect most

species of birds. The MBTA prohibits the killing, taking, or pursuing of migratory birds, their feathers, nests or eggs without prior approval. Game birds are listed and protected except where specific seasons, bag limits, and other factors govern their hunting. Exceptions are also made to control various nuisance birds such as the common raven. The USFWS is the sole authority on regulations regarding the MBTA, including enforcement of federal migratory bird statutes regulating take of game and non-game species by individuals and federal agencies. The NTC and Fort Irwin currently has a depredation permit that allows for the taking of 100 ravens annually from the post landfill.

Executive Order (EO) 13186 was issued on January 11, 2001 and it requires that federal agencies whose actions may affect migratory birds must develop and begin implementing, within two years of the EO, an MOU with the USFWS aimed at conserving these birds. It also establishes a council for the conservation of migratory birds to help agencies implement the EO. In addition, the EO requires NEPA evaluations to include effects on migratory birds and that advance notice or annual reports must be made to the USFWS concerning actions which result in the taking of migratory birds. The EO also requires agencies to control the establishment of exotic species that may endanger migratory birds and their habitat. An MOU between the USFWS and DoD concerning migratory bird conservation is forthcoming.

Other plans that have been developed to protect various migratory birds include Partners in Flight (PIF) Conservation Plans, the USFWS' Migratory Nongame Bird Species of Management Concern in the United States, Shorebirds Conservation Plans, and the North American Waterbird Conservation Plan. Many of these plans list only a few migratory bird species or specific set of birds, though the concerns and management applications can be applied to most other species. These plans have been incorporated to provide for the most complete coverage and protection of migratory birds consistent with the military mission.

On the NTC and Fort Irwin the limiting factors for migratory birds are water and suitable habitat. There are few reliable water sources that are accessible at all times. These include the various springs and the wastewater pond. Other ephemeral sources include car washes, playas after rain, and sprinklers in the housing areas. All of the springs are designated off-limits to military training and personnel, as is the wastewater pond, which is in the cantonment area. Most of the playas on post are also designated off-limits as well. Only Red Pass Lake, Langford Lake, and the Bicycle Lake airstrip are used by the military at this time. Springs are an integral part to any desert ecosystem and, as such, will continue to be protected. Potential nesting locations include creosote bushes, Joshua Trees, and in rocky cliff sides. NTC regulations already provide protection for these plants and training is mostly limited to areas with a slope of less than 20 degrees.

To avoid unnecessary migratory bird mortality, planning should be proactive. Birds should be prevented from roosting where they create health and noise problems by placing bird spike strips or similar non-lethal deterrents. This should not be done during breeding and nesting season. Any construction project that has the potential to affect migratory birds should first be analyzed to determine its effects on migratory birds. One concern for migratory birds is that of the role of communication towers in bird mortality. The USFWS has issued the Service Interim Guidelines for Recommendations on Communication Tower Siting, Construction, Operation, and Decommissioning. These guidelines should be used whenever new towers need to go up or be taken down to ensure the safety of migratory birds. The concern of bird strikes with aircraft has never been an issue at the NTC and Fort Irwin though if in the future it becomes one, a Bird Aircraft Strike Hazard (BASH) program will be implemented.

9.6.4.2.1 Proposed Action

Goal 1. Preserve and maintain migratory bird habitat.

Objective 1. Maintain off-limit status of all desert spring ecosystems and surrounding areas with appropriate habitat.

Objective 2. Remove any non-native invasive vegetation that is competing with native habitat cover.

Objective 3. Prepare educational materials to be incorporated into handouts to military and civilian personnel and for use in natural resource briefings.

Goal 2. Manage migratory birds in accordance with MBTA and EO 13186.

Objective 1. Consider the effects the communication towers and the aircraft program have on migratory birds to determine if actions need to taken.

Objective 2. Obtain any necessary permits to be able to move migratory birds for the purposes of transporting injured birds to a wildlife rehabilitator, accommodating the military mission, or otherwise care for migratory birds.

Objective 3. Conduct annual inventories of migratory birds on the NTC and Fort Irwin. This data will be used as a baseline for future studies.

Objective 4. Implement strategies set forth in such bird management plans as Partners in Flight, Shorebirds Conservation Plans, and the North American Waterbird Conservation Plan to maintain and protect migratory birds.

9.6.4.3 Bats

Inventory and monitoring projects for bats are described in Section 8.2.1.1.1. Protection and management for the willow/southwestern willow flycatcher (Section 9.6.2.3) and least Bell's vireo (Section 9.6.2.4), in particular, are important to the management and protection of many bat species that use the NTC and Fort Irwin (Chambers Group, Inc., 1998).

Springs provide excellent habitat for foraging bats. Removal of dense vegetation from springs permits better access to bats dipping for water. The installation of bat gates on recommended mines would have a dual benefit of protecting bat habitat and reducing hazards to human safety.

9.6.4.3.1 Proposed Action

Goal 1. Use measures established for federal-listed species to provide protection for bats that use the NTC and Fort Irwin.

Objective 1. Implement measures to protect and maintain crucial habitat for the willow/southwestern willow flycatcher and least Bell's vireo (sections 9.6.2.3 and 9.6.2.4) since spring habitats are also valuable foraging habitat for bats.

Objective 2. Emphasize Cave, Bitter, Desert King and Garlic springs (needing significant renovation) with regard to protecting bat foraging sites (Brown, 1994).

Goal 2. Identify and protect bat roosting and maternity sites.

Objective 1. Establish/maintain off-limits bat habitat areas that have the highest known populations and best quality habitat for bats.

Objective 2. Install bat gates that are specific to suspected species at mine openings, using recommendations from Brown (1994), to prevent human activity in mines, which can have a detrimental affect on bat populations on the NTC and Fort Irwin.

Objective 3. Continue to minimize training in areas with greater than 20% slopes to protect cliff faces that are roosting sites for bats.

9.6.4.3.2 Other Management Options

The NTC and Fort Irwin is not legally required to specifically manage nonfederal-listed species. Thus, above programs for bats are not required to be implemented. However, projects described for these species, with exception of protection for bat roosting and nesting habitats, are also required for federal-listed species. Thus, as described in discussions of Other Management Options for federal-listed species, options are only available after consultation with the USFWS.

There is no requirement to protect bat roosting or nesting habitat. Thus, these programs can be reduced or eliminated. However, since bats, in general, are species of concern at the State-level, actions to improve their habitats and minimize threats to their numbers will reduce the potential for future federal listing.

9.7 Wetlands Management

Wetlands protection is required by Executive Order 11990, *Protection of Wetlands*. Wetlands at the NTC and Fort Irwin are confined to ten springs, and although the total wetland acreage is extremely small, these areas are essential to the survival and well being of many wildlife species. Protection and maintenance of existing habitat are the primary thrust of wetlands management on the NTC and Fort Irwin.

Environmental review and regular inspection are the primary means of detecting threats to wetlands on the Training Center. The Natural and Cultural Resources Section reviews actions, which may affect wetlands. Reviews come from several sources: engineer work orders, service orders, military training plans, NEPA documentation, major construction plans, etc. If necessary, projects with potential impacts would be referred to the Corps of Engineers (Los Angeles District) to determine if jurisdictional wetlands are implicated, establish mitigation procedures, and/or obtain permits. Wetland-affecting projects require NEPA documentation (Chapter 14). Both Natural Resources and ITAM personnel regularly visit many springs. These inspections are used to determine threats to spring wetlands and re-establish off-limits marking and fencing if necessary.

Activities in wetlands which require federal permits include, but are not limited to: placement of fill material, ditching activities when the excavated material is sidecast, mechanized land clearing, land leveling, most road construction, and dam construction. The Corps of Engineers' permit process requires coordination with the USFWS and the State Historic Preservation Office (SHPO) to allow for the assessment of potential impacts to protected species and cultural resources.

NTC Regulation 350-3, *Range Regulation*, provides considerable protection of wetlands from military

training damage. Excerpts from Para. 4-5f include, "*There are numerous springs found on Fort Irwin. These springs are vital to the desert wildlife. No vehicle or foot traffic is authorized around springs or vegetation in the spring area.*"

Other sections of this INRMP have provisions to protect springs and, therefore, wetlands. Provisions are found within *Springs and Seeps* (Section 9.4.2.1), *Training Requirements Integration* (Section 9.13), *Military Personnel Awareness* (Section 11.1), and *NEPA* (Chapter 14).

9.7.1 Proposed Action

Goal: Manage wetlands to ensure "no net loss" per Executive Order 11990.

Objective 1. Use the environmental review process to protect wetlands.

Objective 2. Regularly inspect springs on both a formal and opportunistic basis.

Objective 3. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland.

Objective 4. Work with troop units to ensure compliance with spring protection provisions within Range Regulation 350-3, using the ITAM Office Environmental Awareness program and Range Safety briefings.

9.7.2 Other Management Options

There are no management options contrary to the goal of "no net loss" since it is legally mandated. Between the above objectives, the management of springs (Section 9.4.2.1), and the removal of invasive, non-native plants from springs (Section 9.11.1.2), the installation is accomplishing maximum efforts to protect its wetlands and meet legal mandates.

9.8 Water Quality

The NTC and Fort Irwin has its own drinking and other-use water supply system and reasonably high quality groundwater (sections 4.2 and 6.4.2), and it intends to preserve that quality. Section 8.3 describes water quality monitoring.

AR 200-1 establishes the following objectives for water resources on Army lands:

- Conserve all water resources.
- Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
- Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
- Provide drinking water that meets applicable standards.
- Cooperate with federal, state, and local regulatory authorities in forming and implementing water pollution control plans.
- Control or eliminate runoff and erosion through sound vegetative and land management practices.
- Consider non-point source pollution abatement in all construction, installation operations, and land management plans and activities.

An additional Army requirement is the preparation and implementation of a Stormwater Management Plan. Attainment of most of the above objectives is not the responsibility of Army installation natural resources programs, but some of them, especially the last two, are clearly natural resources management concerns. Below sections specifically deal with actions taken by the installation with regard to water quality.

Most water quality laws and regulations are not the responsibility of natural resources organizations at the NTC and Fort Irwin, and are thus not within the scope of this INRMP. Groundwater management consists of restoration projects associated with individual sources of pollution. Some waters on the Training Center are naturally high in undesirable elements. These projects are not considered as natural resources management and are not included within this INRMP.

Erosion is not a significant recognized threat to water quality on the Training Center, largely due to very limited permanent surface waters and the protected status of the land around springs. The implementation of the LRAM component of ITAM (Section 9.8) enhances the installation's ability to protect water quality from sedimentation.

9.8.1 Proposed Action

Goal. Protect surface water quality in NTC and Fort Irwin springs.

Objective 1. Control or eliminate runoff and erosion that could affect springs.

Objective 2. Consider non-point source pollution abatement in construction, installation operations, and land management plans and activities.

9.8.2 Other Management Options

The installation is not legally required to control runoff or erosion that could affect springs. Thus, Objective 1 could be dropped. However, the NTC and Fort Irwin is mandated, by regulation if not law, to consider non-point pollution in its activities. Thus, there are no viable options to Objective 2.

9.9 Land Rehabilitation and Maintenance

Land Rehabilitation and Maintenance (LRAM), a component of ITAM, involves a variety of techniques to repair lands damaged by training and minimize future impacts to training lands. LRAM uses technologies, such as revegetation and erosion control structures, to maintain training areas by preventing site degradation, minimizing soil erosion, reducing dust emissions, and restoring or maintaining vegetative cover. These efforts are specifically designed to maintain quality military training lands, minimize long-term costs associated with land rehabilitation, vehicle maintenance, or additional land purchase, ensure compliance with environmental laws and regulations, and reduce erosion. The NTC and Fort Irwin implemented its first LRAM project and hired its first LRAM Coordinator in 1995.

LRAM project funding applies to sites that are not currently out of compliance or are negatively impacting training. If environmental Notices of Violation are either pending or existing on a given site, the project is not eligible for LRAM funding. Likewise, if a degraded site is not affecting training capability, the project is not eligible for LRAM funding. If land is degraded through erosion and vegetative loss not caused by training and if it is either in noncompliance with environmental laws or not affecting training, it is eligible for environmental funding.

9.9.1 Proposed Action

9.9.1.1 Revegetation and Erosion Control

Each year, revegetation and erosion control projects are programmed in the ITAM budget for the next three years. Potential project sites are initially identified by informal field observations, analysis of RTLA land condition data, and input from land users. Project priorities are based on safety factors as well as current and future training loads. Site design incorporates a variety of revegetation and erosion control techniques with the ultimate goal of site stabilization.

Goal 1. Select, prioritize, and design projects to return damaged areas to full training support capability.

Objective 1. Use field observations, RTLA data, and land user input to identify potential LRAM projects.

Objective 2. Prioritize sites based on the above-mentioned criteria.

Objective 3. Design projects for priority sites using recommendations from existing LRAM studies as well as experience gained from other projects developed on the NTC and Fort Irwin.

Objective 4. Schedule and budget LRAM projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000).

Goal 2. Rehabilitate damaged areas to the point where they can continue to support military activities.

Objective 1. Use troop engineer units, private contractors, and the ITAM field crew to implement LRAM projects.

Objective 2. Continue to test revegetation and erosion control techniques that appear to be suited to problems encountered at the Training Center.

Goal 3. Utilize Best Management Practices (BMPs) to improve the design and implementation efficiency of LRAM projects via adaptive management.

Objective 1. Use inhouse resources to monitor individual LRAM projects for at least five years following project implementation.

Objective 2. Use the GIS to connect tabular databases to each LRAM project, indicating purpose, dates, techniques, success, and problems encountered, to improve the feedback mechanism.

Objective 3. Use experience gained from monitoring (qualitative and quantitative) to improve the design and implementation of future LRAM projects.

9.9.1.2 Dust Control

ITAM dust abatement programs address problems associated with wind erosion and suspension of particulates. In an undisturbed condition, native vegetation and the desert crust hold fine particles of soil in place. Removal of the vegetation and/or disruption of the crust exposes these particles which become airborne particulate matter.

There are numerous problems associated with airborne particulate matter (dust), including the following:

- Compliance with air quality laws;
- Human safety associated with operations within dust;
- Trail width proliferation resulting from vehicles trying to stay to the side, rather than behind, other convoy vehicles;
- Increased vehicle maintenance costs; and
- Reduced visibility hindering military operations.

Re-establishment of plant cover is the best long-term solution to fugitive dust problems. However, in heavily traveled areas where dust abatement is necessary and revegetation is not a viable option, chemical dust control materials have proven effective. These are primarily used on Main Supply Routes (MSRs) in and near cantonment, helicopter landing areas, MOUT sites, and other discrete sites. The ITAM program will continue to investigate environmentally safe chemical stabilizers that are appropriate for soil conditions at NTC and Fort Irwin.

Goal 4. Control dust for improved military mission accomplishment, enhanced human safety, and reduced environmental impacts.

Objective 1. Continue to identify and prioritize critical areas near the cantonment area and major tank trails for dust control projects. Schedule and budget dust control projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000).

Objective 2. Implement dust control (chemical stabilization) on priority sites based on available funding.

Objective 3. If new technologies or products become available that appear to be feasible and cost-effective for the NTC and Fort Irwin, test these products and use results to improve the dust control program.

9.9.1.3 Native Plant Seed Collection and Propagation

A major part of the training land management program at the NTC and Fort Irwin during the next five years will include revegetation of disturbed areas (see Section 9.9.1.1). Federal regulations and a Presidential Memo (Office of the President, 1994), as well as ecosystem management strategies, increasingly dictate the use of native plant species, especially local ecotypes.

Grass, forb, and shrub seed is collected by a qualified collector/supplier with experience in native seed collection. The ITAM field crew supplements contractor-collected seeds with special need collections. Nurseries used for propagation have experience with native plants and the capability to produce plants with a high percentage of root growth to survive minimal water conditions. Joshua Tree National Park has been cooperating with the NTC and Fort Irwin for propagation of seed at Park facilities. NTC and Fort Irwin

Species used for container planting at revegetation sites include 22 shrubs and 3 perennial grasses. Seed mixes for broadcast seeding projects have included about 20 species of shrubs and forbs. Data on container plant survival and seedling germination is collected so that the most appropriate species can be identified for particular site and soil conditions.

Goal 5. Provide high quality stocks of locally adapted seed and plants to support revegetation projects on the NTC and Fort Irwin.

Objective 1. Use annual updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000) to determine native plant and seed stock requirements at least two years in advance.

Objective 2. Acquire locally adapted native seed when possible or purchase appropriate commercially available bulk seed when necessary to meet revegetation goals.

Objective 3. Store seed and maintain seed quality.

Objective 4. Send seed to nurseries with Mojave Desert native plant experience for propagation.

Objective 5. Monitor the seed collection and propagation program and use results to improve the program in terms of collection processes, propagation techniques, and site-specific species selection.

9.9.1.4 Protective Marking

The NTC and Fort Irwin has developed a uniform system of marking off-limits areas to prevent further damage to sensitive areas and avoid injury to military personnel. Seibert stakes are readily identifiable markers mounted on fence posts and marked with both reflective sheeting and thermal tape for 24-hour visibility (U.S. Army, National Training Center and Fort Irwin, 2000).

Seibert stakes are used to mark major tank trails, such as Goldstone and Manix (from the railhead to the installation through BLM and private land); playas (Section 9.13.1.3); some cultural resources sites (Section 13.2); critical habitat (Section 9.6.2.2); hazardous areas; right-of-way boundaries; springs (Section 9.4.2.1); environmental pollution restoration sites; etc. Information concerning Seibert stakes has been incorporated in the O/C Academy, OPFOR Academy, Leader Trainer Program, and the Command Brief, as well as in the soldier field cards (Section 11.1) (U.S. Army, National Training Center and Fort Irwin, 2000). Seibert stakes can be used by any entity on post to mark restricted areas with the approval of the G3 Training Support Division and in coordination with the DPW Natural Resources Section.

Goal 6. Identify sensitive areas, nonmilitary use areas, and hazardous areas to military personnel using the NTC and Fort Irwin range and training areas.

Objective 1. Construct and install Seibert stakes to mark sensitive areas, nonmilitary use areas, and hazard areas. When Seibert stakes are used to mark sites not part of the ITAM program, obtain funding from environmental resources.

Objective 2. Maintain existing marked areas, including removal of Seibert stakes no longer required.

9.9.1.5 Applied Desert Restoration Studies

The process of large-scale rehabilitation and maintenance of arid land intensively used for military training requires the development of restoration techniques and means to monitor the success of these techniques. The installation ITAM program is committed to using the best science available to improve its support of the NTC's military mission.

The installation has used various regional institutions and their experts to develop means to monitor the biological impacts of military training on the Mojave Desert ecosystem, including the use of remote sensing and measurements of key soil characteristics. These studies are valuable to the LRAM program in

that they can lead to more effective and efficient monitoring of the program's techniques.

