FORT CARSON AND
PINON CANYON MANEUVER SITE

FORT CARSON

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

2007-2011

Cooperative Conservation Team
Directorate of Environmental Compliance and Management

Gene Stout and Associates
Loveland, CO

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Fort Carson and Pinon Canyon Maneuver Site

APPROVAL

This Integrated Natural Resources Management Plan meets requirements of the Sikes Act (16 USC 670a *et seq.*) as amended[1].

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Fort Carson and Pinon Canyon Maneuver Site

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PREFACE

Integrated management plans for natural and cultural resources provide resource managers with the "how to" and the justification to carry out Department of Defense's conservation goals. Integrated Natural Resource Management Plans support the military mission by providing for sustained use of its land, sea, and air space; protecting valuable natural and cultural resources for future generations; meeting all legal requirements; and promoting compatible multiple uses of those resources.

Ms. Sherri Goodman
Former Deputy Under Secretary of Defense (Environmental Security)

Fort Carson trains America's warriors to win on battlefields around the globe while conserving those natural resources upon which its military mission ultimately depends. The unmatched quality of Fort Carson troop units and the enduring value of high quality ecosystems at Fort Carson and the Pinon Canyon Maneuver Site have vividly demonstrated that both missions are compatible.

Fort Carson is proud of its contribution toward the defense of the United States of America. Since its inception in 1942, Fort Carson has trained Soldiers and other members of the nation's armed forces in skills needed to win on the battlefields of the world to protect our nation's people.

The land and its natural resources are vital to the well being of both Fort Carson and the Pinon Canyon Maneuver Site. The Installation was established on public lands, and it is well understood that an important stewardship responsibility came with these lands. Fort Carson is committed to that stewardship role.

Our lands are critical to our military mission.
Our lands are important to the well being of our community.
Our lands are important to the nation's environmental health.

This Integrated Natural Resources Management Plan is Fort Carson's plan of action for the care and wise use of lands entrusted to us. The Plan addresses a five-year period, but the philosophy behind this Plan is for a much longer period. We are committed to using an ecosystem management approach to its natural resources program. Ecosystem management will help us protect biological diversity and make smart decisions regarding our use of renewable natural resources to support both our military mission and the needs of our region.

Abundant and diverse natural resources and a healthy environment... now and forever... this is Fort Carson's commitment for both Fort Carson and the Pinon Canyon Maneuver Site, Colorado.

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Fort Carson and Pinon Canyon Maneuver Site

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Sikes Act Roadmap

The Sikes Act (16 USC 670 *et seq*.) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for the following specific items, which are within this Integrated Natural Resources Management Plan, as indicated on the below list in parentheses:

- fish and wildlife management (sections 4.11 and 4.12), land management (sections 4.2, 4.5, 4.7, 4.13, 4.14, and 5.1), forest management (Section 4.3), and fish and wildlife-oriented recreation (Section 5.4);
- fish and wildlife habitat enhancement or modifications (sections 4.6, 4.10, 4.11, 4.12, 4.13 and 4.14);
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife (Section 4.10);
- integration of, and consistency among, the various activities conducted under the INRMP (sections 1.2, 4.1, and 7.6);
- establishment of specific natural resources management objectives and time frames for proposed action (sections 1.2 and 7.3 and Appendix 7.3);
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management (Section 5.4);
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security (Section 5.4);
- enforcement of natural resource laws and regulations (Section 5.2);
- no net loss in the capability of military installation lands to support the military mission of the installation (sections 1.3, 1.6, 4.2, 4.3, 4.6, 4.7, 4.9, 4.14, 5.1, 5.2, 5.3, 5.7, 5.8, and 7.6); and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- annual reviews of this INRMP and its effects (sections 4.1.2 and 7.6, appendices 2.3.1 and 7.3);
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement and related activities in accordance with the INRMP (Section 7.4.2);
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars (Appendix 2.3.1); and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife (Appendix 2.3.1).

Executive Report

It is our obligation to ensure that our Soldiers today – and the Soldiers of the future – have the land, water, and air resources they need to train; a healthy environment in which to live; and the support of local communities and the American people.[2]

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of Fort Carson's natural resources program on Fort Carson and the Pinon Canyon Maneuver Site (PCMS) from 2007 through 2011. The program conserves lands and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP helps ensure the maintenance of quality training lands on Fort Carson and the PCMS to accomplish Fort Carson's critical military mission on a sustained basis and to ensure that natural resources conservation measures and Army military mission activities are integrated and consistent with federal stewardship requirements.

Environmental Compliance

General

Preparation and implementation of this INRMP are required by the Sikes Act (16 USC 670 *et seq.*) and Army Regulation (AR) 200-3 (*Natural Resources – Land, Forest, and Wildlife Management*). Additional INRMP guidance is provided by the Department of Defense (DoD), principally a November 1, 2004 memorandum, *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews*, issued by the Assistant Deputy Under Secretary of Defense, and Department of the Army memorandum issued by the Assistant Chief of Staff for Installation Management, dated May 25, 2006, and titled *Guidance for Implementation for Sikes Act Improvement Act.*

This INRMP helps the Fort Carson comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, noxious weeds, non-point source pollution, endangered species, and wildlife management in general. Other compliance requirements at least partially affecting implementation of the INRMP are listed in Section 1.4, *Compliance Requirements*. This INRMP describes how Fort Carson will implement provisions of AR 200-3 (Department of the Army 1995a) and local regulations, principally Fort Carson (FC) Reg. 200-5 (*Maneuver Damage Control Program*), FC 200-6 (*Wildlife Management*), and portions of FC Reg. 200-1 (*Environmental Protection and Enhancement*), 350-1 (*Mountain Post Training*), FC Regulation 350-9, *Integrated Training Area Management (ITAM)*, FC Reg. 350-4 (*Training, Pinon Canyon Maneuver Site*), and FC Reg 350-9 (*Integrated Training Area Management (ITAM)*).

Sikes Act Improvement Act

The Sikes Act[3] states, *The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation ...*

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[2] Robert J. Schoomaker, U.S. Army Chief of Staff, and R.L. Brownlee, Acting Secretary of the Army. Excerpt from *The Army Strategy for the Environment, "Sustain the Mission – Secure the Future"*

[3] The Sikes Act referenced in this INRMP is as amended, including Public Law 105-85, the Sikes Act Improvement Act of 1997.

The Sikes Act (16 USC 670 *et seq*.) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for those items listed in the Sikes Act Roadmap (page xiii). This INRMP includes these items if they are applicable to natural resources management and land use at Fort Carson and the PCMS. The Sikes Act Roadmap at the beginning of this INRMP has specific locations of Sikes Act requirements within this INRMP.

Endangered Species Act
This INRMP has the signatory approval of the USFWS. This signature approval provides agreement concurrence that implementation of the INRMP would not adversely affect species listed under the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

Per provisions of the 2004 National Defense Authorization Act[4], this INRMP "*provides a benefit to the species for which critical habitat is proposed for designation*." The USFWS policy states that, where applicable, federal critical habitat designation is not warranted if the INRMP includes certain criteria, which are summarized in Section 4.12.1.2.2, *Critical Habitat*.

National Environmental Policy Act
The National Environmental Policy Act (NEPA) requires disclosure of environmental impacts created by proposed major federal actions. The Army Regulation implementing NEPA , 32 CFR 651.33 (Department of the Army 2002) and the Council on Environmental Quality (*Implementing Guidelines for NEPA*, 40 CFR Parts 1500-1508) recommend an Environmental Assessment (EA) be completed for natural resources management plans. AR 200-2 outlines NEPA compliance requirements of proposed Army actions. This INRMP is an update of the *Integrated Natural Resources Management Plan and Environmental Assessment, 2002-2006* (Gene Stout and Associates 2002c), which included an incorporated EA. Under a memorandum issued by the Assistant Chief of Staff for Installation Management, dated May 25, 2006, and titled, *Guidance for Implementation for Sikes Act Improvement Act,* if only limited revisions are made to an existing INRMP, additional NEPA analysis is not necessary. Required additional NEPA documentation for new management actions within this INRMP will be accomplished as these actions are implemented.

Implementation of this INRMP is identified as a specific mitigation for the use of lands at Fort Carson in the *Environmental Assessment (Programmatic for Military Installation Land Use at 7th Infantry Division and Fort Carson, Fort Carson, Colorado* (Gene Stout and Associates 2001). As such, its implementation is eligible for high priority funding.

Scope
The INRMP will provide the basis and criteria for conserving, protecting, and enhancing natural resources using landscape and ecosystem perspectives, consistent with the military mission. The INRMP applies to organizations internal and external to Fort Carson that are involved with or interested in the management or use of Fort Carson and the PCMS natural resources and lands. This application includes active duty units, reserve components, directorates, private groups, and individuals. This INRMP is an integral part of the Fort Carson Master Plan.

[4] Section 318, Military Readiness and Conservation of Protected Species, National Defense Authorization Act of 2004.

Relationship to the Military Mission

Fort Carson is home to approximately 17,500 soldiers with planned increases of about 10,500 soldiers over the period of this INRMP (Robert D. Niehaus, Inc. 2005). Fort Carson and the PCMS also support the Colorado National Guard, Army Reserve Components, and other military units. The military mission of Fort Carson is to train, mobilize, deploy, and sustain combat-ready, multi-component integrated forces. Fort Carson and the PCMS provide facilities and service to U.S. Armed Forces that require land and airspace to practice combat skills and operations on a year-round basis. To accomplish this mission, realistic and quality training opportunities are necessary. The mosaic of natural communities found on Fort Carson and the PCMS and climate extremes ranging from hot summers to cold winters provides U.S. Armed Forces with a variety of realistic training scenarios.

This INRMP supports the military mission by conserving and enhancing training lands upon which the mission is critically dependent. The INRMP also describes recreational opportunities associated with natural resources that are available to Fort Carson and local and regional communities.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate Fort Carson's military mission, nor does it replace any requirement for environmental documentation of the military mission at Fort Carson or the PCMS. Land use at Fort Carson, including military activities, was evaluated in *Environmental Assessment (Programmatic for Military Installation Land Use at 7th Infantry Division and Fort Carson, Fort Carson, Colorado* (Gene Stout and Associates 2001).

Partnerships

This document was prepared in partnership and cooperation with the USFWS and the Colorado Division of Wildlife (CDOW), representing the federal and state Sikes Act cooperating agencies, respectively. Other partners in this effort include universities, other federal and state agencies, and other nongovernmental organizations (see Chapter 2). This INRMP was developed and will be implemented according to principles within the Memorandum of Understanding (MOU) developed by the DoD, USFWS, and International Association of Fish and Wildlife Agencies[5].

INRMP Implementation Summary

This INRMP is designed to provide direct input into the environmental budget process. The INRMP (Chapters 4 and 5) describes specific projects with justifications, timelines, and budgets. Each project with its goals and objectives and timelines are listed in Appendix 7.3.

Section 7.4, *Implementation Funding Options* lists each project by funding source and provides project-specific estimated costs to implement during fiscal years 2007-2011. The below table summarizes INRMP implementation costs by funding source**.**

[5] *Memorandum of Understanding among the Department of Defense and the U.S. Fish and Wildlife Service and the International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resource Management Program on Military Installations*. January 2006.

INRMP Implementation Costs*

Type Funds Anticipated	Section	FY 07	FY 08	FY 09	FY 10	FY 11	Totals
Forestry	7.4.1	$1	$1	$1	$1	$1	$5
Sikes Act	7.4.2	$49	$61	$51	$51	$51	$263
Environmental	7.4.4	Budget data not available.					
Operations and Maintenance**	7.4.5	$40	$40	$40	$45	$45	$210
ITAM	7.4.6	$5,963	$6,125	$6,807	$6,914	$6,921	$32,730

* Funding in thousand of dollars.
** Only dam safety funds are included.

Most funding to implement this INRMP is anticipated to come from environmental funds, particularly salaries. Due to ongoing changes in Army funding policies, these budget data are not yet available.

Costs and Benefits

Costs: Funding will be primarily from revenues generated from the sale of hunting and fishing permits, environmental funds, operations and maintenance funds, and training funds designated for implementation of the Integrated Training and Management (ITAM) program.

Military Mission Benefits: Implementation of this INRMP will improve the quality of training land. It will enhance mission realism through the perpetuation of more realistic training lands. It will reduce maintenance costs, improve health and safety, and enhance the capability for long range planning at Fort Carson and the PCMS.

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, reduce the potential for environmental pollution, promote biodiversity conservation, and implement an ecosystem management approach. INRMP implementation will increase overall knowledge of the operation of Fort Carson and the PCMS ecosystems through surveys and research. INRMP implementation will decrease long-term environmental costs and reduce personal and Installation liabilities from environmental noncompliance.

Other Benefits: Troop environmental awareness will be enhanced while training at Fort Carson and the PCMS. Community relations and Fort Carson's environmental image, internal and external to the Department of Defense, will be enhanced. Quality of life for the Fort Carson community and its neighbors will be improved. Environmental impacts to, as well as from lands adjacent to Fort Carson will be minimized.

INRMP Organization

This INRMP is organized in distinct categories.

- Chapter 1 describes general relationships between natural resources management and the overall Fort Carson mission. It lists compliance requirements and describes the natural resources management philosophy as a whole.
- Chapter 2 identifies responsible parties and their roles in implementation of this INRMP.

- Chapter 3 describes the physical, biological, and human environments at Fort Carson and the PCMS, including a description of the military mission and land management units.
- Chapter 4 describes current conditions and the management (current and proposed) of natural resources programs within the responsibility of the Directorate of Environmental Compliance and Management (DECAM), using specific project descriptions.
- Chapter 5 describes current conditions and the management (current and proposed) of programs directly related to natural resources, using specific project descriptions; some of these are under the responsibility of other Fort Carson organizations.
- Chapter 6 identifies unresolved issues.
- Chapter 7 provides means used for implementing this INRMP, including organization, personnel, external assistance, data analysis, project summary, funding, and command support.
- **References** documents all sources referenced in this INRMP.
- **Agencies and Persons Consulted** identifies local, state, and federal agencies and individuals consulted by the preparers of this INRMP for their expertise.
- **Plan Preparers** identifies individuals, with their qualifications, who prepared this document.
- The **Distribution List** identifies all agencies, organizations, and individuals who received copies of this INRMP.
- The **Acronyms** section lists all acronyms used and their meaning.
- **Appendices** contain information or data relevant to natural resources management on Fort Carson and the PCMS.

For those who are primarily interested in natural resources projects planned for 2007-2011, they are described in chapters 4 and 5, summarized for budget purposes in sections 7.4, *Implementation Funding Options* and 7.5, *INRMP Implementation Costs* and summarized by project with abbreviated goals and objectives in Appendix 7.3.

Monitoring INRMP Implementation

Means that will be used to monitor INRMP implementation are detailed in Section 1.2, *DECAM Vision, Mission, and Conservation Strategic Goal/Objectives*. The most significant monitoring program will be the Annual INRMP Cooperator Review and Update to provide an annual update, if necessary, of the INRMP and if necessary re-prioritize future initiatives. The INRMP will additionally be evaluated through monitoring programs, including the annual internal Environmental Performance Assessment System, the external Environmental Performance Assessment System (every 2-3 years), the Army Environmetal Data Base-Environmental Quality Report, and reviews by the U.S. Army Installation Management Command - West Region and other interested parties. The Installation Status Report, Environmental Infrastructure is a mechanism by which the performance of the environmental program (including natural resources management) is evaluated by the Installation Commander.

Summary

This INRMP outlines steps required to meet Department of Defense, U.S. Army, and Fort Carson legal and stewardship obligations to sustain and improve natural resources on Fort Carson and the PCMS, while enabling the accomplishment of the military mission. The INRMP has been developed through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for Fort Carson, the U.S. Army, and the Department of Defense. This INRMP will not resolve all existing and/or future environmental issues. It does provide the guiding strategy and means to minimize and work toward resolution of such issues.

1.0 Policy and Compliance

The Army Strategy for the Environmental Vision[6]

Sustain the Mission – Although much is changing, certain things remain constant. The Army's primary mission is to defend the United States – its people, its land, and its heritage. Our core values endure.

Secure the Future - … a sustainable Army simultaneously meets current as well as future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the natural environment.

Meet the Challenges - … we are transforming how we fight, how we train, how we do business, and how we interact with others in order to continually improve and provide for the Nation's security.

The Army Strategy for the Environmental Goals[7]

- Foster a Sustainability Ethic – Foster an ethic within the Army that takes us beyond environmental compliance to sustainability.
- Strengthen Army Operations – Strengthen Army operational capability by reducing our environmental footprint through more sustainable practices.
- Meet Test, Training and Mission Requirements – Meet current and future training, testing, and other mission requirements by sustaining land, air, and water resources.
- Minimize Impacts and Total Ownership Costs – Minimize impacts and total ownership costs of Army systems, materiel, facilities, and operations by integrating the principles and practices of sustainability.
- Enhance Well–being – Enhance the well-being of our Soldiers, civilians, families, neighbors and communities through leadership in sustainability.
- Drive Innovation – Use innovative technology and the principles of sustainability to meet user needs and anticipate future Army challenges.

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

It is important to understand the relationship between the natural resources program and Fort Carson as a whole. A comparison of Fort Carson mission and vision with the mission and vision of the DECAM and the DECAM conservation-specific goals and objectives helps define this relationship.

[6] *Sustain the Mission, Secure the Future – The Army Strategy for the Environment*.
[7] *Sustain the Mission, Secure the Future – The Army Strategy for the Environment*.

1.1 Fort Carson Mission and Vision[8]

Mission

Fort Carson's Mountain Post Team - best opportunity in the Army for Soldiers to train, leaders to lead, families to grow and people to work. We are a first rate power projection platform (air and rail) and Post Mobilization Maneuver Training Center; a premier installation and committed community partner, providing combat-ready forces for the 21st Century.

Vision

Fort Carson trains, mobilizes, deploys, and sustains combat-ready forces. We ensure the well-being and protection of the Mountain Post Team, while operating a responsive, efficient and sustainable installation, Post Mobilization Maneuver Training Center and power projection platform.

1.2 DECAM Vision, Mission, and Conservation Strategic Goal/ Objectives[9]

Vision

An enterprising and vigilant DECAM enabling military training and mission readiness in a culture of environmental stewardship that anticipates future requirements

Mission

The DECAM is a customer-orientated interdisciplinary environmental organization established to provide for the long-term accomplishment of the military mission. We manage, conserve, and demonstrate sound stewardship of the public trust for the environmental resources under our responsibility while providing proactive and competent environmental, energy, and natural resources management services and operations. We accomplish the mission by means of a diverse team of individuals integrating professionally all environmental and mission related requirements within our sphere of influence.

Conservation Strategic Goal[7]

Conserve and protect natural and cultural resources consistent with the military mission for present and future generations.

Program Monitoring
Specific program goals and objectives identified in chapters 4, 5, and 7 (as summarized in Appendix 7.3) serve as a checklist to monitor the success of the INRMP.

The most significant monitoring program will be the Annual INRMP Cooperator Review and Update (if necessary). This program is comprised of an annual meeting with key cooperators (minimally USFWS

[8] www.carson.army.mil/gcima
[9] *Directorate of Environmental Compliance and Management Performance Plan, FY 06* (DECAM 2005).

and CDOW representatives) who will review, prioritize, and validate accomplishments and needs during the preceding year. This process will provide an annual update, if necessary, of the INRMP and if necessary re-prioritize future initiatives necessary to adapt to changing requirements.

The INRMP will also be evaluated through monitoring programs, including the annual internal Environmental Performance Assessment System, the external Environmental Performance Assessment System (every 2-3 years), the Army Environmental Data Base-Environmental Quality Report, and reviews by the U.S. Army Installation Management Command - West Region and other interested parties. INRMP goals and objectives in Appendix 7.3 can provide a basis for evaluating INRMP implementation.

The Installation Status Report, Environmental Infrastructure is a mechanism by which the performance of the environmental program (including natural resources management) is evaluated by the Installation Commander. Results of competition in the Department of Defense and Department of the Army natural resources conservation awards program are also indicative of natural resources program success and INRMP implementation.

The DECAM uses qualitative and quantitative data to monitor goal/objective achievement (DECAM 2005a). Monitoring programs are described within specific projects in chapters 4 and 5 of this INRMP.

Outcome Goals
Below are specific Outcome Goals defined in the DECAM Performance Plan (DECAM 2005a).

Outcome Goal: Sustain and improve training land condition and realism. Data for determining immediate or short-term impacts to natural resources are collected by the DECAM and other specialists through after-action review assessments of training exercises. Since this method relies on visual observation, it is subject to the degree of the knowledge and skill of the person making the estimate. Range and Training Land Assessment data can mitigate the potential bias associated with vegetation and wildlife impacts over the long term.

The DECAM and G3/DPTM consult routinely to balance the requirement for land deferments with military training requirements. After analyses of monitoring and trend data, the effectiveness of past and on-going land treatments and other data are determined.

Outcome Goal: Comply with statutory and regulatory mandates, requirements, and procedures to reduce negative impacts on training and quality of life. The DECAM prepared a gap analysis for all wildlife species, is implementing management plans for listed and proposed species, and is addressing declining species proactivley with on-site and off-site activities and partnerships. These plans include goals, objectives, and measurement information that will be used by the DECAM, in consultation with wildlife management partners, to develop species-specific management programs aimed at minimizing impacts to both wildlife and military training. The status of plans and available data vary and will require comprehensive evaluation to determine data needs, reliability, accuracy, and limitations. Collection of vegetation and wildlife data by program managers represents a proactive approach that may prevent listings of species of current and future concern with associated habitat.

Outcome Goal: Improve the urban landscape and livability of the community. The DECAM manages the Fort Carson street tree program which includes planting and maintenance of trees along major thoroughfares and trails. The DECAM maintains maps and other documentation required for this measurement. The DECAM, in an advisory capacity, also strives to include native landscapes,

windbreaks, and visual barriers in new facility construction and landscape renovation projects. The DECAM provides pest management services for the Installation. Integrated pest management data are recorded by operators and include pest management method, application rates, and service time. The Directorate of Public Works (DPW) records facility data for the PCMS through work requests and real property and maintenance records. The quality of facilities is assessed through the Installation Status Report – Infrastructure, which is limited by the definitions and standards of the Installation Status Report, and component code inspections.

The ability to achieve these goals, including direct support of the military mission, depends directly on the health and condition of natural resources at Fort Carson and the PCMS. Properly functioning ecological conditions provide the vegetation, soil, and water resources needed for realistic military training. These same conditions provide opportunities for outdoor recreation that are important assets to both military and civilian communities associated with Fort Carson.

1.3 Support of Installation Goals

The DECAM implements natural resources management strategies for military mission accomplishment and the long-term benefit of the resource. The first outcome goal recognizes that natural resources must be adequately conserved and maintained to maximize military training opportunities and other uses into the future. It also uses quantitative measurement of ecological condition to determine short and long-term effectiveness of conservation strategies. The second outcome goal recognizes our responsibility to both maintain and improve ecosystems and to manage our land in a way that provides for military training regardless of the presence or absence of federal-listed species without impact to quality of life. The last outcome goal indicates the extent to which conservation strategies in the community are effective in terms of the long-term health and sustained vigor of the urban forest and controlling or eliminating economic and health-related pests.

Implementation of this INRMP will support the Fort Carson mission and vision. The natural resources staff at Fort Carson is committed to supporting the military mission, providing stewardship of resources entrusted to the Army, enhancing the quality of life of Fort Carson and surrounding communities, and being a valued member of the overall Fort Carson team. Implementation of this INRMP will demonstrate those qualities.

1.4 Compliance Requirements

The INRMP is the primary mechanism for compliance with natural resources laws and regulations. Federal, state, and local laws and regulations may apply to proposed management actions addressed within this INRMP.

1.4.1 Sikes Act

The Sikes Act[10], states, *The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation ...*

[10] The Sikes Act referenced in this INRMP is as amended, including Public Law 105-85, the Sikes Act Improvement Act of 1997.

The Sikes Act (16 USC 670 *et seq*.) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for:

- fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resources management objectives and time frames for proposed action;
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management;
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of natural resource laws and regulations;
- no net loss in the capability of military installation lands to support the military mission of the installation; and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- regular review of this INRMP and its effects, not less often than every five years (Note: At Fort Carson and the PCMS, this will be accomplished annually with the Annual INRMP Cooperator Review and Update.);
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement and related activities in accordance with the INRMP;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife.

The Sikes Act Roadmap at the beginning of this INRMP contains specific locations of above Sikes Act requirements within this INRMP.

1.4.2 National Environmental Policy Act

The National Environmental Policy Act requires disclosure of environmental impacts created by proposed major federal actions. The intent of NEPA is to better inform decision-makers of potential impacts from proposed projects and to utilize this information early in the project planning process. AR 200-2, *Environmental Analysis of Army Actions* (Department of the Army 2002) and the Council on Environmental Quality Implementing Guidelin es for NEPA (40 CFR Parts 1500-1508) recommend an Environmental Assessment be completed for natural resources management plans. This INRMP is an update of the *Integrated Natural Resources Management Plan and Environmental Assessment, 2002-2006* (Gene Stout and Associates 2002c), which included an incorporated EA. Under a memorandum issued by the Assistant Chief of Staff for Installation Management, dated May 25, 2006, and titled,

Guidance for Implementation for Sikes Act Improvement Act, if only limited revisions are made to an existing INRMP, additional NEPA analysis is not necessary. Required additional NEPA documentation for new management actions within this INRMP will be accomplished as these actions are implemented.

Implementation of this INRMP is identified as a specific mitigation for the use of lands at Fort Carson in the *Environmental Assessment (Programmatic for Military Installation Land Use at 7th Infantry Division and Fort Carson, Fort Carson, Colorado* (Gene Stout and Associates 2001). As such, its implementation is eligible for high priority funding.

1.4.3 Endangered Species Act

This INRMP has the signatory approval of the USFWS. This signature approval provides agreement concurrence that implementation of the INRMP would not adversely affect species listed under the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

Per provisions of the 2004 National Defense Authorization Act[11], this INRMP "*provides a benefit to the species for which critical habitat is proposed for designation*." The USFWS policy states that, where applicable, federal critical habitat designation is not warranted if the INRMP includes certain criteria, which are summarized in Section 4.12.1.2.2, *Critical Habitat*.

1.4.4 Migratory Bird Legal Instrumentalities

Migratory Bird Treaty Act

The Migratory Bird Treaty Act is an international agreement among the United States, Canada, and Mexico that protects designated species of birds. Most birds are protected under the Migratory Bird Treaty Act, with only a few exceptions. Birds classified as migratory also include species that occupy Fort Carson and the PCMS throughout the year. A complete list of all migratory bird species protected by the Migratory Bird Treaty Act is in 50 CFR 10.13.

The Migratory Bird Treaty Act controls the taking of these birds, their nests, eggs, parts, or products. The Act states that it is unlawful "*at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, attempt to capture, or attempt to kill, purchase, offer to purchase, deliver for shipment, ship, export, import, cause to be shipped, deliver for transport, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, possess, offer for sale, sell, offer to sell, barter, offer to barter, any migratory bird, any part, nest, or egg of any such bird, or any part, nest, or egg thereof*;" unless and except as permitted by regulations in the Migratory Bird Treaty Act.

All persons, organizations, and agencies, are liable for prosecution for violations and must follow permitting requirements for taking migratory birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes.

Executive Order 13186

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* required the DoD and the USFWS to establish a memorandum of understanding (MOU) that will promote the

[11] Section 318, Military Readiness and Conservation of Protected Species, National Defense Authorization Act of 2004.

conservation of migratory bird populations (Federal Resister, Volume 71, Number 168, 51580-51585, August 30, 2006).

This MOU specifically pertains to the following categories of DoD activities:

- natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, agricultural outleasing, conservation law enforcement, invasive weed management, and prescribed burning;
- installation support functions, including but not limited to the maintenance, construction or operation of administrative offices, military exchanges, road construction, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, non-tactical equipment, laundries, morale, welfare, and recreation activities, shops, landscaping, and mess halls;
- operation of industrial activities;
- construction or demolition of facilities relating to these routine operations; and
- hazardous waste cleanup.