The Desert Research Institute, University of Nevada, Reno has conducted soil hydrology studies at the NTC and Fort Irwin. These studies model soil moisture, including vertical and horizontal movements on various soil types to provide a geomorphological perspective to improve design of revegetation projects within the LRAM program.

Goal 7. Improve the LRAM program using applied desert restoration studies.

Objective 1. Continue long-term monitoring of rehabilitation techniques relative to site conditions for input into the LRAM decision model.

Objective 2. Continue the soil hydrology studies and incorporate results to improve the LRAM program.

Objective 3. As promising new techniques potentially valuable to the NTC and Fort Irwin LRAM program are discovered, use applied studies to evaluate their usefulness to the program.

9.9.2 Other Management Options

By definition, LRAM is not required by law. Thus, the LRAM program could be eliminated or scaled down to any level. However, significant cutbacks could lead to conflicts with other programs that are legally mandated. For example, if the use of Seibert stakes were curtailed, there would be conflicts between the military mission and the protection of sensitive species and cultural resources, many of which are legally protected. The same would be true if cutbacks in LRAM were to increase erosion threats to cultural resources or affect sensitive plant or animal species habitat. Thus, significant reductions in the LRAM program could result in the requirement to increase the scope of other natural or cultural resources programs. However, since other options for repairing military damaged lands were not specifically designed for this purpose, it would be difficult to find substitute programs that are as effective or efficient as the LRAM program.

The 1997 amendments to the Sikes Act added the requirement for no net loss in the capability of the land to support the military mission of military installations. Thus, even though this law does not specify the implementation of LRAM, it does require programs similar to LRAM if the land is being degraded in terms of its capability to support military operations.

It might be possible to legally scale back the LRAM program and still meet legal requirements. However, since the NTC and Fort Irwin is classified in the highest priority for ITAM funding category, it is not feasible to significantly increase LRAM funding unless Army-wide ITAM program funding is similarly increased.

9.9.3 Proposed Land Expansion

The LRAM component of ITAM is developing plans for proactive management of the land expansion areas (U.S. Army, National Training Center and Fort Irwin, 2000). Management activities include such strategies as hardening proposed maintenance areas, dust control on major vehicle routes, and closure of trails into off-limits areas.

9.10 Cantonment Management

The cantonment is described in Section 7.1.2. It is, in short, the area inside the Outer Loop Road. There are 268 acres of improved lands (*e.g.* lawns, athletic fields, golf areas, landfill, playgrounds, and parks) on the installation, which require annual maintenance. There are about 1,630 acres of semi-improved lands (*e.g.* ammunition storage, airfields, and heliports) which require periodic maintenance, but to a lesser degree than on improved lands (Quillman, 1997).

Grounds maintenance and landscaping within the cantonment at the NTC and Fort Irwin are accomplished by a contractor under the RCI (Residential Community Initiative) Contractor. The Natural and Cultural Resources Section provides technical advice when requested. This section deals with those specific actions within the cantonment that directly support the natural resources program.

A comprehensive landscape-planting plan has been developed to provide guidance and consistency for landscaping different areas on post. The plan is functional in nature, informal in design, and compatible and complementary with adjacent surroundings and natural environment. The plan emphasizes the use of native, low-maintenance plants, in accordance with a Presidential Memorandum (Office of the President, 1994) on the use of native species on federal lands. The Landscape Management Plan should be revised every five years.

Landscaping should use drought-tolerant plant species. When possible, native plants should be used to increase habitat for native wildlife species. Exotic species that can out-compete native vegetation and become naturalized should not be used. The use of native, drought-tolerant species decreases water use and maintenance activities. The installation uses heavy applications of mulch, created from pruning debris, to reduce water use and increase landscape-planting survival.

9.10.1 Proposed Action

Goal. Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible.

Objective 1. Implement the Landscape Management Plan.

Objective 2. Provide professional advice to guide the grounds landscaping and maintenance program toward the use of native species and drought-tolerant species.

Objective 3. Use drip irrigation as much as possible when irrigation is required.

9.10.2 Other Management Options

There are no legal requirements to manage improved grounds to the extent that is done at the NTC and Fort Irwin. However, there are requirements (*e.g.*, Office of the President, 1994; AR 200-3) to use native species and reduce water usage for plantings. Thus, the grounds maintenance program could be scaled back, but not eliminated. On the other hand, it could be significantly increased, particularly if increases involved xeroscaping. However, considering budget cutbacks, grounds maintenance programs are not likely to be significantly enhanced in the near future.

9.11 Pest Management

Cantonment area pest management on the NTC and Fort Irwin is primarily accomplished by a contractor under the Base Operations Contractor. The Natural and Cultural Resources Section provides technical advice when requested. The Natural and Cultural Resources Program Manager has been designated as the Installation Pest Management Coordinator. The Natural and Cultural Resources Section and the ITAM Office are also directly involved in weed and invasive management programs.

The installation has a Pest Management Plan (Quillman, 1997 & 2003) upon which most of the below discussion is based. This plan identifies and prioritizes pests and their destructive effects to determine particular levels of protection. The plan emphasizes pest management within the cantonment area.

Integrated pest management (IPM) is used at the NTC and Fort Irwin, and typically a combination of IPM techniques is required to resolve a problem on a sustained basis. IPM includes the implementation and coordination of optimum sanitation, good structural design and maintenance of facilities, mechanical control, cultural control, biological control, and regulatory control.

Pest control efforts are implemented on the basis of surveillance. Pest surveys are necessary to determine the type of pest, extent of problem, and pest management technique most appropriate for safe, effective, and economic control.

The Office of the President (1994) called upon heads of federal agencies to reduce the amount of pesticide use by using IPM practices. The NTC and Fort Irwin has a policy of only using chemical control when non-chemical techniques are inadequate or impractical. Furthermore, chemical control will not be used as a substitute for good sanitary practices or proper building maintenance.

The NTC and Fort Irwin (Quillman, 1997) recognizes eight categories of pests or undesirable vegetation that cause significant damage and require control or management. In order of priority, they are:

- Disease vectors and medically important pests (e*.g.,* gnats, mosquitoes, black widow spiders, scorpions, bees and other stinging insects, and filth flies);
- Quarantine pests, of which there typically are none on the NTC and Fort Irwin;
- Real property pests (*e.g.*, subterranean termites, which have been documented in fence posts and other earth-wood contact situations, but not in buildings);
- Stored products pests, occasionally found in food facilities and food-storage warehouses;
- Ornamental plant and turf pests (*e.g.,* elm leaf beetles and aphids);
- Weeds and other undesirable vegetation, including invasive, exotic species on unimproved grounds (Russian thistle, saltcedar);
- Vertebrate animal pests *(e.g.*, feral burros, mice, ravens, coyotes, rattlesnakes, stray pets); and
- Household and nuisance pests (*e.g*., cockroaches, ants, spiders, crickets, fleas, beetles).

9.11.1 Proposed Action

The Pest Management Plan (Quillman, 2003) discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors. Below discussions of animal and plant control are specific to the management of natural resources on the installation as opposed to those programs designed primarily for the cantonment area, generally dealing with arthropods and weeds.

9.11.1.1 Animal Control

Goal 1. Control pest animals to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC and Fort Irwin community.

Section 6.7.7 described pest species important to natural resources management on the installation. Populations of ravens and coyotes, both considered to be serious pests at the NTC and Fort Irwin, are artificially inflated in many desert areas by ready access to refuse sites.

An animal control specialist has been added to the DPW Natural Resources staff. The primary duty of the animal control specialist will be to monitor and control the populations of the pest species that occur on Fort Irwin, primarily coyotes, ravens, and feral cats and dogs within the cantonment.

Coyotes

Coyote management actions are described in Section 9.5.3.4.

Ravens

Raven management actions are described in Section 9.5.3.4.

Burros

Feral burros are a management concern because of negative impacts on soils, vegetation, and water quality in the areas where they persist. Burros are primarily found in the northern and northwestern portions of the Training Center. There are thought to be 75-150 burros that use the installation (Dave Sjaastad, BLM Horse and Burro Manager, Ridgecrest, CA., personal communication, 1998).

The NTC and Fort Irwin, Naval Air Weapons Station China Lake, BLM, and Death Valley National Park have agreed to a goal of zero burros on various lands including the NTC and Fort Irwin. Burros can be captured using helicopter roundups and traps at water sites. Captured burros are removed via the BLM Adopt a Horse and Burro program.

Helicopter roundups and trapping at water sites to capture and remove feral burros could affect the desert tortoise, southwestern willow flycatcher, and the least Bell's vireo. The Army should evaluate potential effects to these species such as habitat disturbance, behavior changes, etc. The Army should determine the presence or absence of these species at the specific sites they wish to implement control measures. If impacts are determined, the Army should consult with the USFWS under section 7 of the Act.

Objective 1. By 2004 provide burro exclusions (allowing bighorn sheep entry) on springs in areas frequented by burros.

Objective 2. By 2004 use helicopter roundups and traps at water sites, particularly at Leach Springs and Two Springs, to provide Fort Irwin's part of the 200 burros per month quota for the combined agencies' areas.

Objective 3. Use periodic roundups and trapping to remove burros until all are removed, and maintain this zero status with removal as required.

Rattlesnakes

Speckled, Mohave green, and sidewinder rattlesnakes occasionally are found in developed areas on the installation, particularly the Cantonment Area. NTC regulations prohibit the collection of reptiles or other wildlife on the NTC and Fort Irwin.

Objective 4. Relocate problem rattlesnakes to range areas. The pest control contractor, All Pro Pest Control, will handle removal of rattlesnakes from the cantonment area. They can be reached at (760) 380-4099.

Stray Pets

Stray pets on the range area are not a significant problem on the NTC and Fort Irwin. These domestic animals are not adapted to survive in desert conditions and are often removed by predators, particularly the coyote. The animal control specialist is responsible for removing any nuisance stray pets within the cantonment area.

Native Venomous Invertebrates

Unless there are unusual circumstances, native venomous invertebrates (*e.g.*, black widow spiders, scorpions) are not actively controlled as part of the pest management program.

Africanized bees have been discovered on the NTC and Fort Irwin. Any swarms of bees are considered to be Africanized, and the pest control office should be notified immediately to handle the situation. The phone number is (760) 380-4099.

9.11.1.2 Plant Control

Non-native plants and weeds often pose threats to native habitats, endangered species, and plant community composition and diversity. More specifically, they threaten vital spring ecosystems, complicate LRAM implementation, add to the cost of pest management, and in general, threaten ecosystem functionality. However, a potential conflict exists between removing unwanted plants and protecting federally threatened and endangered species that either eat unwanted plants, or use their habitat. In particular, the endangered southwestern willow flycatcher and the least Bell's vireo nest in exotic saltcedar trees, and the desert tortoise readily eats exotic red brome.

In 2002, the NTC signed a MOU (Memorandum of Understanding) to join and coordinate activities with the West Mojave Weed Management Association, a regional group of representatives from government lands seeking to control weeds and invasive species. The NTC also sends representatives to relevant meetings of Cal-IPC, the California Invasive Plant Council.

Goal 2. Control noxious and invasive exotic plants to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC and Fort Irwin community.

Objective 1. Map the distribution and abundance of non-native, invasive species (*e.g., Tamarix ramosissima, Salsola tragus*).

Objective 2. Prioritize sites that require invasive plant management (*e.g.*, springs, see Section 9.4.2.1).

Objective 3. Develop an action plan for exotic plant control on the Training Center, including the above-

listed map and priority sites, a rating of each species for its difficulty of control, methods of control for all species based on their respective life histories, and a description of means used by each species to spread from site to site.

Objective 4. Continue to seek funding for exotic weed control.

Objective 5. Consider the effects to federally threatened and endangered species and ecosystem function when removing non-native plants. Replant native tree species when removing saltcedar.

Objective 6. Actively participate in regional efforts to control weeds and invasive species, particularly the West Mojave Weed Management Association and Cal-IPC.

9.11.1.3 Measures of Merit

In 1994 the Army approved the following three Measures of Merit that defined the course of Pest Management programs through the year 2003:

- Have a current pest management plan by the end of FY 01.
- Reduce pesticide use by 50% over a seven-year period (1994-2000).
- Have pesticide applicators certified within two years of employment by end of FY 98.

The Pest Management Plan is current. All chemicals used on the NTC and Fort Irwin are EPA & DOD-approved. Integrated pest management techniques (snap traps, glue boards, screening, heat treatment for termites, etc.) have enabled the installation to reduce its use of pesticides by over 50% compared to the base year. The installation understands both obvious and long term threats to both humans and ecosystem functions from pesticides. Applicators are contractors who must meet certification requirements.

Goal 3. Meet Department of Army Measures of Merit for pest management programs on Army installations.

Objective 1. Annually review the Pest Management Plan (Quillman, 1997). Incorporate updates into the plan on a five-year cycle.

Objective 2. Emphasize integrated pest management techniques to continue to minimize the use of pesticides.

Objective 3. Ensure contractor personnel are State-certified applicators.

9.11.1.4 Environmental Considerations

The presence of threatened, endangered, or species of concern and their habitat, especially the Mojave ground squirrel, requires that special precautions be followed closely during any pest management activities that could affect these species. Wetlands require special precautions if pesticides are used in their vicinity. A survey indicated that about one percent of *Peromyscus* are infected with hantavirus, a disease with potentially lethal human health implications.

Goal 4. Use pesticides in a manner to minimize impacts to sensitive animal and plant species.

Objective 1. Follow precautionary statements on labels regarding contamination of water when pesticides

are sprayed near wetlands.

Objective 2. Take special precautions during pest management activities that could affect endangered species or species of concern, particularly by using non-chemical treatments in areas with Mojave ground squirrels.

Goal 5. Minimize environmental risks to human health while conducting pest management programs.

Objective. Ensure that personnel dealing with rodent control are aware of the potential for hantavirus and take appropriate precautions to avoid exposure.

9.11.2 Other Management Options

Some aspects of the animal control program (reduction of raven and coyote predation on desert tortoises) are related to compliance with the Endangered Species Act, and although there may be different options to accomplish the reduced predation, these reductions must be accomplished. Control of coyote predation, in particular, could be far more drastic, but there are biological questions regarding the need for direct coyote control, and cost/benefits might be too high.

The burro removal program could be reduced or eliminated, but a higher degree of control is not possible since the goal is zero burros. Allowing burros to remain a significant non-native part of the ecosystem is not a viable option if ecosystem management and biodiversity commitments are to be met (sections 1.2 and 1.5).

The control or elimination of invasive, non-native plants could be adjusted, but only if restricted by budgetary considerations (Executive Order 13112, *Invasive Species*). A non-control strategy would not comply with this Executive Order and would have other legal ramifications in terms of these species effects on protected plant or animal species or wetland functions.

Control of exotic species and protection of moderately disturbed areas are two indirect means of managing training lands. Non-native species, such as *Tamarix ramossisma* (salt cedar), *Salsola tragus* (Russian thistle), and *Schismus barbatus* (Schismus grass), often invade disturbed areas and out-compete native species for water and nutrients. They create conditions that are both detrimental to training and unfavorable to the re-establishment of native species. An aggressive exotic species control program, which does not currently exist at the NTC and Fort Irwin, could increase the effectiveness of the present revegetation program (Section 9.9.1.1). However, the creation of such a program would require an increase in the DPW Environmental budget.

The Department of Defense and Department of Army are committed to achieving the three Measures of Merit discussed in Section 9.11.1.3. The NTC and Fort Irwin is thus committed to these same goals. There are no alternatives to achieving an updated pest management plan or requiring applicators to meet certification requirements. There are many options within integrated pest management strategies to accomplish a reduction of pesticide use. However, the means used at the Training Center have accomplished the goal of this Measure of Merit, so changes do not seem viable unless they improve either the efficiency or effectiveness of the program.

Considering laws requiring the protection of wetlands, there is no viable alternative to the objective to use caution when applying pesticides near wetlands. The same is true of measures taken to protect sensitive species, such as the Mohave ground squirrel. There is no legal requirement to reduce exposure to

hantavirus, but human health commitments by the Army and the NTC and Fort Irwin make noncompliance with this objective nonviable.

Other pest management programs are either not an integral part of natural resources management (and thus not covered by this analysis), are required by human health regulations, or are optional (to either a lesser or greater degree of implementation) as they are quality of life-related programs. These will not be further discussed with regard to options.

9.12 Fire Management

Wildfires are a threat to the Mojave Desert ecosystem, including endangered, threatened, or otherwise sensitive plant and animal species. Fires encourage the spread of exotic plant species resulting in an increase in fire intensity and frequency. This is especially true in areas, such as gunnery ranges, which experience frequent fires. Fire management on the NTC and Fort Irwin consists of rapid response and effective control of fires. The goal is complete control as quickly as possible. Fire suppression is part of the Base Operations Contract. Prescribed burning is not a viable option for ecosystem management in the Mojave Desert ecosystem due to the evolution of the vegetation without regular fire.

9.12.1 Proposed Action

Goal 1. Provide protection for lands and natural resources from wildfires.

Objective 1. Require all troop units and other installation personnel to report wildfires as soon as possible.

Objective 2. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety related to unexploded ordnance.

Objective 3. Suppress wildfires as soon as possible.

Objective 4. Incorporate burn areas as a GIS data layer for tracking and possible rehabilitation.

Objective 5. Investigate the potential value and costs associated with the establishment of firebreaks around high-risk areas.

Objective 6. Determine methods for treatment of burn areas to reduce invasion by exotic species.

Objective 7. Establish a database to capture fire occurrence and suppression data, such as location, date/time, weather conditions, cause, size, time to suppression, etc.

9.12.2 Other Management Options

It is difficult to develop a more thorough program for the protection of NTC and Fort Irwin lands from wildfires without significant additional expenditures of funds. The commitment is very high, justifiably so since the military mission causes most fires. A lesser commitment to wildfire protection with lesser requirements for reporting, response, and suppression is possible. This would likely have profound effects on the desert ecosystem, as this ecosystem is very prone to physical and functional damage from fires. Prescribed burning is not an identified option for the management or protection of the Mojave Desert

ecosystem.

9.13 Special Interest Area Protection

Designation of special protection status for unique or fragile areas is an important management tool. It is more cost effective to put use restrictions on some areas to minimize damage or disturbance than to mitigate damage or disturbance. The NTC and Fort Irwin has areas with special natural features. They harbor sensitive or unique wildlife species and/or have unique plant communities.

9.13.1 Proposed Action

Goal 1. Provide protection for areas of special ecological concern.

9.13.1.1 General Provisions

As part of project review and the NEPA process, the Natural and Cultural Resources Section reviews proposed projects and activities at the NTC and Fort Irwin. Natural resources managers can identify concerns and recommend measures to minimize damage. Examples include avoiding springs, filling excavations after exercises, and siting missions in areas suited to the mission needs and environmental considerations. See Chapters 14 for more information on the use of NEPA. Wetlands and cultural resources sites are special interest areas, but programs for their protection are outlined in Section 9.6 and Chapter 13 respectively, so they are not included within this section. The same is true with threatened or endangered species habitat (discussed in Section 9.6.2), but special interest sites may also support these plant and animal species.

Objective 1. Use project review and the NEPA process to protect special interest areas.

Objective 2. Use GIS to identify areas of special interest to natural and cultural resources managers, project planners, military planners, and personnel using the NTC and Fort Irwin.

9.13.1.2 Springs

Springs (Section 6.4.1) are critical to many plant and wildlife species within the Mojave Desert, including federal- and State-listed species.

Objective 3. Recognize springs and associated buffer areas of at least 220 yards (200 m) as off- limits.

Objective 4. Erect fencing, metal crossbars, signs, and Seibert stakes (see Section 9.9.1.4) at portions of these springs likely to be approached by wheeled and tracked vehicles to reduce accidental intrusion into, and subsequent damage to, these resources. Check fences around springs for damage after each rotation and repair or replace fencing, signage, or Seibert stakes as needed.

Objective 5. Educate field personnel about the off-limits nature of spring locations as part of major briefings prior to each military exercise to avoid impacts by military equipment and personnel on natural and cultural resources associated with spring areas.

9.13.1.3 Playas

Playas (Section 6.4.1) are critical to specialized plant and wildlife species within the Mojave Desert. When playa crusts are disturbed, wind creates dust, lowering air quality, and creating health andsafety hazards. Due to playas' potential to generate fine particulate matter (PM 10), they are avoided during military maneuvers. Playas also frequently have archeological sites on their perimeters.

Objective 6. Designate playas (except Red Pass Lake, Bicycle Lake airstrip, and Langford Lake) as off-limits to be avoided by military personnel because of potential impacts to associated biological and cultural resources.

9.13.1.4 Joshua Trees

The Joshua tree is a Species of Special Concern in California, and its distribution and density are limited on the NTC and Fort Irwin.

Objective 7. Require approval from the Natural and Cultural Resources Section for removal of Joshua trees in proposed project footprints.

Objective 8. If removal is necessary, re-locate trees to sites with the same orientation and similar characteristics as their original sites to reduce the risk of tree mortality.

9.13.1.5 Goldstone Complex

The Goldstone Complex has some unique ecological characteristics that deserve protection. However, the primary reason the Goldstone Complex is excluded from most military activities is the unique and sensitive NASA mission of the Complex.

9.13.1.6 NTC-Gemini Milkvetch Conservation Area

One of the four known populations of the federally endangered Lane Mountain milkvetch (*Astragalus jaegerianus*) is located along the south boundary separating the NTC from NASA-Goldstone. This population, known as the NTC-Gemini population (formerly the Goldstone population), was designated off-limits to military training and fenced with barbed wire in 2003. A small part of the population extends northward into NASA-Goldstone. This small area was not fenced, and is not a part of the Conservation Area.

Objective 9. Monitor and maintain the fencing around the Conservation Area.

Objective 10. Continue using the area for scientific research. The NTC-Gemini population is conveniently located close to the NTC cantonment and does not require NTC Range Control clearance unless the area is approached via adjacent training areas. To access the conservation area, drive to the Gemini radio telescope. Turn right (SW) before entering the chain link fence; turn right (NW) on a dirt road blocked by a fence and warning sign. A removable section of fence allows easy access to the area.

9.13.2 Other Management Options

Many programs to protect special interest areas are driven by direct or indirect regulatory requirements. There are no options to the use of NEPA to identify threats to these areas. The protection of springs is not directly required by law, but the destruction of spring resources would be contrary to wetlands protection

and possibly the protection of listed species; thus, viable options are not readily available, particularly for the long term.

Protection of playa features also have legal implications, particularly with regard to cultural resources and air quality considerations. Soldier safety issues are also involved regarding use of playas. However, strictly speaking, more playas could be opened for military training, or conversely, Red Pass Lake and Langford Lake playas could also be placed off-limits.

The protection of Joshua trees is not legally mandated. Thus, the program could be dropped, or protection could be made more absolute. Features to isolate the Goldstone Complex from military use are a matter of national priorities, but there are also natural and cultural resources issues involved. Regardless, the NTC and Fort Irwin, by itself, has few options with regard to the use of Goldstone.

9.14 Training Requirements Integration

Training Requirements Integration (TRI) is the direct interface between training requirements for land use and the capability of the land and its natural resources to support that training. TRI relies on RTLA and other monitoring programs to determine land capabilities.

9.14.1 Proposed Action

Goal 1. Integrate NTC and Fort Irwin training requirements for land use with the sustained capability of the land to support such use.

9.14.1.1 Mission Planning

As indicated in Section 16.3.2, the NTC and Fort Irwin GIS has proven capabilities to assist with the planning of military operations and scenarios. The technology can produce maps with overlays that help military commanders visualize special requirements, and terrain can be shown in 3-D to enable personnel to better visualize battlefields. As has also been proven, the GIS can be used to improve troop safety by providing analyses of past accidents in terms of locations to be avoided or where special precautions are prudent.

Objective 1. Assist military mission planners and scenario writers using visualization tools and overlays on imagery and spatial analysis of data layers.

9.14.1.3 Training Restrictions

Restrictions on training are sometimes necessary for long-term sustainment of training and ecosystem protection. In the case of the NTC and Fort Irwin, these restrictions emphasize reducing impacts to native vegetation, providing protection for certain sensitive species and cultural resources, and avoiding conflicts with the mission at the Goldstone Complex. The Training Center includes environmental regulations that directly impact training in Regulation 350-3, *Range Regulation* (U.S. Army, National Training Center and Fort Irwin, 2003).

Objective 2. Use training restrictions, when required, to protect sensitive natural resources and minimize damage to training areas.

Objective 3. Ensure that environmental regulations and restrictions to training have command support.

9.14.2 Other Management Options

Neither land-sustainment mission siting or improved military planning is absolutely required for compliance. Therefore, both projects could be either degraded or enhanced. However, if mission siting does not take long-term mission sustainability into account, eventually the capability of the land to support the military mission will be degraded, a violation of the Sikes Act.

Training restrictions are not imposed on the NTC and Fort Irwin without strong rationales, generally related to environmental compliance or human safety. Therefore, there are few viable options for removing most training restrictions. Additional training restrictions could be imposed, but only if it can be shown that they do not degrade the quality of military training at the Training Center or that they are required for compliance or safety.

Protecting areas, which have not yet become irreversibly damaged, would be a cost-effective way of rehabilitating portions of the training area. Land may recover from 90% disturbance much faster than from 98% disturbance. Resting an area while the remaining plants are still capable of producing seed would reduce the large expenditure on plant materials normally associated with revegetation projects. This could be implemented by periodically limiting access to, or designing battle scenarios around, selected sites as identified by RTLA monitoring plots or repeat aerial photography.

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10.0 ENFORCEMENT

Many aspects of natural resources management require effective enforcement. Programs, such as endangered species protection, off-highway vehicle recreation, protection of sensitive areas, hunting, etc., are very dependent upon effective law enforcement.

The Garrison Commander has appointed the Natural Resources Manager as the Game Warden, but specific officers with dedicated natural resources duties have not been appointed. Military Police personnel are authorized to check for post hunting permits, but not to enforce State hunting license requirements. Range enforcement is generally accomplished coincidental with other duties or in response to specific situations. Thus, a natural resources law enforcement presence is not apparent on the NTC and Fort Irwin, and the potential for illegal natural resources activities is increased due to this deficiency.

Off-highway vehicles are a problem in a few areas near installation boundaries. Scrappers (persons who enter military reservations to steal ordnance and other items from range areas) are a serious problem on installations in the Southwest (and elsewhere). It is uncertain to what degree scrappers are operating at the NTC and Fort Irwin but they are thought to be active in the northern portion of the installation. The installation has the potential for significant losses due to theft or vandalism of cultural resources. The size and remote location of the Training Center are significant challenges to effective enforcement.

Per NTC Reg. 420-3, the Provost Marshal is responsible for the following activities relating to natural resources:

- Enforcement of hunting laws and regulations,
- Firearms registration,
- Field checks of hunters,
- Action to terminate unauthorized activities,
- Apprehension and detention of violators,
- Providing information to hunters and coordination of missing hunter actions, and
- Control of unauthorized entry to restricted areas, coordinating with the G-3.

The G3 Training promulgates the *Range Regulation* (NTC Reg. 350-3), which contains regulations for use of range areas. This regulation requires individual military units to assume responsibility for compliance with regulations.

The CDFG is available for support of wildlife-related laws and other issues, as needed. The hunting program at the NTC and Fort Irwin is so limited and tightly controlled that CDFG enforcement assistance seldom is needed. The CDFG has been involved in issues such as mountain lion complaints. Poaching is not an identified enforcement issue on the installation.

The NTC and Fort Irwin uses the Federal Magistrate Court to adjudicate civilian violators who are issued citations. The Uniform Code of Military Justice is used for cases cited using the Military Police Report system. State and federal enforcement officers use District or State courts for case adjudication.

10.1 Proposed Action

Goal 1. Assure legal compliance of military and civilian activities with regard to natural and cultural

resources on the NTC and Fort Irwin.

Objective 1. Maintain a law enforcement program for military and civilian activities on the NTC and Fort Irwin range areas.

Objective 2. Coordinate enforcement activities with other agencies, particularly the CDFG.

Objective 3. As soon as possible, train the Natural and Cultural Resources Manager and the Archeologist in enforcement of the Archeological Resources Protection Act, using a BLM-sponsored course.

10.2 Other Management Options

The natural resources enforcement program is minimal at the NTC and Fort Irwin. Reduced program emphasis is not a viable option.

The natural resources enforcement program could be significantly enhanced, which would be consistent with 1997 revisions to the Sikes Act, which emphasizes professional enforcement of natural resources laws on military reservations. Permanent civilian enforcement officers could be hired and trained in natural resources enforcement, such as has occurred on many other military installations. However, these options require additional permanent civilian authorizations and increased budgets, both unlikely considering trends in civilian personnel levels and budgets within the Department of Defense.

11.0 AWARENESS

Conservation awareness is instrumental in creating conditions needed to protect and manage natural resources. The NTC and Fort Irwin approach to awareness stresses education. It provides military personnel and the public with insights into the installation's natural environment and conservation challenges. The more people know about the installation's unique and sensitive natural resources, the more responsibly they act toward them. A conservation awareness program must be directed to both installation and external interests to be effective.

The NTC and Fort Irwin provides an extensive and dynamic natural resources awareness program. The program covers topics including hazardous waste spill prevention and response, natural resources management, desert safety, resources protection, desert tortoise protocol, unexploded ordnance precautions, and similar items.

Goal 1. Provide information to soldiers and civilians so they remain safe while they are at the Training Center.

Goal 2. Educate users to minimize impacts to the land and natural resources to maintain and enhance training.

11.1 Military Personnel Awareness

Environmental Awareness is a component of ITAM that fosters a conservation ethic in those who use NTC and Fort Irwin lands to preserve the capability of training lands to indefinitely sustain the military mission. The Environmental Awareness program was initiated in 1996 on the NTC and Fort Irwin, and the program rapidly developed during 1996-97. Major tools for military personnel awareness through the ITAM program include briefings, training posters, handouts, and natural and cultural resources videos (U.S. Army, National Training Center and Fort Irwin, 2000).

Both home station units and visiting soldiers receive environmental awareness briefings. NTC and Fort Irwin soldiers are briefed through the Observer Controller Academy, Opposing Force (OPFOR) Academy, the National Guard and Reserve Component, and requested safety briefings. Visiting units receive briefings through requested briefings. Both groups receive take-home pamphlets, booklets, and maps. There are also exportable (CD ROM, ZIP, Internet) briefings available upon request for those who may not be able to attend scheduled briefings. These CD briefings are sent to rotational units prior to their arrival to the Training Center to be used at their home stations.

Another aspect of awareness programs at the NTC and Fort Irwin is personnel safety. There are hazards associated with training on the rugged lands at the Training Center. Safety information and materials are often disseminated during environmental awareness training.

The Natural and Cultural Resources Section supports the Environmental Awareness program since many of its programs are dependent upon developing soldier conservation ethics. Many projects within the draft ESMP (U.S. Army 2004) require education of both on-post and rotational military units to comply with the Endangered Species Act. The same is true of the protection of cultural resources (Chapter 13). Most Environmental Awareness materials include information relating to natural and cultural resources protection.

The Natural and Cultural Resources Section and ITAM have implemented a series of educational briefings and handouts explaining sensitive resources on the Training Center, including the desert tortoise. Briefings are conducted by the Garrison Commander, Range Control, and a team from the Natural and Cultural Resources Section, usually consisting of one biologist and one archaeologist. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources, including the desert tortoise and its habitat. The following educational programs are either in place or are scheduled for implementation:

- The Observer/Controller Academy has a 1-hour course on natural and cultural resources training at the NTC and Fort Irwin for all Academy personnel on post and rotational military police who escort troops along the Manix Tank Trail. Specific procedural information is provided to all personnel via hand-outs and lectures explaining ways to deal with desert tortoises observed in the field.
- The OPFOR Academy is a monthly program for leaders and officers who are stationed at the installation. Materials provided in the OPFOR Academy include presentations, a handout on natural and cultural resources on post, and a take-home quiz to reinforce learning.
- The Leader/Trainer Program has a 30-minute course presented one to two times each month to approximately 85 visiting officers who will be responsible for coordinating training maneuvers against OPFOR during their rotation.
- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a ½-hour presentation on cultural and natural resources (including the desert tortoise). Approximately 25 military and civilian personnel attend this class every other month.
- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending these briefings.

11.1.1 Proposed Action

Goal 1. Educate military personnel and civilians associated with military training to minimize impacts to the land and resources to maintain and enhance training.

Objective 1. Revise the Leader's Handbook, Soldier's Field Card, posters, training CDS, and other environmental awareness materials to keep information current.

Objective 2. Develop an in-processing brief and a quarterly post brief to emphasize better integration of environmental concerns at the incoming soldier level as well as within the civilian employee sector to inform all users of the post as to the natural resources upon which the training success of the Training Center ultimately rests.

Objective 3. Provide briefings and educational materials to Training Center units, rotational units, and particularly Army National Guard and Reserve Component units.

Objective 4. Schedule and budget ITAM Environment Awareness projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 2000).

Objective 5. Periodically publish information booklets similar to the Rock Art booklet, which is a high quality publication that provides information on the background of rock art, its value, and ways to help preserve it.

Goal 2. Establish/maintain education and training programs and well-defined operational procedures to

avoid injury or mortality of desert tortoises and other sensitive species during training and other activities.

Objective 1. Develop education programs that will increase awareness of the desert tortoise and its habitat among all personnel on the NTC and Fort Irwin.

Objective 2. Use established training avenues to increase awareness of requirements to protect sensitive species on the NTC and Fort Irwin.

Objective 3. Develop brochures for venomous animal awareness and spring protection.

Objective 4. Develop a cooperative approach to species/habitat protection and continue to stress the importance of reporting.

11.1.2 Other Management Options

The ITAM Environmental Awareness program is not specifically required for legal compliance, but many materials and programs are directly related to protected natural or cultural resources, and the entire program is directed toward sustainment of the capability of the installation to support the military mission, as required by the Sikes Act. Thus, while there are many options for educating military users of the installation, the option to not educate these personnel is not viable. Materials used by the NTC and Fort Irwin are developed specifically for military personnel based on experience on other military installations. It is questionable whether other materials and briefings could be developed with better cost/benefits.

Projects using education to protect sensitive species, particularly the desert tortoise, were developed in response to the Biological Opinion (USFWS, 1995) during development of the programmatic management plan (Chambers Group, Inc., 1996a) and the draft ESMP (U.S. Army 2004). Thus, while there are options to specific methods used, the option to not use education is not viable, and changes in the program would likely require consultation with the USFWS.

11.2 Public Awareness

Use of Media

The NTC and Fort Irwin's weekly newspaper, the *High Desert Warrior*, is the most efficient way for natural resources personnel to access the NTC and Fort Irwin community. This newspaper is used to explain programs and gain support for their implementation. Articles target a wide range of readers but may be designed to appeal to specific categories of readers.

Natural resources and ITAM personnel often write articles for the *High Desert Warrior*, and staff writers also cover natural resources and ITAM programs. Examples of articles include the use of engineer units to support LRAM projects, desert tortoises, use of the Student Conservation Association, and scouts helping designate off-limits areas. The Natural and Cultural Resources Program Manager writes short "clips" which can be used as "fillers" for the paper (*e.g*., coyotes, badgers, etc.).

Other newspapers, such as the Barstow *Desert Dispatch* and Victorville *Daily Press*, use information about the Training Center's natural resources programs. Army publications, such as *The Environmental Update*, *The Bridge*, and the FORSCOM publication, *The Grapevine*, have published articles (*e.g.*, soil stabilization, Seibert stakes, Environmental Awareness program, etc.) for dissemination to other military

installations. News releases and interviews with media are coordinated with the Public Affairs Office.

The media is important to the dissemination of information regarding tortoise management and protection. Information provided by the Public Affairs Office provides timely newspaper articles and spots on base television and radio stations to installation personnel and the public.

Field Trips

The NTC and Fort Irwin provides opportunities for the public to learn about the desert tortoise and other items of interest through participation in programs such as the Desert Explorers. Desert Explorer field trips, which are led by personnel from the Natural and Cultural Resources Section, cover topics including cultural resources, geology, endangered and threatened species, and the natural history of plants and animals of the Mojave Desert.

Special Events

The NTC and Fort Irwin natural resources and ITAM personnel go to considerable efforts to spread the word regarding their programs using special events. Below is a partial listing of recent examples:

- Earth Day talks at civic clubs and schools,
- Talks and tours for scientific groups,
- Local Chamber of Commerce meeting presentations, and
- Environmental displays at the Barstow Military Appreciation Day, Edwards AFB open house, Barstow Earth Day, Torrance for Armed Forces Appreciation Day, and Fort Irwin Earth Day.

Youth Programs

Youth groups are involved in various natural resources programs on the NTC and Fort Irwin. Scouts use post projects for their conservation badges. Boy Scouts, Cub Scouts, and Girl Scouts have assisted with the construction of Seibert stakes and planting of native vegetation for the ITAM program. Natural resources personnel provide lectures and guided field trips for youth groups, when requested.

Once or twice a year, a biologist from the Natural and Cultural Resources Section assists in educating children on post by visiting the Fort Irwin Elementary School to provide information and class lectures on the natural history and ecology of the desert tortoise. This includes a hands-on session where tortoise shells and live tortoises (adopted due to illness) are displayed.