In summary, both DoD and the USFWS agree to:

- emphasize an interdisciplinary, collaborative approach to migratory bird conservation within the geographic framework of the North American Bird Conservation Initiative, Bird Conservation Regions;
- strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent or minimize the loss or degradation of habitats on DoD-managed lands;
- work with willing landowners to prevent or minimize the loss or degradation of migratory bird habitats on lands adjacent or near military installation boundaries;
- promote collaborative projects;
- provide training opportunities to DoD natural resources personnel on migratory bird issues, to include bird population and habitat inventorying, monitoring methods, and management practices that avert detrimental effects and promote beneficial approaches to migratory bird conservation;
- participate in the Interagency Council for the Conservation of Migratory Birds to evaluate implementation of the MOU;
- promote migratory bird conservation internationally, as it relates to wintering, breeding, and migration habitats of birds that breed on DoD lands; and
- promote and undertake ecologically sound actions to curb the introduction in the wild of exotic or invasive species harmful to migratory birds.

In summary, DoD shall:

- follow all migratory bird permitting requirements for non-military readiness activities that are subject to 50 CFR parts 21.22 (banding or marking), 21.23 (scientific collecting), 21.26 (special Canada Goose permit), 21.27 (special purposes), or 21.41 (depredation) (no permit is required to take birds in accordance with Parts 21.43–21.47 (depredation orders));
- encourage incorporation of comprehensive migratory bird management objectives in the preparation of DoD planning documents, including INRMPs, Pest Management Plans, Installation Master Plans, NEPA analyses, and non-military readiness elements of Bird Aircraft Strike Hazard documents;

- incorporate conservation measures addressed in Regional or State Bird Conservation Plans in INRMPs;
- consistent with imperatives of safety and security, allow the USFWS and other partners reasonable access to military lands for conducting sampling or survey programs;
- prior to starting any activity that is likely to affect populations of migratory birds: 1) identify migratory bird species likely to occur in the area of the proposed action and determine if any species of concern could be affected by the activity; 2) assess and document, through the project planning process, using NEPA when applicable, the effect of the proposed action on species of concern using the best available demographic, population, or habitat association data in the assessment of effects upon species of concern; and 3) engage in early planning and scoping with the USFWS relative to potential impacts of a proposed action to proactively address migratory bird conservation and to initiate appropriate actions to avoid or minimize the take of migratory birds;
- manage military lands and non-military readiness activities in a manner that supports migratory bird conservation, giving consideration to the following factors: 1) habitat protection, restoration, and enhancement; 2) fire and fuels management practices; 3) invasive species and aquatic nuisance species management practices; 4) communications towers, utilities, and energy development; and 5) recreation and public use;
- develop and implement new and/or existing inventory and monitoring programs, at appropriate scales, using national standardized protocols, to evaluate the effectiveness of conservation measures to minimize or mitigate take of migratory birds, with emphasis on those actions that have the potential to significantly impact species of concern;
- advise the public of the availability of this MOU through a notice published in the Federal Register; and
- in accordance with DoD INRMP guidance, promote timely and effective review of INRMPs with respect to migratory bird issues with the USFWS and respective state agencies.

In summary, the USFWS shall:

- work with DoD by providing recommendations to minimize adverse effects upon migratory birds from DoD actions;
- through the Division of Migratory Bird Management, maintain a Web page on permits that provides links to all offices responsible for issuing permits and permit application forms for take of migratory birds;
- provide essential background information to the DoD when requested to ensure sound management decisions;
- work to identify special migratory bird habitats (*i.e.*, migration corridors, stop-over habitats, ecological conditions important in nesting habitats) to aid in collaborative planning;
- through the Ecological Service Field Office, provide to DoD, upon request, technical assistance on migratory bird species and their habitats;
- in accordance with USFWS *Guidelines for Coordination with DoD and Implementation of the 1997 Sikes Act* (2005), work cooperatively with DoD in the development, review and revision of INRMPs; and
- review and comment on NEPA documents and other planning documents forwarded by military installations.

In summary, both DoD and the USFWS understand the following.

- This MOU will not change or alter requirements associated with the Migratory Bird Treat Act, Endangered Species Act, NEPA, Sikes Act, or other statutes or legal authority.
- Responsibilities established by this MOU may be incorporated into existing DoD actions; however, DoD may not be able to implement some responsibilities identified in the MOU until DoD has successfully included them in formal planning processes. This MOU is intended to be implemented when new actions are initiated as well as during the initiation of new, or revisions to, INRMPs, Pest Management Plans, and non-military readiness elements of Bird Aircraft Strike Hazard plans. It does not apply to ongoing DoD actions for which a NEPA decision document was finalized prior to, or within 180 days of the date this MOU is signed.
- This MOU in no way restricts either Party from participating in similar activities with other public or private agencies, governments, organizations, or individuals.
- An elevation process to resolve any dispute between the Parties regarding a particular practice or activity is in place and consists of first attempting to resolve the dispute with the DoD military installation and the responsible Ecological Services Field Office. If there is no resolution at this level, either Party may elevate the issue to the appropriate officials at the applicable Military Service's Chain of Command and USFWS Regional Offices. In the event that there is no resolution by these offices, the dispute may be elevated by either Party to the headquarters office of each agency.
- This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the Parties will be handled in accordance with applicable laws, regulations, and procedures, including those for government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties and shall be independently authorized by appropriate statutory authority.
- The Parties shall schedule periodic meetings to review progress and identify opportunities for advancing the principles of this MOU.
- This MOU is intended to improve the internal management of the executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.
- Modifications to the scope of this MOU shall be made by mutual consent of the Parties, through issuance of a written modification, signed and dated by both Parties, prior to any changes.
- Either Party may terminate this instrument, in whole or in part, at any time before the date of expiration by providing the other Party with a written statement to that effect.

Final Rule – Migratory Bird Permits; Take of Migratory Birds by the Armed Forces

Section 315 of the 2003 National Defense Authorization Act provides that, not later than one year after its enactment, the Secretary of the Interior (Secretary) shall exercise her authority under Section 704(a) of the Migratory Bird Treaty Act to prescribe regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the military department concerned. The Authorization Act further requires the Secretary to promulgate such regulations with the concurrence of the Secretary of Defense.

The USFWS published a final rule (50 CFR Part 21, Federal Register Volume 72, Number 39, February 28, 2007, pp 8931-8950) that basically exempts the Armed Forces for the incidental taking of migratory birds during military readiness activities. This rule "*…authorizes such take, with limitations, that result*

from military readiness activities of the Armed Forces. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, then they must confer and cooperate with the Service (USFWS) *to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects.*"

This rule only includes military readiness activities. It specifically does not include routine operation of installation operating support functions (*e.g*., administrative offices, military exchanges or commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, recreation activities, shops, mess halls), operation of industrial activities, or construction or demolition of facilities relating to these routine operations.

"*The rule does not authorize take under the ESA* (Endangered Species Act)*. If a military readiness activity may affect a listed species, the Armed Forces retains responsibility for consulting with the Service under section 7(a)(2) of the ESA. Similarly, if a military readiness activity is likely to jeopardize the continued existence of a species proposed for listing, the Armed Forces retain responsibility for conferring with the Service in accordance with section 7(a)(4) of the ESA.*"

"*Withdrawal of authorization may be proposed if the Secretary determines that failure to do so is likely to result in a significant adverse effect on a population of a migratory bird species and one or more of the following circumstances apply:*
(A) The Armed Forces have not implemented conservation measures that (i) are directly related to protecting the migratory bird species affected by the proposed military readiness activity; (ii) would significantly reduce take of migratory birds species affected by the military readiness activity, (iii) are economically feasible, and (iv) do not limit the effectiveness of military readiness activities.
(B) The Armed Forces fail to conduct mutually agreed upon monitoring to determine the effects of a military readiness activity on migratory bird species and/or the efficacy of the conservation measures implemented by the Armed Forces.
(C) The Armed Forces have not provided reasonably available information that the Secretary has determined is necessary to evaluate whether withdrawal of take authorization for the specific military readiness activity is appropriate."

The rule assumes that installations will use the NEPA process to determine whether an ongoing or proposed military readiness activity is "*likely to result in a significant adverse effect on the population of a migratory bird species of concern.*" If such significant adverse effects are likely, an installation would be required to confer with the USFWS to develop appropriate conservations measures to minimize or mitigate such significant adverse effects.

1.4.5 Army Regulations

AR 200-2 (*Environmental Analysis of Army Actions*) (Department of the Army 2002) provides policies, procedures, and responsibilities for integrating environmental considerations into Army planning and decision-making. It outlines NEPA compliance requirements of proposed Army actions.

AR 200-3 (*Natural Resources-Land, Forest, and Wildlife Management*) (Department of the Army 1995a) provides policy, procedures, and responsibilities for the conservation, management, and restoration of land and its natural resources consistent with the military mission and national policies. It requires the preparation, implementation, and monitoring of an Integrated Natural Resources Management Plan for each installation. This regulation also requires an annual internal review of INRMPs by the Army.

AR 200-4 (*Cultural Resources Management*) (Department of the Army 1997a) provides guidelines for integrating cultural resources issues into an INRMP. Guidelines focus on cultural resources compliance requirements that are generated as a result of ecosystem management activities, contributions that cultural resources studies can make to ecosystem management decisions, and human activities, including those practiced by Native Americans. These guidelines should be supported and sustained in development and implementation of an ecosystem management plan.

AR 200-5 (*Pest Management*) (Department of the Army 1999a) establishes policy and procedures for installation pest management programs, emphasizing integrated pest management techniques. Installation pest management plans and installation INRMPs must be consistent with each other.

AR 350-19 (*The Army Sustainable Range Program*) (Department of the Army 2005) assigns responsibilities and provides policy and guidance for the Army ITAM program. It replaces AR 350-4, which was specific to ITAM. The regulation includes support for sustainable ranges, assessment of range sustainability, and management of automated and manual systems that support sustainable ranges.

1.4.6 List of Laws and Regulatory Instruments

Appendix 1.4.6 lists the most significant, but not complete, federal and state laws and regulations and other regulatory instruments that govern implementation of this INRMP.

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 DoD 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 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.

Fort Carson will use ecosystem management to guide its program in the next five years and beyond. Ecosystem Management is an approach to maintaining or restoring the composition, structure and function ecosystems for the goal of long-term sustainability. It is based on a collaboratively developed vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives and is applied within a geographic framework defined primarily by natural ecological boundaries (Meffe *et al.* 2002).

This management strategy enables the installation to conduct military training while conserving natural resources at a landscape scale upon which the quality of training ultimately depends. Adaptive management is simply ecosystem management at a landscape scale and involves the basics of conducting a scientific experiment of implementing the most favorable option, testing that option's results, and modifying implementation accordingly.

1.6 Environmental Management System and Sustainability

> *We must strive to become systems thinkers if we are to benefit from the interrelationships of the* ***triple bottom line*** *of sustainability: mission, environment, and community*.[12]

1.6.1 The Army Strategy for the Environment

Army sustainability is defined as acting and operating in a way that meets the needs of current missions without compromising the Installation's ability to meet the needs of future missions. The U.S. Army adopted *The Army Strategy for the Environment, "Sustain the Mission – Secure the Future*" (Office of the Assistant Secretary of the Army for Installations and Environment 2004) to:

- strengthen the Army contribution to joint operations;
- meet current and future training, testing, and other mission requirements;
- improve our capability to operate installations, to include growing joint interdependency;
- reduce costs and minimize impacts so the Army can do more, and do it better;
- enhance human health, safety, and well-being; and
- be an active citizen within our communities, as well as a good neighbor.

The Vision and Goals of this strategy are the introduction to this Chapter to convey the importance of this strategy to the development and implementation of this INRMP.

1.6.2 Environmental Management System

Executive Order 13148, *Greening the Environment through Leadership in Environmental Management* requires government agencies to implement an Environmental Management System (EMS) by 2005. Subsequent DoD and Department of the Army guidance requires an EMS be initiated by 2005 and incorporated into other organizational management systems by 2009 to achieve and demonstrate improved environmental performance. Department of the Army guidance specifically requires an EMS to be in conformance with International Organization for Standardization 14001 standards. The EMS must

[12] Robert J. Schoomaker, U.S. Army Chief of Staff, and R.L. Brownlee, Acting Secretary of the Army. Excerpt from *The Army Strategy for the Environment, "Sustain the Mission – Secure the Future"*

incorporate three basic elements: a commitment to environmental compliance, prevention of pollution, and continuous improvement.

Fort Carson is implementing an International Organization for Standardization 14001-conforming EMS (incorporating sustainability to create a Sustainability and Environmental Management System [SEMS]) ahead of schedule, in recognition of the importance of sustainability to the continuing success of the Installation.

1.6.3 Sustainability at Fort Carson

In 2002 community members, non-government organizations, and businesses met with Fort Carson and created a vision of the Pikes Region in 25 years.

We envision Fort Carson and the region 25 years from now as:

- enduring, like a national treasure;
- inspiring as a model of sustainability;
- restoring the environment; and
- returning value to the community.

Twelve aggressive, long-term (25-year) sustainability goals were established and approved by Fort Carson's Deputy Commanding General and Garrison Commander. Internal and external stakeholders worked with Fort Carson to validate goals and identify objectives, measures, targets, and initiatives to develop the Installation Five-year sustainability plan (7th ID and Fort Carson 2003).

One goal is creating a SEMS that meets requirements of an EMS (Section 1.6.2, *Environmental Management System*) and supports efforts in achieving the other eleven goals. The SEMS (7th ID and Fort Carson 2003) integrates elements of an EMS and principles of The Natural Step[13]. The Natural Step provides a framework[14] of basic scientific principles to articulate minimum conditions necessary to achieve a sustainable society using a systems approach. Achievement of goals and objectives within the SEMS will move Fort Carson into alignment with the following Natural Step system conditions.

- Nature is not subject to systematically increasing concentrations of substances extracted from the earth's crust.
- Nature is not subject to systematically increasing concentrations of substances produced by society.
- Nature is not subject to increasing degradation by physical means.
- Human needs are met worldwide.

SEMS Vision

Every soldier, civilian worker, contractor, and resident at Fort Carson engages in daily decision-making that models and fosters a sustainable Installation through shared vision, mission, and values aligned with personal passions while meeting the needs of the Army and the region.

[13] Brian Nattrass and Mary Altomare. 1999. *The Natural Step for Business*. New Society Publishers, Gabriola Island, British Columbia, Canada.
[14] Jamie MacDonald. 2001. *An Integrated Framework for Sustainability Management Systems (SMS)*. Dalhousie University, School for Resource and Environmental Studies, Halifax, Nova Scotia, Canada.

SEMS Goal

Advance a sustainable mission at Fort Carson by adopting a SEMS and by imparting (passing on) a personal commitment and enthusiasm for sustainability.

The Fort Carson SEMS (7th ID and Fort Carson 2003) supports the Installation's 25-year Sustainability goals. Three of these specifically relate to the development and implementation of this INRMP.

4. Enhance partnering to collaboratively develop, integrate, and implement regional sustainability (INRMP Section 4.1, *Ecosystem Management Coordination and Planning* and Chapter 2, *Responsible and Interested Parties*);
6. Further integrate sustainability principles into the Fort Carson land use planning, Real Property Master Planning, and Military Construction, Army programming processes (INRMP Section 1.5, *Biodiversity Conservation and Ecosystem Management*; Chapter 2, *Responsible and Interested Parties*; and Section 5.8, *National Environmental Policy Act Implementation*); and
11. Maintain training ranges (land and associated air space used for live fire ranges, maneuver, testing and urban development designated for Military Operations in Urban Terrain training) capable of supporting current and future military training to standard (INRMP Section 4.7, *Training Resources Sustainability* and Section 5.1, *Integrated Training Areas Management*).

Following objectives were developed to meet these three goals:

Objective 4.1: Achieve consensus in the community/region around common sustainability indicators.

Objective 4.2: Increase the rate of success for achieving Fort Carson sustainability objectives and targets through partnering.

Objective 4.3: Increase sustainable business practices collaboratively with business, non-profit organizations and government through community education.

Objective 6.1: Create sustainable master planning and land use planning processes and plans that integrate all relative aspects of Fort Carson and its surrounding communities.

Objective 11.1: Provide the capability for units training on Fort Carson and PCMS to train to standard and sustain that level of performance consistently over time.

Objective 11.2: Maintain an Unfinanced Requirement Plan identifying needed upgrades to support facilities and infrastructure.

Objective 11.3: Provide environmental monitoring and maintenance of training lands and biodiversity.

Objective 11.4: Conduct a Land Use Requirements Study and Alternatives Analysis.

Objective 11.5: Ensure no significant environmental and safety impacts of expended munitions, to include Unexploded Ordnance.

Objective 11.6: Mitigate archaeological sites to open training lands where appropriate and feasible.

Objective 11.7: Ensure ranges are buffered from external encroachment where appropriate and feasible.

Each objective has specific initiatives to achieve these objectives. Initiatives have lead and action agencies, specific steps, required resources, and time/cost considerations (7th ID and Fort Carson 2003).

2.0 Responsible and Interested Parties

2.1 Fort Carson

Below discussions of Fort Carson organizations primarily deal with natural resources-related responsibilities. Relationships between the DECAM and other organizations are emphasized.

2.1.1 Garrison Commander

The Garrison Commander directs and is responsible for all aspects of garrison operations at Fort Carson and the PCMS, including natural resources management. As such, the Garrison Commander is responsible for implementation of most of this INRMP. The Garrison Commander reviews hunting, fishing, and recreation permit suspension appeals and make final decisions concerning suspensions of recreational privileges on Fort Carson and the PCMS.

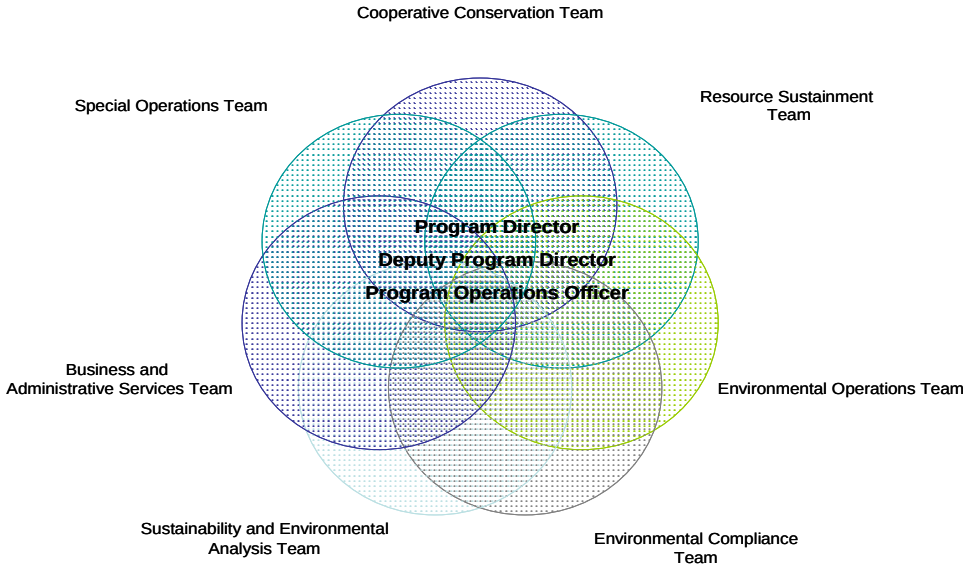
Acting through the Command Group, personal and special staff, directors, and separate commanders, the Garrison Commander is responsible for (Department of the Army 1995a):

- providing for funding and staffing of natural resources management professionals and other resources required to effectively manage natural resources on the installation;
- planning land utilization to avoid or minimize adverse effects on environmental quality and provide for sustained accomplishment of the mission;
- 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;
- ensuring the functioning of an Installation Environmental Quality Control Committee (or a functional alternative);
- ensuring ongoing and timely coordination of current and planned land uses between mission, natural resources, environmental, legal, and master planning;
- 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, *Environmental Analysis of Army Actions* (Department of the Army 2002);
- 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 (*i.e*., Chief, Natural and Cultural Resources Division).

2.1.2 Directorate of Environmental Compliance and Management

The DECAM is the environmental executive agent for the Garrison Commander and is the principle driver in the formulation of policies and procedures related to the environment, energy, and natural resources. The organizational structure includes the DECAM Director, Deputy DECAM Director Program Operations Officer, and seven teams: Cooperative Conservation Team, Resource Sustainment Team, Environmental Operations Team, Environmental Compliance Team, Sustainability and Environmental Analysis Team, Business and Administrative Services Team, and Special Operations Team (Figure 2.1.2).

Figure 2.1.2 DECAM Organizational Structure



The DECAM Director maintains an organization with the resources available to accomplish the INRMP and, acting primarily through the Cooperative Conservation Team, is responsible for (Department of the Army 1995a):

- 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;
- enforcement of laws and regulations related to the environment and natural resources;
- 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 Fort Carson; and
- managing all phases of the natural resources program for Fort Carson with appropriate natural resources management personnel.

The Cooperative Conservation Team, primarily acting through its Watershed/Wetland/404, Wildlife, Peak to Prairie, Greenprint, Army Compatible Use Buffer, Shortgrass Prairie, and Ecoregional teams, is responsible for preparation and implementation of most of this INRMP. The Resource Sustainment Team has responsibilities for watersheds/rangeland (shared with Cooperative Conservation Team), Forestry/Urban Forestry, and Cultural Resources. The Special Operations Team has responsibilities for Wildland Fire, Wildlife Law Enforcement, PCMS DECAM Operations, Equipment Maintenance, PCMS NEPA, and Sustainability Resources. The Sustainability and Environmental Analysis Team has responsibility for Fort Carson NEPA. These teams are the direct "vehicle" for accomplishment of the above responsibilities.

2.1.3 Directorate of Public Works

Activities of the DPW overlap with DECAM programs as they relate to the Conservation Strategic Goal. Construction, downrange road repair and maintenance, fire prevention/suppression, and grounds maintenance are part of the DPW mission. The DECAM complements and supports these missions by providing regulatory and technical guidance, developing and using water rights, reviewing and requesting permits, consulting with wildlife agencies, assisting with wildland firefighting and management, and maintaining downrange maneuver Training Areas.

2.1.4 Directorate of Plans, Training, Mobilization and Security

The Directorate of Plans, Training, Mobilization and Security (DPTM) is under the responsibility of the Garrison Commander. DPTM, particularly its Range Control Division, is the interface between the DECAM and troops training in the field. The Range Control Division is responsible for managing the ITAM program, managing range complexes, coordinating military training, and releasing range areas for recreational use.

The Range Control Division provides Training Area and range access to accomplish provisions of this INRMP, assists in enforcing considerations within range regulations, and is directly responsible for implementation and/or support of portions of this INRMP that directly affect or interact with training responsibilities, which include:

- operating, scheduling, and maintaining Fort Carson and the PCMS training facilities and Training Areas, ranges, field training sites, and range equipment;
- preparing, maintaining, and enforcing Fort Carson regulations involving the ITAM program and range operations;
- implementing the ITAM program (*i.e.*, sustainable range awareness, geographic information system, range and training land assessment, land rehabilitation actions);
- providing input to U.S. Amry Installation Management Command - West Region for ITAM program users requirements;
- supporting the geographical information system (GIS) database to ensure good customer service for all installation programs that rely on GIS data layers;
- coordinating with the DECAM on training activities that may affect fish and wildlife, wetlands, vegetation, water, soils, and/or cultural resources;
- issuing Downrange Passes for recreation on Fort Carson and the PCMS; and
- coordinating with DECAM in the development of the ITAM annual workplan.

Effective coordination between DPTM and DECAM is required if the DECAM is to achieve the Conservation Strategic Goal. The DPTM and DECAM coordinate on areas set aside under the deferment

and rest/rotation programs to allow other organizations to implement their management programs in a synchronous and complimentary manner. The DPTM and DECAM work together to identify range reclamation needs in relation to military operations and overall conservation of the rangeland resources, watersheds, and wildlife with associated habitat. The DPTM communicates to all involved organizations the location of set aside areas, so that military training does not damage land reclamation efforts or sensitive areas. DPTM personnel provide information on hunting seasons and "sensitive use" areas to preclude game violations and deterioration of land from recreational use (DECAM 2001a).

2.1.5 G3

The G3 is under the responsibility of the Fort Carson Chief of Staff. G3 is responsible for planning military training and operations. G3 provides military training requirements for Fort Carson and PCMS ranges.

2.1.6 Directorate of Morale, Welfare and Recreation

The Directorate of Morale, Welfare and Recreation (DMWR) establishes procedures and governs various aspects of installation morale, welfare, and recreation activities and non-consumptive, wildlife-related activities (bird watching, wildlife photography, etc). Programs that particularly affect natural resources include equestrian programs, off-road activities, Turkey Creek Ranch with related activities, and park activities.

Responsibilities include:

- planning and implementing the installation Outdoor Recreation Program;
- supervising and maintaining outdoor recreation activities, exclusive of hunting and fishing; and
- collecting fees and charges for various outdoor recreation activities, including the sale of hunting, fishing, and recreation permits under the Sikes Act authority.

The DECAM interacts with DMWR in providing outdoor recreational opportunities to Soldiers and the general public. DMWR issues hunting, fishing and recreational permits and collects associated revenues whereas the DECAM provides recreationist safety training, conducts bow-hunting certification, and provides law enforcement oversight. The CDOW establishes seasons in close coordination and consultation with the DECAM.

2.1.7 Public Affairs Office

The Public Affairs Office is responsible for promoting an understanding of Fort Carson operations 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 Fort Carson, especially in disseminating information critical to implementation of the program.

Natural resources conservation is inherently of significant interest to the general public, and this is especially true of Fort Carson and the PCMS. The people of Colorado are generally well educated and possess a distinct and genuine concern, interest, and curiosity of the natural resources in the region. Public support of natural resources management on Fort Carson and the PCMS is vital to ensuring a regional approach to management. It is critical to inform and then engage the public using partnerships, community involvement, and other actions (see Section 5.3, *Conservation Awareness*).

2.1.8 Staff Judge Advocate

The Staff Judge Advocate provides legal advice, counsel, and services to command, staff, and subordinate elements of the Fort Carson. Specific Staff Judge Advocate responsibilities with regard to integrated natural resources 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 DECAM on compliance with environmental laws; and
- advising the G3/DPTM on laws and regulations that affect training land use, management, and compliance.

2.1.9 Other Installation Organizations

Implementation of this INRMP will require assistance from other directorates and organizations. Such organizations include the Directorates of Contracting and Logistics (procurement), Safety, Provost Marshal (general enforcement), Garrison Resource Management (budget process), commanders of major subordinate organizations, and commanders of tenant units and activities.

Safety and Provost Marshal offices assist the DECAM and the Fort Carson Commander with ensuring the safety and security of all personnel. The DECAM enforces wildlife laws and regulations and ensures recreationists abide by general and weapons safety guidelines and physical security requirements. The DECAM and the Safety and Provost Marshal offices communicate primarily when planning and delineating hunting season requirements and schedules and giving the PCMS predeployment and field briefings. The Safety Office communicates safety issues involving landform and reclamation to the DECAM for corrective action. Occasionally, the DECAM and the Provost Marshal Office jointly investigate wildlife violations (DECAM 2001a).

Military units, including Reserve and National Guard forces, utilize downrange Training Areas and influence the DECAM's ability to meet the Conservation Strategic Goal. Units and activities need to be able to train with realism, and they need to be able to utilize the land today and in the future. Units, activities, and individuals also need facilities and living areas that are safe and healthy and provide a quality of life that balances environmental conservation with customer requirements. The DECAM complements and supports training using various land and wildlife management strategies and by providing regulatory and technical guidance (DECAM 2001a).

The DECAM, in conjunction with Range Control Division, provides Maneuver Damage Control training and pre-deployment briefings for units preparing to utilize the PCMS and incoming units preparing to use Fort Carson. The DECAM assists units with planning and conducting military exercises to minimize impacts to the environment. The DECAM and ITAM provide training opportunities for military engineer units using projects requiring heavy equipment, such as erosion control dam repair and excavation, banksloping, rock crushing and hauling, and hardened crossing construction. The DECAM also conducts training and provide instructional pamphlets related to self-help pest management, tree and shrub planting, and pruning (DECAM 2001a).

2.1.10 Environmental Quality Working Group

Fort Carson has an Environmental Quality Working Group to internally coordinate environmental activities, including natural resources management. The goal of this Group is to … *maximize resources by using better business practices and integrated planning to improve operational effectiveness, efficiency and take care of people*. Its objective is to … *further integrate environmental stewardship into decision making process and daily operations*. The desired outcome of the Working Group is … *environmental stewardship fully integrated into Fort Carson decision making process to sustain future operations*[15].

The Working Group is chaired by the Deputy Director, DECAM and includes representatives of every major unit or Directorate within Fort Carson, including the Garrison Commander. It meets monthly. The Environmental Quality Working Group exceeds the requirements of and replaces the need for an Environmental Quality Control Committee, which is required by AR Regulation 200-3 (Department of the Army 1995a).

2.2 Other Defense Organizations

2.2.1 U.S. Army Installation Management Command - West Region

The U.S. Army Installation Management Command - West Region, located at Rock Island, Illinois, is responsible for providing command and technical guidance to the Fort Carson natural resources program by (Department of the Army 1995a):

- assisting with program implementation and conducting staff visits to Fort Carson,
- 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.

The U.S. Army Installation Management Command – West Region will conduct an onsite evaluation of the Fort Carson natural resources program at least once every three years and will act as trustee over the overall natural resources program.

2.2.2 Army Environmental Command

The Army Environmental Command, 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, pest management, environmental compliance, Army Compatible Use Buffer (ACUB) Program, and related areas.

2.2.3 U.S. Army Corps of Engineers

U.S. Army Corps of Engineers, Engineer Research and Development Center laboratories and the Omaha District can provide research, technical, administrative, and logistical support to Fort Carson. The U.S. Army Corps of Engineers has the primary responsibility for administering Section 404 permits, and the Colorado Department of Public Health and Environment administers stormwater discharge permits.

[15] Environmental Quality Working Group Action Plan, FY00-01.

The Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers has provided support to Fort Carson concerning erosion control, soil interpretation, trafficability of wet soils, aerial imagery and monitoring of wet soils necessary to assist in the mitigation of negative impacts resulting from military training activities during wet/frozen weather. This research laboratory has used Fort Carson to develop three new germplasms, in conjunction with the Agricultural Research Service and the DECAM, which are more resistant to military training impacts and severe environmental conditions[16].

The Engineer Research and Development Center, Construction Engineering Research Laboratories, U.S. Army Corps of Engineers was instrumental in the development and accomplishment of such research projects as the Facilities Technology and Transfer project, installation and development of the GIS computer system, recycling tank tracks in the construction of erosion control structures, and various other projects on Fort Carson and the PCMS.

2.2.4 Area Military Installations/Organizations

Fort Carson shares some regional Front Range natural resources issues with other military installations in the area, including the Air Force Academy, Cheyenne Mountain Air Force Station, Pueblo Chemical Depot, Peterson Air Force Base, Schriever Air Force Base, Buckley Air Force Base, and Francis E. Warren Air Force Base (in Wyoming). Fort Carson continues to be a leader in sustainability by proactively seeking partners to facilitate natural resources conservation, while concomitantly maintaining the Installation training mission. Perhaps the best example of this DoD cooperative effort is the Front Range Eco-Regional Management Team initiative, which is described in Section 4.1.1, *Regional Ecosystem Management Coordination*.

The Fort Carson Army Compatible Use Buffer (ACUB) program, Greenprint project, and the Central Shortgrass Prairie Ecoregional Assessment are other successful examples. Through interactions with multiple agencies, organizations and individuals, Fort Carson has initiated grassland prairie ecosystem assessments, noxious weed management and control, forest health assessments in collaboration with the Air Force Academy, regional fire management plan development, and established conservation easements that will buffer Installation boundaries from incompatible development, while concurrently conserving critical shortgrass prairie habitat. The Colorado Air National Guard, U.S. Forest Service, Bureau of Land Management, Colorado College, and the CDOW had a partnership with Fort Carson in a Birds of Prey Study Group, which included Fort Carson.

2.3 Other Federal Agencies

2.3.1 U.S. Fish and Wildlife Service

The USFWS is the primary federal agency with which Fort Carson cooperates on natural resources management. Cooperative efforts with the USFWS primarily involve federal-listed species management, migratory bird protection and management, recreation, fishing, wildlife law enforcement, habitat improvement projects, GIS, NEPA, forest and range management, noxious weed management, pest management, contaminants and wetland inventories, and providing assistance, manpower, equipment, and expertise for the day-to-day operations of the DECAM. The USFWS has the lead on the enforcement and compliance with the Endangered Species Act and Migratory Bird Treaty Act, as well as other federal wildlife acts, laws and regulations. The USFWS cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS.

[16] Strategic Environmental Research and Development Program, Information Bulletin, Fall 2001, Number 10.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 2.3.1 contains specific items of agreement among the USFWS, CDOW, and Fort Carson, as required by the Sikes Act. This INRMP replaces the *Fort Carson and the Pinon Canyon Maneuver Site Integrated Natural Resources Management Plan, 2002-2006* (Gene Stout and Associates 2002c).

2.3.2 U.S. Natural Resources Conservation Service

The U.S. Natural Resource Conservation Service (NRCS) is the primary federal agency with which Fort Carson cooperates on erosion control projects, soil surveys, ecological site surveys, plant materials studies, and rehabilitation efforts on disturbed lands. Numerous acres of bank sloping and rangeland seeding have also been accomplished with the technical support of the NRCS. NRCS is part of a multi-agency team that is working with Fort Carson to alleviate a regional sediment pollution problem. The NRCS and El Paso County Soil Conservation District are helping Fort Carson develop a memorial tree park to honor those who died or were wounded in the Iraq and Afghanistan wars.

2.3.3 U.S. Forest Service

The U.S. Forest Service manages lands adjacent to the PCMS. Fort Carson has procedures for U.S. Forest Service crossing the PCMS to access these lands (Section 5.4, *Wildlife-based Recreation Management*). Fort Carson and the U.S. Forest Service have mutual aid agreements for the suppression of wildfires. The U.S. Forest Service cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS.

2.3.4 U.S. National Park Service

The U.S. National Park Service provides continuing technical support to Fort Carson in cultural resources management, which could affect natural resources management.

2.3.5 Environmental Protection Agency

The Environmental Protection Agency (EPA) is involved in various federal programs related to natural resources management, particularly in the wetlands permitting process, delegated nationally to the U.S. Army Corps of Engineers. The EPA cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS.

2.3.6 U.S. Geological Survey

The U.S. Geological Survey (USGS) is the principal federal agency with which Fort Carson cooperates on the management of watersheds and water resources on Fort Carson and the PCMS. With the support of the USGS, hydrological monitoring studies have been implemented to provide data for the proper management of water resources and watersheds on Fort Carson and the PCMS. The USGS is part of a multi-agency team that is working with Fort Carson to alleviate a regional sediment pollution problem. The USGS also supports the water rights program by collecting water diversion and use data and providing these data to the Colorado Water Commissioner.

The Biological Resources Division, USGS has conducted research on Fort Carson and the PCMS. Activities have included Fort Carson providing Mountain Plover and raptor use of prairie dog colonies to the Division to support regional studies.

2.3.7 U.S. Bureau of Land Management

The Bureau of Land Management cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS. The Bureau of Land Management assisted the DECAM in

research to determine the distribution and habitat of the Mexican Spotted Owl on Fort Carson during 1995 and 1996 by providing personnel to assist with the project. The DECAM and the Bureau of Land Management jointly participated in tracking this species on private and government lands west of Fort Carson. The BLM manages land containing several sensitive plant species that also occur on Fort Carson and PCMS. Exploring partnerships for coordinated management with BLM may help prevent these species from becoming more rare, precluding the need for listing. Also, under the Fort Carson-Pinon Canyon Military Lands Withdrawal Act (Public Law 104-201, September 23, 1996, Sections 2901 – 2913), section 2905, the Army and the Department of Interior are to enter into a management plan and an implementing memorandum of understanding for the land management of Fort Carson and PCMS.

2.3.8 U.S. Animal and Plant Health Inspection Service, Wildlife Services

The U.S. Animal and Plant Health Inspection Service, Wildlife Services, cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS. The agency is also involved in noxious weed control programs.

2.4 State Agencies

2.4.1 Colorado Division of Wildlife

The CDOW is responsible for management of most fish and wildlife within the state, including those on federal lands. Specific cooperation with the CDOW involves law enforcement, license/permit sales, special seasons and bag limits, check station operation, and compliance issues concerning state laws/regulations, including state-listed species. The CDOW cooperates in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS.

The CDOW is a signatory cooperator in implementation of this INRMP. Appendix 2.3.1 contains specific items of agreement among the CDOW, USFWS, and Fort Carson, as required by the Sikes Act. This INRMP replaces the *Fort Carson and the Piñon Canyon Maneuver Site Integrated Natural Resources Management Plan, 2002-2006* (Gene Stout and Associates 2002c).

2.4.2 Colorado State Forest Service

The Colorado State Forest Service sells tree seedlings to Fort Carson each year, provides technical support to the tree planting program, assists with Ips beetle control, and has assisted in the establishment and maintenance of the PCMS windbreak.

2.4.3 Colorado Division of Water Resources

Fort Carson coordinates all water rights actions with the Colorado Division of Water Resources. The Installation is also a member of the Arkansas Basin Roundtable, which implements the Colorado Water for the 21st Century Act.

2.4.4 Other Colorado Agencies

The Colorado Department of Agriculture, Colorado Department of Natural Resources, Colorado State University Cooperative Extension, and Colorado State Board of Land Commissioners cooperate in a multi-agency effort to manage prairie dogs in Colorado, which includes Fort Carson and the PCMS. Colorado State Parks owns and manages land containing several sensitive plant species that also occur on Fort Carson and PCMS. Exploring partnerships for coordinated management with State Parks may help prevent these species from becoming more rare and prevent the need for listing. The Colorado State Department of Agriculture is assisting with a study of the biological control of weeds on Fort Carson. The Colorado State University Agricultural Extension Service is a source of weed management information

and expertise. The Colorado Division of Minerals and Geology provides general direction, guidance, and coordination concerning all reclamation projects, specifically the Stone City Clay Mine operation. The Colorado Department of Public Health and Environment is delegated by the EPA to administer Clean Water Act, Section 303(d) impared waters.

2.5 Native American Tribes

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, executive orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. Executive Order 13175 and the *American Indian and Alaska Native Policy* (Department of Defense 1998) establish regular and meaningful consultation and collaboration with Indian tribal governments. Fort Carson provides a process that permits elected officials and other representatives of Indian tribal governments to provide meaningful and timely input on actions or policies that might be of tribal interest, such as those that affect Indian sacred sites or traditional cultural properties.

Tribal organizations that may be consulted with regard to these issues include:

Apache Tribe of Oklahoma, P.O. Box 1220, Anadarko, OK 73005;
Cheyenne and Arapaho Tribes of Oklahoma, P.O. Box 38, Concho, OK 73022;
Comanche Nation, P.O. Box 908, Lawton, OK 73502;
Jicarilla Apache Nation, P.O. Box 507, Dulce, NM 87528;
Kiowa Nation, P.O. Box 369, Carnegie, OK 73015;
Northern Arapaho Tribe, P.O. Box 396, Fort Washakie, WY 82514;
Northern Cheyenne Tribe, P.O. Box 128, Lame Deer, MT 59043;
Oglala Sioux Tribe of the Pine Ridge Reservation, P.O. Box H, Pine Ridge, SD 57770;
Pawnee Nation of Oklahoma, P.O. Box 470, Pawnee, OK 74058;
Shoshone Tribe (Eastern Band), P.O. Box 538, Fort Washakie, WY 82514
Southern Ute Indian Tribe, P.O. Box 737, Ignacio, CO 81137;
Ute Mountain Ute Tribe, General Delivery, Towaoc, CO 81334; and
Wichita and Affiliated Tribes of Oklahoma, P.O. Box 729, Anadarko, OK 73005.

2.6 Universities and Colleges

Various institutions of higher education either are or have been partners with Fort Carson natural resources program at Fort Carson and the PCMS. The following are examples of such partnerships.

- Colorado State University and Texas A&M University have supported research for biological control and alternative control of noxious weeds, range management/monitoring, forest inventories, and wildlife management/monitoring and surveys.
- The University of Wisconsin at Madison, Virginia Polytechnic University, Colorado State University, Utah State University, Oregon State University, University of Wyoming, University of Northern Colorado, University of Southern Colorado, University of Denver, Pikes Peak Community College, University of Vermont, and Colorado College have supported natual resources management and research initiatives related to wildlife, watershed, and range conservation at Fort Carson and the PCMS.
- The Massachusetts Institute of Technology and Oxford University (England) have assisted Fort Carson to better understand gullying processes.

- The University of Wyoming and the University of California – Riverside conducted selenium assessments on Fort Carson.
- Through a MOU, Pikes Peak Community College supports range and wildlife projects on Fort Carson and the PCMS.
- Colorado College supports the wildlife management program.

2.7 Municipalities and Counties

Communities adjacent to or in proximity of Fort Carson and the PCMS are positively affected by natural resources management on the installations. Fort Carson and the PCMS provide opportunities for general public hunting, fishing, and other recreation.

Fort Carson has cooperative agreements with the Colorado Springs Fire Department and El Paso County to provide mutual aid for the suppression of wildland fires on Fort Carson and surrounding area. Fort Carson is part of the Fountain Creek Watershed Management Working Group of the Pikes Peak Area Council of Governments as well as other cooperative ventures that are established to deal with regional natural resources issues. The Upper Arkansas Weed Management Cooperative, an organization of eight southern Colorado counties, was formed to expedite and coordinate weed management efforts between agencies in the Upper Arkansas River drainage. The DECAM will share information, particularly the location of weed infestations, with this organization to facilitate the development of a regional weed control strategy. There are no significant conflicts between natural resources management on Fort Carson and the PCMS and surrounding communities.

2.8 Other Interested Parties

Fort Carson has interactions with many private conservation organizations and individuals. Examples of these relationships are listed below.

- Fort Carson used the expertise of The Colorado Nature Conservancy and Colorado Natural Heritage Program in the development of management plans for rare plants and animals on Fort Carson and the PCMS.
- DECAM personnel cooperate with the local chapter of The Audubon Society on annual Christmas counts.
- Army and Fort Carson cooperative agreements with The Nature Conservancy and El Paso County facilitate the ACUB program on Fort Carson and the PCMS.
- A Cooperative Agreement with the USFWS, Colorado Natural Heritage Program, and Fort Carson facilitates the Army's Sensitive and Rare Species on Fort Carson and the PCMS.
- The Fort Carson natural resources program is certified with the Wildlife Habitat Council.
- The Southern Rockies Carnivore Restoration Project has an interest in the issue of coyote control for swift fox management at the PCMS.
- The Director, DECAM has served on the Board of Directors of the National Wildlife Federation, becoming its Chair.
- The Director, DECAM serves on the Board of Directors of the National Wildlife Action, which coordinates closely with the National Wildlife Federation.
- The Director, DECAM has served on the Board of Directors of the Colorado Wildlife Federation, becoming its President.
- The Director, DECAM has served on the Board of Directors of the Colorado Chapter of The Wildlife Society, becoming its President.

- The Cooperative Conservation Team Program Leader chairs the Natural Resources Technology Advisory Board at Pikes Peak Community College.
- School Districts 8 and 11 utilize Fort Carson as an outdoor learning center.
- Partners in Flight collaborates on migratory bird conservation and general bird conservation activities.
- The Colorado Native Plant Society uses Fort Carson and the PCMS for field trips.
- The Cooperative Conservation Team Program Leader serves on the Rangeland Assessment and Monitoring Committee for the Society for Rangeland Management.
- The Cooperative Conservation Team Program Leader serves on the Central Shortgrass Ecoregional Assessment Steering Committee.
- The Cooperative Conservation Team Program Leader serves on the Arkansas Interbasin Compact Committee, established by House Bill 05-1177; Colorado Water for the 21st Century Act.
- The Colorado College Biology Department regularly uses Fort Carson and the PCMS for field trips and research projects.

3.0 Physical, Biological, and Human Environments, Including the Military Mission

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.[17]

3.1 General Background

3.1.1 Location

Fort Carson
Fort Carson is located in the east-central portion of Colorado, south of Colorado Springs, at the base of the Rocky Mountain Front Range (38E45'N, 104E47'W) and occupies portions of three counties (El Paso, Pueblo, and Fremont). Fort Carson is bounded by two major north-south highways: Interstate 25 to the east and Colorado 115 on the west. The City of Pueblo lies about 35 miles south of the Cantonment Area, and Denver lies about 65 miles to the north (Figure 3.1.1).

PCMS
The PCMS is located in Las Animas County in southeastern Colorado east of Highway 350, extending to the Purgatoire River and north from Van Bremer Arroyo to the Otero County line. Nearby cities and towns include Trinidad and Model to the southwest and Timpas and La Junta to the northeast (Figure 3.1.1).

3.1.2 Neighbors

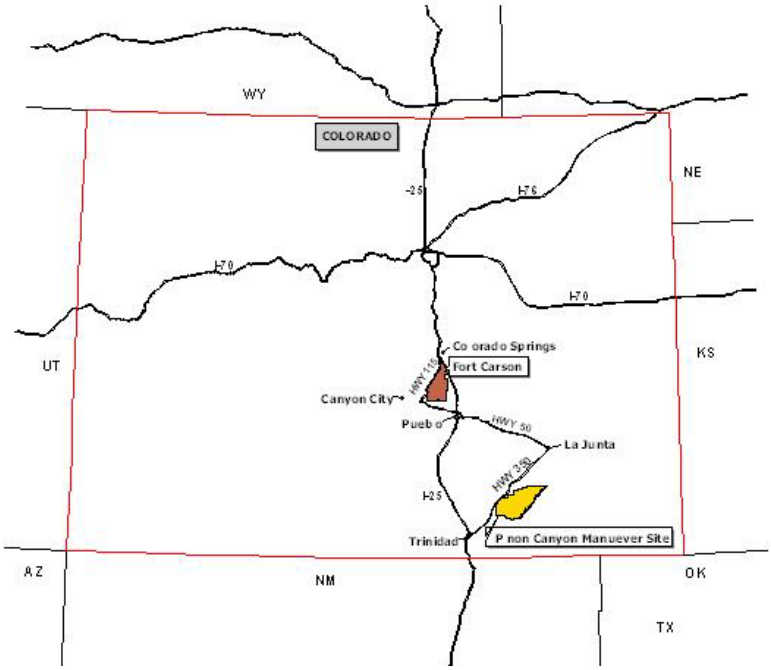
Fort Carson
Land use adjacent to Fort Carson consists primarily of low-density residential housing with exception of areas adjacent to the Cantonment Area, which are high-density residential housing. Development in the vicinity of Fort Carson is concentrated to the north (Colorado Springs) and east (Security-Widefield) of the installation. Portions of the towns of Fountain, Widefield, and Security, located within one mile of the installation boundary, consist largely of dispersed residential areas (Figure 3.1.2a). Areas bordering eastern, southeastern, southern, and southwestern boundaries of Fort Carson contain ranches, farms, and open space lands. Development is limited along the central western boundary and is increasing along the northwestern border. An area adjacent to the southeastern boundary that lies close to live-fire training ranges used by both the Army and the Colorado Air National Guard is being developed.

PCMS
Areas bordering boundaries of the PCMS contain ranches, farms, and open space lands, including the U.S. Forest Service, Comanche National Grasslands on the northeastern border of the PCMS. Figure 3.1.2b shows adjoining lands that are not privately owned. Development is not occurring to any significant degree on any boundaries, but the pace of development is increasing. Many tracts of private land along the northern border of PCMS have changed ownership from large ranches, controlled by only

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

a few owners, to numeorus smaller parcels (generally ~40 acres) that are individually controlled, often by absentee owners.

Figure 3.1.1 Location of Fort Carson Military Reservation and Piñon Canyon Maneuver Site



3.1.3 Acreage and Acquisition

In 1942 about 60,048 acres were purchased for Fort Carson. In 1965 about 77,343 acres were obtained (Headquarters, Fort Carson and 4th Infantry Division (Mechanized) 1980; Higginbotham/Briggs & Associates 1994). The Fort Carson acreage is 138,303 acres (calculated using the DECAM GIS) measuring 2-15 miles wide (east-to-west) and 24 miles in length (north-to-south). The DECAM GIS is used for acreage analyses within this INRMP.

On September 17, 1983 a land purchase of 245,000 acres at Piñon Canyon was completed to fulfill a need for additional training land for Fort Carson. Since then, the acreage has been reduced to 235,896 acres (calculated using the DECAM GIS).

Figure 3.1.2a Lands Neighboring Fort Carson, Colorado

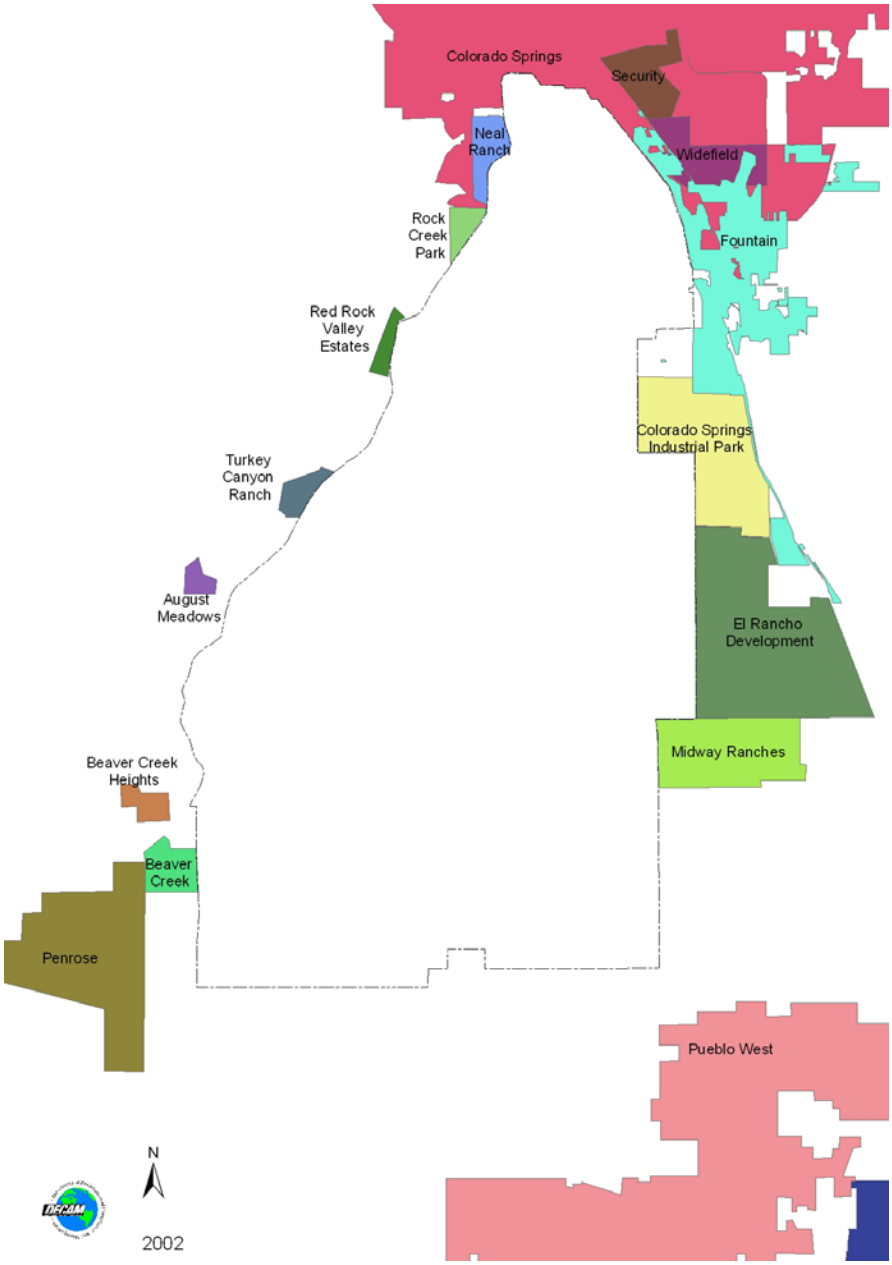
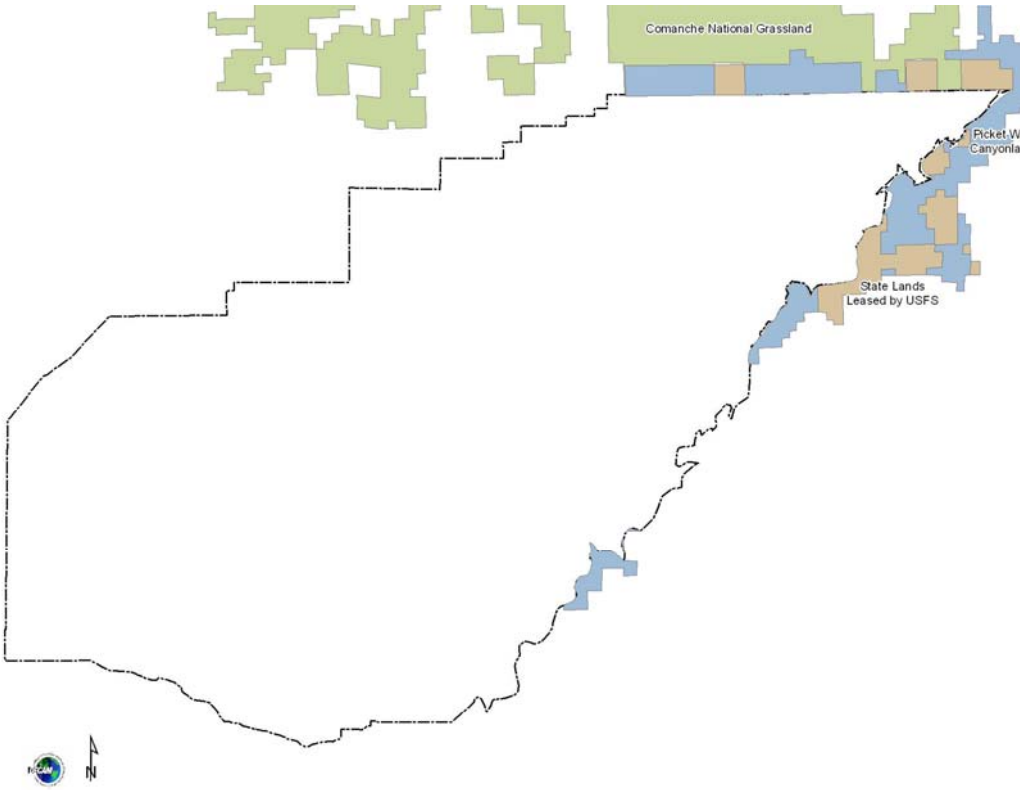


Figure 3.1.2b Lands Neighboring the PCMS, Colorado



Green – U.S. Forest Service Comanche National Grasslands
Blue – U.S. Forest Service Picket Wire Canyonlands
Brown – State lands leased by U.S. Forest Service
No color – Private lands

Interspersed among purchased lands at both Fort Carson and PCMS were areas of both federal lands and federal public minerals. These federal interests were subject to various interim withdrawals and reservations over the years, culminating in the Fort Carson-Pinon Canyon Military Lands Withdrawal Act (Public Law 104-201, September 23, 1996, Sections 2901 – 2913), which withdrew and reserved 3,133.02 acres of public land and 11,415.16 acres of federally-owned minerals at Fort Carson and 2,517.12 acres of public lands and 130,139 acres of federally-owned minerals at PCMS for 15 years (until September 22, 2011). It is likely that the Department of the Army will seek to renew or extend these withdrawals.

3.1.4 Installation History

Fort Carson

A general historic regional setting and detailed history of Fort Carson are found in *Fort Carson, a Tradition of Victory* (Public Affairs Office undated). Many Native American tribes used the land upon which Fort Carson is located over the past 12,000 years (*e.g.,* Ute Mountain Ute, Southern Ute, Comanche, Kiowa, Cheyenne, Arapaho, Oglala Sioux, Jicarilla Apache, Pawnee). By 1869 most Native Americans had been forced from the area following a decade of fighting for land possession. In 1873 the first stage road to cross the future Fort Carson was built between Denver and Canon City. At least two railroads were constructed across the future fort site in the early 1930s. The site was inhabited by ranchers and used extensively for cattle grazing.

By 1940 prominent local citizens were lobbying the War Department for the selection of their area for an Army installation. On January 6, 1942, one month after Pearl Harbor was attacked, the site for Camp Carson was selected. By November 4, 1942 construction was completed. Military training began in mid-summer 1942, and 104,165 Soldiers trained at Camp Carson during World War II.

By April 4, 1946 the military population at the Mountain Post had dropped to about 600. The War Department announced that the camp would remain open, and additional units were assigned to Camp Carson. On August 27, 1954 Camp Carson was officially designated Fort Carson. However, by the early 1960s the Second United States Army Missile Command (Medium) was the only major unit at Fort Carson.