Desert Tortoise Education Facility

The installation constructed a Desert Tortoise Education Facility in the middle of the cantonment area at Jackrabbit Park. Captive desert tortoises are residents of the facility and can be observed by base personnel and visitors. Typically, tortoises in the facility are captives that have been brought to the post veterinarian by base personnel or tortoises that have been injured on- or off-post and cannot be returned to the wild.

11.2.1 Proposed Action

Goal 1. Provide an understanding of the NTC and Fort Irwin natural resources program to installation and surrounding communities.

Goal 2. Provide information to soldiers, civilian employees, and other installation users to improve their understanding of impacts of their activities on the environment.

Objective 1. Use the printed media, both on- and off-post, as an important part of natural resources management on the NTC and Fort Irwin.

Objective 2. After coordination with the Public Affairs Office, provide support to the electronic media in preparation of television or radio programs involving natural resources on the Training Center.

Objective 3. Whenever personnel are available, provide tours of the NTC and Fort Irwin to interested groups, such as the Desert Explorers.

Objective 4. Continue to participate in local events with natural resources significance, particularly those associated with Earth Day and appreciation of the armed forces.

Objective 5. Work with youth groups whenever possible as a good investment in the future.

Objective 6. Maintain and enhance educational opportunities at the Desert Tortoise Education Facility.

Objective 7. Provide a "visitor-activated" audio description of the tortoise life cycle and other information for the Desert Tortoise Education Facility.

11.2.2 Other Management Options

With exception of efforts directed specifically toward public education regarding the desert tortoise, none of the above projects are mandated by law. Major reductions in tortoise education programs would likely require consultation with the USFWS. Other programs could be reduced or expanded to any degree desired. Army policies and programs preclude the elimination of all public awareness efforts, but the degree of participation from ITAM and natural resources personnel is optional. Personnel constraints in both programs largely restrict the option to significantly increase public awareness activities.

11.3 Professional Enhancement

Natural resources management on the NTC and Fort Irwin is involved with other professionals on other military installations and neighboring public lands. As a part of overall professional enhancement, natural resources and ITAM personnel on the Training Center provide information to others who may be interested in learning from experiences on the installation. For example, personnel have made presentations to other Defense natural resources managers at the Annual ITAM Workshop, and the NTC has sponsored or co-sponsored several research symposia since 1996. These symposia featured presentations from a wide spectrum of scientists, including biologists, geologists, botanists, meteorologists, GIS managers, archeologists, etc.

11.3.1 Proposed Action

Goal 1. Sponsor and participate in opportunities to provide information regarding NTC and Fort Irwin natural resources programs and similar programs elsewhere.

Objective 1. Consider sponsoring other Mojave Desert Research Symposia or similar events, depending on

available resources.

Objective 2. Actively participate in training sessions, such as the annual ITAM Workshop (see Section 16.2.2).

Objective 3. Author/co-author papers for scientific journals presenting research/project results.

11.3.2 Other Management Options

None of the above projects are mandated by law. Thus, they can be reduced or expanded to any degree desired. Army policies promote the involvement of natural resources personnel with other professionals, but the degree of participation from ITAM and natural resources personnel is optional. Personnel and budget constraints will limit significant increases in the time and money spent on these programs.

12.0 OUTDOOR RECREATION

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP and to be consistent with DoD Directive 7400.4 and AR 200-3, outdoors recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, horseback riding, picnicking, bird watching, off-road vehicle use, hiking, and camping. Developed or constructed facilities and activities such as golf, tennis courts, baseball facilities, etc. are not included.

General Goal 1. Provide opportunities for the NTC and Fort Irwin community to participate in high quality, safe outdoor recreation.

General Goal 2. Manage outdoor recreation consistent with needs of the NTC and Fort Irwin military mission.

General Goal 3. Integrate recreation activities with natural resources stewardship and compliance.

12.1 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on the NTC and Fort Irwin, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

12.2 Public Access

General public access is not permitted on the NTC and Fort Irwin, except under highly controlled conditions. The military mission is extremely hazardous, and there are significant dangers associated with range use on the installation. Security requirements are high. An example of public use of the installation is guided tours, which can be closely controlled to maintain visitor safety and prevent conflicts with the military mission.

Department of Defense Directive 4715.3, *Environmental Conservation Program*, May 3, 1996, states, "*The principal purpose of DoD lands and waters is to support mission-related activities. Those lands and waters shall be made available to the public for educational or recreational use of natural and cultural resources when such access is compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness. Opportunities for such access shall be equitably and impartially allocated*".

Paragraph 2-10 of Army Regulation 200-3, *Natural Resources -- Land, Forest, and Wildlife Management*, states that access by recreational users, *... will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use; and at such times as such access can be granted without bona fide impairment of the military mission, as determined by the installation commander*. This regulation further states that withholding public access must be substantiated by a statement in the INRMP. The NTC and Fort Irwin policies toward public access are within Army and Defense policies.

12.2.1 Proposed Action

Goal. Provide highly controlled access to the NTC and Fort Irwin for natural resources recreation, in accordance with Army policies.

Objective. Continue NTC and Fort Irwin policies toward public access.

12.2.2 Other Management Options

It is difficult to increase access opportunities within the constraints of the current military mission, which is very land-use extensive, range scheduling exclusive, and inherently dangerous to nonmilitary users. There is the option to tighten recreational access policies, but unless either the mission or the threat assessment associated with access changes, this would have to be substantiated with signatory agencies of this INRMP.

12.3 Hunting and Fishing

There are no fisheries capable of supporting recreational fishing on the NTC and Fort Irwin. Hunting is controlled via NTC Reg. 420-3. Small game species at the installation include Gambel's quail, chukars, cottontail rabbits, and jackrabbits. Migratory game species, particularly mourning doves, ducks, and geese, pass through the installation during spring and fall migrations. Ducks and geese are not hunted on the installation. Coyotes also may be hunted.

Hunting is conducted under regulations promulgated by the CDFG. Hunters are required to possess a State hunting license and must abide by State (and federal with regard to migratory species) regulations regarding firearms, hunter safety requirements, hunting seasons, and bag limits.

The role of the Provost Marshal in the control of hunting on the NTC and Fort Irwin is outlined in Chapter 10. Hunting on Fort Irwin is restricted to post recreation areas, and is under the direction of the Directorate of Community Affairs.

- Advance designation of areas open to hunting;
- Designation of restrictions, including areas open, hours open, and hunter quotas;
- Administrative processes to control hunters, including issuing access passes and ensuring hunters have installation hunting permits and firearms registration certificates; and
- Coordination with the Provost Marshal to control unauthorized entry into restricted areas and accounting for delinquent (possibly lost) hunters.

The Director of Public Works (Natural and Cultural Resources Section) is responsible for the following actions:

- Development and implementation of wildlife management plans that include game species (*i.e.*, this INRMP), in coordination with the CDFG and USFWS;
- Conducting surveys to monitor impacts of hunting on game species;
- Control of predators and nuisance animals;
- Assistance to the Provost Marshall for enforcement of game regulations;
- Administration of the penalty and suspension system of NTC Reg. 420-3; and

- Advising the Natural Resources Conservation and Beautification Committee on technical aspects of the hunting program.

12.3.1 Proposed Action

Goal. Provide quality hunting opportunities on the NTC and Fort Irwin, consistent with requirements to avoid conflicts with the military mission and provide for safe hunting conditions.

Objective 1. Implement provisions within NTC Reg. 420-3.

Objective 2. Implement surveys to monitor impacts of hunting.

12.3.2 Other Management Options

Additional hunting in terms of more lands and more access times is not consistent with the conduct of the military mission and, thus, is not a viable option. Reduced hunting, to include no hunting, is an option. However, changes in the hunting policy would have to be coordinated with the CDFG via changes to this INRMP, per the Sikes Act and AR 200-3. Changes in the system of controlling hunters are possible but only if security, safety, and non-conflict with the military mission are maintained.

12.4 Other Natural Resources Oriented Outdoor Recreation

The NTC and Fort Irwin has natural resources-related recreational activities other than hunting. These range from more passive activities such as picnicking, wildlife watching, and nature photography to more active recreational outlets such as bicycling, horseback riding, recreational shooting, and camping. These activities are generally a responsibility of the DCA, which uses the base operations contract for program implementation.

12.4.1 Specific Activities

High Desert Equestrian Club

The High Desert Equestrian Club is a private organization open to all members of the Fort Irwin community. The club operates a 32-stall stable located in the western section of the cantonment area, off Goldstone Road, across the street from the Rod and Gun Club shooting range. Horses are privately owned and maintained by individual owners, who are also expected to maintain the stalls. No staff or offices are located at the stables. Horseback riding is allowed at locations designated by Range Control. The boundaries for horseback riding areas can be found in NTC Reg. 350-3 (U.S. Army, NTC and Fort Irwin, 1996). Equestrians are free to ride within designated areas at their discretion. The club must also follow the policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Off-Highway Vehicle Park

An Off-Highway Vehicle (OHV) area was created in 2003 to provide recreation for off-road enthusiasts. By providing a designated area for off-roaders, the Army was able to enforce a strict ban on OHVs elsewhere on the base. The OHV Park is located within base recreation lands, at the intersection of Fort Irwin Road and NASA Road (Figure 12.4.1). The area is approximately 70 acres. The perimeter is fenced with both desert tortoise proof fence and two-strand barbed wire, with boundary signs.

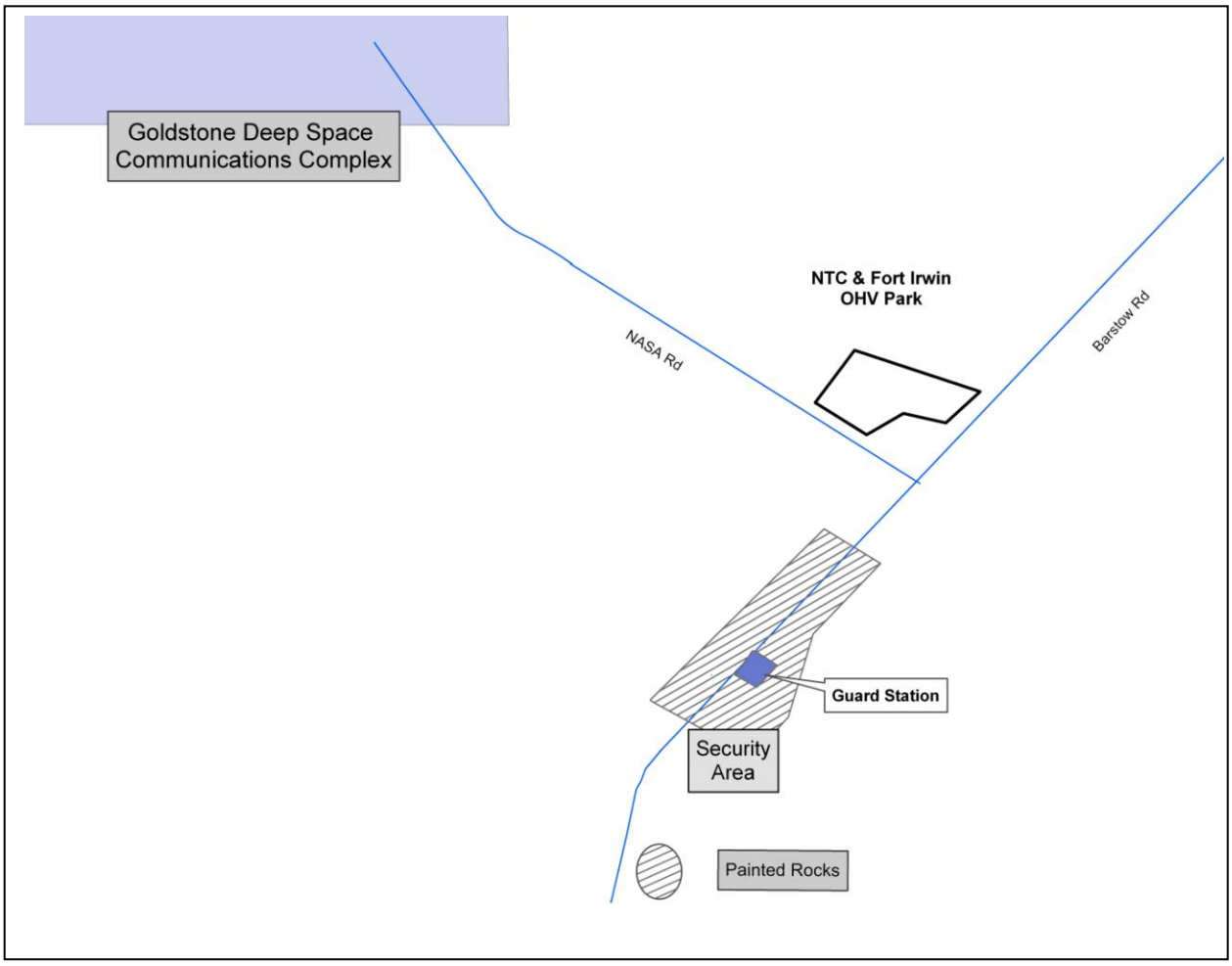

Figure 12.4.1 Location of the NTC and Fort Irwin OHV (Off-Highway Vehicle) Park.

Potential users of the OHV Park must receive training from the Outdoor Recreation office of the Directorate of Community Activities (760-380-3434). OHV enthusiasts who take the training course are given keys that unlock the entry gate to the OHV Park.

There are no sensitive natural resources within the OHV Park. Adult tortoises were translocated from the park in 2003. The OHV Park requires periodic fencing checks. For example, a heavy rain storm in 2004 washed out a short segment of tortoise fencing, and was subsequently repaired. Tortoises could have entered the park while the tortoise fencing was down. A tortoise that managed to gain entry to the OHV Park would likely be hit and killed by fast-moving OHVs.

Camping and Picnicking

Picnicking is a popular activity on the NTC and Fort Irwin. Picnic facilities are at Jackrabbit Park, Constitution Park, the Pavilion, and small areas near playgrounds and other areas.

There are 13 recreational vehicle hook-up spaces in the cantonment area for use by military and civilian personnel and their dependents. Electricity is the only utility supplied to the area; there are no water or sewer hook-ups at the park. Spaces are available with a per-day charge. Primary users of the recreational

vehicle park are contractors performing long-term work on the installation.

Desert Explorers Club

The Desert Explorers Club is an organization on the installation, open to all members of the Fort Irwin community: military, civilian, dependents, support personnel, and visitors. As an educational organization, the Desert Explorers facilitate stewardship of the natural environment and areas of cultural and/or historical significance by increasing understanding and appreciation of the Mojave Desert ecosystem on the Training Center. Activities include hikes and day trips on and off the installation, meetings, and an occasional speaker on the desert environment. Activities are planned, announced, and open to anyone. The Natural and Cultural Resources Section has an active partnership with the Desert Explorers Club to facilitate awareness programs (Section 11.2).

The Sportsman Club

The Sportsman Club is a private organization on the NTC and Fort Irwin, open to all members of the Fort Irwin community: military, civilian, dependents, support personnel, and visitors. The club operates rifle, pistol, and archery ranges located in the western section of the cantonment area, off Goldstone Road. The shooting range has been located to avoid disruptions with the training activity of the Training Center and is open from sunrise to sunset. Proper firearm safety procedures are to be followed at all times. The organization must follow policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Skeet and Trap Range

The skeet and trap range (Range 8) is controlled by Range Control and operated by DCA Staff. When Range 8 is open, firing ranges operated by the Sportsman Gun Club are closed due to firing fans.

Recreational Equipment Issue Center

DCA operates a major outdoor recreation equipment issue center. Items issued include fishing equipment, camping equipment, boats and motors, canoes, camping trailers, etc. The Center provides boating safety classes, and it arranges for special training, such as scuba classes. The Center provides taped instruction on such varied activities as golf, camping, and desert survival. The Center offers a wide variety of off-post tours and recreational outings (*e.g.*, rock climbing, rafting, skiing, deep seas fishing) using a commercial vendor. These tours and outings are scheduled at least 14 times per month.

Golf

The NTC and Fort Irwin formerly had a nine-hole golf course and small driving range in the cantonment area that had been closed for some time. In 1998 the installation converted the driving range into a pitch and putt, six-hole golf facility. The facility is watered with secondarily treated water from the wastewater treatment plant.

12.4.1.1 Proposed Action

Goal. Provide quality opportunities for natural resources-based outdoor recreation.

Objective 1. Continue and enhance opportunities for outdoor recreation involving natural resources at the Training Center.

12.4.1.2 Other Management Options

There are many options available for outdoor recreation, but they must be consistent with the accomplishment of the military mission to be viable. They must also be consistent with the ecosystem management strategy employed to protect and use natural resources as well as overall goals for outdoor recreation on the military installation. The program could be decreased or expanded to whatever level can be supported by the NTC and Fort Irwin.

12.5 Indoor Recreation

The cantonment area is the primary housing and recreation area on the installation. Numerous recreational activities and facilities are available for military and civilian personnel and their dependents. Activities and facilities include a movie theater, bowling alley, baseball and soccer fields, basketball and racquetball courts, pools, a jogging and confidence course, outdoor skate park, a 4 plex (softball), and 12 parks. During non-rotational periods, many of these facilities are unused.

The NTC and Fort Irwin has constructed a Desert Tortoise Education Facility in the center of the cantonment area. Here, soldiers, family members, and visitors can see captive desert tortoises. See Section 11.2.1 for more information on this facility.

13.0 CULTURAL RESOURCES PROTECTION

Cultural resources management at the NTC and Fort Irwin is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (NHPA) (16 U.S.C. Section 470, as amended), the Archeological Resources Protection Act (16 U.S.C. Section 470aa-47011), the American Indian Religious Freedom Act (42 U.S.C.), the Native American Graves Protection and Repatriation Act (25 U.S.C. Section 3001 *et seq*.), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and AR 200-4 (*Cultural Resources Management*).

Management of the NTC and Fort Irwin's cultural resources is a mission of the Environmental Division, DPW, which has a full-time Cultural Resource Manager (CRM) who is responsible for all aspects of cultural resources management, including coordination with the California State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, Native American tribal organizations, and the public. The installation has a *Ft. Irwin Integrated Cultural Resources Management Plan* (SAIC, 1998), and much of the below discussion is taken from this plan.

There are four major goals of the NTC and Fort Irwin Cultural Resources Program (SAIC, 1998):

- Manage cultural resources in the context of freedom to use open space in an unrestricted manner wherever feasible.
- Reiterate and update guidelines, standards, and management practices for cultural resources proposed in a draft final *Fort Irwin Historic Preservation Plan* (Dean, 1986), which was not implemented.
- Set priorities for survey, evaluation, and treatment projects based on the sensitivity of cultural resources to impacts from Army activities and the likelihood that those impacts would occur in the foreseeable future.
- Recommend ways that Native Americans might participate in the overall historic preservation program.

This INRMP has a more limited cultural resources goal than the complete Cultural Resources Program, but it is compatible with cultural resources program goals.