A Training Center for basic and advanced training was briefly activated in 1961, and in 1962 the Army's first mechanized infantry division (the 5th) was activated. Air operations, which began in 1949 on a dirt strip on the edge of Post, became a modern airfield in 1966 when Butts Field was completed. Between 1965 and 1966, 78,741 acres were added to accommodate requirements for mechanized training.

By the end of 1967, activities at Fort Carson were the highest since World War II as a result of Vietnam requirements. The relocation of the 4th Infantry Division to Fort Carson in 1970 was a clear signal that the Post would remain open following the Vietnam pullout.

Economic impacts of Fort Carson on the Colorado economy rose quickly from $55 million in 1964 to $100 million in 1967 to $200 million in 1970 to $340 million in 1973. During 1971-72 the Post was a test site for the Modern Volunteer Army concept.

The most recent 10-15 years' changes in troop units at Fort Carson reflect the Post's evolving role in the defense of the nation. In 1992 the 10th Special Forces Group (Airborne) arrived at Fort Carson. In 1995 the 4th Infantry Division headquarters, one maneuver brigade (1st Brigade), and support units of the 4th Infantry Division at Fort Carson were inactivated. One brigade (3rd Brigade Combat Team) was reassigned to the 2nd Armored Division, Fort Hood, Texas but remained at Fort Carson. The 2nd Armored Division at Fort Hood was re-flagged as the 4th Infantry Division, and the 3rd Armored Cavalry Regiment was relocated to Fort Carson from Fort Bliss, Texas. In 1999 the 7th Infantry Division was formed at Fort Carson, which is composed primarily of three Reserve Component enhanced separate infantry brigades, one each from Oregon (41st), Arkansas (39th), and Oklahoma (45th). The 2nd Brigade Combat Team, 2nd Division was transferred to Fort Carson in 2005.

As described in Section 3.1.5.1, *Military Units*, there are plans to move the 4th Infantry Division to Fort Carson. Other changes due to 2005 Base Realignment and Closure decisions, restationing, new unit activations, unit conversions, and inactivations will also affect Fort Carson troop units in the near future.

PCMS
In the mid-1970s the U.S. Army, Fort Carson began searching for additional land on which to conduct military maneuvers. The additional land was necessary for brigade-sized Army Training and Evaluation Program for the 4th Infantry Division (Mechanized) and associated reserve units. An Environmental Impact Statement (EIS) was prepared in 1980 to evaluate potential environmental impacts from the proposed acquisition of training land. After the EIS process was completed, on September 17, 1983 a land purchase of 245,000 acres at Piñon Canyon was completed.

Prior to acquisition, the PCMS supported large grazing operations and low human densities since it was first settled in the late 1870s (Public Affairs Office undated). Prior to the initiation of training in August 1985, intensive range restoration and wildlife research activities were conducted on the site. Since August 1985 research and management activities have continued for the range and wildlife resources of the PCMS.

3.1.5 Military Mission

Mission Statement

Fort Carson's Mountain Post Team - best opportunity in the Army for soldiers to train, leaders to lead, families to grow and people to work. We are a first rate power projection platform (air and rail) and Post Mobilization Maneuver Training Center; a premier installation and committed community partner, providing combat-ready forces for the 21st Century.

Fort Carson is one of the Power Generation Platforms within the U.S. Army. As such, it has a high priority role in deploying and mobilizing in the event of war. Fort Carson military units must be prepared to immediately deploy while other units move to Fort Carson and the PCMS for mobilization training and continued deployment.

3.1.5.1 Military Units

2005 Troop Units
In November 2005 there were 17,754 active duty, permanent party, military personnel assigned to Fort Carson. Total personnel include all current authorized active duty military personnel units plus independent-duty service members within the market area, such as recruiters, ROTC instructors, and others authorized for Fort Carson. These data exclude Federalized (Mobilized) Army National Guard and Reserve units. The total personnel figure includes 7,348 unaccompanied members, 398 military couples, 597 voluntarily separated personnel, and 9,411 military families (Robert D. Niehaus, Inc. 2005).

Military units stationed at Fort Carson have changed in the past, and unit changes are likely in the future to meet changing Army requirements. The following are major troop units who currently use Fort Carson lands to train.

- Division West, First US Army, which oversees training and mobilization of Reserve and National Guard units in 21 states west of the Mississippi River, except Minnesota;

- 4th Infantry Division;
- 2nd Brigade, 2nd Infantry Division;
- 43rd Area Support Group;
- 10th Special Forces Group (Airborne);
- 71st Explosive Ordnance Detachment; and
- U.S. Army Garrison.

The ***2nd Brigade, 91st Division (E)***, a tri-component training support brigade provides training assistance and evaluations to over 300 detachment- and company-level National Guard and Reserve units in a 15-state area (Nakata Planning Group, LLC 2000).

The ***Colorado Army National Guard*** uses Fort Carson for training. The National Guard has a federal mission to provide combat-ready (equipped and trained) military units capable of performing their missions when activated by the President of the United States. The Guard has a Colorado mission to provide the Governor of Colorado with units capable of assisting in the event of major civil disorders or natural disasters, while restoring order and service to the affected area. The Colorado Army National Guard has a local mission to contribute to the communities in which the units are based and provide resources and equipment, as applicable regulations allow, to the communities.

Training by the Army National Guard includes many of the same activities as accomplished by active duty units based at Fort Carson. However, the Colorado Army National Guard has one weapon system that is not currently used by active duty units at the installation, the Multiple Launch Rocket System, which was previously used by active duty units stationed at Fort Carson.

The ***Army Reserve Component*** has a major combat support role within the U.S. Army. Fort Carson is the designated mobilization station for 109 reserve component units from 14 states. Many reserve units train at Fort Carson.

Other units (*e.g.*, Marine Forces Reserve, Navy SEALS and SEABEES, Air Force Special Operations Command, 302nd Airlift Wing (Reserve), U.S. Air Force Academy, Colorado Air National Guard [use of Range 123, per an environmental assessment and environmental impact statement]) use Fort Carson for military training activities. Federal (*e.g*., Federal Bureau of Investigation, Central Intelligence Agency, Drug Enforcement Agency) and local (*e.g*., El Paso County Sheriff's Office, Colorado Springs Police Department) law enforcement agencies use lands at Fort Carson and the PCMS for enforcement training.

Projected Changes in Troop Units

There is a projected increase of 10,479 troops assigned to Fort Carson by 2010, a 59% increase over the present (Robert D. Niehaus, Inc. 2005). This projected change in troop strength is primarily due to the movement of the ***4th Infantry Division*** to Fort Carson, but it is also affected by other changes due to 2005 Base Realignment and Closure decisions, restationing, new unit activations, unit conversions, and inactivations. The 4th Infantry Division will have three maneuver brigades (including the 3rd Heavy Brigade Combat Team, 4th Infantry Division (Mechanized)) and an aviation brigade.

The 3rd Armored Cavalry Regiment is moving to Fort Hood, Texas. The 10th Special Forces Group (Airborne) is projected to add an additional battalion.

3.1.5.2 Training Activities

The primary mission of Fort Carson and the PCMS is the training, housing, and support of all military personnel and associated training activities on the installation. Support is also provided to the U.S. Army Reserve, the National Guard, the Reserve Officers Training Corps, the U.S. Air Force Reserve, the U.S. Naval Reserve, and the U.S. Marine Corps Reserve. Fort Carson is used for live-fire gunnery and for squad- to battalion-sized maneuvers and lane training of both reserve and active components. Training is nearly continuous year-round.

The PCMS is best used for battalion- and brigade-sized maneuvers, lane training, and force-on-force exercises, usually by mechanized infantry and armored cavalry. Typically, there are 1-3 brigade-sized rotations per year (3-5 weeks each) with up to 10 additional battalion- or smaller-sized exercises per year[18].

Below are training activities that occur on Fort Carson and the PCMS.

Maneuver

Maneuver can be mounted (vehicle-oriented) and/or dismounted (foot movement). Mounted maneuver could be an assault with tanks and supporting troops and equipment on an enemy position, which would generally be off-road. The other end of the spectrum of mounted maneuver would be the convoy movement of military vehicles on a road or trail. Dismounted maneuver could be a platoon of Soldiers assaulting an enemy position on foot or a squad on foot patrol.

Mounted maneuver cannot be conducted in many areas of Fort Carson. Much of the interior of the installation is used for impact areas and safety fans; much of the eastern edge of Fort Carson is developed into firing ranges with their attached impact areas; and the northern edge is cantonment (urbanized). Thus, maneuver tends to be concentrated along boundaries to the west and south. Analyses of battlefield conditions also determine maneuver sites (Engagement Area Development). This terrain factor, for example, often results in intensive, repeated maneuver in certain areas. Most of the PCMS is available for mechanized maneuver, and almost all of the PCMS is available for dismounted or light mounted maneuver.

Use of Firing Ranges

At Fort Carson, live-fire training is conducted at firing ranges specifically designed for each weapon or weapon system. Firing ranges can be as simple as a firing line for shooters with permanent targets at known distances downrange to very sophisticated, computer-operated, multipurpose ranges with lanes for personnel or vehicles to move downrange engaging a variety of pop-up and/or moving targets. Ranges can be for weapons as basic as rifles and pistols or as complex as helicopter gunnery or tank table ranges. Fort Carson ranges can support the firing of all weapons in the Army inventory plus some in inventories of the Air Force and Marine Corps. Combined Arms Live Fire Exercises, which involve both live fire and maneuver, are conducted by various units.

The PCMS has limited live-fire ranges. There are static ranges just south of the Cantonment Area for small arms qualification, and there is a Live-Fire Maneuver Range in the north-central portion that is used primarily for live-fire associated with convoy operations.

[18] In recent years activity has been greatly affected by requirements to train, mobilize, and send troops to Iraq and Afghanistan.

Use of Smoke
Smoke is required for combat tactical training to mark or signal locations and events and also to obscure military equipment and activities, such as mine field breaching (clearing lanes), troop assemblies, or troop movement. Signaling smokes are generally limited to colored smoke grenades and terepthalic acid (white) smoke grenades. Obscurant smoke is produced by vaporizing fog oil, a hydrotreated virgin mineral oil, through a vehicle-mounted generator. Graphite, if added to fog oil smoke, makes it more difficult for the enemy to "see through" the smoke. Smoke pots and white phosphorous artillery and mortar rounds also produce an obscurant smoke (maximum of 60 minutes per use). Due to Colorado Air Quality Control Commission exemption language, smoke may not be generated or used within one kilometer[19] of Fort Carson or PCMS boundaries.

Bivouac
Bivouac (temporary encampments) generally involves parking vehicles (from HUMVEEs to tanks), setting up tents, camouflage activities, preparing food, personal hygiene, and similar tasks (the military equivalent of camping). It is significant in that bivouac involves the concentration of vehicles and personnel at specific sites, often for extended periods. Bivouac sites are determined by the type of training, the area being used, and terrain features. Specific bivouac sites tend to be often used due to repeated similar training activities in commonly used areas with limited sites that meet bivouac requirements.

Engineer Operations
Combat engineers provide support to combat units. Combat heavy engineers have two general classifications. Vertical units construct walls, drill wells, install power/communication lines, do general electric and plumbing tasks, build structures, and conduct similar tasks. Horizontal units construct and maintain roads, dig holes, construct or erect bridges, haul materials, and conduct similar tasks. Combat engineer tasks performed on Fort Carson by vertical and horizontal engineer units include the digging of fighting positions and tank traps, use of barbed and concertina wire fences, mine field exercises, demolition (Fort Carson only), bridge construction (using ribbon pontoon bridges and vehicle-mounted scissor bridges), field facility construction, and similar tasks.

Holes are not dug in areas with known sensitive natural or cultural resources, and holes that are dug, are filled. These activities are usually not conducted in Limited-Use Areas or off-limits areas (Section 4.13, *Special Interest Areas*). Combat engineers also design and implement construction and land/facility maintenance projects on Fort Carson and the PCMS that enhance their military skills while supporting installation development and maintenance. They are particularly useful for implementation of Land Rehabilitation and Maintenance projects (Section 5.1.2).

Air Support
Fort Carson air operations generally use Federal Aviation Administration Restricted Area R2601, which is within installation boundaries. Most aircraft stationed at Fort Carson are assigned to the 3rd Armored Cavalry Regiment, and these are all observation, attack, or utility helicopters. The installation has a civilian support mission for medical evacuation and search and rescue, but virtually all other missions are direct support of the Fort Carson military mission. The DECAM receives considerable support from

[19] This distance is 300 meters for smoke grenades and other hand-held smoke. Red smoke may be used from any location in event of an emergency.

helicopter assets on the installation for missions involving wildlife management, wildland fire fighting, range and resources management, and compliance missions.

Attack helicopters must qualify with live-fire weapons twice annually, and this is done on Fort Carson ranges. Most other missions on Fort Carson are the transport of troops and cargo or non-firing support of maneuvers. The Army Reserve Component now stations up to eight Chinook (CH-47D) helicopters at Butts Army Airfield as part of a realignment of Reserve forces.

Various other military aircraft use Fort Carson facilities and airspace. Colorado Air National Guard units train on the installation, primarily using the Air Burst Range (Range 123) located on the installation southern boundary. The Air Force Special Operations Command regularly supports the 10th Special Forces Group (Airborne), including a mission whereby Special Forces units coordinate firing missions for the Specter gunship, a converted C-130 aircraft (AC130U). Army Special Operations aircraft (helicopters) also support the 10th Special Forces, which conducts parachute operations from both fixed- and rotary-wing aircraft. The 302nd Airlift Wing (Reserve), stationed at Peterson Air Force Base, uses Fort Carson for C-130 tactical training, including parachute operations and landings and takeoffs on/from a tactical airstrip. The U.S. Air Force Academy conducts some flight training in Fort Carson airspace. Civilian aircraft have access to Fort Carson airspace during emergencies.

Many different types of military aircraft use Fort Carson, but most aircraft use is by the 3rd Armored Cavalry Regiment and its assigned aircraft. Almost all fixed-wing aircraft that land at Fort Carson are C-130s or C-12s or Air Force Academy training aircraft. The landing strip is not long enough for most larger aircraft.

Most aircraft mentioned above use the PCMS. However, no live fire from fixed- or rotary-wing aircraft occurs there except on the Live Fire Maneuver Range, which can support limited helicopter firing.

Combat Support and Combat Service Support
Many units that train on Fort Carson and the PCMS are not direct combat units, but rather they support or serve combat units. Support units conduct such activities as fuel storage and disbursement, equipment maintenance, food service, military police, military intelligence, supply, and other activities. Maneuver training takes up so much available downrange land that areas just to the southwest of the Cantonment Area are often used for support units. There is far more available land for such activities at the PCMS.

Deployment Training
Fort Carson combat units must be prepared to quickly and efficiently deploy anywhere in the world with relatively short notice. Deployment training includes the planning and implementation of activities including the loading of equipment on rail cars and personnel and supplies on aircraft. Deployment training typically occurs within the Fort Carson Cantonment Area and often involves moving equipment, personnel, and supplies to/from the PCMS, the National Training Center at Fort Irwin, California, or Joint Readiness Training Center at Fort Polk, Louisiana. The PCMS has limited deployment capabilities, but facilities to enhance deployment capabilities are being constructed as funding becomes available (*e.g.*, small arms qualification ranges, urban training facility, administration buildings).

3.1.5.3 Effects of the Military Mission on Natural Resources
A USFWS report (Canestorp *et al*. 1995) summarized impacts of military activities on the PCMS after about 10 years of military activity. "… *immediate and direct impacts to PCMS wildlife resources from military training can be obvious, but are apparently short term and of no overt significance. Those*

wildlife species which can do so simply move out of the way of military personnel and the exercises, and return to their former ranges following completion of training. Vegetative resources can be heavily impacted locally, but are reclaimed as soon as feasible…" The report summarizes, "*To date, long term negative impacts of military training on the area's wildlife have not been realized. Indeed, some consequences of the land's acquisition by the military have resulted in positive effects…*"

Current and/or Potential Military Mission Impacts on the Environment

The following impacts on natural resources were taken from the *Fort Carson Land Use Environmental Assessment* (Gene Stout and Associates 2001), unless stated otherwise.

Maneuver

Maneuver has perhaps the greatest potential to affect land condition on both Fort Carson and the PCMS. Tactical maneuvers reduce vegetative ground cover and may increase bare ground area (Shaw and Diersing 1989a, 1989b, 1990). As a result, the potential for soil erosion increases due to the loss of vegetation and soil compaction. Erosion can eventually affect water quality through accelerated sedimentation and alteration of the soil horizons, making subsurface minerals and elements available. In the case of PCMS, the overall landscape level changes have shown increased vegetation cover and reduced erosion from pre-training levels, possilby due to decreased grazing impacts, especially in canyon and riparian areas (Shaw and Diersing 1990, Bramblett and Fausch 1991a and b). Biochemical fluxes within ecosystems often represent dynamic and changing conditions (*e.g.*, elevated amounts of nitrate in the groundwater in grass/shrubland systems is a sign that inputs from human sources have increased or that the plants in the system are under stress). Dismounted training seldom affects large acreages, but it can have long-term impacts on regularly used trails.

Mounted training is difficult to quantify in terms of its effects on the land. General types of vehicles (tracked [*e.g.*, tank, howitzer] or wheeled [*e.g.*, HUMVEE, dump truck, tractor]); vehicle weight and its distribution on the land (*e.g.*, tracked vehicles better distribute weight); and conditions under which the vehicle operates (*e.g.*, wet weather increases the potential for damage) are important. Section 5.1.3, *Training Requirements Integration*, describes a program (Army Training and Testing Area Carrying Capacity) to quantify mounted maneuver impacts on Fort Carson. Mounted maneuver can produce objectionable noise, particularly when heavy vehicles move close to boundaries late at night. Both mounted and dismounted maneuver have potential to impact soils, vegetation, wildlife, and cultural resources through ground disturbance. Mounted maneuver operations have the potential to create pollution from spills of petroleum, oils, or lubricants.

Impacts from maneuver (and other military activities) tend to be disproportionate since some areas (*e.g.*, pinon pine and juniper) are more attractive to training units due to their concealment capabilities. In some cases, these areas are also among the most susceptible to long-term damage.

Use of Firing Ranges

Live-fire can use ammunition that is not explosive (*e.g.*, most rifle/pistol, machine gun, inert tank, and inert artillery rounds) in which case the impact portion of the range is not "dudded" with dangerous unexploded munitions. These impact areas can be used for other purposes when they are not in use for firing.

Other live-fire uses ammunition that is explosive or can create a "dud" (unexploded round) that is directly detrimental to the environment (*e.g.*, 40-mm anti-personnel, mortar, anti-tank, high explosive tank, white phosphorus or high explosive artillery rounds; high explosive grenades). These impact areas must be

closed unless they are cleared of unexploded munitions, normally a very expensive process. Most long-range weapons systems (*e.g.*, artillery, tanks, Multiple Launch Rocket Systems) use the same impact areas for explosive and inert rounds; thus, these areas are generally permanently closed to training or other uses.

Impact areas (large caliber, small caliber, and airburst weapons) occupy a considerable amount of land at Fort Carson. As such, they reduce options to conduct other types of training. For example, firing must be conducted from relatively close to boundaries, which increases off-post noise impacts. Another example... firing ranges and their impact areas preclude maneuver from much of the eastern boundary, which concentrates these activities on the western boundary, exacerbating noise and dust problems there. Types of munitions (*e.g.*, high explosive duds virtually exclude other uses) also affect training options within impact areas.

Range locations and configurations also reduce options for training. Range size, location, and configuration are often determined by training requirements and safety factors with few options with regard to siting. For example, the Live-Fire Maneuver Range at PCMS affects maneuver training opportunities in a large portion of the PCMS when the range is operational.

Live-firing certain munitions (*e.g.*, incendiary, high explosive, tracer rounds) can cause wildfires. Most of these fires are contained within impact areas.

Construction and upgrades of ranges often involves soil disturbance, thus potentially impacting wildlife and cultural resources. Ground disturbance and direct destruction from ordnance impact can also impact wildlife and cultural resources.

Use of Smoke
Many military operations require obscured enemy vision using a cloud of smoke that is artificially generated at both Fort Carson and the PCMS. Off-post smoke drift is dispersed to the point where it is not an effective obscurant at that point. Fog oil operations have the potential to create pollution from spills of fog oil or petroleum, oils, or lubricants used by vehicles in the operations.

Bivouac
Bivouac sites (temporary encampments) are notable with regard to land use in that the concentrated use of a site can create damage if the activity is repeated often enough. Often, the first step in land degradation from bivouac activities is the loss of ground cover, which can be followed by localized erosion and possibly increases in down-watershed stream sedimentation. Ground disturbance associated with bivouac can impact wildlife and cultural resources.

Engineer Operations
Combat engineers provide support to combat units that can affect the quality of training lands and their ecological functionality at both Fort Carson and the PCMS. Engineer activities (*e.g.*, digging fighting positions or tank ditches, obstacle removal, mine field clearing) create soil disturbance, which has the potential to affect cultural and natural resources. Combat engineers also conduct bivouac with very heavy equipment, which can affect the environment. Demolition can create noise and dust impacts. Engineer operations have the potential to create pollution from spills of petroleum, oils, or lubricants.

Other combat engineer activities can be beneficial to natural resources. Combat engineers must learn to use heavy equipment, and when such training can be incorporated into environmental projects (*e.g.*,

training land rehabilitation, erosion control structure construction, site hardening), it can add significantly to the natural environment and/or protect the environment from damage in the future.

Air Support
Environmental impacts of air support activities at Fort Carson and the PCMS include aircraft noise, minor disturbance to landing and drop zones, disturbance to nesting birds, and training activities of troops following air arrival. Some air support operations have the potential to create pollution from spills of petroleum, oils, or lubricants. There are wildfires and wildlife risks of live-fire from attack helicopters. During the raptor-breeding season (March-June), pilots are instructed not to fly below the rims of narrow canyons, near ridgelines, or conduct low-level flights over riparian woodlands. Nesting birds of prey commonly use these types of sites and habitats on the PCMS and Fort Carson.

Combat Support and Combat Service Support
Support units often have similar impacts to land as described for bivouac since they use the same sites repeatedly. Support units also have potential to adversely affect land resources via petroleum product spills, improper sanitation, digging activities, and other effects of intensive use of small areas by units with a wide variety of tasks. Ground disturbance associated with many support activities can impact natural and cultural resources and air quality.

Deployment Training
Deployment training has few impacts to the natural environment at Fort Carson or the PCMS as it occurs almost exclusively within the Cantonment Area, at rail yards, the airfield, motor pools, and similar locations.

Military Mission Impact Mitigation
Fort Carson's implementation of this INRMP, particularly the Integrated Training Area Management program (Section 5.1), minimizes and mitigates many impacts discussed above. ITAM strives to achieve a proactive approach to minimizing military impacts on training lands and rehabilitating damaged lands (Land Rehabilitation and Maintenance). The Sustainable Range Awareness component acts to improve land user understanding of the impacts of activities on the environment, and thus, ultimately reducing the amount and/or degree of those impacts. The Training Requirements Integration component also minimizes and mitigates military impacts on the environment by integrating military training requirements for land use with natural resources conditions and capabilities. Range and Training Land Assessment monitors land conditions. The use of GIS helps track these problems and solutions both graphically and historically, therefore, assisting military trainers and land managers in accomplishing their respective missions simultaneously.

Future Military Mission Impacts on Natural Resources
Although units may change in the future, there are no plans to change the type of training activities these troops will accomplish beyond those training missions performed by current units stationed at, or using Fort Carson or the PCMS. However, the intensity of training may change. Several examples are pertinent.

- Low-impact training activities associated with peace-keeping (*e.g.*, dealing with angry civilians of different cultural backgrounds) are increasing in response to changes in the way military units are deployed by the United States throughout the world. Fort Carson (and the Army in general) is adapting training facilities and tactics to meet these challenges, which often requires training in an urban or small town environments.
- The use of computer-based simulators is increasing throughout the Army, including Fort Carson

(*e.g*., construction of a Close Combat Tactical Trainer, the proposed Battle Simulations Center). Such use decreases training impacts upon the land.

- During mobilization (such as in recent years), Fort Carson is required to train and deploy more troops than normal. This, in turn, increases the tempo of training (*e.g.*, more weekend training, more complete utilization of Training Areas). It could also require the use of temporary tent quarters as full mobilization would increase the military population beyond the billeting capacity.
- Safety danger zones (fans) for weapon firing may get larger, which will decrease the use of areas when these weapons are fired (*e.g.*, the M1A2 tank main gun requires a wider fan than that on the M1A1; a Stinger training round has an extremely large fan). (Safety danger zones are those areas where possible harm could occur if one were to be within during live-fire of a weapon from a specific area. Weapons will be fired into impact areas, but these safety danger zones will cover more area than just the impact area they are being fired into.)
- Demands on ranges and Training Areas may increase as newer and more lethal weapons systems are developed and fielded.
- Environmental requirements will continue to grow, and these are likely to affect training (Gene Stout and Associates 2001, Nakata Planning Group, LLC 2000).

The projected increase of 10,479 troops assigned to Fort Carson by 2010, primarily due to the movement of the 4th Infantry Division to Fort Carson (Section 3.1.5.1, *Military Units*), will significantly increase the intensity of training at Fort Carson and the PCMS. In addition, facilities to house and support such an increase will cause an expansion of the Cantonment Area into lands that are now available for training, exacerbating natural resources issues on training lands and removing some natural habitats and affecting others (*e.g*., proposed new housing areas, new troop facilities).

Combined effects of these projected training trends on natural resources at Fort Carson and the PCMS are difficult to predict. Some will obviously decrease training impacts (*e.g*., use of simulations, decreasing unit size, environmental requirements) on many lands. Others will change the nature of impacts to natural resources (*e.g.*, larger firing fans, urbanized training, more intensive maneuver training). The increase in training intensity will create more challenges to achieve long-term sustainability of training lands, as required by the Sikes Act.

Construction projects outside of the Cantonment Area, often on lands that are relatively natural, are particularly important to natural resources management (in addition to being encroachments on training lands). Such projects include family housing on the Plateau Site (environmental documentation ongoing), Multipurpose Range Complex (Digital) (under construction), headquarters for the 4th ID and 4th Brigade, Combined Arms Training Facility (contract being revised), Multipurpose Machine Gun Range, and the Colorado Army National Guard Centennial Training Site development. As these projects are funded, they would be evaluated for environmental impacts using NEPA documentation.

The *Range and Training Land Program Development Plan* (Nakata Planning Group, LLC 2000) (Section 10.2.2) lists nine priority projects for upgrading range facilities at Fort Carson. As these projects are funded, they would be evaluated for environmental impacts using NEPA documentation.

The Department of Defense is being forced to make do with less in terms of both quantity and quality of training lands. Effective training resources must be managed to not exceed the optimum training carrying capacity of sites to ensure the long-term use of the resource. Now that Base Realignment and Closure is reality, other military missions may look toward Fort Carson and the PCMS to fulfill their future training

needs. New missions would need to be closely scrutinized to determine their compatibility with the current mission and resources of Fort Carson and the PCMS.

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

The presence of Fort Carson continues to preserve native ecosystems by minimizing development and ensuring that land uses are conducted in a manner that protects the environment on both Fort Carson and the PCMS. Natural resources considerations and military training demands limit the extent of other potentially damaging land uses.

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

An integral part of the Fort Carson mission is good environmental stewardship. No environmental laws preclude Fort Carson from accomplishing its mission. However, there may be time delays due to the need for environmental coordination or obtaining environmental permits, particularly for fast-breaking training requests. Some areas of Fort Carson and the PCMS have training restrictions due to archeological or environmental constraints, but some training opportunities are available in most of these areas.

Overall, effects of natural resources management on Fort Carson's military mission are positive. The natural resources program, in general, is specifically targeted to benefit both military training and the environment. Many programs, such as forest, watershed, and soils management and ITAM, have positive effects on military mission requirements.

3.2 Physical Environment and Climate

3.2.1 Physiography and Topography

Fort Carson

The eastern portion of Fort Carson is in the Colorado Piedmont section of the Great Plains Province. The western portion is in foothills of the Rampart Range section of the Southern Rocky Mountains Province.

Primary landforms consist of low plains, high plains, and low hills. Fountain Creek and its tributaries dominate the eastern area of the installation, which is classified as low plains. High plains, consisting of gently rolling uplands to sharp-crested hills and rocky outcrops, are in the southeastern, west-central, and western portions of the installation. The Cantonment Area is located in the high plains. Elevations range from 5,400-6,200 feet above mean sea level in the low plains and from 5,400-6,400 feet above mean sea level in the high plains. Wild Mountain, Timber Mountain, and Booth Mountain are the highest areas on the installation, and Beaver Creek Valley is the lowest. The maximum relief on Fort Carson is 1,840 feet (DECAM 1997).

PCMS

The PCMS is located within the Raton Section of the Great Plains Province. The Raton Section is distinguished by such topographic features as mesas, cuestas, dissected plateaus, deep canyons, and volcanic formations.

The landscape on the PCMS is defined by four regions. Pinon pine and one-seeded juniper woodlands are found on limestone ridges in the north and northwest. The Hogback, a basalt dike, runs east and west near the southern boundary. Grassy plains cover the area between the Purgatoire River, the Hogback, and pinon-juniper woodlands. The final region contains canyons and associated drainage areas (Public Affairs Office undated). Elevations on the PCMS range between 4,262 feet to over 5,576 feet.

3.2.2 Geology

There are three main fault lines in the region: Oil Creek, Ute Pass, and Rampart Range faults. The region is rated "zone one" for earthquake potential on a scale of zero to four, with a "four" having the greatest potential for earthquakes. Very small earthquakes do occur in the region with mostly unnoticeable effects[20].

Fort Carson

Geologic units on Fort Carson range in age from Quaternary (one million years before present to recent) to Pennsylvanian (200-250 million years before present). Unconsolidated sediments deposited during the Quaternary consist of fluvial and alluvial sands, silts, and gravels and wind-deposited silts and sands. Consolidated units include shale, limestone, hard sandstone, siltstone, claystone, and conglomerate sandstone and shale (Dames and Moore 1978).

PCMS

Raton Mesa and Mesa de Maya, both prominent land features in the vicinity of Trinidad, are capped with basaltic rocks (Armstrong 1972). The Spanish Peaks are likewise of volcanic origin.

The geological structure of the PCMS is generally associated with the Apishapa Uplift that trends southeast to northeast across the southern area of the site. These sedimentary rocks dip generally northeastward 1-3 degrees but may dip up to 36 degrees. Small faults associated with the Uplift are found in the northern edge of the PCMS. The major smaller structure within the PCMS is the Black Hills Monocline and two associated structures, Sheep Canyon and Muddy Creek monoclines. Several smaller synclines and anticlines are also associated with these monoclines, including the Model Anticline in the western portion of the PCMS (Nakata Planning Group, LLC 2000).

3.2.3 Mineral Resources

Mineral resources on Fort Carson and PCMS are described in Section 4.4.2, *Mineral Resources*.

3.2.4 Soils

Soil resources and their management are described in Section 4.2.1.2, *Watershed Management, Soils*.

3.2.5 Water Resources

Water resources and their management are described in sections 4.8, *Water Resources Management* and 4.9, *Water Rights Management*.

3.2.6 Air Quality

Air quality is regulated at the national level through regulations promulgated under the Clean Air Act of 1970 and its subsequent amendments. The Clean Air Act requires state or local governments to monitor ambient levels of pollutants that have federal standards. The state of Colorado has developed ambient air quality standards that are more stringent than federal standards.

[20] Gazette Telegraph, February 19, 1996 article.

Fort Carson
Air quality within El Paso, Fremont, and Pueblo counties is generally classified as good with the typical inversion season in El Paso County from November through March causing only limited impacts. In the fourth quarter of 1999 the Environmental Protection Agency classified a portion of El Paso County as a maintenance area for carbon monoxide emissions, and therefore, reviews are performed on any proposed action that produces carbon monoxide to ensure that the activity would not impact the air quality by exceeding specified thresholds. Subsequently, regulations are written and enforced to maintain the "attainment" status for all criteria air pollutants, including particulate matter, the largest pollutant from military training activities.

The Clean Air Act and its amendments are enforced by both the county and state health and environment departments, which currently impact military land use planning and training. Current regulations require control of fugitive emissions, like smoke and particulate matter (dust), so as to limit off-site impacts and also protect the general health of local residents, including those Soldiers involved in training.

Fugitive dust is a fundamental air quality issue on Fort Carson. Reseeding and land rehabilitation programs aid in reducing airborne particulate matter. Additionally, road surface binders or dust palliatives are used to suppress dust on the unpaved roads that are adjacent to Fort Carson's property boundaries, as well as in the Cantonment Area. Fugitive dust is also generated during construction and other similar operations.

A significant impact from the aforementioned regulations is a one-kilometer buffer in which no non-handheld, smoke-generating device may be utilized. The intent of this buffer zone is to minimize the risk of offsite impacts related to opacity. The buffer, originally required for exemption from Colorado Regulation 1 Opacity Law, ultimately protects air quality and viewsheds for residents off the installation.

PCMS
Las Animas County is in attainment for all National Ambient Air Quality Standard for Emissions of Particulate Matter 10 microns (PM10) or less in diameter. PM10 emissions are generally particulates that are inhaled into the lungs. Health problems, especially respiratory problems, have been associated with high levels of PM10. Major sources of PM10 are street sanding and wood burning. Dust and large particulates are not direct sources of PM10, but they can contribute to the problem in the long-term as they are subject to mechanical breakdown on road surfaces. In past years, the air quality monitoring program at PCMS measured levels of two variables, Total Suspended Particulates and PM10. Air quality is not currently being monitored.

A significant impact from the aforementioned regulations is a one-kilometer buffer in which no non-handheld, smoke-generating device may be utilized. The intent of this buffer zone is to minimize the risk of offsite impacts related to opacity. The buffer, originally required for exemption from Colorado Regulation 1 Opacity Law, ultimately protects air quality and viewsheds for residents off the installation.

3.2.7 Climate

Fort Carson
The region surrounding Fort Carson is classified as mid-latitude semi-arid, characterized by areas with hot summers, cold winters, and relatively light rainfall. July is the warmest month (mean temperature of 70° Fahrenheit [F]), and January is the coldest (mean temperatures of 28° F).

Precipitation occurs in the Fort Carson area as rain, snow, and intermediate forms, such as hail. The quantity of precipitation is affected significantly by the orographic effect of the nearby Rocky Mountains and tends to increase with increasing elevation (Livingston *et al.* 1976). Mean annual precipitation at Fort Carson increases toward the northwest. Colorado Springs averages 17.5 inches of precipitation annually with about 80% falling between 1 April and 1 September in the form of thundershowers, which occur in the region about 50 days per year, generally accompanied by heavy showers, gusty winds, frequent thunder and lightning, and occasional hail. Average annual snowfall in the region is 42.4 inches. Snow and sleet usually occur from September to May with the heaviest snowfall in March and possible trace accumulations as late as June.

There are five meteorological stations on Fort Carson operated by the U.S. Geological Survey (operated since 1999 as part of a flood alert system) in addition to the station at Butts Army Airfield. Data compiled from these stations will provide more specific Fort Carson information, but long-term trends and means are not yet available (Section 5.6, *Meteorological Data Collection*). Fort Carson also has a U.S. Forest Service Remote Automated Weather Station.

Monthly weather parameters collected by the U.S. Weather Service (www.weather.com) for Colorado Springs are shown in Table 3.2.7a.

Table 3.2.7a Summary of Colorado Springs, CO Climate Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. High	42°F	45°F	52°F	59°F	68°F	79°F	84°F	82°F	74°F	63°F	50°F	42°F
Avg. Low	14°F	18°F	24°F	31°F	41°F	50°F	55°F	54°F	45°F	34°F	23°F	16°F
Mean	28°F	32°F	38°F	45°F	55°F	64°F	70°F	68°F	60°F	49°F	36°	29°F
Avg. Precip.	0.3 in	0.4 in	1.1 in	1.6 in	2.4 in	2.3 in	2.9 in	3.5 in	1.2 in	0.9 in	0.5 in	0.4 in
Record High	73°F 1997	76°F 1963	81°F 1971	87°F 1992	93°F 1984	100°F 1954	100°F 1954	99°F 1954	94°F 1995	86°F 1979	78°F 1981	77°F 1955
Record Low	-26°F 1951	-27°F 1951	-11°F 1956	-3°F 1959	21°F 1954	32°F 1951	42°F 1952	39°F 1992	22°F 1985	5°F 1969	-8°F 1976	-24°F 1990

There are approximately 93 days per year with a cloud cover of 30 percent or less. The yearly average daytime relative humidity is 39 percent and rises to 62 percent at night.

Prevailing winds are normally westerly. Wind speed varies from 0 to 8 mph with peaks of 20 to 25 mph. Peaks are usually associated with thunderstorms or frontal systems. At times during summer, westerly winds shift to the southwest and bring hot dry air from deserts of the southwestern United States. These winds bring the hottest weather of the year, but the hot spells are usually of short duration.

PCMS

The climate in the PCMS area is classified as dry continental with average annual precipitation of approximately 16.5 inches (below Trinidad data), fluctuating widely from year to year and between areas of the parcel. Precipitation at the PCMS primarily results from either frontal storms or convective storms. Frontal storms can occur throughout the year and have varying strength and frequency; the largest quantities of precipitation are associated with periods of moist airflow from the Gulf of Mexico.

Convective storms occur frequently during July through September (Von Guerard *et al.* 1993). July is the warmest month (mean temperature of 70° F), and December and January are the coldest (mean temperatures of 31° F).

There are 12 meteorological stations and five seasonal rain gauges on the PCMS operated by the U.S. Geological Survey (operated since 1993 as part of a flood alert system). Data compiled from these stations is providing more specific PCMS information, but long-term trends and means are not yet available (Section 5.6, *Meteorological Data Collection*). The PCMS also has a U.S. Forest Service Remote Automated Weather Station.

Monthly weather parameters collected by the U.S. Weather Service (www.weather.com) for Trinidad are shown in Table 3.2.7b.

Military training exercises on the PCMS are conducted with climatic conditions considered as a major component. During periods of wet, frozen, or thawing soils, it may be suggested that military activities be minimized until the soil dries to minimize additional damage.

Table 3.2.7b Summary of Trinidad, CO Climate Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. High	47°F	50°F	55°F	61°F	71°F	81°F	86°F	84°F	77°F	67°F	54°F	48°F
Avg. Low	13°F	17°F	23°F	30°F	40°F	49°F	53°F	51°F	44°F	32°F	22°F	14°F
Mean	31°F	34°F	39°F	46°F	56°F	65°F	70°F	68°F	60°F	50°F	38°F	31°F
Avg. Precip.	0.5 in	0.5 in	1.2 in	1.5 in	1.9 in	1.4 in	2.6 in	2.4 in	1.4 in	1.2 in	1.2 in	0.7 in
Record High	80°F 1997	82°F 1979	85°F 1971	91°F 1989	97°F 1996	103°F 1994	103°F 1973	100°F 1980	100°F 1995	89°F 1991	81°F 1980	81°F 1980
Record Low	-32°F 1963	-24°F 1982	-10°F 1965	3°F 1997	22°F 1991	35°F 1976	43°F 1952	43°F 1972	23°F 1984	1°F 1993	-17°F 1976	-19°F 1990

3.3 Biological Resources

Scientific names for vertebrate animals mentioned within this INRMP that are found on Fort Carson or the PCMS are in appendices 3.3.2a (*Vertebrates Known on Fort Carson*) and 3.3.2b (*Vertebrates Known on Piñon Canyon Maneuver Site*). Fort Carson and PCMS plant lists are extensive and regularly updated. Scientific names of plants are in DECAM files.

3.3.1 Flora

General floral resources and their management are described in Section 4.2.1.3, *Watershed Management, General Vegetation*. More specific aspects of flora and their management are discussed in sections 4.3, *Forest Management*; 4.10, *Wetland Management*; 4.11, *General Fish and Wildlife Management*; 4.13, *Special Interest Areas*; and 4.14, *Noxious Weed Management*.

3.3.2 Fauna

Faunal species found on Fort Carson and PCMS are described in Section 4.11, *General Fish and Wildlife Management*. Federal- and State-listed faunal species found on Fort Carson and PCMS are described in sections 4.12.1, *Federal-listed Species* and 4.12.3, *State-listed Species*.

3.4 Human Environment

3.4.1 Cultural Resources

Cultural resources on Fort Carson and PCMS are described in Section 5.5, *Cultural Resources Protection*.

3.4.2 Land Uses

3.4.2.1 Overview

Figures 3.4.2.1a and 3.4.2.1b show general categories of land use with larger parcels specifically identified. Land use on Fort Carson and the PCMS can be broken into three categories.

Developed lands are urban and suburban settings plus the airfield and ammunition storage facility.
Special use areas include larger areas set aside primarily for recreation or otherwise off-limits to most training activities.
Military field Training Areas are those lands used for field exercises. They may be developed in terms of range facilities, and they include impact areas.

Fort Carson

As shown in Table 3.4.2.1, developed lands comprise 5%; special recreation lands encompass 2% percent; and military field training lands comprise 93% of Fort Carson. Of military field training lands, 73% are generally available for maneuver activities. Other military field training lands are either restricted use (impact and buffer zones) or specialized training (Tank Table VIII, Range 123, and Multipurpose Range Complex).

Although Fort Carson's primary use is for military training, the lands also support recreational activities, as well as the operation of two small clay mines in the vicinity of “Stone City”. Recreational facilities are available at Turkey Creek Recreational Area and Iron Horse Park. Downrange, with exception of firing ranges and impact areas, all lands are available for hunting, fishing, bird watching, and similar activities.

PCMS

As shown in Table 3.4.2.1, developed land at the PCMS comprises less than 1% of total land. There are no special recreation areas, except for a campground just south and adjacent to the intersection of routes 1 and 3 (4-Corners), which is open when the Live Fire Maneuver Range is not in operation. Military field Training Areas comprise 95% of the PCMS. Of this training land, 79% is unrestricted maneuver land. The rest of field training land has some restrictions (dismounted only, digging restrictions, etc.). Although the primary use at the PCMS is for military training, lands also support various recreational activities, such as hunting, bird watching, and hiking.

Figure 3.4.2.1a General Land Use on Fort Carson

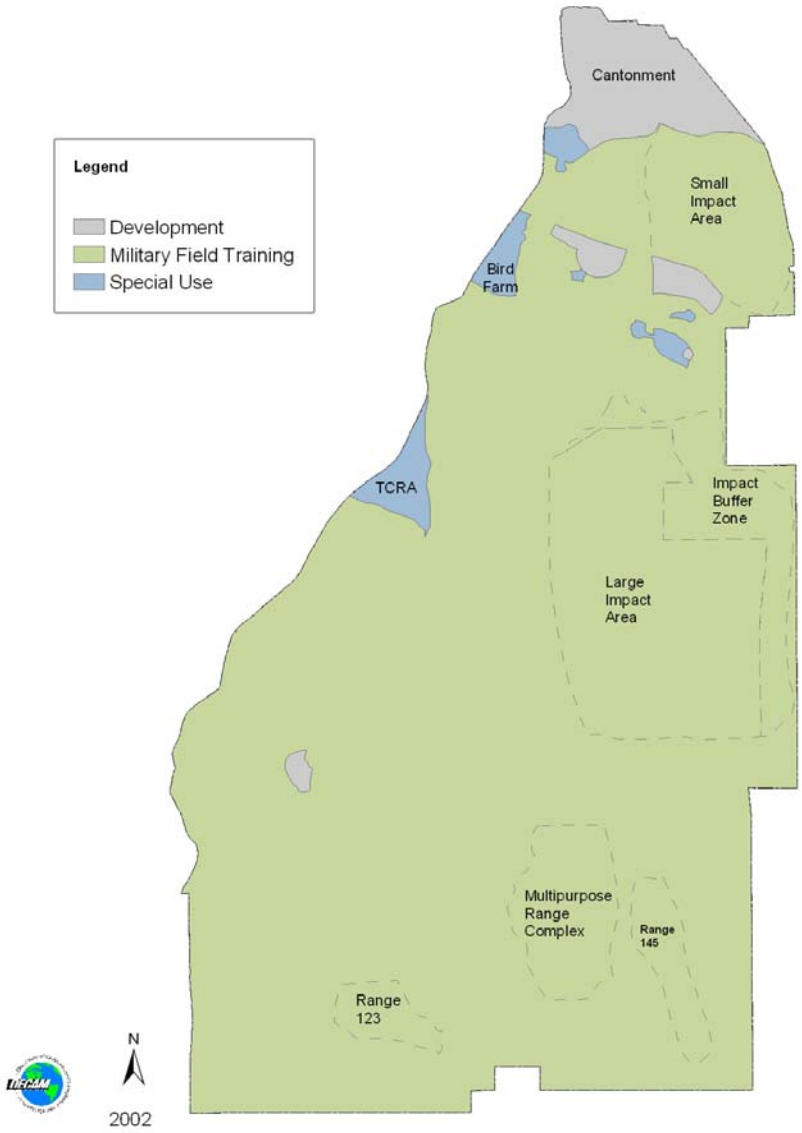


Figure 3.4.2.1b General Land Use on the PCMS

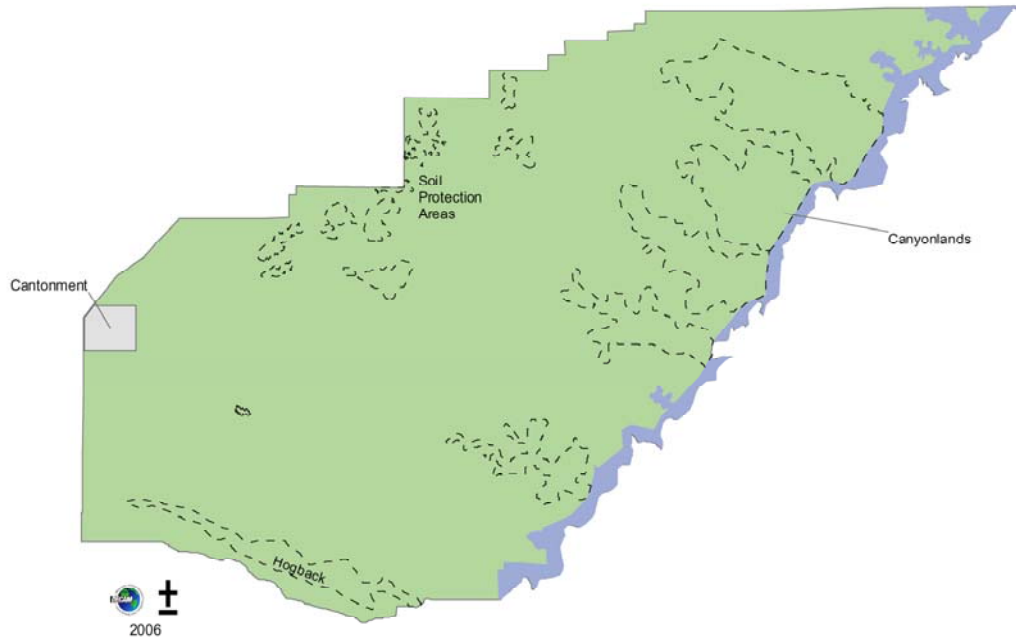


Table 3.4.2.1 General Land Use

Land Use	Fort Carson Acres	PCMS Acres
Development		
Cantonment	5,177 (4%)	1,659 (1%)
Camp Red Devil	233 (<1%)	
Butts Airfield	644 (<1%)	
Ammo Reclaim and Ammunition Supply Point	592 (<1%)	
Tent City	544 (<1%)	
Development Subtotal	***7,190 (5%)***	***1,659 (1%)***
Special Use		
Turkey Creek Recreation Area	1,235 (1%)	

Land Use	Fort Carson Acres	PCMS Acres
Bird Farm Recreation Area (Wildlife Complex)	634 (<1%)	
Golf Course	365 (<1%)	
Archery Range	29 (<1%)	
Haymes Reservoir	72 (<1%)	
Northside Reservoir	51 (<1%)	
Townsend Reservoir	37 (<1%)	
Scout Camp	73 (<1%)	
Wildlife Demonstration Area	246 (<1%)	
Turkey Creek Protected Species Area	70 (<1%)	
Gary Walker Buffer Zone	718 (<1%)	
Off-limits Wildlife/Buffer Zone		10,731 (5%)
Special Use Subtotal	***3,710 (2%)***	***10,731 (5%)***
Military Field Training		
Maneuver and Training Areas	92,479 (67%)	184,557 (79%)
Impact Buffer Zone	5,287 (4%)	
Small Arms Impact Area	6,075 (4%)	*
Maneuver Live-fire Range Impact Area		*
Large Impact Area	15,602 (11%)	
Tank Table VIII, Range 145	2,066 (1%)	
Multipurpose Range Complex	4,472 (3%)	
Range 123	1,422 (1%)	
Canyonlands (restricted use)		29,452 (13%)
Soil Protection Sites (restricted use)		4,191 (2%)
Hogback (restricted use)		3,778 (2%)
Military Field Training Subtotal	***127,403 (92%)***	***222,978 (95%)***
Total Area	**138,303**	**235,368**

* These impact areas are also used for maneuver and are included within that acreage.

3.4.2.2 Development

Fort Carson
The Cantonment Area, located in the northernmost portion of the reservation, includes troop and family housing; administrative, maintenance, community support, recreation, supply and storage, and utilities facilities; and limited training lands. Butts Army Airfield and the Cantonment Area contain most installation support activities and capital improvements. Impact areas have limited multiple-use options due to danger to personnel and equipment. Remaining lands have been designated for recreation and other uses. About 2,117 acres are dedicated as recreational or fishing areas, not including those areas within the Cantonment Area that are used for outdoor and indoor recreation. Training Areas, with exception of live-fire areas, are open for hunting when it can be scheduled without conflict to the military mission. Other recreation and uses also occur in some Training Areas when these areas are not being used for military activities.

PCMS
The primary developed land at the PCMS is the Cantonment Area. The Cantonment Area has 1,659 acres of land that has restricted military training. Remote former ranches, homes, and related outbuildings were historically developed, and many are still used to support management and research activities.

3.4.2.3 Training Areas

Fort Carson
Fort Carson is divided into 56 Training Areas. These Training Areas are assigned to any unit for field training and include all land except impact areas, tank tables, the Multipurpose Range Complex, various recreation sites, and the Cantonment Area. Primary usesof the below Training Areas was taken from DECAM (1997), as updated in 2006.

Table 3.4.2.3a Size and Primary Uses of Fort Carson Training Areas

Training Area Number	Size (acres)	Primary Use
1	584	Dismounted/Drop Zone/Landing Zone and 10th Special Forces Complex
2	760	Dismounted
3	1,072	Dismounted/MOUT*, MATES*, and Colorado Army National Guard Complex
4	603	Dismounted/Land Navigation
5	979	Mechanized/Drop Zone
6	789	Dismounted/Mechanized/Drop Zone/ORTC/Bulk Fuel/TUAV Facility
7	824	Mechanized
8	1,189	Land Navigation

Training Area Number	Size (acres)	Primary Use
9	1,272	Mechanized
10	1,891	Mechanized
11	790	Mechanized
12	354	Mechanized
13	971	Laser Range/Safety Fan
14	366	Mechanized
15	1,241	Mechanized
16	1,021	Mechanized/Drop Zone
17	2,075	Mechanized/Drop Zone
18	2,178	Mechanized/Drop Zone
19	1,210	Mechanized/Safety Fan
20	966	Mechanized
21	1,631	Mechanized/Safety Fan
22	907	Mechanized/Safety Fan
23	1,079	Dismounted/Safety Fan
24	1,522	Mechanized/Drop Zone
25	1,481	Mechanized
26	1,965	Mechanized/Safety Fan
27	1,942	Mechanized/Safety Fan
28	1,962	Mechanized
29	965	Mechanized
30	1,904	Mechanized/Drop Zone/Landing Zone
31	2,630	Mechanized/Drop Zones/Landing Zone
32	1,770	Mechanized/Safety Fan
33	1,699	Mechanized/Safety Fan
34	1,354	Mechanized/Drop Zone/Safety Fan
35	3,339	Mechanized/Safety Fan
36	3,991	Mechanized/Safety Fan
37	791	Mechanized/Safety Fan
38	2,431	Mechanized/Safety Fan/Drop Zone
39	2050	Mechanized/Drop Zone/Signal Repeaters

Training Area Number	Size (acres)	Primary Use
40	1,480	Mechanized/Drop Zone
41	6,304	Mechanized
42	1,495	Mechanized/Drop Zone
43	2,775	Mechanized
44	968	Mechanized
45	5,831	Mechanized/Air Safety Fan
46	1,418	Mechanized/Safety Fan
47	2,822	Mechanized/Safety Fan
48	1,886	Mechanized
49	964	Mechanized
50	1,110	Mechanized
51	1,170	Laser Range
52	715	Laser Range
53 (718 acres off-limits)	1,048	Mechanized
54	2,278	Mechanized/Drop Zone
55	2,566	Mechanized
56	2,633	Mechanized
Subtotal	***94,012***	
Impact areas, buffer zone, and special ranges	34,924	
Developed Areas	6,625	
Special Use Areas	2,742	
Grand total	**138,303**	

* MOUT – Military Operations in Urban Terrain; MATES - Mobilization and Training Equipment Site

PCMS

Training Area designations have changed on the PCMS as the Army gains experience training on these lands. Section 4.7.2, *Rest/Rotation/Deferment Program* describes these changes.

Table 3.4.2.3b Size and Primary Uses of the PCMS Training Areas

Training Area Number	Size (Acres)	Primary Use
1	3,824	Mechanized
2	8,158	Mechanized
3	2,066	Mechanized
4	2,631	Mechanized
5	1,143	Mechanized
6	2,787	Mechanized

Training Area Number	Size (Acres)	Primary Use
7	64,109	Mechanized
8	1,644	Mechanized
9	2,704	Mechanized
10	64,889	Mechanized
11	4,887	Mechanized
12	13,807	Mechanized
13	13,895	Mechanized
14	231	Mechanized
15A	312	Mechanized
15B	463	Mechanized
Subtotal	***184,557***	
Restricted Training A (3,778 acres) B (637 acres) C (3,554 acres) D (2,894 acres) E (3,923 acres) F (5,441 acres) G (6,474 acres) H (10,720 acres)	37,421	Dismounted
Wildlife/Buffer Area	10,731	None
Cantonment Area	1,659	Limited
Grand total	**235,368**	

* Restricted Training Areas B and C were formerly the Soil Protection Area, containing greater acreages than presently shown. The Soil Protection Area was off-limits to all training from 1983 until 1990 when it was open to dismounted-only training. However, since the area has recovered over the past 20 years, most of it will be opened to mechanized military maneuver when the Soil Protection Sites are marked and added to training maps, per Memorandum of Agreement between DECAM and Range Control Division. Remaining protection areas (dismounted training only) consist of Soil Protection Sites.

3.4.2.4 Ranges

Fort Carson
Fort Carson has the following training facilities (Nakata Planning Group, LLC 2000):

- 30 basic marksmanship ranges,
- 13 collective live-fire ranges,
- 9 direct fire gunnery ranges,
- 62 indirect fire facilities,

- 4 special live fire facilities, and
- 45 other, nonlive fire facilities.

PCMS
The PCMS has recently (2004-05) constructed live-fire ranges just south of the Cantonment Area for small arms qualification and a Live Fire Maneuver Range for convoy type training in the north-central portion of the installation. None of these ranges use ammunition that can generate unexploded ordnance.

3.4.2.5 Impact Areas

Fort Carson
The impact area is where munitions from firing weapons will lose ballistic energy and fall to the earth or fall to be a human hazard. Rounds from small arms ranges at Fort Carson terminate in the small arms impact area, and other weapons fire into the large impact area. Impact areas are off-limits to unauthorized personnel due to live-fire hazards and hazards from explosive munitions residue.

PCMS
The PCMS has impact areas for its small arms ranges and the Live Fire Maneuver Range. All are available for maneuver when not being used.

3.4.2.6 Limited-Use Areas
Some limited-use areas are further described in Section 4.13, *Special Interest Areas*, and shown on figures 3.4.2.1b and 4.13.1.

Fort Carson
Fort Carson limits the training use of certain sensitive areas to minimize environmental effects of training. Limited use areas include:

Off-limits. Turkey Creek National Register Rock Art District, Golf Course, Turkey Creek Recreation Area, Wildlife Complex (formerly the Bird Farm Recreation Area), Townsend Recreation Area, Northside Recreation Area, Haymes Recreation Area, Wildlife Demonstration Area, Falcon Scout Camp, three reservoirs, and a buffer for a neighboring ranch south of the installation are off-limits to training.