13.1 Cultural Resources

13.1.1 Cultural Resources Inventory

Within the boundaries of the NTC and Fort Irwin there are a large number of archaeological and historical sites and districts. A wide range of site types are represented: prehistoric habitation and resource procurement sites (dating back at least 12,000 years); Native American rock art sites (petroglyphs); historic period Euro-American habitation sites, mines, trails, and other sites (including military training facilities); and the Pioneer Deep Space Antenna built for NASA in 1958 and registered as a National Historic Landmark in 1985.

To date, 65% of the installation has been surveyed for archaeological sites. Survey efforts have largely been conducted in areas which are likely to contain sites (such as former lake margins and springs). These surveys have identified roughly 700 prehistoric archaeological sites. The survey effort is on going with

new areas surveyed each year.

The goal of the cultural resources survey is to inventory sites on the installation, to evaluate those sites for significance, and to nominate sites that meet significance criteria to the National Register of Historic Places (NRHP), established by the NHPA. Three sites are listed on the NRHP (Bitter Springs, Cave Springs, and the Pioneer Deep Space Antenna). Twenty-four others have been determined eligible but are not yet registered. In addition, three historic districts (Drinkwater Spring, No-Name Basin West, and Nelson Lake) have been determined eligible for the NRHP. Many other sites are considered eligible for the NRHP but have not yet been formally designated as such.

A recent survey of standing architectural resources in the Cantonment Area and the Pioneer Deep Space Station Site found that only three standing structures were considered eligible for the NRHP. All three structures are located at the Pioneer Site in the Goldstone Deep Space Communications Complex. Currently (May 2005), the plans for Pioneer Site are uncertain. It is likely that the site will be used for urban warfare training, and the original radio telescope will be moved to a protected area such as Barstow. While no other historic or architectural structures are currently identified as eligible for the NRHP, in the future some structures may become more significant and warrant protection.

Eligibility of archeological sites for inclusion in the NRHP is the principal criteria determining management prescriptions. Generally, sites fall into one of three categories with regard to NRHP eligibility:

- ***Eligible***: These sites have been determined eligible for the NRHP and therefore are subject to protection. They should not be affected without consultation per Section 106 of the NHPA and development of a plan to mitigate adverse effects.
- ***Ineligible***: These sites have been determined ineligible for the NRHP and do not require protection from adverse effects.
- ***Potentially eligible (intermediate)***: Further investigation is required to determine NRHP eligibility. Therefore, these sites are potentially eligible for the NRHP and require protection until determinations of eligibility can be made.

13.1.2 Planning

The level of survey intensity has been highly variable across the installation (Basgall and Hall, 1994). Most cultural studies at the Training Center were conducted after initial disturbances and in conjunction with ongoing land-use practices. As such, sampling strategies have not been systematic, making quantitative comparisons difficult in most circumstances.

Initial management priorities for cultural resources known or expected to exist on the NTC and Fort Irwin are established according to three main criteria: (1) threats to archaeological sites from ongoing or anticipated training activities; (2) evaluation of existing inventory levels and assessment of future needs; and (3) appraisal of the need for further evaluation and/or mitigation at known or newly identified resources (Basgall and Hall, 1994). Once installation-wide inventory levels are deemed adequate, management efforts can shift to monitoring and mitigating specific impacts on a known set of resources. As such, the direction of management efforts at the installation should be seen as a transition from exploratory identification, evaluation, and treatment of resources spread across the Training Center to a state in which a smaller, established set of sites and localities is monitored and treated in accordance with changing training requirements. All archaeological sites are being recorded in the Training Center's GIS to facilitate management of these resources.

13.1.3 Relationships with the Military Mission

Archaeological resources within the installation are frequently located in areas which are suitable for training. This has resulted in widespread site destruction and damage, particularly around former lake margins and basins (playas). In many cases, destroyed and damaged sites had been previously cleared for training as they were sufficiently studied before their destruction. Much of this destruction occurred in previous decades during military training exercises. Currently, efforts are made to protect known sites as well as unsurveyed areas within the installation. Whenever possible, sites which are on the NRHP or are considered eligible for the NRHP are protected by "off-limits" signs and fencing. Cultural Resources Program personnel and Range Control monitor these areas.

In addition to survey and inventory of sites on the installation, another primary goal of the Cultural Resource Program is to mitigate additional sites for unrestricted use by the Training Center. Mitigation involves large-scale data recovery (surface collection and excavation) at archaeological or historic sites. Artifacts and other items collected in mitigation projects are curated at the NTC and Fort Irwin. Numerous archaeological mitigations have been conducted, and additional mitigations will be conducted as funding becomes available.

13.1.4 Consultation with Native Americans

Various laws and regulations require the NTC and Fort Irwin to consult with Native Americans regarding Army activities on sites within the installation. The NHPA requires that federal agencies must consult with the Advisory Council on Historic Preservation regarding any proposed action that has the potential to affect a property on or eligible for the NRHP. This includes consultation with the SHPO and interested parties, including but not limited to Native Americans.

The Archaeological Resources Protection Act (ARPA) requires that archaeological resources on public and Indian lands be protected. This includes notifying Indian tribes, in advance, of possible harm to sites with religious or cultural importance.

The Native American Graves Protection and Repatriation Act (NAGPRA) protects the ownership and control of native American human remains and related cultural items excavated or discovered on federal lands. If human remains are discovered during projects, work must stop, and a reasonable effort must be made to protect the discovery. Appropriate Native American groups must be notified, and requirements of Section 106 of NHPA and NAGRPA must be followed for excavation and disposition of the remains. NAGPRA also requires a 30-day delay period after the discovery of human remains before project work in the area of the discovery can resume. Work may resume earlier if consultation and agreement occur.

The American Indian Religious Freedom Act covers the protection of intangible, ceremonial, or traditional values and concerns not tied to specific cultural properties. The NTC and Fort Irwin must establish contact with interested Native American groups during the regular course of the NHPA Section 106 process.

Executive Order 13007 (*Indian Sacred Sites*) stipulates that if a federally recognized tribe or representative of an Indian religion identifies a sacred site on the NTC and Fort Irwin, the installation commander must enter into consultation with that group or individual to provide access to and ceremonial use of the site and avoid adversely affecting the physical integrity of such sites.

13.2 Natural Resources Management Implications

Natural resources management on the NTC and Fort Irwin has little potential to affect cultural resources. Conversely cultural resources management on the post seldom significantly affects natural resources management. In the case of site mitigation, the natural resources staff will survey the area for threatened and/or endangered species. If a federally listed species is encountered, a Section 7 consultation with USFWS will be requested, and upon approval of USFWS, the species will be relocated and mitigation will continue. If no listed species are encountered, site mitigation can continue. Upon completion of the site mitigation, the site will be restored to as close to its natural condition as possible.

Archaeological mitigations conducted at the Training Center have recovered a substantial database of prehistoric and early historic environmental conditions. Faunal and botanical data reveal changes in climate, biodiversity, and habitat through time. These resources may be instrumental in assessing long-term effects of land-use at the installation, as well as long-term climate change.

Natural resources practices with potential to adversely affect cultural resources are outlined below.

- **Land Rehabilitation and Maintenance/erosion control**: Of all practices associated with natural resources management on the NTC and Fort Irwin, LRAM/erosion control projects have perhaps the greatest potential to affect archeological sites. Projects involving decompaction, earth moving, and fill deposition can damage or bury archeological sites. Generally, however, effects to archeological sites from reduced erosion are positive. In addition, surveys are done in project areas prior to initiation of work.
- **Outdoor recreation programs**: Public access associated with hunting and outdoor recreation activities has limited potential to increase the risk of vandalism to archeological sites.
- **Spring maintenance/exotic plant species control**: Care must be taken to minimize ground disturbance when working around springs that are highly likely to contain archeological resources. Projects such as fence building, spring development, and exotic plant removal have potential to disturb or damage archeological sites.

Even with proper review, natural resources projects still have potential to affect archeological sites through accidental discovery.

Natural resources management can be used to protect cultural resources sites. Seibert stakes (Section 9.9.1.4) are used to keep military activity from damaging sites. LRAM projects (Section 9.9.1.1) can be planned to specifically protect sites from erosion, and LRAM, in general protects both known and unknown sites downslope.

Numerous provisions of this INRMP benefit cultural resources management on the NTC and Fort Irwin. These include *Special Interest Area Protection* (Section 9.12), *Military Personnel Awareness* (Section 11.1), *Land Rehabilitation and Maintenance* (Section 9.8), *Enforcement* (Chapter 10), and *NEPA Implementation* (Chapter 14).

13.2.1 Proposed Action

Goal 1. Implement this INRMP in a manner consistent with the protection of cultural resources at the NTC and Fort Irwin.

Objective 1. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management.

Objective 2. Consider natural resources projects when planning cultural resources surveys, and use results of cultural resources surveys to plan natural resources projects.

Objective 3. Conduct listed species surveys and, if required, consultation for proposed cultural resources mitigation sites.

Objective 4. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the CRM for approval, determinations of effect, and Section 106 consultation, as necessary.

Objective 5. Maximize use of GIS archeological information in planning and implementing LRAM projects.

Objective 6. Take the following protective measures upon discovery of sites.

- Cease ground-disturbing activities immediately and report to the CRM upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the CRM to be natural, do no further investigation and resume the project. Protect the site until such time that it is determined ineligible for the NRHP if remains are determined to be cultural.

Objective 7. Use natural resources techniques and projects to protect cultural resources sites.

13.2.2 Other Management Options

There are few viable options with regard to protection of cultural resources during implementation of this INRMP. Laws and regulations require surveys and protection or mitigation of significant cultural resources sites on federal lands. Procedures are detailed, and the proposed action follows these procedures. Deviations from the proposed action would require, at a minimum, consultation with the SHPO.

The use of natural resources to protect cultural resources has options in terms of scope of these projects. The potential to protect sites using active erosion control and site marking is almost unlimited. Thus, the number of projects could be increased or decreased.

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14.0 NATIONAL ENVIRONMENTAL POLICY ACT IMPLEMENTATION

The National Environmental Policy Act (NEPA) was created, as the impact of humans on the environment became apparent. NEPA is a process that can be used to disclose environmental concerns with human activities and resolve them to the best degree possible. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. NEPA regulations (AR 200-2, *Environmental Effects of Army Actions* provides guidance to the DA on how to implement the NEPA process for Army Actions (DA 29 March 2002). NEPA was not legislated to stop actions. Rather, it was crafted as a planning tool to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.

The NTC and Fort Irwin must also comply with the California Environmental Quality Act (CEQA), a state law similar to NEPA requiring public agency decision-makers to analyze and disclose the environmental implications of their actions. CEQA applies to all government agencies in California, including the NTC and Fort Irwin. CEQA contains substantive provisions requiring agencies to deny approval of a project with significant adverse effects when feasible alternatives or feasible mitigation measures can substantially lessen such effects.

14.1 Responsibilities and Implementation

14.1.1 Responsibility

The Environmental Division, DPW has primary responsibility for NEPA implementation at the NTC and Fort Irwin. One person is assigned NEPA as a primary duty. The process of reviewing and preparing NEPA documentation often involves direct coordination with other natural resources partners, particularly those listed in Chapter 5 of this INRMP.

14.1.2 NEPA Documentation

The most common NEPA document prepared for projects that do not impact the environment is a Categorical Exclusion, often with an attached Record of Environmental Consideration (REC). This simple documentation generally works well for routine projects, such as borrow sites, small digging projects, routine maintenance, small construction projects, management plans, research projects, certain testing and training activities, and other projects where it can be determined that specific screening criteria have been met as outlined in 32 CFR 651.

Environmental Assessments (EA) are required for specific types of projects or when the screening criteria for a categorical exclusion are not met. Not being able to meet the criteria for a categorical exclusion can happen when a new military exercise or range is planned, when the action involves a wide geographic area, or when wetlands or other sensitive plant communities may be involved. Examples include new military missions, projects that may affect threatened or endangered species or cultural resources, major plans (such as this INRMP), or range construction. EAs require the approval from the Director of Public Works and a 30-day public comment period. The final document after the EA has been approved is the Finding of No Significant Impact (FONSI), which states that the project has no significant impacts and that an Environmental Impact Statement is not necessary.

If a FONSI is not appropriate, the following options are available:

- Modify the action to remove significant impacts (mitigation).
- Mitigate significant adverse impacts (mitigation).
- Drop the action.
- Publish a Notice of Intent to prepare an Environmental Impact Statement.

14.1.3 Mitigation

Mitigation is a way to either consider less damaging options or provide means to off-set damage to the environment and should be considered throughout the NEPA process. Below are five general mitigation tactics:

Avoidance: Avoid adverse impacts on natural resources by not performing activities that would result in such impacts. Confine construction to areas where no significant impacts would occur to natural resources.

Limitation of action: Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on natural resources.

Restoration of the environment: Restore the environment to its previous condition or better. This could involve reseeding and/or replanting an area with native plants after it has been damaged by construction projects.

Preservation and maintenance operations: Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or erosion caused by construction projects that would impact natural resources.

Replacement: Replace the resource or environment that will be impacted by construction projects. Replacement can occur in-kind or otherwise, on-site or at another location. This could involve creation of the same type or better quality habitat for a particular impacted wildlife species or creation of habitat for another species.

Mitigation that is identified in a FONSI is a Class 1 "must fund" for environmental purposes. This provides a mechanism to fund mitigation included in NEPA documents.

14.2 NEPA and Natural Resources Management

The Environmental Division uses NEPA to ensure its activities (as described in this INRMP) are properly planned, coordinated, and documented. The Division also uses NEPA to identify problems associated with other organizations' projects that affect NTC and Fort Irwin natural resources when it reviews such projects.

Siting range-related projects is perhaps the most basic decision that requires input from natural resources personnel. If this phase is done within the cooperative spirit of NEPA, most other environmental problems are generally resolved with relative ease. Decisions such as specific siting or mission planning should be cooperatively discussed prior to preparing NEPA draft documents. The use of the Training Requirements Integration component of ITAM (Section 9.13) may help in this process. An important offshoot of proper

NEPA implementation is that projects are often enhanced by the effort. Siting is one of the most common examples of project enhancement. When natural resources managers understand mission/project requirements in terms of land features and requirements, they often not only offer more potential site options to mission or project planners but also offer alternatives to avoid future environmental conflicts.

14.2.1 Proposed Action

Goal 1. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Objective 1. Document effects of implementation of this INRMP through an EA that is embedded in this document.

Goal 2. Use NEPA to identify projects and activities on the NTC and Fort Irwin that might impact natural resources and work with project planners to resolve issues early in the planning process.

Objective 1. Create and fill the position of NEPA Coordinator.

Objective 2. Under the leadership of the NEPA Coordinator, perform environmental review of all construction, planning, and training at the NTC in accordance with NEPA.

Goal 3. Help the NTC and Fort Irwin comply with NEPA.

Objective 1. Reference this INRMP/EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 2. Classify mitigation as a "must fund" for budgetary purposes.

Objective 3. Conduct an informational brief on NEPA purpose and process for appropriate command level personnel and likely proponents to inform them of the benefits, requirements, and importance of NEPA.

14.2.2 Other Management Options

There are few viable options with regard to NEPA documentation with regard to this INRMP. Laws and regulations require the use of NEPA, and the DA specifically requires an EA for INRMPs. Procedures are detailed, and the proposed action follows these procedures. The NTC and Fort Irwin could have chosen to prepare a separate EA for this INRMP rather than a combined document. However, this would not have changed the outcome of the analysis.

This EA could have been prepared only considering the preparation of the INRMP, which would require individual NEPA documentation for each project as it is implemented. This option would be far more costly. The option to not prepare NEPA documentation for natural resources projects is not legally viable. The option to prepare an Environmental Impact Statement was viable, but there was no reason to assume that one would be required.

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15.0 UNRESOLVED ISSUES

The NTC and Fort Irwin faces many tough issues, but they are not unresolved in terms of plans to deal with them. This INRMP includes projects designed to either complete or move toward completion of issues that confront natural resources management on the Training Center. Many projects described in this INRMP could benefit from increased funding and personnel support.

The only significant unresolved issue involving natural resources at the NTC and Fort Irwin is the land expansion issue. This INRMP includes all lands belonging to the Training Center. Although training will not begin on these lands until 2006-2008, natural resources management described in this INRMP assumes that training will commence on schedule. If any changes to the Land Expansion process are made, this INRMP will be adjusted as needed to include programs and projects for any new lands.

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16.0 IMPLEMENTATION

This plan is only as good as the NTC and Fort Irwin capability to implement it. This INRMP was prepared with a goal of 100% implementation. Below are described the organization, personnel, and funding needed to implement programs described in chapters 8 through 14.

16.1 Organization

The Environmental Division, DPW and the ITAM Office, G3-Training at the NTC and Fort Irwin can implement most of this INRMP and fulfill general goals and policies established in Chapter 1 and more specific goals and objectives within chapters 8-16. Other Training Center organizations identified in Section 5.1 are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during 2006-2011 for improved operations efficiency.

16.2 Personnel

"The management and conservation of natural and cultural resources under DoD control, including planning, implementation, and enforcement functions, are inherently governmental functions that shall not be contracted."[11]

16.2.1 Staffing

The following staffing is required to implement this INRMP at the NTC and Fort Irwin:

Directorate of Public Works

Natural and Cultural Resources Program Manager	1	GS-12
Ecologists	2	Contract positions
Botanist/Task Lead	1	Contract position
NEPA Coordinator	1	Contract position
Wildlife Biologist	1	Contract position
Animal Control Officer	1	Contract position
Animal Control Technician	1	Contract position
Field Technician	2	Contract position
Staff Archaeologist	1	Contract position
Archeology Technician	3	Contract positions
Collections Manager	2	Contract positions

Mojave Desert Ecosystem Program

DoD Coordinator/Program Lead	1	Contract position
Administrative Assistant	1	Contract position
GIS Manager	1	Contract position
Web Master	1	Contract position

[11] DoD Instruction 4715.3, Environmental Conservation Program, 2 May 96.

Software Specialist	1	Contract position

G3 Training

ITAM Manager	1	Contract position
Project Coordinator	1	Contract position
LRAM Coordinator	1	Contract position
RTLA Coordinator	1	Contract position
GIS Manager	1	Contract position
Systems Administrator	1	Contract position
Field Crew	4	Contract positions

Above personnel lists do not include personnel within DCA or the Provost Marshal's Office.

16.2.1.1 Proposed Action

Goal. Provide staffing of natural resource management professionals required to effectively manage natural resources on the NTC and Fort Irwin (Department of Army, 1995).

Objective. Provide staffing for the NTC and Fort Irwin natural resources program as indicated in the above discussion.