Limited-use (permanent). Rock Creek and Little Fountain Creek watercourses across much of Fort Carson are permanently off-limits to off-road maneuver, bivouac, and digging activities. These east-west watercourses have crossings to permit north-south traffic. These crossings are marked as minefield breaching points using NATO standard signs.

Limited-use (temporary). Certain high use areas (*e.g.*, high points, assembly areas, key terrain) are restricted from off-road maneuver, bivouac, and digging activities for up to three years or more to allow natural revegetation or rehabilitation projects. These areas are returned to full training use following restoration.

Smoke-restricted zone. A one-kilometer zone adjacent to the periphery of Fort Carson has been established as an area where smoke training is not permitted. This buffer is required as a condition of the exemption for use of training smoke on Fort Carson as adopted by the Colorado Air Quality Control Commission.

PCMS
The PCMS has training land classified as dismounted-only Training Areas (*i.e*., Hogback, Soil Protection Sites, Purgatoire River side canyons, Gilligan's Island) and off-limits areas (*e.g.*, Cantonment Area). The PCMS also has a one-kilometer smoke-restricted zone.

3.4.2.7 Agricultural Leases
Neither Fort Carson nor the PCMS have agricultural leases. Such uses are not compatible with military uses, unsuitable for agriculture, and/or inconsistent with the management of lands for sustained natural ecosystem functionality. Section 4.4.1, *Agricultural Outleasing* describes conditions for which agricultural outleases would be considered.

3.4.2.8 Land Management Areas
Land Management Areas were formerly used to facilitate the proper management, monitoring, and decision-making process relative to the day-to-day natural resources management of Fort Carson and the PCMS (DECAM 1997). To avoid multiple land management area designations, natural resources management at Fort Carson and the PCMS now use Training Areas as management units unless other units are designated for specific programs. Examples would be sections 3.4.2.6, *Limited-Use Areas*, 4.2.1.1, *Watershed Management, Watersheds*, and 4.13, *Special Interest Areas*,

3.4.3 Facilities, Public Services, and Utilities

Fort Carson
The value of real property at Fort Carson (land and facilities) is $877,908,300 (Garrison Resource Management 2004).

Facilities
Fort Carson has 8,484,424 square feet of building space (Garrison Resource Management 2004). Most of this space is within the Cantonment Area, but some is located at Butts Army Airfield and downrange facilities. Most facilities proposed for construction in the installation Master Plan should not significantly affect natural resources or management activities. Project review through NEPA will assure that projects creating new footprints or possibly affecting natural resources receive complete review for environmental concerns.

Some new construction associated with greatly increased troop numbers at Fort Carson will create new facilities and housing on undisturbed or relatively undisturbed lands near the Cantonment Area. These projects will remove natural vegetation and affect wildlife.

Road System
Colorado State Highway 115 borders the reservation on the west. U.S. Highway 85-87 borders the northeastern corner and parallels the eastern boundary. Interstate 25 and U.S. Highway 85-87 serve Fort Carson from the north and south, and U.S. Highway 24 and State Highway 94 serve from the east and west.

The road network in the Cantonment Area is generally well maintained and adequate for supporting assigned mission activities. Nearly all major roads within the Cantonment Area have bituminous surfaces and are capable of handling all types of wheeled vehicles.

Main roads downrange are unpaved and reasonably well maintained. Secondary downrange roads are maintained to varying degrees.

Wastewater

The installation operates and maintains a sanitary sewage treatment plant, which services the Cantonment Area, the family housing area, Butts Army Airfield, and the Range Control complex. The original system, constructed in 1942, has been modified several times to meet discharge requirements. The sewage treatment plant had a major renovation completed in 1999, with additional equipment installed as needed.

Effluent discharges from the sewage treatment plant are regulated under a National Pollution Discharge Elimination System permit Number CO-00221181, effective October 1, 2005 – September 30, 2010. Discharge occurs into Clover Ditch. A portion of the effluent is used to irrigate the Fort Carson golf course. The installation wastewater system also services Cheyenne Mountain Air Force Base under an Interservice Support Agreement.

Stormwater Drainage

The Cantonment Area is located in the Lime Kiln Valley watershed. The northern portion of the Cantonment Area is drained by three major ditches: B Ditch, Clover Ditch, and I Ditch, all of which are tributaries to Fountain Creek. Stormwater drainage downrange is usually via natural drainages with some modifications, particularly near roads and range facilities.

Water Supply and Treatment

Fort Carson purchases treated *(i.e.*, flocculation and coagulation, sedimentation, filtration [rapid sand and dual media], and disinfection) water from Colorado Springs for domestic, industrial, and irrigation use in the Cantonment Area (DECAM 1997). This water is delivered to Fort Carson through two 20-inch diameter lines that enter the Post from the north and split to eastern and western sides of the Cantonment Area. Some water purchased by Fort Carson is supplied to Cheyenne Mountain Air Force Base. There are concerns regarding the capability of Colorado Springs Utility Department to supply water needed by Fort Carson, particularly during summer when landscaping water requirements are highest.

Tributaries for which Fort Carson retains water rights are Little Fountain Creek, Little Turkey Creek, Red Creek, Rock Creek, Sand Canyon Creek, Turkey Creek, and Wild Horse Creek. The 16 subsurface water rights are for the nine installed wells. Decreed usage categories include irrigation, recreation, fish maintenance, fire fighting, military use, livestock, and domestic and industrial.

Solid Waste

The installation's most recent landfill, located south of the Cantonment Area, included approximately 240 acres and during its lifetime has received both sanitary wastes and construction debris. This landfill is now closed and is being capped. The *Integrated Solid Waste Management Plan, Fort Carson, Colorado* (Rust Environment & Infrastructure 1999) contains details of this program at Fort Carson and the PCMS.

Energy Use

Fort Carson is dependent upon the City of Colorado Springs Utilities Department for natural gas and electricity. Natural gas is metered and piped through a series of gas mains and tributaries to the installation's four central heating plants, Butts Army Air Field, and the Family Housing Area. Electrical services are provided through two aerial 34.5-kilovolt, 3-phase, supply lines, which terminate at two power substations in the Cantonment Area.

PCMS
The value of real property at the PCMS (land and facilities) is $46,620,900 (Garrison Resource Management 2004).

Facilities
The PCMS has 10,774 square feet of building space (Garrison Resource Management 2004). Most of this space is within the Cantonment Area, but some is located at remote former ranches, which are now used primarily by the DECAM to support management and research activities. Facilities proposed for construction in the installation Master Plan should not significantly affect natural resources or management activities. Lands designated for new building construction will be inventoried for natural resources impacts. Project review through NEPA will assure that projects creating new footprints or possibly affecting natural resources get complete review for environmental concerns.

Road System
The western border of the PCMS generally follows Highway 350, approximately 28 miles north-northeast of Trinidad. Main range roads are unpaved and generally well maintained. Secondary range roads are maintained to varying degrees.

Wastewater
The PCMS uses evaporative, nondischarging lagoons for Cantonment Area wastewater discharges. Ranches have septic tanks.

Water Supply and Treatment
The PCMS purchases treated water from the City of Trinidad for use in the Cantonment Area. Ranches have wells.

Solid Waste
Fort Carson contracts for solid waste pickup at the PCMS. Wastes are transported to appropriate disposal facilities.

Energy Use
The PCMS primarily purchases electricity from San Isabel Electric.

3.4.4 Hazardous and Toxic Substances

Fort Carson
A wide variety of hazardous/toxic materials are used on the installation, including petroleum, oil, and lubricants; chemical agents; explosives; and pyrotechnics. Such products are used in military training and normal maintenance activities/operations. Hazardous waste generated by Fort Carson is stored at an approved storage facility, operated by the DECAM in compliance with the RCRA Part B Permit issued by the Colorado Department of Public Health and Environment.

Included in Fort Carson's Part B Permit is a Corrective Action Program that outlines requirements for investigation and remediation, if required, of 170 Solid Waste Management Units. Currently, 80 of these sites are closed out in the permit under a No Further Action determination. The remaining 90 Solid Waste Management Units are in various forms of the RCRA process, including investigation, remediation, and/or long term maintenance. Fort Carson is a Non-National Priorities List installation.

Asbestos-containing Materials and Lead-based Paint
Many older Fort Carson structures were built when asbestos was commonly used for construction. For example, asbestos is typically found in floor tiles, pipe wrappings, ceilings, and insulation. Lead-based paint has not been used since 1978, but it does exist in older structures.

Pesticides
Fort Carson, as required by Department of Army policies, emphasizes integrated pest management. However, pesticides may be required for insect and rodent control and control of undesired vegetation, including noxious weeds. Pesticides used on Fort Carson are described in the *Integrated Pest Management Plan* (7th ID and Fort Carson 2001a).

Munitions
Fort Carson's permanent Ammunition Supply Point storage area is located just north and east of Townsend Reservoir (south of the Cantonment Area) and provides an environmentally controlled space for the storage of ammunition used for live firing. Ammunition stored here is classified as Class V materiel according to the Army's supply category. The Ammunition Supply Point contains some 20 standard ammunition storage igloos, two aboveground magazines, the Ammunition Supply Point Office, and a utility building.

Storage Tanks
Above Ground Storage Tanks or Convualts for gas, diesel, and heating fuel at Fort Carson are generally located within the cantonment area, primarily motor pools. All Underground Storage Tanks were removed in FY06 with the opening of the Bulk Refuel Facility located at Butts Army Airfield and the Retail Facility Located on Specker Avenue. Both Facilities are Contractor Owned and Contractor Operated. Above Ground Storage Tanks located within the motor pools are used for storage of used oil. Building 8000 stores MOGAS, diesel, ssed oil, and JP-8 in their Above Ground Storage Tanks. The remaining nine Underground Storage Tanks on Fort Carson belong to Army-Aif Force Exchange System. Some sites where Underground Storage Tanks have previously been pulled are being investigated to ensure that the surrounding soil and groundwater did not incur any impacts from these operations. These efforts are regulated by Colorado Department of Labor and Employment, Division of Oil and Public Safety.

PCMS
A more limited variety of hazardous/toxic materials are used on the PCMS compared to Fort Carson. No hazardous waste is stored at the PCMS.

Asbestos-containing Materials and Lead-based Paint
Ranches at the PCMS were built when asbestos and lead-based paint were commonly used for construction. Neither material is likely to be found in the Cantonment Area.

Pesticides
Fort Carson, as required by Department of Army policies, emphasizes integrated pest management. However, pesticides may be required for insect and rodent control and control of undesired vegetation, including noxious weeds. Pesticides used on the PCMS are described in the *Integrated Pest Management Plan* (7th ID and Fort Carson 2001a).

Munitions
There are no munitions stored at the PCMS except pyrotechnic devices.

Storage Tanks

Above Ground Storage Tanks or Convualts for gas, diesel and heating fuel at PCMS are located within the cantonment area. Each ranch house (4) has an Above Ground Storage Tank to store fuel with two each tanks at Red Rocks and Sharps bringing the total to six. There are five Above Ground Storage Tanks at the PCMS POL Facility which store used oil, MOGAS, and diesel. There are five Underground Storage Tanks at PCMS with in the cantonment area. All Underground Storage Tanks tanks are being upgraded/ installed with the latest technology to ensure compliance with Colorado Department of Labor and Employment, Division of Oil and Public Safety requirements.

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4.0 Natural Resources Management

Sustain the Mission – Secure the Future

It is our obligation to ensure that our Soldiers today – and the Soldiers of the future – have the land, water and air resources they need to train; a healthy environment in which to live; and the support of local communities and the American people.[21]

This chapter includes those programs that are implemented specifically for natural resources conservation. Some, such as fire management and Cantonment Area management, may be partially within responsibilities of organizations other than the DECAM, but items discussed in this chapter emphasize those facets of these programs that are conducted by the DECAM.

Programs are described in terms of their status (**Current Conditions**) and recent history (**Current Management**) followed by proposed project(s) (**Proposed Management**), if appropriate. These projects are intended to be budget submissions to integrate implementation of this INRMP to various budget processes (Section 7.4, *Implementation Funding Options*).

Projects are described in a goal(s)-objective(s) format to provide process descriptions that are compatible with adaptive management analyses and overall INRMP implementation monitoring processes. All goals and objectives are summarized in tabular format in Appendix 7.3. Sustainability, Performance, and Compliance goals, where applicable, are taken from the *DECAM Performance Plan FY06* (DECAM 2005a).

Each project has a summary description at the beginning of the Proposed Management section. The format is as follows:

Project: Title
Justification: Laws, regulations, or policy compliance (*e.g.*, participation in regional initiatives; Sikes Act, Endangered Species Act, AR 200-3, stewardship)
Funding Priority: Proposed or actual budget classification (Note: If projects include individual objectives with different priorities, the highest is listed.)
Project Timing: Dates to be accomplished, by objective (*e.g.*, 2002, 2002-04, indefinitely, uncertain)
Regulatory Coordination: Agencies with whom coordination is required

4.1 Ecosystem Management Coordination and Planning

4.1.1 Regional Ecosystem Management Coordination

Fort Carson continues to be a leader in sustainability and ecosystem management by proactively seeking partners to facilitate natural resources conservation, while concomitantly maintaining the Installation training mission. The Fort Carson ACUB program, the Greenprint project, the Central Shortgrass Prairie Ecoregional Assessment, and Front Range Eco-Regional Management Team initiative are successful examples. Through collaboration with multiple agencies, organizations and individuals, Fort Carson has initiated grassland prairie ecosystem assessments, noxious weed management and control, forest health assessments in collaboration with the Air Force Academy, regional fire management plan development,

[21] Oeter J. Schoomaker, General, Army Chief of Staff and R.L. Brownlee, Acting Secretary of the Army

and establishment of conservation easements that will buffer Installation boundaries from incompatible development, while concurrently conserving critical shortgrass prairie habitat.

4.1.1.1 Current Conditions and Current Management

4.1.1.1.1 Front Range Eco-Regional Management Team

The proximity of Buckley Air Force Base, Cheyenne Mountain Air Force Station, Fort Carson/PCMS, Francis E. Warren Air Force Base, Peterson Air Force Base, Pueblo Chemical Depot, Schriever Air Force Base, the U.S. Air Force Academy, and the USFWS Assistance Office provides reasonable conditions for sharing manpower, expertise, and resources to collectively enhance natural and cultural resource conservation efforts.

A MOU with these DoD installations was developed to improve management of natural and cultural resources on DoD installations. The scope of this MOU covers DoD installations and USFWS offices directly involved in management of these military lands along the Front Range of the Rocky Mountains. This MOU implemented the Front Range Ecoregional Management Team, which is composed of the above DoD military installations.

By 2000 this effort was formalized as the Front Range Eco-Regional Management Team. Initial funding for Front Range Eco-Regional Management Team initiatives was through installation funds. In 2005 Legacy Act funding was provided for outreach and a project for biocontrol of noxious weeds.

There is a need for large landscape efforts to provide for regional ecosystem management initiatives that will benefit natural resources management. Initial steps in this direction include the following.

- Develop and implement Regional Management Plans for the Mountain Plover and black-tailed prairie dog. This regional effort should involve El Paso County, Colorado Springs, the Colorado Division of Wildlife, the USFWS, the Natural Resources Conservation Service, The Nature Conservancy and the DECAM, Fort Carson.
- Involve and engage the Front Range Eco-Regional Management Team as part of the DECAM regional ecosystem management process. This involvement should include:
    - utilization of Eco-regional Management Team biologists, agronomists, foresters, ecologists and soil scientists to participate in this regional ecosystem management process;
    - sharing contracts, data, and equipment to effectively implement this regional ecosystem effort;
    - cooperative fire management, including both suppression and prescribed burning; and
    - control noxious weeds, specifically tamarisk.

4.1.1.1.2 Army Compatible Use Buffer Program

There are two statutes under which the Army may enter into cooperative agreements with states, local governments, and non-governmental entities to enhance the environment and limit encroachment on military installations. 10 USC 2684a authorizes agreements to limit encroachment and other constraints on military training by:

- preserving habitat in a manner that may eliminate or relieve environmental restrictions that may otherwise restrict military training and operations and

- limiting development or use of property that would be incompatible with the training mission of the installation.

16 USC 670c-1 authorizes agreements to provide for the maintenance and improvement of natural resources on, or to benefit natural and historic research on, military installations. The program is funded at DoD level through the Readiness and Environmental Protection Initiative, and implemented through Army Compatible Use Buffer (ACUB) program.

Under the ACUB program Fort Carson and The Nature Conservancy are collaborating to mitigate incompatible development on Installation borders and protect rare plant and shortgrass prairie habitat on lands adjacent to Fort Carson and the PCMS. Protection of several properties having high conservation value and high potential for encroachment from incompatible development along Installation boundaries will help lessen the potential for regulatory impacts to training and, in turn, facilitate cross-boundary management. This effort also complements the Fort Carson Greenprint initiative and the Central Shortgrass Prairie Assessment that focus on maintaining training resources and flexibility by planning "beyond the fence-line." These proactive management and conservation activities can be more effective at preventing regulatory burdens that might impact military training and meet the needs of many agencies, nongovernmental organizations, and private landowners.

Fort Carson is also collaborating with El Paso County to avoid or mitigate incompatible development through purchases of plots of land on or near the Installation's eastern boundary that might otherwise be subject to residential development. These efforts will also likely produce environmental benefits through the avoidance of development on the purchased land.

There is a need to develop conservation easements and leases that will provide the DECAM with the capability to improve populations of sensitive species, such as the Mountain Plover and black-tailed prairie dog, on a regional ecosystem basis on or in close proximity to Fort Carson and the PCMS. This strategy will provide the means to utilize installation natural resources as the basis for ecosystem complexes that will not only target the sustainability of sensitive and protected species but entire ecosystems that are in jeopardy. Specific benefits include:

- conserving and protecting species habitat on a regional basis that may lessen land-use restrictions on Fort Carson and PCMS training lands through precluding the need to list these species as threatened or endangered or by conserving substantial habitat areas prior to a need for listing;
- having these substantial protected habitat areas adjacent to, or in close proximity to these installations may reduce pressure on wildlife and birds to migrate to other less threatened environments on Fort Carson and the PCMS, thereby reducing potential conflicts with military missions; and
- facilitating wildlife habitat improvements on adjacent lands by potential use of traditional agricultural practices (*e.g*., managed grazing, improving water distribution) for the Mountain Plover and black-tailed prairie dog.

In June 2005, over 5,000 acres of conservation easement lands were acquired on Fort Carson's southern boundary, with an additional 3,000 acres axquired in May 2006. Additionally, up to 60,000 acres may be placed under conservation leases on Fort Carson's southern and eastern boundaries. These potential leases would be designed to facilitate the acquisition of in-perpetuity conservation easements. In 2006 agreements with local agencies, and in some cases involving The Nature Conservancy, initiated efforts to mitigate future incompatible development on Fort Carson's southern and eastern boundaries.

4.1.1.1.3 Greenprint Initiative

The objective of the Fort Carson Greenprint initiative is to maintain training resources and flexibility by planning "beyond the fence-line." The Greenprint Initiative was developed by Fort Carson to methodically assess buffer lands within five miles of Fort Carson and the PCMS to mitigate encroachment. It includes both biological and physical encroachment. Output from the Greenprint Initiative is used to support ACUB actions. The assessment is expected to be completed by 2009.

Comment [R1]: Sentence rewriten

4.1.1.1.4 Central Shortgrass Prairie Eco-Regional Assessment

ACUB and Greenprint discussions between Fort Carson and The Nature Conservancy identified the need to frame the conservation context of DoD lands at a regional scale as well as prioritize where conservation efforts can be most effective at an ecosystem level. This led to securing a DoD Legacy grant to support an ecoregional assessment for the Central Shortgrass Prairie encompassing all of eastern Colorado and parts of six neighboring states. The purpose of the assessement is to identify a set of conservation areas that best represents native species and ecosystems of the shortgrass prairie and underlying ecological processes. The assessment is part of a larger partnership initiative whose vision is to promote and support the long-term persistence of native species, natural communities, and ecological systems within the ecoregion.

A multi-entity steering group (*i.e.*, USFWS, CDOW, NRCS, Colorado State Land Board, U.S. Forest Service Pawnee and Comanche National Grasslands, Playa Lakes Joint Venture, NatureServe, Colorado Natural Heritage Program, Rocky Mountain Bird Observatory, Colorado Association of Conservation Districts, Environmental Protection Agency) has identified many common goals and potential collaborative conservation projects. Through NatureServe, state Natural Heritage Programs, the Rocky Mountain Bird Observatory, and the Playa Lakes Joint Venture regional scale data have been compiled.

Identifying where conservation has the greatest chance for success will support other Fort Carson initiatives (e.g., Front Range Eco-Regional Management Team, Greenprint, ACUB). The team will include management guidance for up to six select species that are pertinent to Fort Carson and/or the PCMS (*e.g.*, Mexican Spotted Owl [*Strix occidentalis lucida*], black-tailed prairie dog [*Cynomys ludovicianus*], golden blazing star [*Mentzelia chysanth*]). These guidance documents will be based on "*Management Guidance Templates For Species At Risk On DOD Installations*." It is anticipated that upon completion, these management guidance templates and the broader Central Shortgrass Prairie ecoregional assessment will then be used by Fort Carson and other DoD installations to direct and mobilize resources on priority areas, thereby reducing the burden on military lands as repositories of prairie species and habitats. This effort also establishes a monitoring framework to measure conservation success, based upon the following.

- What needs to be conserved?
- Where is it, and how well is it doing?
- How much is enough?
- What places could contribute to goals?
- What is needed for conservation?

The Central Shortgrass Prairie Eco-regional Assessment will provide a planning document that could be used by federal, state, and private conservation agencies to prioritize their conservation efforts on declining species and habitats. These efforts may result in more training flexibility regarding listed species through identification of potential off-installation training mitigation sites.

The Pawnee and Comanche National Grasslands and Colorado State Land Board realize benefits by being able to use the information to assess the conservation value of their land in a regional context to inform land consolidation and management strategies. This will help facilitate more effective management and, similar to Fort Carson ACUB and Greenprint initiatives, identify where working beyond the boundaries is critical to success.

The Colorado Association of Conservation Districts, NRCS, and the Environmental Protection Agency are able to utilize the information from this project to inform their conservation efforts. This will help maximize the effectiveness of conservation dollars spent to protect soils resources and provide clean air and water for all of society.

A 2006 Legacy-funded project would implement Species at Risk assessments for a number of species as well as support implemention of regional conservation actions identified in the Central Shortgrass Prairie Ecoreginal Assessment and Partnership.

4.1.1.1.5 Other Regional Initiatives

Fort Carson has the following regional initiatives to support its noxious weed control program (for more detail see Section 4.14, *Noxious Weed Management*.

- Fort Carson has a cooperative agreement with the ***Upper Arkansas Regional Weed Cooperative***, in which its primary roles are to map weeds in boundary areas of common interests, support an annual weed conference in Canon City, CO, and print and distribute educational materials for the Fort Carson community.
- Fort Carson has agreements with the El Paso County, Pueblo County, and Fremont County Weed Advisory Boards; the Colorado Department of Agriculture (Division of Plant Industry); and U.S. Department of Agriculture - Animal and Plant Health Inspection Service to participate in the regional control of noxious weeds, both on and off the installations.
- Fort Carson is part of the ***Tackling Tamarisk on the Purgatoire (River) Working Group***, whose main sponsors are The Nature Conservatory and the Colorado State Forest Service.

The DECAM is an active partner with the Lower Fountain Water Quality Management Association by participating as a member of the Technical Advisory Committee. This will serve to ensure that Fort Carson has input in regional watershed planning and conservation (DECAM 2005a). The DECAM is also a member of the Fountain Creek Watershed Taskforce that ensures Installation input on regional watershed issues.

Chapter 2 (*Responsible Parties*) identifies Fort Carson organizations, federal agencies, state agencies, universities, Indian tribes, and others with whom DECAM must coordinate with to achieve its natural resources strategic goal. Also, the Natural and Cultural Resources Division maintains over 20 interservice support agreements, cooperative agreements, and MOUs with local, state, and federal agencies.

The DECAM Wildlife Office has a biologist serving on the following cooperative efforts:

- Arkansas River Habitat Partnership Program (mitigates elk damage),
- Colorado Chapter of the Wildlife Society,
- Colorado Mountain Plover Working Group,

- Colorado Black-tailed Prairie Dog Working Group,
- Multi-State Prairie Dog Working Group,
- Central Shortgrass Ecoregional Assessment, and
- Mexican Spotted Owl Working Group.

The USGS is using satellite imagery to validate rangeland impacts of military training on soils in selected PCMS Training Areas.

Fort Carson is represented on the Fountain Creek Watershed Plan Technical Advisory Committee (URS, Pikes Peak Area Council of Governments, and Pueblo Area Council of Governments undated). This relationship ensures that Army actions are sensitive to private and local government watershed use concerns and that Fort Carson has a voice concerning management decisions affecting the watershed.

Natural resources management on military installations must be coordinated with the military mission to provide the support needed for the mission as well as effectively conserve natural resources. Within Fort Carson this coordination is accomplished primarily through Range Control.

4.1.1.2 Proposed Management

Project: Ecosystem Management Coordination
Justification: Participation in regional initiatives, Endangered Species Act compliance, stewardship
Funding Priority: Class 0
Project Timing: Objective 6 - 2009; objectives 7 and 8 – by 2007; other objectives - ongoing indefinitely
Regulatory Coordination: None directly required

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

Goal 2. Promote and participate in regional planning and program implementation for natural resources conservation.

Objective 1. Coordinate natural resources planning with planning for the sustainment of the military mission.

Objective 2. Continue to use partnerships with regional agencies and groups including the USFWS, CDOW, USGS, NRCS, The Nature Conservancy, Colorado Partners in Flight, The Rocky Mountain Bird Observatory, and other federal and state agencies for the management of natural resources at Fort Carson and the PCMS.

Objective 3. Continue project funding with the USFWS, USGS, and other partnering agencies for technical assistance for natural resources program support, to include wildlife, fisheries, protected species, and noxious weed management, land rehabilitation, watershed management, water rights, hydrology, wetland surveys, contaminants, GIS, environmental assessment, and administration.

Objective 4. Remain an active partner in regional initiatives, such as the Front Range Eco-Regional Management Team, Central Shortgrass Prairie Eco-Regional Assessment, Greenprint, Peak to Prairie, and others.

Objective 5. Aggressively develop conservation easements and leases through the ACUB program that will improve populations of sensitive species on a regional ecosystem basis on or in close proximity to Fort Carson and the PCMS.

Objective 6. Complete Greenprint Initiative assessment by 2009.

Objective 7. Complete Central Shortgrass Prairie Eco-regional Assessment by 2006.

Objective 8. Implement the 2006 Legacy project for the Central Shortgrass Prairie Eco-regional Assessment by 2007.

4.1.2 Integrated Natural Resources Management Planning

4.1.2.1 Current Conditions and Current Management

This INRMP must be reviewed annually by Fort Carson, as stipulated in AR 200-3 (Department of the Army 1995a). This is being accomplished using a modified list of the goals and objectives in the plan, as summarized in Appendix 7.3 of the previous INRMP (Gene Stout and Associates 2002c). The DECAM, USFWS, and CDOW meet annually to discuss progress in INRMP implementation.

A major review is required every five years at a minimum. If significant changes are required, the INRMP must be updated. The decision to prepare an INRMP update was made in 2005 despite the lack of significant changes, which resulted in the preparation of this 2007-2011 INRMP.

4.1.2.2 Proposed Management

Project: Integrated Natural Resources Management Planning
Justification: Sikes Act compliance, AR 200-3, stewardship
Funding Priority: Class 0
Project Timing: Objective 1 - annually; objective 2 - 2010
Regulatory Coordination: USFWS and CDOW

Goal. Use coordinated planning to fully integrate the natural resources program at Fort Carson and the PCMS.

Objective 1. Review this INRMP annually using project goals and objectives to guide reviews; revise projects and budgets as required; coordinate significant changes with the USFWS and CDOW.

Objective 2. Review/update the INRMP at least every five years or when major changes are made to the natural resources program; coordinate this update with the USFWS, CDOW, USGS, and other partners.

4.2 Watershed Management

Historically, land use simply involved utilizing the natural resources with little regard to sustainability. Significant deterioration of rangeland resources was a result of over grazing, poor farming practices, and inadequate planning. Healthy rangelands benefit both the users and the general public. The Public Land Law Review Commission recommended that deteriorated or fragile rangelands retained in federal ownership should be protected from further deterioration and rehabilitated, where possible, with the use of federal funds. Military training and construction activities have a significant impact on the land-based resources of Fort Carson and the PCMS (DECAM 2005a).

Watershed management is comprised of many other natural resources programs including *Ecosystem Management Coordination and Planning* (Section 4.1), *Forest Management* (Section 4.3), *Water Resources Management* (Section 4.8), *Wetland Management* (Section 4.10), habitat management within *General Fish and Wildlife Management* (Section 4.11), *Rare and Listed Species Management* (Section 4.12), *Noxious Weed Management* (Section 4.14), and *Integrated Training Area Management* (Section 5.1).

4.2.1 Current Conditions

4.2.1.1 Watersheds

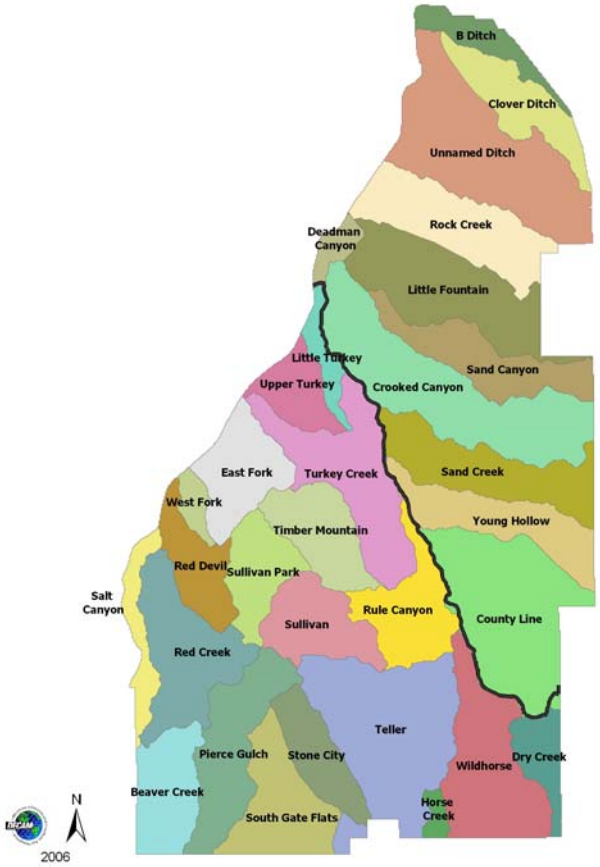
Watersheds are topographically delineated land areas that define and control the pattern of local surface water runoff. In natural resources management, watershed units are often used as the smallest boundaries for water, soils, vegetation, and wildlife conservation efforts since these resources are closely interacting at this landscape scale. On Fort Carson and PCMS watershed-scale management is imperative for maintaining the critical land resources that provide a realistic military training environment. Proper management of the Installations' watersheds also promotes compliance with various federal and state environmental laws (*e.g.*, Clean Water Act, Noxious Weed Act, Endangered Species Act) (DECAM 2005a).

Overall, both Fort Carson and the PCMS are part of the Arkansas River Watershed. Fort Carson is located in two smaller watersheds, Fountain Creek and Beaver Creek. The DECAM is represented on the Fountain Creek Watershed Technical Advisory Committee, which is developing a plan for the Fountain Creek watershed (URS, Pikes Peak Area Council of Governments, and Pueblo Area Council of Governments undated). The PCMS primarily is within the Purgatoire River Watershed, but a small portion drains into Timpas Creek (both Purgatoire River and Timpas Creek watersheds are part of the larger Arkansas River Watershed). The DECAM uses subwatersheds of these major watersheds to manage its land resources. These watershed management units are portrayed in figures 4.2.1a and 4.2.1b for Fort Carson and the PCMS, respectively.

The DECAM is responsible for oversight of the comprehensive erosion and sediment control program, which is described in the *Environmental Assessment (EA) for Erosion and Sediment Control Program at Fort Carson, Colorado* (U.S. Department of Army 1998). This EA was prepared for a Corps of Engineers regional permit to build erosion control structures at Fort Carson and the PCMS. This program includes specific plans and techniques for banksloping, erosion control dams, check dams, hardened crossings, turnouts, diversions, and terraces. Approximately 350 erosion control dams have been constructed on Fort Carson, and approximately 430 erosion control dams have been constructed on the PCMS. These require periodic maintenance.

In 2000 responsibility for the ITAM program was transferred from the DECAM to the G3/DPTM. As a result, the G3/DPTM is now responsible to monitor lands and rehabilitate damage as it relates to training. The DECAM retains overall responsibility for ensuring multiple land and water use sustainability and compliance with related laws, such as the Clean Water Act (Section 404), and future Total Maximum Daily Load limits, which are required by Section 303(d) of the Clean Water Act.

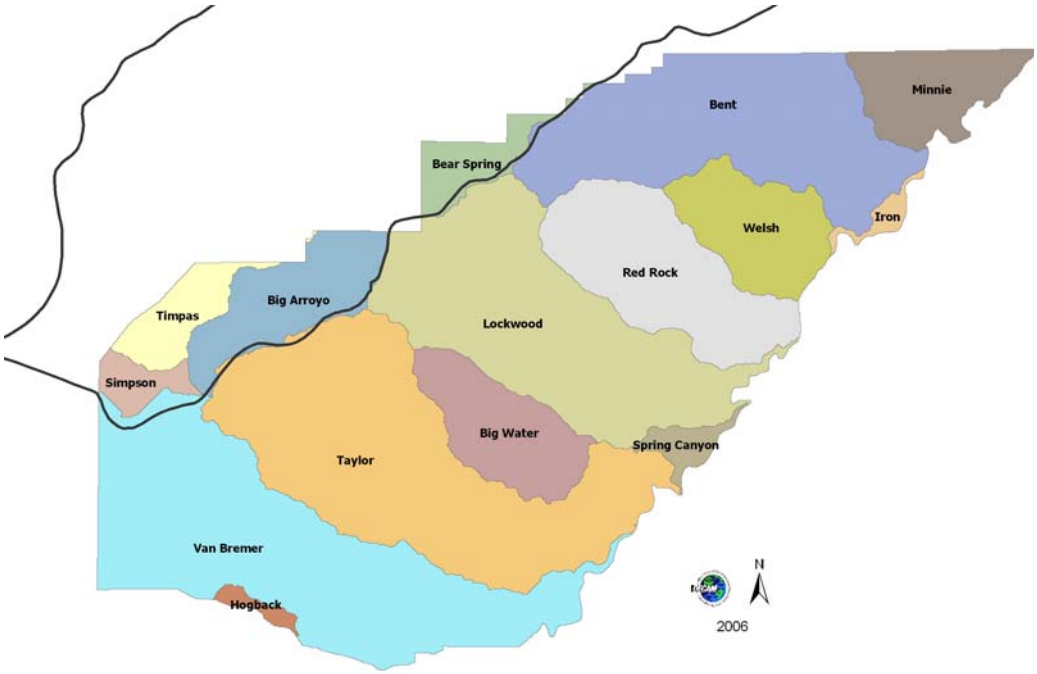
Figure 4.2.1a Watersheds on Fort Carson



Section 303(d) of the Clean Water Act (33 USC 1250, *et seq*., at 1313(d)) requires the State of Colorado to classify waters that do not meet designated water quality standards and designated as "impaired" water bodies. Colorado's Water Quality Control Commission within the Colorado Department of Public Health and Environment is required to present this information in a list to the U.S. Environmental Protection Agency (EPA) for review and approval. This list is known as the "Section 303(d) List of Impaired Waters".

As part of this listing process, the Colorado Department of Public Health and Environment is required to prioritize waters/watersheds for future development of Total Maximum Daily Load (TMDL). Colorado and the Regional Water Quality Control Board have ongoing efforts to monitor and assess water quality, develop the Section 303(d) List, and develop TMDLs with associated priorities of High, Medium, or Low.

Figure 4.2.1b Watersheds on the PCMS



Based on EPA's review of Colorado Department of Public Health and Environment's list of Water Quality Limited Segments still requiring TMDLs, EPA has determined that the 2006 list partially meets requirements of §303(d) of the Clean Water Act, and EPA's implementing regulations. Specifically, EPA has approved the Colorado Department of Public Health and Environment's list of waterbodies, associated pollutants, and priority rankings identified in Regulation #93 of Colorado Department of Public Health and Environment's listing submission. It is current EPA policy that Colorado has up to 13 years from the time a waterbody/ pollutant is added to its §303(d) list of Water Quality Limited Segments to address the need for a TMDL.

Currently, Teller Reservoir (mercury, with High Priority) and Wildhorse Creek (selenium, with Low Priority; *E. coli*, with High Priority) are identified on the Water Quality Limited Segments list, but no TMDLs have been developed. Additionally, water flows from Fort Carson impact segments of Fountain Creek, and the PCMS impacts segments of the Purgatorie River. Water Quality Limited Segments requiring TMDLs for Fountains Creek affected by Fort Carson has been listed for selinium, with Low Priority. Water Quality Limited Segments requiring TMDLs for the Purgatoire River affected by the PCMS has been listed for selinium, with Low Priority. Fort Carson's on-going sediment control program is considered effective in controlling runoff that may contribute selinium and sediment to these waterbodies.

Fort Carson will continue to coordinate with the Colorado Department of Public Health and Environment relative to development of TMDLs and, as they are developed, will adjust the Installation sediment control and monitoring program to meet new and/or additional requirements identified by the Colorado Department of Public Health and Environment. A primary consideration regarding sediment loads within the Purgaroire River is that the sediment load in the Purgatoire River is more likely a reflection of natural soil conditions and flows. Reducing the sediment load, temperatures, and effects of the intensity of storm events, would most likely have a negative impact on native fish and aquatic organisms. Overall, the Purgatoire River adjacent to PCMS is one of the best remaining habitats for native fish within the mainstem of the Arkansas drainage within Colorado[22]. It is also the site for state records of unique aquatic invertebrates (Anderson and Rosenlund 1991, Bramblett 1989, Fausch *et al*. 1985, and Pague *et al*. 1995).

4.2.1.2 Soils

Fort Carson

Thirty-four soil categories and 65 soil associations have been identified on Fort Carson (Larsen *et al*. 1979; Larsen 1981). Figure 4.2.1.2a shows the distribution of soil associations on Fort Carson. Table 4.2.1.2a lists soil associations. Predominant soil associations are the Penrose-Minnequa Complex, Penrose-Rock Complex, Schamber-Razor Complex, and Razor-Midway Complex.

A high shrink-swell capacity is the result of montmorillonitic clays dominating most soil complexes. Soil erosion, primarily from water runoff, is a significant problem on the installation. Soils of greatest concern for erosion control are clays, silty clays, and clay loams. Wiley-Kim and Penrose-Manvel (S. Molinaro personal communication in DECAM 1997) are most susceptible to erosion. Specific information concerning soils can be obtained from the soil surveys of El Paso, Pueblo, and Fremont counties, Colorado, conducted by the NRCS (Larsen 1981, Larsen *et al*. 1979, and Wheeler *et al.* 1995, respectively).

PCMS

There are 31 soil associations recognized on the PCMS (NRCS unpublished). The distribution of soil associations is shown on Figure 4.2.1.2b, and these soil associations are listed on Table 4.2.1.2b.

Soils most commonly affected by erosion are clays, silty clays, and clay loams. Specific information concerning soils can be obtained from the Soil Survey of Las Animas County, Colorado, conducted by the NRCS.

The PCMS contains four major landscape types. Each landscape type has a characteristic pattern of soils as described briefly below (Nakata Planning Group, LLC 2000).

The first landscape type, located in the western part of the PCMS, is dominated by a flat to gently sloping plain. Soils in this portion are formed in wind-deposited lifts with occasional small ridges of limestone outcropping in some areas. Soils are generally silty and weakly developed and are calcareous throughout. One small area of sand dunes crosses midway through this landscape type. Range sites dominating this landscape are Loamy Plains on upland flats, Saline Overflow in depressions and along intermittent drainages, and Sandy Plains in sand dunes. This range site generally has a medium stability rating and will experience moderate soil losses by water erosion and high soil losses by wind erosion if disturbed.

[22] The sucker mouth minnow, *Phenacobius mirabilis*, was documented in the Purgatoire River during 2006 field work.

Figure 4.2.1.2a Fort Carson Soil Associations

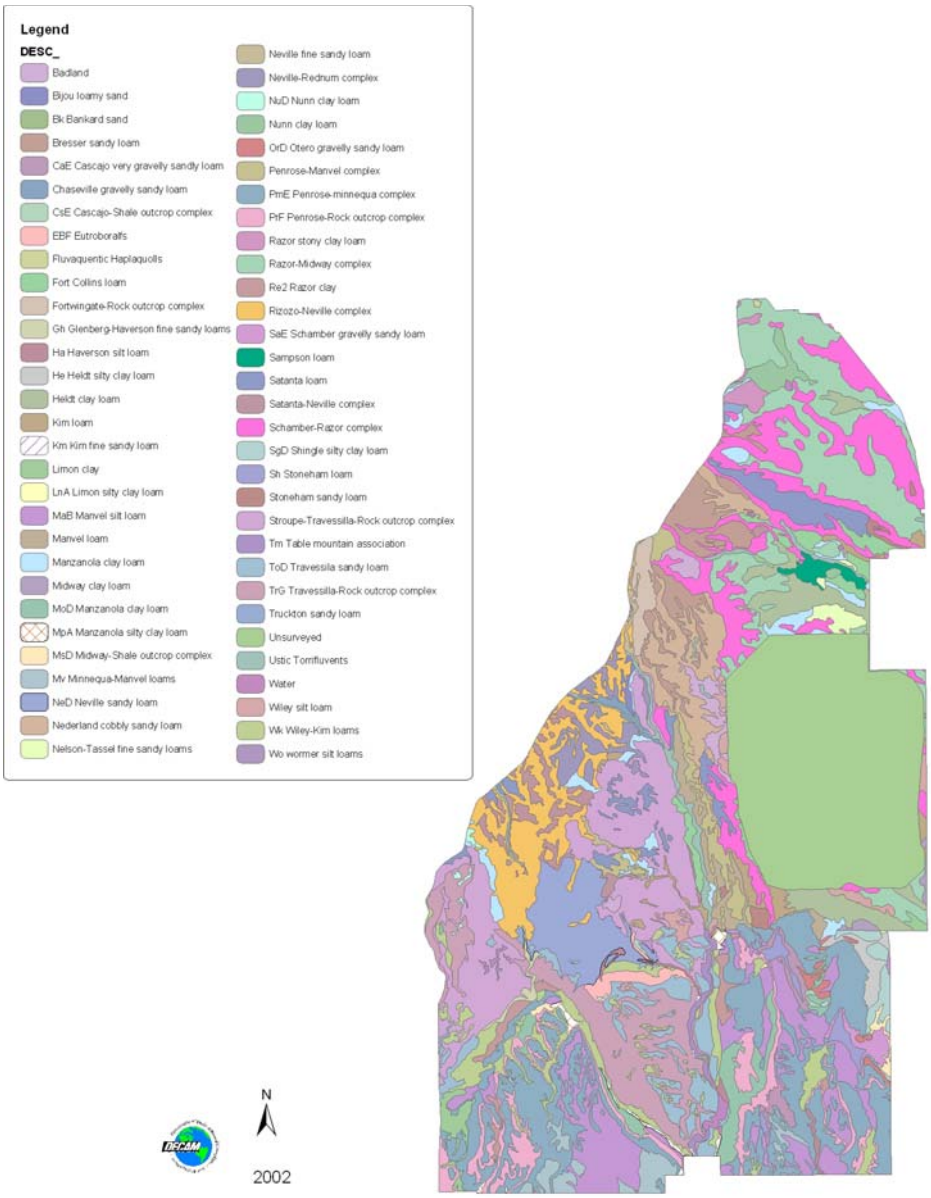


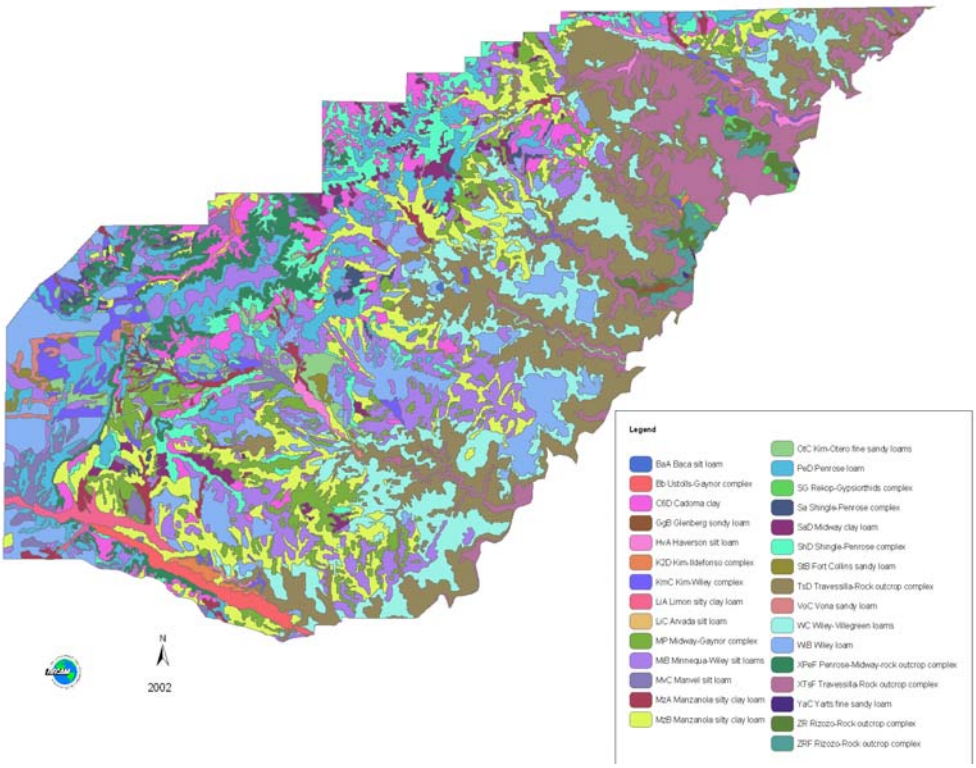
Table 4.2.1.2a Fort Carson Soil Association Category Symbols and Descriptions*

Symbol	Description and Slope	Percent Slope	Percent Cover
4	Badland	N/A	0.82
5	Bijou loam sand, 1-8% slopes	1-8	0.11
12	Bresser sand loam	3-5	1.58
13	Bresser sandy loam	5-9	0.66
16	Chaseville gravelly sandy loam	1-8	0.17
29	Fluvaquentic Haplaquolls, nearly level	N/A	0.01
30	Fort Collins loam	0-3	0.52
31	Fort Collins loam	3-8	0.40
32	Fortwingate-Rock outcrop complex	15-60	0.59
33	Heldt clay loam	0-3	2.20
43	Kim loam	1-8	0.81
47	Limon clay	0-3	0.59
50	Manvel loam	3-9	1.03
52	Manzanola clay loam	1-3	0.30
53	Manzanola clay loam	3-9	1.07
54	Midway clay loam	3-25	0.16
55	Nederland cobbly sandy loam	9-25	2.60
56	Nelson-Tassel fine sandy loams	3-18	0.37
57	Neville fine sandy loam	3-9	0.25
58	Neville-Rednum complex	3-9	1.19
59	Nunn clay loam	0-3	0.55
64	Penrose-Manvel complex	3-45	1.12
74	Razor stony clay loam	5-15	0.35
75	Razor-Midway complex	N/A	6.76
76	Rizozo-Neville complex	3-30	4.17
78	Sampson loam	0-3	0.38
79	Satana loam,	0-3	1.43
80	Satana loam	3-5	0.53
81	Satana-Neville complex	3-8	1.19
82	Schamber-Razor complex	8-50	6.90
86	Stoneham sandy loam	3-8	0.26
88	Stroupe-Travessilla-Rock outcrop complex	9-90	7.58
97	Truckton sandy loam	3-9	0.07
101	Ustic Torrifluvents, loamy	N/A	0.81
108	Wiley silt loam	3-9	0.62

Symbol	Description and Slope	Percent Slope	Percent Cover
116-Bk	Bankard sand	N/A	0.01
118-CaE	Cascajo very gravelly sandy loam	5-25	0.57
119-CsE	Cascajo-Shale outcrop complex	5-30	0.03
122-EBF	Eutroboralfs, steep	N/A	0.19
126-Gh	Glenberg-Haverson fine sandy loams	N/A	0.19
127-Ha	Haverson silt loam	N/A	0.24
128-He	Heldt silty clay loam	2-6	0.43
131-Km	Kim fine sandy loam	N/A	0.02
136-LnA	Limon silty clay loam	0-2	0.01
141-MaB	Manvel silt loam	1-5	4.89
144-MoD	Manzanola clay loam	0-2	1.38
145-MpA	Manzanola silty clay	0-2	0.27
146-MsD	Midway-Shale outcrop complex	1-9	0.19
147-Mv	Minnequa-Manvel loams	N/A	1.10
149-NeD	Neville sandy loam	3-9	2.81
152-NuD	Nunn clay loam	5-9	0.10
157-OrD	Otero gravelly sandy loam	3-9	0.27
160-PmE	Penrose-Minnequa complex	1-15	9.14
161-Prf	Penrose-Rock outcrop complex	25-65	2.73
164-Re2	Razon clay, eroded	N/A	0.63
168-SaE	Schamber gravelly sandy loam	5-25	0.34
169-SgD	Shingle silty clay loam	1-9	0.53
170-Sh	Stoneham loam	N/A	0.46
172-Tm	Table mountain association	N/A	0.33
173-ToD	Travessilla sandy loam	1-9	2.43
174-TrG	Travessilla-Rock outcrop complex	30-90	4.75
181-Wk	Wiley-Kim loams	N/A	2.73
182-Wo	Wormer silt loam	N/A	0.06
183	Unsurveyed	N/A	14.60
184	Water	N/A	0.17
	Total		100.00

* Taken from Larsen *et al.* 1979 and Larsen 1981.

Figure 4.2.1.2b PCMS Soil Associations



The second major landscape type is composed of Limestone Ridges, which cross the northwestern corner of the PCMS and form a small divide oriented to the south in the western portion of the training area. Bear Springs Hills is the most notable feature in this landscape area. Soils are commonly stone-covered with limestone at 20 inches or less in areas supporting stands of pinon pines and one-seed junipers and silty soils with limestone at 30 inches or more in gently rolling grassy areas. Soils are generally weakly developed, silty soils, calcareous, and contain low amounts of organic matter. Major range sites are Limestone Breaks on steep sideslopes, and Saline Overflow along intermittent drainages. This range site generally has a low stability rating and will experience high soil losses by water erosion and moderate soil losses by wind erosion if disturbed.

Table 4.2.1.2b The PCMS Soil Association Category Symbols and Descriptions*

Symbol	Description and Slope	Percent Slope	Percent Cover
2-BaA	Baca silt loam	0-3	0.02
3-Bb	Ustolls-Gaynor complex	15-35	0.85
4-C6D	Cadoma clay	4-12	4.76
5-GgB	Glenberg sandy loam	0-3	0.13
6-HvA	Haverson silt loam	N/A	0.59
7-K2D	Kim-Ildefonso complex	4-12	0.32
8-KmC	Kim-Wiley complex	1-9	1.91
9-LiA	Limon silty clay loam	0-1	0.77
10-LiC	Arvada silt loam	2-5	0.03
11-MiB	Minnequa-Wiley silt loams	1-6	10.09
12-MP	Midway-Gaynor complex	1-5	5.22
13-MvC	Manvel silt loam	1-9	1.30
14-MzA	Manzanola silty clay loam	0-1	1.39
15-MzB	Manzanola silty clay loam	1-4	10.17
16-OtC	Kim-Otero fine sandy loams	2-7	1.67
18-PeD	Penrose loam	2-15	6.91
19-Rv	Riverwash	N/A	0.00
20-Sa	Shingle-Penrose complex	2-15	0.76
21-SaD	Midway clay loam, gullied	3-15	1.54
22-SG	Rekop-Gypsiorthids complex	2-30	0.27
23-ShD	Shingle-Penrose complex	2-15	3.84
24-StB	Fort Collins sandy loam	0-7	0.35
25-TsD	Travessilla-Rock outcrop complex	3-25	15.61
27-VoC	Vona sandy loam	3-7	0.45
28-WC	Wiley-villegreen loams	1-4	10.11
29-WiB	Wiley loam	0-3	8.15
30-XPeF	Penrose-Midway-rock outcrop complex	25-65	3.11
31-XTsF	Travessilla-Rock outcrop complex	25-65	8.23
32-YaC	Yarts find sandy loam	1-6	0.04

Symbol	Description and Slope	Percent Slope	Percent Cover
33-ZR	Rizozo-Rock outcrop complex	3-20	0.62
34-ZRF	Rizozo-Rock outcrop complex	20-50	0.78
Total			100.00

* Taken from Larsen *et al.* 1979 and Larsen 1981.

The third major landscape type occurs between the limestone ridges and the Purgatoire River. It is composed of a wide valley that crosses the PCMS from southwest to northeast. Soils in this area range from silty soils in flat areas, which are formed in a thin layer of wind-deposited silt, to clayey soils formed in weathered shale in broad concave areas. Soils adjacent to intermittent drainages range from deep medium textured soils in areas where soil has been deposited by water to shallow soils formed directly on shale at the heads of drainages where downcutting into the shale has occurred. Major range sites in this landscape type are Loamy Plains, Alkaline Plains, and Saline Overflow. The stability rating in this landscape type ranges from medium to low. Soils will experience moderate water erosion losses in most areas and moderate to high wind erosion rates if disturbed.

The fourth landscape type occurs where the canyon of the Purgatoire River and associated side canyons form a series of steep rock-strewn cliffs and rolling mesa tops. Steepest portions of the canyons contain cliffs and stony soils with dark colored noncalcareous surface layers, while associated rolling hillslopes have moderately deep silty soils with noncalcareous surface layers and some areas of stony soils and sandstone outcrops. Range sites occurring in this landscape are Pinon-Juniper-Rockland and predominantly Loamy Plains and Sandstone Breaks, with some areas of Saline Overflow, and Salt Meadow. This landscape type has a medium stability rating in gently sloping areas and a low stability rating in steep areas. Water erosion rates range from moderate in gently sloping areas to very high in steep areas, and wind erosion losses will be moderate to high on almost all soils of this type if disturbed.

4.2.1.3 General Vegetation

Fort Carson and the PCMS are located within upper regions of the Prairie Grasslands Plant Zone. The area is characterized by openness and generally treeless terrain dominated by plants belonging to the grass family. Figures 4.2.1.3a and 4.2.1.3b show very general vegetation types on Fort Carson and the PCMS, respectively. More specific aspects of flora and their management are discussed in sections 4.3, *Forest Management*; 4.10, *Wetland Management*; 4.11, *General Fish and Wildlife Management*; 4.13, *Special Interest Areas*; and 4.14, *Noxious Weed Management*.

Grasslands comprise about 48% and 41% of Fort Carson and the PCMS, respectively, and are usually classified as shortgrass prairie. Grasslands are located primarily in the eastern, east-central, and southwestern portions of Fort Carson and dominate much of the PCMS. Major grasses include blue grama, western wheatgrass, galleta, sideoats grama, dopseeds, buffalo grass, little bluestem, and needle and thread grass. Various shrubs scattered throughout the grasslands are prickly pear cactus, cholla cactus, yucca, four-winged saltbush, rabbitbrush, and skunkbush sumac.

Shrublands, typically with grass understory, comprise about 15% of Fort Carson and 33% of the PCMS vegetation. Coniferous shrubland, dominated by pinon pine and one-seed juniper (which may be classified as shrub or trees depending on growth form), is found throughout Fort Carson and the PCMS.