16.2.1.2 Other Management Options

The above staffing plan is not excessive in terms of staffing at comparable military installations in the nation. Other management options range from zero to much larger staffing. Staffing at significantly lower levels than listed above would undoubtedly lead to noncompliance with federal laws and regulations. Thus, this is not a viable option. Staffing at higher levels would increase the scope and quality of natural resources management on the Training Center with impacts as discussed in Other Management Options sections throughout this INRMP.

16.2.2 Personnel Training

The NTC and Fort Irwin natural resources organizations have a goal to continuously improve the success of natural resources management activities through professional development and information exchange. This will be accomplished by:

- Maintaining staff knowledge of management strategies at the current state of the art through training and participation in or hosting workshops, research presentations, and other activities of regional and national professional natural resources research and conservation programs; and
- Sharing information with natural resources experts to ensure maximum benefits of adaptive management and research efforts.

The NTC and Fort Irwin plans to send one or more persons to each of the following annual workshops or professional conferences:

ITAM annual workshop
National Military Fish and Wildlife Association annual workshop

North American Natural Resources Conference
Desert tortoise handling class

The Wildlife Society Conference
Desert tortoise management oversight group meetings
FORSCOM training sessions
Meetings of regional initiatives

Other conferences/workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Projects which are especially useful include ecosystem restoration workshops, global position system training, GIS training in ArcMap, advanced GIS training, endangered species training, and BLM-sponsored Archeological Resources Protection Act enforcement workshops.

The Wildlife Society and National Military Fish and Wildlife Association are among the professional societies applicable to meeting the needs of the NTC and Fort Irwin natural resources managers. Membership in these societies is encouraged. They have some of the best scientific publications in their professions, and literature review is a necessary commitment to maintain standards. Attending meetings of these societies provides excellent opportunities to communicate with fellow professionals as well as maintain professional standards.

16.2.2.1 Proposed Action

Goal. Provide for the training of natural resources personnel (Department of Army, 1995).

Objective. Implement the above described personnel training program for the NTC and Fort Irwin.

16.2.2.2 Other Management Options

Most of the proposed training is specifically targeted toward natural resources managers on military installations. Professional management of natural resources is required by the Sikes Act. This implies continuing training to maintain professional skills. Thus, while there are many other options to acquire training for natural resources managers at the NTC and Fort Irwin, the option to not train is not viable. Most other training options would not be as specific to the needs of Training Center personnel as outlined in the proposed action.

16.2.3 External Assistance

The rapid development of natural resources management combined with Army personnel cutbacks have resulted in an increased need for outside assistance with natural resources programs on the NTC and Fort Irwin. The installation has used its partnerships in a variety of ways, but particularly for wildlife research, ITAM implementation, cultural resources management and planning, natural resources planning, and others. The growth of environmental compliance requirements has increased many of these needs and added considerably to the need for partners in other areas, including on-the-ground personnel support.

16.2.3.1 Proposed Action

Goal 1. Provide external specialized skills and resources to support the NTC and Fort Irwin natural resources management.

Goal 2. Provide external personnel to assist with the management of the NTC and Fort Irwin natural resources program.

Objective 1. Implement external support projects indicated in the below table, which are described in more detail in appropriate sections of this INRMP.

2006-2011 Natural Resources External Support Project Needs

Project	Priority*	Agency	Completion	Comments
ITAM personnel	1	contractor	Indefinite	Ongoing
Natural and Cultural Resources Section personnel	1	contractor/ORISE	Indefinite	Ongoing
Dust control	1	contractor	Indefinite	Ongoing
Plan preparation	1	contractors	Project-specific	As needed
Cultural resources surveys	1	contractor	Project-specific	As needed
Burro removal	1	BLM, China Lake, National Park Service	Indefinite	Ongoing
Goldstone natural resources management	1	Goldstone (NASA)	Indefinite	Ongoing
Tamarisk removal	1	BLM/others	Project-specific	As needed
Plant propagation	1	National Park Service/ private nurseries	Indefinite	Ongoing
Endangered species compliance	1	USFWS	Indefinite	As required
Desert tortoise management plan	1	Department of Army, DPW	2004	Ongoing
Lane Mountain milkvetch survey	1	Charis Corporation	2001, 2003	Completed
Raven monitoring/plan	1	USGS	Indefinite	
Wetland permitting	1	Corps of Engineers, Los Angeles District	Project-specific	As required
Contracting	1	Corps of Engineers, various districts	Project-specific	As needed
Enforcement Assistance	1	CDFG	Project-specific	As needed

Project	Priority*	Agency	Completion	Comments
Update/revise INRMP	1	DPW, Environmental	2001	When required
State-listed species management	2	CDFG	Indefinite	As needed
Environmental Awareness materials	2	U.S. Army Environmental Awareness Resource Center	Project-specific	As needed
Bat gate construction	2	DPW	2002	
Mohave ground squirrel survey	2	Phil Leitner, PacBell consultant	2004	
California black rail survey	2	DPW	2002	Completed
Bighorn sheep monitoring	3	CDFG	Indefinite	Ongoing
Cryptogram crust study	3	John Carroll University	1999	Completed
Soil hydrology study	3	Desert Research Institute	Indefinite	Ongoing
Fringe-toed lizard study	3	California State Univ., Dominguez Hills	2000	

* 1 Needed as soon as possible for immediate management application.
2 Useful for improving management to a significant degree over a long period.
3 Has good potential to improve long-term management.

16.2.3.1.1 Personnel Assistance

The Intergovernmental Personnel Act of 1972 (IPA) provides a means to conduct research or obtain other personnel assistance at the NTC and Fort Irwin. IPA is a system whereby a federal (or state) agency borrows other federal or state agency personnel for a limited time period to do a specific job. The installation pays the borrowed employee's salary and administrative overhead. There are two advantages: personnel are directly supervised by the NTC and Fort Irwin, and no manpower authorizations are required. The NTC and Fort Irwin is not using IPA agreements in its natural resources program, but it retains the option to use this source of personnel assistance during 2006-2011.

Another "borrowed personnel" option is through the Oak Ridge Institute of Science and Education (ORISE). ORISE involves colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, postgraduates, and associate degree graduates opportunities to gain experience in their respective fields. Stipends are equivalent to salaries for employees hired with similar educational backgrounds, and a 30% overhead is added. The normal limit on individual ORISE personnel is three years. Installations may assist in the selection of ORISE personnel. ORISE personnel are being used at the NTC and Fort Irwin for biological, archeological, and NEPA assistance,

and this source of assistance is likely to be continued.

The Student Conservation Association (SCA) provides another personnel option. This nonprofit national organization has a cooperative agreement with the Department of Army, which provides for internships for students and recent graduates to obtain experience in their fields of study. The NTC and Fort Irwin ITAM program used SCA personnel in 1997 to assist with trail closure projects. California has a similar organization, the California Conservation Corps.

Volunteers are an occasional source of personnel assistance at the Training Center. Scouts are sometimes used (Section 11.2), and there are occasional other volunteers. One type of project that would be ideal for volunteers is the removal of tamarisk from springs, a labor-intensive task requiring little experience.

Objective 2. Consider using IPA agreements as a source of personnel assistance.

Objective 3. Use ORISE as an important option for personnel assistance.

Objective 4. Maintain the option to use the Student Conservation Association and the California Conservation Corps for assistance with field projects.

Objective 5. Use volunteers as an opportunistic source of assistance.

16.2.3.1.2 University Assistance

Universities are an excellent source of research assistance. As listed in Section 5.5, the NTC and Fort Irwin has used several universities in recent years to help with specialized needs, particularly universities in southern California.

Objective 6. Use universities, particularly California State University Dominguez Hills (ground squirrel survey), University of California Los Angeles (plant surveys), University of California Riverside (invertebrates), San Diego State University (ITAM), and the Desert Research Institute (soil hydrology), to assist with implementation of this INRMP.

16.2.3.1.3 Contractor Support

Contractors give the installation access to a wide variety of specialties and fields. Examples of contractor use in recent years are in Section 5.6.

Objective 7. Use contractors to assist with implementation of this INRMP.

16.2.3.1.4 Other Agency Support

As indicated in sections 5.2, 5.3, and 5.4, the NTC and Fort Irwin has relationships with a number of federal and state agencies for support of its natural resources program.

Objective 8. Use State and Federal agencies, particularly this INRMP's signatory partners, the USFWS and CDFG, and BLM, to assist with implementation of this INRMP.

16.2.3.2 Other Management Options

External support projects in the above table are discussed in other sections of this INRMP. Other Management Options are discussed in these sections.

16.3 Data Storage, Retrieval, and Analysis

The capability to store, retrieve, and analyze data is central to professional management of natural resources, and it is essential to implementing the adaptive management aspect of ecosystem management. The NTC and Fort Irwin is committed to providing efficient, cost-effective systems for data storage and analysis.

Data collected will be statistically analyzed and stored on the ITAM server and the Natural and Cultural Resources Section. Data will be available for use by NTC personnel, the MDEP, and other regional initiatives. Data will also be integrated into the GIS system.

Goal 3. Store, analyze, and use data is an efficient, cost-effective manner.

16.3.1 Microcomputer System

Microcomputers are essential to the routine operation of efficient natural resources management organizations. The volume of data is too substantial to handle without computers, and routine administrative tasks are accomplished considerably more efficiently with computers.

Personal microcomputers are available to all professional personnel within both the Natural and Cultural Resources Section and the ITAM Office. Many personnel, including persons in other Environmental Division sections, have the capability to use ArcGIS® (ESRI, Redlands, CA), a personal computer-based GIS.

16.3.1.1 Proposed Action

Objective 1. Upgrade hardware and software as needed during the next five years.

16.3.1.2 Other Management Options

The NTC and Fort Irwin could either shut down its microcomputer systems for natural resources management, or it could neglect to upgrade existing hardware and software. Either option would quickly reduce the quality of both the natural resources and ITAM programs, and the installation would soon be technologically separate from its ecosystem management partners in the Mojave Desert as well as other military installations and commands. The NTC and Fort Irwin has extremely modern microcomputer hardware and software. Additional expenditures could be made, but it is questionable whether they would significantly improve the quality of programs considering the needs of both the natural resources and ITAM programs and the computer expertise of individual personnel.

16.3.2 Geographic Information System

The ITAM program at the NTC and Fort Irwin established a GIS, primarily to support land management programs, during spring 1996. The NTC and Fort Irwin GIS has developed or obtained extensive databases. Database development will continue during 2006-2011. Most use of GIS has been the production of maps, including maps for military planning and operations. This technology can provide 3D

views of training missions, which enables soldiers to visualize terrain. Data can also be used in spatial analyses to improve planning decisions and the analysis of potential environmental impacts.

The GIS is rapidly becoming the central natural resources data center for both natural resources and ITAM programs on the NTC and Fort Irwin, and it will be increasingly used by other personnel, particularly those in the Environmental Compliance Section. Operations planners use the GIS to portray fire and maneuver options in a much more meaningful manner than can be done using standard maps (Section 9.14.1.2).

The natural and cultural resources section plans to implement an Environmental Management System during the 2004 fiscal year. This system features a central database of all natural and cultural resource related items; spatial information (points, lines, and polygons); and input coming from PC Pocket Computers with GPS input. Personnel in the field will log locations (using GPS input) and annotate datapoints on their Pocket PCs, which will be automatically uploaded to the central database on a regular basis.

16.3.2.1 Proposed Action

Objective 2. Develop a list of database needs for the NTC and Fort Irwin and develop or obtain these databases.

Objective 3. Continue to provide appropriate databases to MDEP, other regional initiatives, and other potential users using a local area network and a wide area network.

Objective 4. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot.

Objective 5. Provide GIS databases via ArcGIS® to all pertinent Environmental Division personnel.

Objective 6. Create and maintain a GIS-enabled Environmental Management System that allows field entry of complex resource data and locations, and connects data collection and information requests to a centralized database.

Objective 7. Create user-friendly interfaces to enable a wider use of GIS databases specific to the needs of installation users.

Objective 8. Develop a dedicated GIS laboratory with enhanced funding (other than ITAM), equipment, and personnel to service the needs of the total installation.

16.3.2.2 Other Management Options

There are almost limitless options with regard to the rapidly evolving GIS field, ranging from no use of the technology to massive expenditures on numerous software, hardware, and data acquisition options. The NTC and Fort Irwin GIS is very advanced, and database development is impressive considering the short time the program has been in place. Growth beyond the long range Objective 8 is probably not a viable option as the presence of the MDEP precludes duplication of GIS effort with regard to regional support. The "no use" option of an installation ITAM/Natural Resources GIS is, unfortunately, a reality on some military installations as positions are eliminated as part of downsizing within DoD.

16.3.3 Remotely Sensed Imagery

The oldest aerial photographs of the NTC and Fort Irwin area were likely taken in the 1940s, but these have not been used for natural resources management on the installation. Remote imagery is now utilized for soil and disturbance mapping which provides information concerning land change over time. This type of sampling is being used intensively in the land acquisition process. Low level aerial photography has been used for tracking road proliferation and other types of disturbance.

In 1996 the installation convened a working group to list needs for remote imagery. In April 1997 this effort resulted in color, 0.5-meter resolution digital orthophotographs of the installation and its surrounding lands (a rectangle with a southwestern corner of 35º N, 117º 15' W and a northeastern corner of 35ºN, 116ºW, with some missing pieces). Aerial photography at this same resolution was repeated in June 2001 and included all of the land expansion areas and south as far as Barstow-Daggett Airport.

Current remote imagery is probably adequate for most NTC and Fort Irwin needs during most of the 2006-2011 period. Considering the size of the installation, satellite imagery should be an economical way to monitor changes in the landscape.

16.3.3.1 Proposed Action

Objective 9. Use remote imagery for improved decision-making for military activities, ITAM implementation, environmental management, and natural and cultural resources management and protection.

Objective 10. Obtain additional color, digital orthophotographs at 0.5-meter resolution every four or five years to record changes in both soils and vegetation cover.

Objective 11. Obtain historic satellite imagery of the installation during past wet years (other El Nino years) for comparisons of the effects of this important phenomenon on installation vegetation.

Objective 12. Determine the potential for use of hyperspectral imagery to enhance vegetation and change detection analyses.

16.3.3.2 Other Management Options

There are many options with regard to the rapidly evolving remote imagery field, ranging from no use of the technology to massive expenditures on data layers. The proposed action continues a very aggressive use of state-of-the-art technology, and it is difficult to justify an enhanced effort beyond what is proposed. No use or significantly less use options for remote imagery are possible, but considering the requirement to maintain the quality of training lands and to comply with environmental laws, these options would ultimately require an even greater expenditure to monitor land conditions using more personnel-intensive methods.

16.4 Project/Program Summary

Goals and objectives within this INRMP, when listed, can be used to monitor the effectiveness of natural resources management at the NTC and Fort Irwin. Appendix 16.4 contains a list of goals and objectives for this INRMP in the order items appear. The list does not include a priority system for two reasons:

- The Sikes Act requires implementation of this INRMP, making it difficult to justify priorities for implementation, which implies priorities for compliance. Federal agencies are required to comply with federal laws.
- Many projects or programs affect obviously high priority species/communities/ecosystems/etc. (federally-listed species, wetlands, etc.) and at the same time affect species/communities/ ecosystems/etc. that prior to the passage of the Sikes Act amendments, were not priorities (*e.g.*, nonlisted species, noncritical habitat). It is often difficult to separate the benefactors of many programs. Spring protection and maintenance is a good example.

16.5 Implementation Funding Options

Natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP. As noted, not all of these are now used by the NTC and Fort Irwin.

16.5.1 Environmental Program Requirements

Most projects described in this INRMP, exclusive of ITAM, are budgeted using the Environmental Program Requirements (EPR) Report. Below are sources of funds within the EPR system:

16.5.1.1 Sikes Act Funds

Sikes Act funds are collected via sales of licenses to hunt or fish. They are authorized by the Sikes Act and regulated via AR 200-3, Chapter 6. These funds may be used only for fish and wildlife management on the installation where they are collected. They have no year-end (unobligated funds carry over on 1 October). The NTC and Fort Irwin does not charge a fee for hunting permits; thus, the installation has no Sikes Act funds. This is not expected to change during 2006-2011.

16.5.1.2 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at Department of Army and Major Command levels with no requirements for spending where they were generated. AR 200-3 (Chapter 2) outlines procedures for collection and spending these funds. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs. These are the broadest use funds available exclusively to natural resources managers.

The NTC and Fort Irwin is technically authorized to request agricultural funds from FORSCOM since there is no requirement for funds to be generated at spending installations. However, due to base closures and other factors, agricultural funds are decreasing, so it is unlikely that the Training Center will be able to effectively compete for them during 2006-2011.

16.5.1.3 Environmental Funds

Environmental funds are a special subcategory of Operations and Maintenance funds. They are set aside by the Department of Defense for environmental purposes but are still subject to restrictions of Operations and Maintenance funds. Compliance with laws is the key to getting environmental funding. Environmental

funds are most commonly used for projects that return the installation to compliance with federal or state laws, especially if noncompliance is accompanied by Notices of Violation or other enforcement actions.

"Must fund" classifications include mitigation identified within *Findings of No Significant Impact* and items required within Federal Facilities Compliance Agreements. This INRMP is a Federal Facilities Requirement Agreement, and some projects and programs within it are used to mitigate various military activities. In addition, 1997 amendments to the Sikes Act require implementation of INRMPs, which make implementation of this INRMP a priority for funding.

The following table lists environmental projects associated with implementation of this INRMP:

Project*	FY 05	FY 06	FY 07	FY 08	FY 09	Totals
GS Biologist Salaries	$195	$205	$215	$226	$237	$1,078
Desert Tortoise Surveys	$150	$200	$150	$150	$150	$ 800
Predation Rate Studies	$80	$80	$80	$80	$80	$ 400
Tortoise Translocation Study	$1500	$1500	$1500	$800	$800	$6,100
Fences and Off-limits Signs	$100	$500	$500	$100	$100	$1,300
Adaptive Management	0	$500	$500	$500	$500	$2,000
Update Pest Management Plan	$5	$5	$5	$5	$5	$ 25
Contractor Salaries	$1,209	1269	1333	1399	$1470	$6,680
Pest Species Abatement	$150	$150	$160	$160	$160	$ 780
Endangered Plants and Animals	$150	$190	$200	$225	$225	$ 990
NEPA Documentation	$100	$100	$100	$100	$100	$ 500
Land Management Assistance	$100	$100	$100	$50	$50	$ 400
Other Mitigation	0	$1512	$1500	$2738	0	$5,750
T & E Species Research	$100	$100	$100	$50	$50	$ 400
Limiting Factors (Lane Mt milkvetch)	$45	$100	$50	$50	$50	$ 295
Exotic Vegetation Control	$10	$50	$50	$50	$50	$ 210
Microinvertebrate Studies	$50	0	0	0	0	$ 50
Desert Tortoise URTD Studies	$50	0	0	0	0	$ 50
Totals	$3,999	$6,567	$6,550	$6,691	$4,036	$27,843

* Funding in thousand of dollars.

Funding for cultural resources projects is included in the Integrated Cultural Resources Management Plan.

The above table indicates environmental funding as of spring 2005. Projects specifically for pest management, cantonment area management, and cultural resources management are not included in this listing.

Thus, the total Environmental Fund budget for this INRMP is estimated at $3,999,000 for FY 05. These estimates will be adjusted as needed each year.

16.5.2 ITAM and Training Funds

The NTC and Fort Irwin is a Category I installation with regard to ITAM implementation and funding (Office of the Deputy Chief of Staff for Operations and Plans, 1995). ITAM funds must be used for range and training land sustainment and cannot be used for the purpose of natural resource or endangered species management. ITAM projects may, however, have secondary benefits that include improved wildlife habitat or protection of sensitive areas. ITAM funding requests are not submitted via the EPR process. Instead, the 5-year ITAM Work Plan is used to channel ITAM funding requests from the NTC and Fort Irwin, through FORSCOM and the Army Training Support Center, to ODCSOPS. The NTC and Fort Irwin requires the following ITAM budget for FY 04 through FY 08:

ITAM Funding*

Project	FY 04	FY 05	FY 06	FY 07	FY 08	Totals
LRAM	$1,111	$1,266	$1,307	$1,259	$1,360	$6,303
EA	$27	$74	$77	$76	$84	$338
TRI	$162	$140	$180	$145	$153	$1,785
RTLA/GIS	$461	$723	$285	$298	$317	$2,084
Totals	$1,761	$2,203	$1,849	$1,778	$1,914	$10,510

* Funding in thousand of dollars.

Thus, the total ITAM budget for this INRMP is estimated at $10,510,000 for 2004-2008. These estimates will be adjusted as needed each year.

16.6 Command Support

Command support is essential to implementation of this INRMP. This Plan has the support of the NTC and Fort Irwin Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to implementation of this INRMP as required by the Sikes Act and other Federal laws. Just as importantly, the Command is dedicated to maintaining and improving the military mission at the NTC and Fort Irwin. Implementation of this INRMP is a means to that end.

17.0 Environmental Consequences

As discussed in Section 1.8.4 of this document, two alternatives are considered feasible:

a. The Proposed Action with full implementation of the INRMP, and
b. The Other Management Options alternative, which uses management strategies and objectives not included within the INRMP.

Therefore, the impact on various systems in affected environments will be assessed based on these two alternatives. The Other Management Options alternative is discussed for each proposed action in Chapters 8 through 16 of this INRMP. The Proposed Action is summarized (by goals and objectives) in Appendix 16.4. The following sections are summaries of these more detailed analyses.

The Proposed Action would not have significant negative environmental consequences compared to existing conditions. The Other Management Options alternative could have a wide range of environmental consequences, ranging from very positive to very negative on various components of the NTC and Fort Irwin environment. The two alternatives differ significantly in their ability to proactively manage natural resources, support the military mission, mitigate environmental damage due to the Army mission, and comply with environmental laws.

The INRMP provides goals and objectives for managing natural resources, a course of action designed to significantly improve the management of NTC and Fort Irwin natural resources. The INRMP allows flexibility in management options as more information becomes available from ongoing and planned studies.

17.1 Geology and Soils

17.1.1 Proposed Action

The Proposed Action includes an integrated program for the planning of land use and maintenance and repair of damaged lands. Brief periods of increased erosion could occur during damaged sites' maintenance and rehabilitation activities, but these would be relatively minor compared to erosion control benefits. The Proposed Action has evolved significantly during the past decade due to experience gained from implementation of the LRAM program, and the Army proposes to take advantage of lessons learned during this process. The Proposed Action offers effective protection and mitigation for damages incurred by soils due to the Army mission.

17.1.2 Other Management Options

Other Management Options range from intensive erosion control programs that would provide relatively good soils protection to virtually no erosion control or damage prevention. The 1997 amendments to the Sikes Act require maintaining the capability of the NTC and Fort Irwin to support its military mission. Actions less than the Proposed Action risk noncompliance with this law. The Proposed Action is based on the Army-wide ITAM program that was developed exclusively to deal with mitigation of military training impacts, and the NTC and Fort Irwin program is funded at the Army's highest level of classification. Thus, it is likely that Other Management Options would have less cost/benefits in terms of soils management than the Proposed Action.

17.2 Water Resources

The INRMP includes some surface water monitoring, but water quality, except as it directly relates to fisheries management, is not a natural resources program within the Army environmental program. Rather, due to water quality laws, it is considered a compliance program and is the primary responsibility of the Environmental Division, DPW at the NTC and Fort Irwin.

17.2.1 Proposed Action

The Proposed Action has positive effects on surface water quality, but surface water quality, related to erosion, is not significantly threatened at the NTC and Fort Irwin due to the highly protected nature of the few surface waters on the installation. Thus, the Proposed Action has no significant negative impacts to surface water resources on the Training Center. Implementation of the Proposed Action would not affect groundwater.

17.2.2 Other Management Options

Provided that Other Management Options do not include removal of protection of surface water sites, this alternative would likely have no significant impacts to surface water resources on the Training Center. Other Management Options could not include objectives that would lead to water quality degradation in terms of noncompliance with water quality standards.

17.3 Biological Resources

17.3.1 Proposed Action

The Proposed Action would provide management of faunal and floral resources at the NTC and Fort Irwin on an integrated basis. The INRMP uses an ecosystem management strategy to achieve biological diversity conservation, in accordance with the Department of Defense Biodiversity Initiative (The Keystone Center, 1996). It emphasizes the use of native species, as emphasized on the Presidential memorandum to the heads of federal agencies (Office of the President, 1994).

The Proposed Action includes specific actions to manage the Mojave Desert ecosystem, including wildlife habitat protection and enhancement, wildlife population management, cantonment area management, protection of special interest natural areas, and an integrated approach to pest management. These programs include protection from wildfires, monitoring a variety of plants and animals, wetlands protection, spring enhancement and protection, and minimization and repair of damage to habitat by human activities. Implementation of NEPA under this INRMP would provide a methodology to help ensure compliance with laws and regulations affecting biological resources at the NTC and Fort Irwin.

The Proposed Action also provides a means to use biological resources for a variety of human uses, a major tenant of ecosystem management. These uses include military activities and a variety of outdoor recreational uses, including hunting, nature study, and others.

17.3.2 Other Management Options

Management options selected within the INRMP are the result of decades of on-the-ground management of biological resources on the NTC and Fort Irwin as well as countless consultations with local and regional resources management professionals. The INRMP package represents the best opinions of the NTC and Fort Irwin natural resources personnel as well as those of cooperating partner agencies.

Therefore, the Other Management Options, as a total package, would likely produce a lesser degree of ecosystem-wide benefits or be detrimental to some biological resources. Below are a few examples of other options and their likely effects:

- Surveys could ignore species such as the Mojave ground squirrel, alkali mariposa lily, California black rail, and Mojave monkey flower. This would make it virtually impossible to provide any protection for these State-listed species.
- Active management of springs, particularly protection from military damage and exotic plant species removal, could be removed or reduced in scope. Considering the vital nature of these springs to many plant and wildlife species on the NTC and Fort Irwin, this could drastically reduce biological diversity and abundance at the Training Center.
- The NTC and Fort Irwin could minimize interagency coordination. This would adversely affect natural resources management effectiveness at the Training Center and adversely affect management of the Mojave Desert ecosystem as a whole.
- The NTC and Fort Irwin could choose to not participate in burro removal programs. This would significantly negatively affect native plants and animals on the Training Center and decrease the success of burro management programs on neighboring lands.
- The NTC and Fort Irwin could reduce it efforts to educate military and civilian users of the installation of the effects of their actions on the ecosystem. This, in turn, would likely result in increased impacts to the Mojave Desert ecosystem at the Training Center.
- NTC and Fort Irwin landscapes could be more intensively managed for human-related aesthetic qualities. This would reduce the amount of wildlife habitat for most native species, increase risks involved with more pesticide/herbicide use, reduce groundwater reserves, and encourage the spread of exotic ornamental plants.

The Other Management Options alternative would likely produce a less-balanced effect on biological resources than the Proposed Action. However, the degree of effect would be dependent upon objectives of natural resources management and the degree of implementation applied.

Other Management Options would likely emphasize reaction to problems rather than a proactive approach to natural resources management. This approach would emphasize responses to current needs to support the military mission as well as site-specific responses to environmental compliance. Surveys and monitoring of natural resources, and long term programs, would be lower priority. A reaction-to-problems approach would probably achieve compliance with laws, but it would not provide as many benefits to biological resources and would be more expensive in the long-term. Such implementation would decrease outdoor recreational opportunities associated with biological resources on the NTC and Fort Irwin.

17.4 Air Quality

This INRMP affects air quality with regard to the generation of fine particulate matter (PM 10) as a result of military activities on the NTC and Fort Irwin.

17.4.1 Proposed Action

The Proposed Action includes implementation of the LRAM program, within which reduced dust generation is a major project. The Proposed Action will reduce the generation of PM 10 through the maintenance of most playas as off-limits, the application of dust retardants to main tank trails, and the revegetation of damaged lands and closures of trails.

17.4.2 Other Management Options

Other Management Options could include greater expenditures for direct dust control, the closure of the two remaining open playas, and/or more revegetation. However, due to the highest classification of the NTC and Fort Irwin for ITAM implementation, it is unlikely that these expenditures are viable. However, if they were to occur, greater reductions in PM 10 would likely occur.

Conversely, these programs could be reduced in scope or intensity. This action, in turn, would increase the generation of PM 10.

17.5 Cultural Resources

17.5.1 Proposed Action

The proposed implementation of the INRMP would be beneficial to the protection of cultural resources. The Proposed Action includes steps to protect cultural resources sites from damage during implementation of this plan. Ground-disturbing natural resources projects in unsurveyed areas must have site-specific surveys prior to implementation. The review of projects by the Cultural Resources Manager and the NEPA process are used to ensure protection of known and potential cultural resources while implementing the INRMP. Implementation of the ITAM program, particularly marking off-limits sites and reducing erosion hazards, is a significant benefit of the Proposed Action to archeological resources (Draft ICRMP, DA 2003).

17.5.2 Other Management Options

The Other Management Options alternative would have no direct negative effects on cultural resources since the NTC and Fort Irwin would still have to comply with laws and policies related to cultural resources. However, if Other Management Options selected included a reduced level of LRAM, the degree of protection to archeological sites would be decreased. Many Other Management Options are potential undertakings and could require site-specific cultural resources surveys in unsurveyed areas. The amount of survey would be determined by the number of ground-disturbing projects proposed for unsurveyed areas.

17.6 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs federal agencies to identify and address disproportionately high and adverse human or environmental impacts of their program, policies, and activities on minority or low income populations in the surrounding community. The remote location of the NTC and Fort Irwin in relation to populated areas minimizes the potential for disproportionate impacts on minority or disadvantaged groups of people.

17.6.1 Proposed Action

There is no evidence or suggestion that the Proposed Action will disproportionally affect any minority or disadvantaged group of people in the area.

17.6.2 Other Management Options

There is no evidence or suggestion that Other Management Options discussed in this INRMP will disproportionally affect any minority or disadvantaged group of people in the area.

17.7 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997) recognizes a growing body of scientific knowledge demonstrating that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed, because they eat, drink, and breathe more in proportion to their body weight, because their size and weight may diminish protection from standard safety features, and because their behavior patterns may make them more susceptible to accidents.

The President directed each federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

17.7.1 Proposed Action

The Proposed Action would not have a disproportionate environmental health risk or safety risk to children.

17.7.2 Other Management Options

Other Management Options would not have a disproportionate environmental health risk or safety risk to children.

17.8 Findings and Conclusions

The National Training Center and Fort Irwin should implement an Integrated Natural Resource Management Plan at Fort Irwin, California for the period 2006-2011 to manage natural resources, support the military mission, mitigate environmental effects of the overall military mission, and comply with various environmental laws. Full implementation of the INRMP will also ensure the continued use of NTC and Fort Irwin natural resources for the military mission and outdoor recreational uses.

Implementing the NTC and Fort Irwin INRMP would result in no significant detrimental impacts to environmental systems. Minor adverse impacts on wildlife habitat will be mitigated by full implementation of restorative and proactive wildlife management provisions in the INRMP. There would be beneficial consequences to the INRMP, such as reducing negative impacts to soil, water, air, and biological

resources, thereby avoiding violations of federal and state laws, including the Sikes Act, Endangered Species Act, Clean Air Act, and NEPA. Full implementation (the Proposed Action) would allow the Army to manage its natural resources at the NTC and Fort Irwin in a proactive manner to meet current and future conservation needs.

Implementing the INRMP would not constitute a major Federal action significantly affecting the quality of the environment. A Finding of No Significant Impact, Appendix 17.8, should be published.

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
Ac	acres
AR	Army Regulation
ARPA	Archeological Resources Protection Act
BLM	Bureau of Land Management
BLUEFOR	Blue Force (Rotation Training Unit)
BMP	Best Management Practices
C	Celsius
CD	compact disk
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Cm	centimeters
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRM	Cultural Resources Manager
DCA	Directorate of Community Activities
DoD	Department of Defense
DPW	Directorate of Public Works
EPR	Environmental Program Requirements
ESMP	Endangered Species Management Plan
F	Fahrenheit
FONSI	Finding Of No Significant Impact

FORSCOM	Forces Command
GIS	geographic information system
Ha	hectares
INRMP	Integrated Natural Resources Management Plan
IPA	Intergovernmental Personnel Act
IPM	Integrated Pest Management
ITAM	Integrated Training Area Management
Km	kilometers
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
LURS	Land Use Requirement Study
M	meters
MAAR	Mojave Anti-Aircraft Range
MDEP	Mojave Desert Ecosystem Program
Mgd	million gallons per day
MILES	Multiple Integrated Laser Engagement System
MOU	Memorandum of Understanding
Mph	miles per hour
Msl	mean sea level
MSR	main supply route
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NTC	National Training Center
ODCSOPS	Office of the Deputy Chief of Staff for Operations and Plans
OC	Observer Controller
OHV	off-highway vehicle
OPFOR	Opposing Force
ORISE	Oak Ridge Institute of Science and Education
PACIDERM	Planning And Coordination of Interagency Desert Environmental Resources Managers
PM	particulate matter
Ppm	parts per million
RTLA	Range and Training Land Assessment
SCS	Soil Conservation Service
SHPO	State Historic Preservation Office
SRP	Site Rehabilitation Prioritization
TDS	total dissolved solids
TRI	Training Requirements Integration
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WMCMP	Western Mojave Coordinated Management Plan
WSA	Wilderness Study Area

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

APPENDICES

APPENDIX 5.3.1.1: Items of Cooperation Between the U.S. Fish and Wildlife Service, California Department of Fish and Game, and the National Training Center and Fort Irwin

PURPOSE: The purpose of this document is to specifically list items to be provided by the California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), and the National Training Center and Fort Irwin (NTC and Fort Irwin) for cooperative implementation of the NTC and Fort Irwin Integrated Natural Resources Management Plan (INRMP). Items not specifically listed will generally be the responsibility of the NTC and Fort Irwin unless the other agencies agree to assist with their implementation.

AUTHORITY: In accordance with the authority contained in Title 10, U.S. Code, Section 2671, and Title 16, U.S. Code, Section 670 the Department of Defense, the Department of Interior, and the State of California, through their duly designated representatives whose signatures appear on the NTC and Fort Irwin INRMP, specifically approve the INRMP and the below specific items of cooperation among the three agencies.

MUTUAL AGREEMENT:

- Persons hunting the lands of the NTC and Fort Irwin shall be required to obtain special NTC and Fort Irwin hunting licenses unless exempt by NTC and Fort Irwin regulations. There will be no charge for these permits unless coordinated with the signatory partners of this INRMP. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).
- Persons hunting the lands of the NTC and Fort Irwin must purchase State licenses, tags, and stamps as required by the CDFG, unless exempt by CDFG regulations.
- A Federal waterfowl stamp is required for hunting waterfowl as prescribed by Federal laws.
- All hunting on the NTC and Fort Irwin will be in accordance with federal and state game laws.
- Representatives of the CDFG and the USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security.
- The CDFG and USFWS shall furnish technical assistance for development and implementation of professionally sound natural resources programs on the NTC and Fort Irwin provided funding for such support is available.
- The NTC and Fort Irwin shall furnish assistance and facilities to the CDFG and/or USFWS for mutually agreed upon natural resources research projects.
- No exotic species of fish or wildlife will be introduced on NTC and Fort Irwin lands without prior written approval of the Army, CDFG, and the USFWS.
- The CDFG shall establish season and bag limits for harvest of game species on the NTC and Fort Irwin.
- Hunting on the NTC and Fort Irwin will be authorized and controlled by the installation commander in accordance with locally published installation regulations promulgated in compliance with applicable Federal and State laws, Army regulations, military requirements, and the INRMP.
- Hunting will be allowed only in areas where there is no conflict with military training activities and no unreasonable safety hazard to participants, military personnel and dependents, or Army civilian employees. Certain areas will be closed to hunting, including, but not limited to, impact

areas containing unexploded ordnance.

- Enforcement of wildlife laws will be a joint responsibility of the NTC and Fort Irwin, the CDFG, and the USFWS.
- The NTC and Fort Irwin agrees to cooperate with USFWS and CDFG for management of threatened or endangered species residing on the installation. Such efforts will be in compliance with Federal and State laws and applicable Army regulations.
- The NTC and Fort Irwin has the option to directly transfer funds to the CDFG and USFWS for implementation of this INRMP.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, the NTC and Fort Irwin agrees that any land use change, which significantly impacts natural resources, must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS:

The military mission of the NTC and Fort Irwin supersedes natural resources management and associated recreational activities, and such activities must be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

REQUIRED REFERENCES:

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.
- The possession of a special permit for hunting migratory game birds will not relieve the permittees of the requirements of the Migratory Bird Stamp Act, as amended.
- This INRMP is a Federal Facilities Compliance Agreement.
- As required by the Sikes Act, the following agreements are made:

(1) This NTC and Fort Irwin INRMP is the planning document required by the Sikes Act, as amended. This Plan contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with the new requirements within the Sikes Act, if needed.

(2) This plan will be reviewed by the CDFG, USFWS, and the NTC and Fort Irwin on a regular basis, but not less often than every five years.

(3) No land or forest products from the NTC and Fort Irwin will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on the NTC and Fort Irwin under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the INRMP.

(4) With regard to implementation and enforcement of the NTC and Fort Irwin INRMP, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with Federal and State agencies having responsibility for the conservation or management of fish or wildlife.

(5) The NTC and Fort Irwin INRMP is not, nor will be treated as, a cooperative agreement to which chapter 63 of title 31, United States Code applies.

(6) This INRMP will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by

any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

APPENDIX 6.7: Fauna on the NTC and Fort Irwin

Common Name	Scientific Name	Special Status
Fish		
mosquitofish	*Gambusia affinis*	
Reptiles		
desert tortoise	*Xerobates* (=Gopherus) *agassizii*	State and Federally Threatened
banded gecko	*Coleonyx variegatus*	
desert iguana	*Dipsosaurus dorsalis*	
chuckwalla	*Sauromalus obesus*	
zebra-tailed lizard	*Callisaurus draconoides*	
Mojave fringe-toed lizard	*Uma scoparia*	
collared lizard	*Crotaphytus collaris*	
long-nosed leopard lizard	*Gambelia wislizenii*	
desert spiny lizard	*Sceloporus magister*	
western fence lizard	*Sceloporus occidentalis*	
side-blotched lizard	*Uta stansburiana*	
long-tailed brush lizard	*Urosaurus graciosus*	
desert horned lizard	*Phrynosoma platyrhinos*	
common night lizard	*Xantusia vigilis*	
Mojave black-collared lizard	*Crotaphytus bicintores*	
western whiptail	*Cnemidophorus tigris*	
western blind snake	*Leptotyphlops humilis*	
rosy boa	*Lichanura trivirgata*	
spotted leaf-nosed snake	*Phyllorhynchus d0ecurtatus*	
coachwhip	*Masticophis flagellum*	
western patch-nosed snake	*Salvadora hexalepis*	

Common Name	Scientific Name	Special Status
glossy snake	*Arizona elegans*	
ground snake	*Sonora semiannulata*	
gopher snake	*Pituophis melanoleucus*	
common kingsnake	*Lampropeltis getulus*	
long-nosed snake	*Rhinocheeilus lecontei*	
western shovel-nosed snake	*Chionactis occipitalis*	
desert night snake	*Hypsiglena torquata*	
speckled rattlesnake	*Crotalus mitchelli*	
sidewinder	*Crotalus cerastes*	
lyre snake	*Trimorphodon biscutatus*	
Mojave rattlesnake	*Crotalus scutulatus*	
Birds		
pied-billed grebe	*Podilymbus podiceps*	
horned grebe	*Podiceps auritus*	
eared grebe	*Podiceps nigricollis*	
American white pelican	*Pelecanus erythrorhynchos*	Species of Special Concern
great blue heron	*Ardea herodias*	
great egret	*Casmerodius albus*	
snowy egret	*Egretta thula*	
cattle egret	*Bubulcus ibis*	
green-backed heron	*Butorides striatus*	
black-crowned night heron	*Nycticorax nycticorax*	
white-faced ibis	*Plegadis chihi*	Species of Special Concern
Canada goose	*Branta canadensis*	
wood duck	*Aix sponsa*	
green-winged teal	*Anas crecca*	
mallard	*Anas platyrhynchos*	

Common Name	Scientific Name	Special Status
northern pintail	*Anas acuta*	
blue-winged teal	*Anas discors*	
cinnamon teal	*Anas cyanoptera*	
northern shoveler	*Anas clypeata*	
gadwall	*Anas strepera*	
American widgeon	*Anas americana*	
canvasback	*Aythya valisineria*	
redhead	*Aythya americana*	
ring-necked duck	*Aythya collaris*	
lesser scaup	*Aythya affinis*	
bufflehead	*Bucephala albeola*	
red-breasted merganser	*Mergus serrator*	
ruddy duck	*Oxyura jamaicensis*	
turkey vulture	*Cathartes aura*	
osprey	*Pandion haliaetus*	Species of Special Concern
northern harrier	*Circus cyaneus*	Species of Special Concern
sharp-shinned hawk	*Accipiter striatus*	Species of Special Concern
Cooper's hawk	*Accipiter cooperii*	Species of Special Concern
red-tailed hawk	*Buteo jamaicensis*	
Swainson's hawk	*Buteo swainsoni*	State Threatened
ferruginous hawk	*Buteo regalis*	Species of Special Concern
golden eagle	*Aquila chrysaetos*	CA Fully Protected
American kestrel	*Falco sparverius*	
peregrine falcon	*Falco peregrinus anatum*	
prairie falcon	*Falco mexicanus*	Species of Special Concern
chukar	*Alectoris chukar*	
Gambel's quail	*Callipepla gambelii*	

Common Name	Scientific Name	Special Status
California quail	*Callipepla californica*	
California black rail	*Laterallus jamaicensis coturniculus*	State and Federally Endangered
Virginia rail	*Rallus limicola*	
sora	*Porzana carolina*	
American coot	*Fulica americana*	
killdeer	*Charadrius vociferus*	
semipalmated plover	*Charadrius semipalmatus*	
black-necked stilt	*Himantopus mexicanus*	
American avocet	*Recurvirostra americana*	
greater yellowlegs	*Tringa melanoleuca*	
lesser yellowlegs	*Tringa flavipes*	
solitary sandpiper	*Tringa solitaria*	
spotted sandpiper	*Actitis macularia*	
western sandpiper	*Calidris mauri*	
least sandpiper	*Calidris minutilla*	
dunlin	*Calidris alpina*	
long-billed dowitcher	*Limnodromus scolopaceus*	
common snipe	*Gallinago gallinago*	
Wilson's phalarope	*Phalaropus tricolor*	
red-necked phalarope	*Phalaropus lobatus*	
Franklin's gull	*Larus pipixcan*	
Bonaparte's gull	*Larus philadelphia*	
ring-billed gull	*Larus delawarensis*	
California gull	*Larus californicus*	Species of Special Concern
yellow-footed gull	*Larus livens*	
Foster's tern	*Sterna fosteri*	

Common Name	Scientific Name	Special Status
black tern	*Chlidonias niger*	
rock dove	*Columba livia*	
ringed turtle-dove	*Strepopelia risoria*	
white-winged dove	*Zenaida asiatica*	
mourning dove	*Zenaida macroura*	
greater roadrunner	*Geococcyx californianus*	
common barn-owl	*Tyto alba*	
short-eared owl	*Asio flammeus*	Species of Special Concern
long-eared owl	*Asio otus*	Species of Special Concern
great horned owl	*Bubo virginianus*	
burrowing owl	*Athene cunicularia*	Species of Special Concern
lesser nighthawk	*Chordeiles acutipennis*	
common poorwill	*Phalaenoptilus nuttalli*	
white-throated swift	*Aeronautes saxatalis*	
Vaux's swift	*Chaetura vauxi*	Species of Special Concern
Costa's hummingbird	*Calypte costae*	
black-chinned hummingbird	*Archilochus alexandri*	
rufous hummingbird	*Selasphorus rufus*	
belted kingfisher	*Ceryle alcyon*	
acorn woodpecker	*Melanerpes formicivorous*	
ladder-backed woodpecker	*Picoides scalaris*	
Gila woodpecker	*Melanerpes uropygialis*	State Endangered
northern flicker	*Colaptes auratus*	
western kingbird	*Tyrannus verticalis*	
ash-throated flycatcher	*Myiarchus cinerascens*	
southwestern willow flycatcher	*Empidonax traillii extimus*	Federally Endangered
willow flycatcher	*Empidonax traillii*	State Endangered

Common Name	Scientific Name	Special Status
vermillion flycatcher	*Pyrocephalus rubinus*	Species of Special Concern
western wood-pewee	*Contipus cordidulus*	
Say's phoebe	*Sayornis saya*	
black phoebe	*Sayornis nigricans*	
olive-sided flycatcher	*Contopus borealis*	
Cassin's kingbird	*Tyrannus vocierans*	
horned lark	*Eremophilia alpestris*	
barn swallow	*Hurundo rustica*	
cliff swallow	*Hirundo pyrrhonata*	
violet-green swallow	*Tachycineta thalassina*	
northern rough-winged swallow	*Stelgidopteryx serripennis*	
tree swallow	*Tachycineta bicolor*	
common raven	*Corvus corax*	
verdin	*Auriparus flaviceps*	
red-breasted nuthatch	*Sitta canadensis*	
Bewick's wren	*Thryomanes bewickii*	
rock wren	*Salpinctes obsoletus*	
cactus wren	*Campylorhynchus brunneicapillus*	
canyon wren	*Catherpes mexicanus*	
house wren	*Troglogytes aedon*	
marsh wren	*Cistothorus palustris*	
ruby-crowned kinglet	*Regulus calendula*	
blue-gray gnatcatcher	*Polioptila caerulea*	
black-tailed gnatcatcher	*Polioptila melanura*	
mountain bluebird	*Sialic currucoides*	
Townsend's solitaire	*Myadestes townsendi*	

Common Name	Scientific Name	Special Status
hermit thrush	*Catharus guttatus*	
Swainson's thrush	*Catharus ustulatus*	
American robin	*Tudus migratorius*	
northern mockingbird	*Mimus polyglottos*	
LeConte's thrasher	*Toxostoma lecontei*	Species of Special Concern
Bendire's thrasher	*Toxostoma bendirei*	Species of Special Concern
crissal thrasher	*Toxostoma dorsale*	Species of Special Concern
sage thrasher	*Oreoscoptes montanus*	
water pipit	*Anthus spinoletta*	
cedar waxwing	*Bombycilla cedrorum*	
phaniopepla	*Phaniopepla nitens*	
loggerhead shrike	*Lanius ludovicianus*	Species of Special Concern
European starling	*Sturnus vulgaris*	
solitary vireo	*Vireo solitarius*	
Hutton's vireo	*Vireo huttoni*	
warbling vireo	*Vireo gilvus*	
least Bell's vireo	*Vireo bellii pusillus*	State and Federally Endangered
gray vireo	*Vireo vicinior*	
Virginia's warbler	*Vermivora virginiae*	Species of Special Concern
Townsend's warbler	*Dendroica townsendi*	
MacGillivray's warbler	*Oporornis tolmiei*	
yellow-rumped warbler	*Dendroica coronata*	
yellow warbler	*Dendroica petechia*	Species of Special Concern
orange-crowned warbler	*Vermivora celata*	
yellow-breasted chat	*Icteria virens*	Species of Special Concern
common yellowthroat	*Geothylpis trichas*	

Common Name	Scientific Name	Special Status
Wilson's warbler	*Wilsonia pusilla*	
hermit warbler	*Dendroica occidentalis*	
Nashville warbler	*Vermivora ruficapilla*	
black-throated gray warbler	*Dendroica nigrescens*	
western tanager	*Piranga ludoviciana*	
black-headed grosbeak	*Pheucticus melanocephalus*	
Lazuli bunting	*Passerina amoena*	
indigo bunting	*Passerina cyanea*	
green-tailed towhee	*Pipilo chlorurus*	
rufous-sided towhee	*Pipilo erythrophthalmus*	
lark sparrow	*Calamospiza melanocorys*	
white-crowned sparrow	*Zonotrichia leucophrys*	
sage sparrow	*Amphispiza belli*	
black-throated sparrow	*Amphispiza bilineata*	
song sparrow	*Melospiza melodia*	
fox sparrow	*Passerella iliaca*	
chipping sparrow	*Spizella passerina*	
rufous-crowned sparrow	*Aimophila ruficeps*	
Brewer's sparrow	*Spizella breweri*	
savannah sparrow	*Passerculus sandwichensis*	
clay-colored sparrow	*Spizella pallida*	
grasshopper sparrow	*Ammodramus savannarum*	
golden-crowned sparrow	*Zonotrichia atricapilla*	
dark-eyed junco	*Junco hyemalis*	
bobolink	*Dolichonyx oryzivorus*	
red-winged blackbird	*Agelaius phoeniceus*	
western meadowlark	*Sturnella neglecta*	

Common Name	Scientific Name	Special Status
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	
rusty blackbird	*Euphagus carolinus*	
Brewer's blackbird	*Euphagus cyanocephalus*	
brown-headed cowbird	*Molothrus ater*	
great-tailed grackle	*Quiscalus mexicanus*	
Bullock's oriole	*Icterus galbula bullocki*	
Scott's oriole	*Icterus parisorum*	
hooded oriole	*Icterus cucullatus*	
northern oriole	*Icterus galbula*	
house finch	*Carpodacus mexicanus*	
Lawrence's goldfinch	*Carduelis lawrencei*	
lesser goldfinch	*Carduelis psaltria*	
house sparrow	*Passer domesticus*	
Mammals		
pallid bat	*Antrozous pallidus*	Species of Special Concern
western pipistrel	*Pipistrellus hesperus*	
California myotis	*Myotis californicus*	
badger	*Taxidea taxus*	
spotted skunk	*Spilogale putorius*	
coyote	*Canis latrans*	
kit fox	*Vulpes macrotis*	
grey fox	*Urocyon cinereoargenteus*	
bobcat	*Lynx rufus*	
mountain lion	*Felis concolor*	
whitetail antelope squirrel	*Ammospermophilus leucurus*	
Mohave ground squirrel	*Spermophilus mohavensis*	State Threatened

Common Name	Scientific Name	Special Status
Botta's pocket gopher	*Thomomys bottae*	
long-tailed pocket mouse	*Chaetodipus formosus*	
little pocket mouse	*Perognathus longimembris*	
Great Basin pocket mouse	*Perognathus parvus*	
desert pocket mouse	*Perognathus penicillatus*	
cactus mouse	*Perognathus eremicus*	
desert kangaroo rat	*Dipodomys deserti*	
Merriam's kangaroo rat	*Dipodomys merriami*	
Great Basin kangaroo rat	*Dipodomys microps*	
Panamint kangaroo rat	*Dipodomys panamintinus*	
western harvest mouse	*Reithrodontomys megalotis*	
canyon mouse	*Peromyscus crinitus*	
deer mouse	*Peromyscus maniculatus*	
southern grasshopper mouse	*Onychomys torridus*	
desert woodrat	*Neotoma lepida*	
blacktail jackrabbit	*Lepus californicus*	
desert cottontail	*Sylvilagus audubonii*	
feral burro	*Equus asinus*	
Nelson's desert bighorn sheep	*Ovis canadensis nelsoni*	State Threatened and Federally Endangered

APPENDIX 17.8: Finding of No Significant Impact

FINDING OF NO SIGNIFICANT IMPACT:
PROPOSED INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

Name of Project: Integrated Natural Resource Management Plan/Environmental Assessment, National Training Center & Fort Irwin, California

Description of Proposed Project: The National Training Center & Fort Irwin proposes to implement an updated Integrated Natural Resource Management Plan (INRMP) at Fort Irwin, California for the period 2006-2011 to manage natural resources, support the military mission, provide outdoor recreational opportunities, and comply with various environmental laws.

Implementation will be an ongoing operation over the five-year period using both in-house and external personnel. The primary thrust of the program will be to survey and monitor natural resources and implement programs to conserve and manage them in a proactive manner, complying with environmental laws and regulations. Land Expansion areas would be included in the updated INRMP.

Project Alternatives: Alternatives were considered but cannot meet the management, conservation, inventorying, monitoring and compliance objectives of an INRMP. The No Action alternative is to continue management without updating the current INRMP. A variety of "Other Management Options" exist, and have been described, but only full implementation of the INRMP will ensure the continued use of NTC and Fort Irwin natural resources for the military mission and outdoor recreational uses.

Environmental Effects: The Environmental Assessment (EA) evaluates the effects of the INRMP's measures that are designed to ensure the maintenance of quality training lands, natural resource conservation measures, and integrate Army activities with federal stewardship requirements. The following effects will potentially occur:

Desert Soil, Geology, Erosion
Brief periods of increased erosion could occur during damaged sites' maintenance and rehabilitation activities, but these would be relatively minor compared to erosion control benefits. The Proposed Action offers effective protection and mitigation for damages incurred by soils due to the Army mission. Mitigation measures include, but are not limited to, use of dust control methods approved by the Mojave Desert Air Quality Management District (MDAQMD). The effects are minimal and no mitigation is therefore necessary.

Water Resources
The Proposed Action has positive effects on surface water quality, but surface water quality, related to erosion, is not significantly threatened at the NTC and Fort Irwin due to the highly protected nature of the few surface waters on the installation

Biological Resources
The Proposed Action includes use of adaptive management as a tool in the conservation, inventorying, monitoring and management of biological resources, as a way to ensure the most effective and reasonable measures are used to protect the natural resources for future generations to use and enjoy. The primary effect of adaptive management is flexibility. The use of pesticides to remove invasive species is also an effect, but a negligible one, provided the herbicides are applied according to instructions detailed on the label. The effects are therefore not significant.

Air Quality
The Proposed Action includes implementation of the LRAM program, within which reduced dust generation is a major project. The Proposed Action will reduce the generation of PM 10 through the maintenance of most playas as off-limits, the application of air quality district approved dust retardants to main tank trails, and the revegetation of damaged lands and closures of trails. The effects are therefore not significant.

Cultural Resources
The proposed implementation of the INRMP would be beneficial to the protection of cultural resources. The Proposed Action includes steps to protect cultural resources sites from damage during implementation of this plan. Ground-disturbing natural resources projects in areas not yet surveyed must have site-specific surveys prior to implementation. The effects are therefore not significant.

Environmental Justice
There is no evidence or suggestion that the Proposed Action will disproportionally affect any minority or disadvantaged group of people in the area. The effects are therefore not significant.

Protection of Children
The Proposed Action would not have a disproportionate environmental health risk or safety risk to children. The effects are therefore not significant.

Conclusion: Upon reviewing the environmental assessment and other project information, the Director of Public Works, National Training Center (NTC) and Fort Irwin, has concluded that the effects of the proposed project is not a major federal action that would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. The NTC and Fort Irwin will implement necessary mitigation measures and will consult with regulatory agencies, as necessary, to ensure compliance with all federal, state, regional, and local regulations and guidelines. Therefore, an environmental impact statement will not be prepared.

Point of Contact: Requests for further information or submittal of public comments may be made for 30 days after first publication date to:

Garrison Commander
National Training Center
PO Box 105021
Fort Irwin, CA 92310-5021

Individuals wishing to review the EA may examine a copy at the following locations: Directorate of Public Works, Fort Irwin, California; Fort Irwin Public Library, Fort Irwin, California; and the Barstow Public Library, Barstow, California.

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Appendix 9.5.2 Lane Mountain Milkvetch Long-Term Monitoring Plan for the US Army National Training Center and Fort Irwin

Nota bene: The milkvetch monitoring plan is a draft. As of November 2005, it is awaiting review by the FWS and CDFG. These agencies may request changes to the plan, so that small changes to the long-term monitoring plan will be made without formally modifying the INRMP. The milkvetch monitoring plan is a separate document from the INRMP, with ownership and electronic format that is different and independent of the INRMP.

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APPENDIX 9.5.3 Desert Tortoise Translocation Plan (Final Draft)

Nota bene: This Plan is attached to the NTC & Fort Irwin INRMP at the request of CDFG. The Plan is a final draft, and has not been completed at this time (July 2005). The Plan is a separate document from the INRMP, with independent ownership and different electronic format than used by the INRMP. The appendices of the Plan are not included.