Figure 4.2.1.3a General Vegetation Classes on Fort Carson

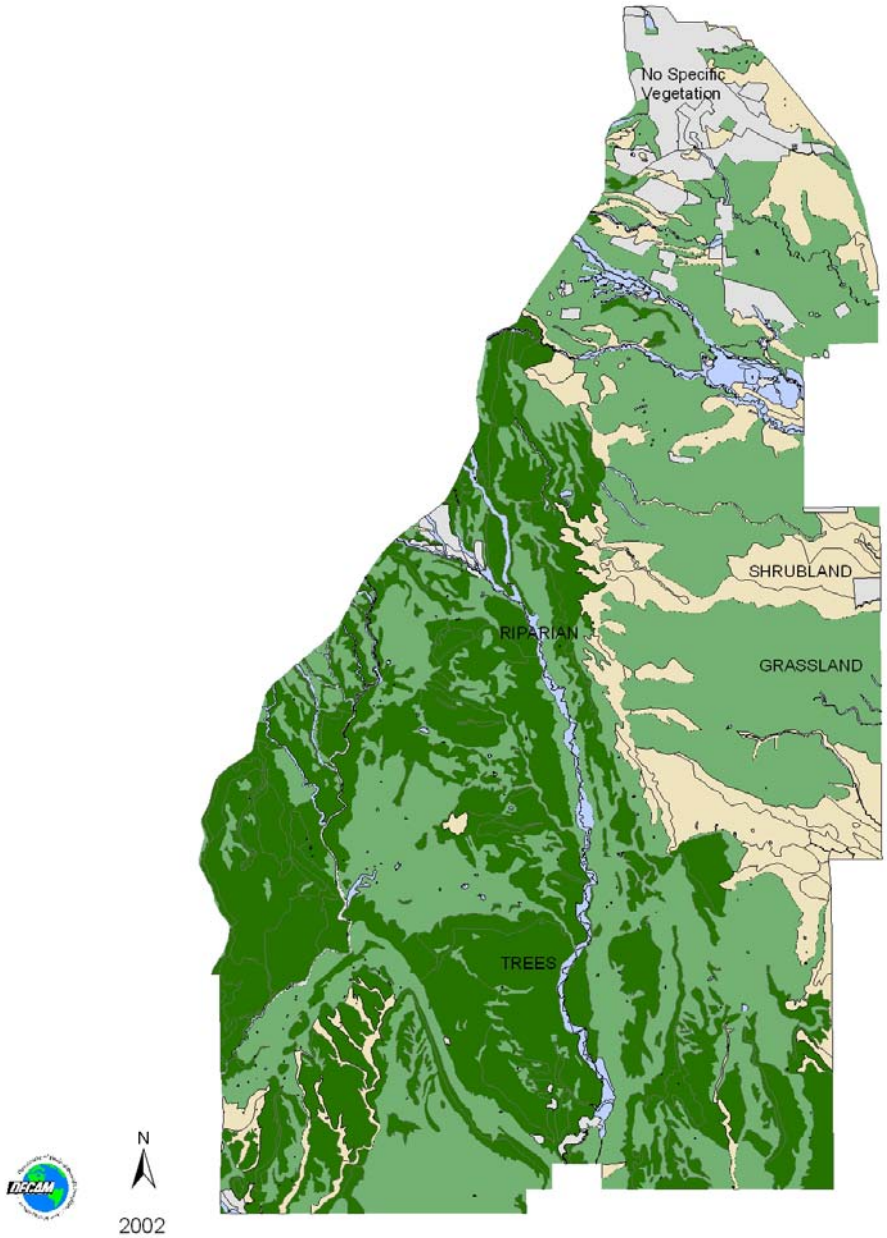
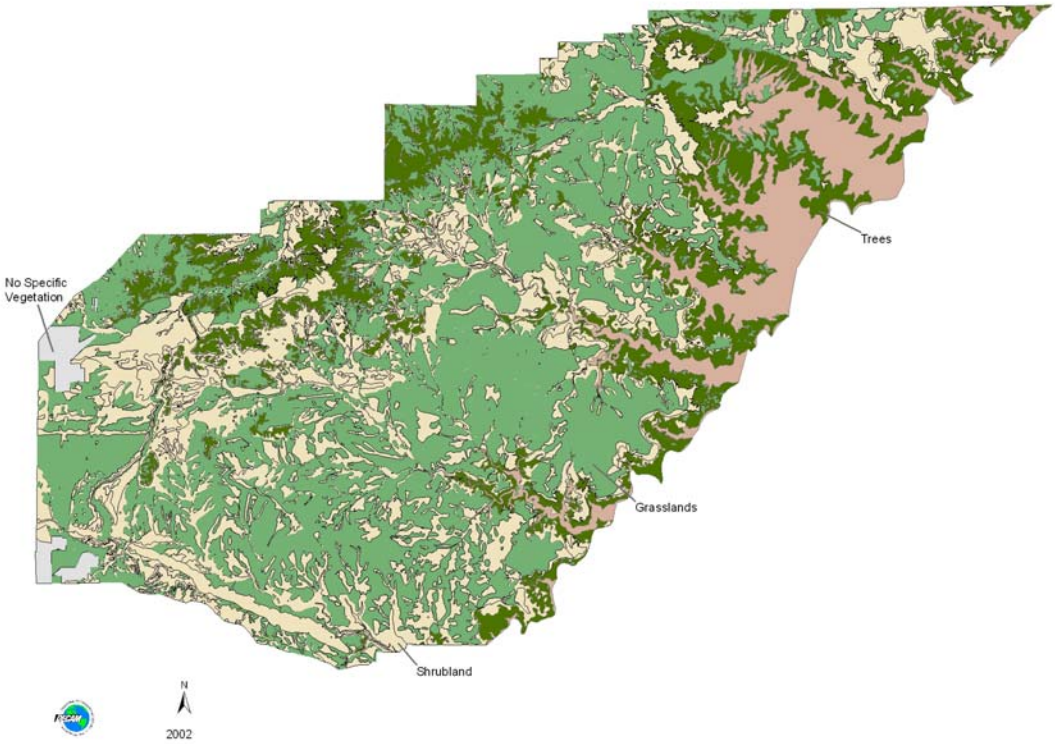


Figure 4.2.1.3b General Vegetation Classes on the PCMS



Deciduous shrubland, whose species include Gambel oak, salt cedar, and willow, is found along major drainageways.

Forest/Woodlands constitute about 37% of Fort Carson and 17% of the PCMS. Ponderosa pine, pinon pine, and one-seed juniper are the dominant species of higher elevation woodlands on rocky and steeper slopes, and cottonwood, willows, and cherrys dominate woodlands of drainageways.

Fort Carson

The *Fort Carson, Colorado: Terrain Analysis* (Dames and Moore 1978) and *Plant Community Associations of Fort Carson, Colorado* (Polzin 2000) have additional descriptions of Fort Carson floral resources. Polzin (2000) recognized 45 vegetation communities on Fort Carson.

The NRCS identified range (ecological) sites on Fort Carson. A range (ecological) site is defined as "*a distinctive rangeland, which in the absence of abnormal disturbance, has the potential to support a native plant community characterized by an association of species different from that of other sites.*" These sites are: Alkaline Plains, Gravelly Foothills, Gravel Breaks, Limestone Breaks, Loamy Plains, Overflows, Sandstone Breaks, Salt Flats, Saline Overflows, Sandy Plains, Shaly Plains, Sandy Bottomlands, Loamy Foothills, Shallow Foothills, Clayey Foothills, and Sandy Foothills.

There is very limited native vegetation remaining within the Fort Carson Cantonment Area, except for areas of the northwestern portion, in a corridor adjacent to Colorado Highway 115 (south of Gate 1), and in the Training Area on the eastern border, adjacent to Interstate 25. The land surface has been altered by construction and military training activities.

PCMS

Historically, the vegetation of the PCMS was influenced by human and environmental factors. Historic use of the Piñon Canyon region began when Hispanic pioneers from New Mexico established plazas along the Purgatoire River in the 1860s. These early settlers farmed almost exclusively in the canyons (Public Affairs Office undated). Additionally, their plazas were very small-scale operations. These Hispanic communities persisted until 1904 when they were abandoned following flooding by the Purgatoire River.

During the late 1870s, large Anglo-owned cattle ranches developed in the Piñon Canyon region. These settlers took up 320- or 640-acre tracts on the grassy plains (Public Affairs Office undated). Cattle ranchers primarily controlled the northern portion of the PCMS, whereas sheep ranchers dominated the southern part.

Passage of the Enlarged Homestead Act in 1909 brought many homesteaders to the Piñon Canyon area. These homesteaders arrived from adjacent Great Plains States and attempted dryland farming on the grassy plains (Public Affairs Office undated). Droughts of the 1920s and 1930s forced most farmers to leave the region, and by the 1940s ranching had once again become the major industry. Most wool growers switched to raising cattle in the 1950s. Cattle ranching remained the major industry until 1983, when the U.S. Army purchased the PCMS.

Vegetation at the PCMS is affected by many factors. Droughts of the 1920s and 1930s may have influenced the current vegetation. Parent materials have dictated soil types. The mosaic of vegetation on the PCMS is due, in part, to soils that developed from sandstone, limestone, basalt, and shale parent materials (Shaw *et al*. 1989a). Variations in topography have also affected the occurrence of plant species. For example, canyon vegetation is different than pinon-juniper woodlands. Land use practices have also altered the vegetation. Fire as a natural ecological process has been eliminated or controlled by man. Prior to 1983, the PCMS was ranched for over 100 years. Undoubtedly, pressures associated with grazing have impacted the area. The Raton Section of the Great Plains Province, which includes the PCMS, falls into the shortgrass prairie zone, which is characterized by blue grama, galleta, and western wheatgrass (Shaw *et al*. 1989a).

The NRCS has identified 15 range sites on the PCMS. These sites are: Alkaline Plains, Basalt Breaks, Gypsum Breaks, Limestone Breaks, Loamy Plains, River Bottom, Sandstone Breaks, Salt Flats, Saline Overflows, Sandy Plains, Shaly Plains, Sandy Bottomlands, 80% Loamy Plains/20% Gravel, Shaly Plains/Loamy Plains, 75% Shaly Plains/25% Limestone Breaks, and Unknown. Loamy Plains is the most common (40%) range site type on the PCMS.

Land Condition and Vegetation Trends
Data collected by the DECAM within the Land Condition Trend Analysis program (now called Range and Training Land Assessment [Section 5.1.1]) are maintained in DECAM computer files and summarized in tabular form.

These data for the PCMS show that land condition improved from the time of acquisition through 1992 and has been relatively stable or improving since then. Causes of changes in rangeland condition are not as apparent on Fort Carson as at the PCMS since Fort Carson has been used for training long before baseline condition data were collected.

Historically, both Fort Carson and the PCMS have been impacted by livestock, wildlife, fire, and humans. These historical aspects must be considered when assessing ecological site condition. Comprehensive rangeland monitoring can be more useful than the traditional condition and trend assessment. Wildlife habitat, water quality, soil condition and erosion, invasive and noxious weeds, and wildfire fuels must be included within a comprehensive monitoring program.

Floral Inventory
A reference plant collection (herbarium) was developed through the Land Condition Trend Analysis program for species found on Fort Carson and the PCMS. This herbarium includes a laminated sample of each plant species with pertinent information on each laminated sheet. The entire collection has been digitized. The herbarium is located at the DECAM, and digitized files are available at both the DECAM and ITAM (Range Control Division).

Lists of plant species found on Fort Carson are maintained and annually updated in Word® files within the DECAM. Previous lists are found in the Land Condition Trend Analysis report (Gordon 1989), plant communities report (Polzin 2000), and the 2002 INRMP (Gene Stout and Associates 2002c).

Lists of plant species found on the PCMS are maintained and annually updated in Word® files within the DECAM. Previous lists are found in the Gap analysis report (species of special concern) (Canestorp 1997), Shaw *et al*. (1989a, 1989b), and the 2002 INRMP (Gene Stout and Associates 2002c).

Special Interest Flora
State-listed and Special Status flora that are known or potentially occur on Fort Carson and/or PCMS are described in sections 4.12.3, *State-listed Species* and 4.12.4, *Species of Special Concern*. There are no known federal-listed flora species on either Fort Carson or PCMS.

4.2.2 Current Management
The strategy of the DECAM watershed management program is to work toward a system that is environmentally, militarily, legally, and economically beneficial to all that have a vested interest in it. Watershed management incorporates numerous fields and interests, including hydrology, soils management, ecosystem management, wildlife habitat management, noxious weed management, military training, compliance, Total Maximum Daily Loads, water quality, recreation, socio-economic impacts, and research. The development and execution of this program will benefit from a joint effort with a cross-section of partners. Such partners may include representatives from the DECAM (Natural and Cultural Resources Division and NEPA, pollution prevention, water quality programs), G3/DPTM (ITAM), DPW, military units, USGS, NRCS, Agricultural Research Service, U.S. Army Corps of Engineers, Army Research Office, USFWS, Colorado Department of Public Health, U.S. Environmental Protection

Agency, local governments, nongovernmental organizations, and interested private landowners. The DECAM will provide oversight of this program.

On-going military training activities resulting in significant disturbance of soil, vegetation, and water resources can upset the natural balance of native communities, thereby impacting DECAM's ability to sustain quality Training Areas. Some Training Areas are fragile and difficult to restore following disturbance. Other Training Areas can be quite resistant and resilient to disturbance, but negative impacts can occur if the frequency or intensity of disturbance is high. Degradation of soil not only affects the land surface but also causes watershed output in the form of sediment and nutrients that can adversely impact adjacent resources. (DECAM 2005a).

4.2.2.1 Watershed Management Planning

Individual watershed management plans are the foundation of a watershed management program. The DECAM has developed three individual watershed management plans (Grand Canyon, Sullivan, and Sullivan Park) for Fort Carson. Grand Canyon, a 4,000-acre watershed, was a test plan that was implemented mostly in 1997-98. The plan included erosion control dams, hardened crossings, drop structures, road closures and rerouting, rock and pole check dams, diversions, terraces, banksloping, seeding, and culverts.

Sullivan and Sullivan Park plans were developed more recently. These individual plans are being implemented to the best degree possible considering funding and personnel constraints, but implementation has not been extensive. Each plan describes the condition of the watershed, include prioritized, site-specific, rehabilitation projects for the watershed, and include implementation plans, including responsibility. This requires coordination with ITAM for projects that are caused by or that affect training (Section 5.1.2, *Land Rehabilitation and Maintenance*) and DPW for projects that are caused by or affect downrange infrastructure. Some projects could be jointly implemented.

There is a need to develop comprehensive and ecosystem based watershed management plans that include erosion control structures, monitoring, dam repair needs, riparian protection guidelines, wetland identification, and similar items. Imperative to developing and maintaining watershed management plans is a process to identify erosion problem areas and design and implement appropriate remediation projects (*e.g*., diversions, check dams, turnouts). A multi-agency task force, comprised of DECAM, DPTM-Range Control, USGS, and NRCS personnel, provides monitoring and data collection of hydrological, soil and vegetation key indicators. Plan implementation includes constructing new and maintaining existing erosion control structures in critical areas that are deemed necessary to rehabilitate negative erosive effects of fire, military training activities, drought, etc. (DECAM 2005a).

The development and implementation of watershed management plans is a process that could eventually encompass the entire Fort Carson/PCMS natural resources program. This process is just beginning, and it is important to establish watershed priorities. This prioritization will use soils, soil erodibility, and training intensity GIS database analyses.

4.2.2.2 Vegetation Monitoring

The DECAM collected Land Condition Trend Analysis data for Fort Carson annually from 1989 through 1996 and for the PCMS annually from 1989 through 1999. These data have been summarized in tabular format and provide baseline and mission-related data. Selected parameters from the database were analyzed using statistical software to determine what significant changes occurred.

DECAM requires a vegetation monitoring capability to ensure compliance with environmental laws and regulations regarding sustained use of natural resources. The development of land cover and vegetation maps will be an important aspect of this monitoring, as described in Section 4.12.5, *Land Cover and Vegetation Mapping*.

Vegetation mapping for Fort Carson is based on 1999-2000 ground-truthing of orthophotographs taken about 1979 (Polzin 2000). Vegetation mapping for the PCMS is based on Shaw *et al*. (1989a). Both maps are generally adequate for use during 2002-06. The herbarium and plant species lists for both installations are updated as new plant species are located.

4.2.2.3 Plant Materials Improvements

The DECAM is responsible for ensuring that plant materials used at Fort Carson and the PCMS benefit the ecosystem and military training. Selected plant materials will be native, except where non-natives meet management objectives; be adapted to the area's climate and soils; not be federal- or state-listed noxious weeds; not significantly impact wildlife and wildlife habitat; and provide erosion and sediment protection. The 1997 INRMP (DECAM 1997) identified plant species that have potential for use on Fort Carson and the PCMS in Tables 3-3.2 and 6-2.1.

The DECAM developed seed mixes for Fort Carson and PCMS that are specifically designed for their major soil/vegetation types. They have been distributed to organizations on and off the installations that perform downrange seeding operations. Section 5.1.2, *Land Rehabilitation and Maintenance*, has specific objectives to improve seed mixes and use locally collected seeds to improve rehabilitation projects.

The Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers has used Fort Carson to assess the establishment, persistence, and resistance to training pressure of 44 native and non-native plant species on two different range sites. Waldron *et al.* (2005) describe results of this study and management considerations for revegetation and weed control for frequently disturbed lands, such as found on Fort Carson and PCMS. The project also used Fort Carson to develop three new germplasms that are more resistant to military training impacts and severe environmental conditions[23]. This project was done in conjunction with the Agricultural Research Service (Logan, Utah) and the DECAM to improve seed mixes for rehabilitation projects.

There have been significant failures to re-establish native species in dryland portions of Fort Carson (saline marine soils associated with the northeastern portion of the installation, including the Cantonment Area), particularly projects associated with construction and other severe soil disturbance. Water restrictions and the economics associated with irrigation are compounding this problem. In general, Fort Carson needs to reduce the amount of bluegrass, which requires irrigation. Native dryland species offer the most promise to meet this reduction requirement.

There are concerns regarding 2001 and 2002 wildfire burn areas, which have sterile sites that are not recovering following the 2003 season. DECAM is evaluating these sites and will coordinate results with seeding plans for these sterile burn sites by spring 2006 (DECAM 2005a).

4.2.2.4 Vegetation Control Studies

The Agricultural Research Station in Logan Utah has two ½-acre test plots on Fort Carson where they have conducted and may again conduct vegetation studies that will assist in making the best decisions

[23] Strategic Environmental Research and Development Program, Information Bulletin, Fall 2001, Number 10.

regarding plant material selection and planting methods. Vegetation on these plots would be removed prior to new experimental plantings.

4.2.2.5 Sediment Monitoring

Sediment monitoring is closely related to *Water Resources Management* (Section 4.8).

Fort Carson

The DECAM implemented an in-house survey of sediment loading at over 40 Fort Carson sites during 1998-2000 in cooperation with the Agricultural Research Service. In addition to the network of 40 sites, monitoring stations on an erosion-control reservoir (46.212) and a stream draining the western portion of Sullivan Park (Red Creek) were operated. The program with Agricultural Research Service was concluded during 2002. The previously operated, continuous-record, erosion-control reservoir (46.212) was added to the network of three erosion-control reservoirs monitored (semi-annual or as-needed visits) by the USGS. The seasonally-operated, continuous-record, stream flow-sediment gauging station on Red Creek was converted to a seasonally-operated, peak-flow only gauging station. These sites continue to be operated by the USGS in support of limited erosion and sediment production assessment of Fort Carson.

PCMS

The USGS continues to monitor a network of more than 70 erosion-control reservoirs (semi-annual or as-needed site visits), a main-stem streamflow-gauging station on the Purgatoire River, and five seasonal, continuous-record, streamflow-sediment gauging stations on tributaries draining more than 60 percent of the PCMS. Monitored erosion-control reservoirs are used in assessing sediment and streamflow yields from small watersheds within the Maneuver Site, and streamflow-sediment gauging stations are used to quantify streamflow and sediment outflows from the PCMS. These sites continue to be monitored and/or operated by the USGS in support of erosion and sediment-production assessment of the PCMS.

As resources permit, the USGS will continue to analyze sediment yields using survey data for small watersheds on the PCMS to allow a more thorough data analysis of sediment transport and streamflows at the PCMS. To this point there have been technical problems with the analyses because highly-eroded smaller drainage areas have produced disproportionate quantities of sediment, which skew overall sediment-yield data and illustrate the value of remediating these very small, high-sediment yield basins.

The following Fort Carson/PCMS sediment monitoring needs could be addressed by the USGS:

- investigate methods to quantify effects of military training using remote sensing (satellite imagery),
- establish a baseline network of monitored erosion-control reservoirs and streamflow-sediment gauging stations to assess mechanized training impacts on the Soil Protection Area, and
- develop a web site to provide access to hydrologic and meteorological data for Fort Carson and the PCMS.

4.2.2.6 Selenium

Fort Carson and the PCMS have some of the highest naturally occurring, documented levels of selenium (Se) in the United States. Naturally occurring selenium can create problems when land disturbances, such as military mechanized maneuvers and excessive erosion, occur. Selenium that has leached into lower soil profiles over millions of years is exposed, and plants that act as selenium receivers invade disturbed sites. Selenium can enter directly into aquatic systems when selenium-loaded soils are exposed to water.

Selenium can also be redistributed onto ground surfaces by deep-rooted, selenium receptor plants. Both aquatic and terrestrial wildlife can be acutely and chronically affected.

No government standards/regulations exist for terrestrial and non-point source selenium. The DECAM implemented a selenium reception study, in conjunction with the University of Wyoming, which was completed in 1998. The study defined the distribution of selenium in soils and vegetation. Fort Carson land managers use this knowledge to minimize selenium reception on the Installation.

4.2.3 Proposed Management

Project: Watershed Management
Justification: Maintaining the capability of training lands to support the military mission (Sikes Act), compliance with the Clean Water Act and future Total Maximum Daily Load restrictions, stewardship
Funding Priority: Class 0
Project Timing: Objective 10 – 2011, Objective 12 – begin in 2008; objectives 15 and 16 – by 2011; other objectives - indefinitely, on-going, or as needed
Regulatory Coordination: U.S. Army Corps of Engineers for projects requiring Section 404 permits

Sustainability Goal. Achieve a 70% reseeding establishment of desirable vegetation on disturbed acreage seeded by DECAM within three growing seasons after seeding.

Goal. Use watershed monitoring, planning, and management to ensure no net increase in sediment leaving Fort Carson and the PCMS.

Objective 1. Review, and if still appropriate, implement existing watershed management plans.

Objective 2. Prioritize watersheds on Fort Carson and PCMS and prepare additional watershed management plans for high priority watersheds; begin implementation of each the following year.

Objective 3. Continue to be an active partner with the Lower Fountain Water Quality Management Association by participating as a member of the Technical Advisory Committee to ensure that Fort Carson has input into regional watershed planning and conservation initiatives.

Objective 4. Gather information regarding techniques of vegetation establishment that includes equipment suitability and specific or general proven revegetation methodologies; then implement as appropriate, adapting as monitoring indicates.

Objective 5. Closely review all proposed project specifications and training plans for potential impacts to the land resource.

Objective 6. Ensure that key personnel are trained in land rehabilitation techniques/methodologies.

Objective 7. Update the flora inventory (including herbarium mounts) as new species are found during site-specific surveys, sensitive plant species surveys, and other projects.

Objective 8. Implement the Land Cover and Vegetative Mapping program to provide a basis for monitoring changes in vegetative cover.

Objective 9. Work with the U.S. Army Corps of Engineers, Cold Region Research Laboratory to implement a plant materials development program to identify native and non-native plant varieties best suited for this region and most resistant to military training activities.

Objective 10. In 2007 establish dryland plant material research trials in saline marine soils to develop and plant materials list; complete project by 2011.

Objective 11. Develop more specific seed mixes (by soil type) to meet special land rehabilitation needs.

Objective 12. Measure sediment loss (volume) on Fort Carson, by watershed, using digital imagery with ground-truthing; as access allows; Sullivan Canyon Drainage will be test area.

Objective 13. Construct new and maintain existing erosion control structures in critical areas that are deemed necessary to rehabilitate negative erosive effects of fire, military training activities, drought, etc.; use data from Objective 12 to determine needs.

Objective 14. Use the USGS to collect surface water and sediment yield data at Fort Carson and the PCMS.

Objective 15. Use the USGS to investigate methods to quantify effects of military training using remote sensing (satellite imagery) and establish a baseline network of monitored erosion-control reservoirs and streamflow-sediment gauging stations to assess mechanized training impacts on Soil Protection Sites.

Objective 16. As resources permit, use the USGS to develop a web site to provide access to hydrologic and meteorological data for Fort Carson and the PCMS.

Objective 17. Use knowledge of selenium and its environmental reception to design watershed projects that safeguard the environment from selenium excesses.

Objective 18. Survey and assess sites on Fort Carson and PCMS for selenium; develop and implement plans to mitigate and restore problematic selenium areas.

4.3 Forest Management

Fort Carson and the PCMS forest resources are an essential part of installation ecosystems, and they provide concealment for military operations. Use and management of Fort Carson and the PCMS forests during the next five years can have impacts for many generations of Soldiers and land managers.

It is difficult to envision use requirements, economic conditions, and goals of forest resources many years in the future; thus, forest management and use decisions should be conservative. Many forestry management decisions must be tempered with multiple-use needs. Future military mission requirements may put different demands on forest resources of Fort Carson and the PCMS. In addition, public demand for increased recreation and other uses of the forest resources change with time. Below sections are based on the *Forest Management Plan, Fort Carson and the Pinon Canyon Maneuver Site* (DECAM 2006), which is in Appendix 4.3.

4.3.1 Current Conditions

Including pinon-juniper woodlands and riparian communities, 50,355 acres of Fort Carson and 39,960 acres of PCMS are forest and woodland. These forested areas (figures 2 and 3 within the Forest

Management Plan [Appendix 4.3]) are composed of various communities that can be classified as ponderosa pine communities, pinon and juniper woodlands, shrubland communities, and riparian woodland communities.

Compared to current typical Colorado Front Range stands, average stand densities on both installations indicate a low or understocked stand density. However, peak densities for both installations fall in the well-overstocked category (Colorado State University 2001).

The federal- and state-listed as threatened Mexican Spotted Owl is a rare winter resident that is known to use Rock Creek, Little Fountain, and Red Creek canyons on Fort Carson. These canyons are forested, and DECAM is considering experimental thinning techniques in this area as well as fuelbreak thinning to reduce fire potential.

Many areas with forest resources on Fort Carson and the PCMS are heavily used by the military during training exercises. Some of the understory is heavily damaged from troops using these areas. Keown and West (1978) indicate dramatic changes in woody vegetation during early years of Fort Carson. The report suggests that stand density declines in specific lower FCMR watersheds can be attributed to military training activities during the 1970s.

4.3.2 Current Management

Due to impacts of military training activities and the slow natural regeneration of dominant tree species on Fort Carson and the PCMS, any program that results in the loss of live, viable trees will be discouraged. Exceptions to this management strategy are:

- areas where thinning is needed for military operations,
- forest health improvement,
- wildlife habitat enhancement,
- insect and disease control,
- fire prevention measures, and/or
- other situations dictated by unforeseen circumstances.

A forest management team developed by the DECAM is responsible for managing Fort Carson and PCMS forests. The following objectives are pertinent to the management of forest ecosystems on Fort Carson and the PCMS.

- Provide for the optimum forest densities to enhance and support military training, consistent with multiple natural resource uses.
- Improve and maintain forest health.
- Develop and maintain wildlife habitat within the concept of normal forest management practices.
- Protect cultural resource sites.

The following special considerations are pertinent to the management of forest ecosystems on Fort Carson and the PCMS.

- Sustain military training by improving line-of-sight visibility; improve the ability of vehicles and equipment to maneuver within the forest; and provide adequate concealment[24].
- Enhance fire management by reducing hazardous fuel loads; reduce the risk of fire(s) moving off the Installation and identify potential let-burn areas.
- Sustain a productive and functional forest ecosystem by maintaining or increasing the diversity of plant and animal species.
- Provide uneven-aged forests through such silvicultural practices as thinning; reduction of dead, dying, and diseased trees; and culling undesirable species.
- Protect cultural resources, including man-made structures and historic, prehistoric, and paleontological resources.
- Employ best management practices, such as utilizing revenue generated from thinning or pruning to offset expenses, and promote thinned forest biomass utilization/recycling.
- Maintain a desirable viewshed for neighboring communities.

Comment [GLB2]: Does this plan either define "acceptable" erosion rates, or references where the definition is?

General Forest Management
Overall forest management, such as silviculture, fire mitigation, and forest health, will continue to be managed by DECAM personnel in a proactive manner under four basic areas: **Defensible Space** – improving firebreaks or thinning around important structures or resources; **Prescribed Burning** – return of fire to fire-adapted ecosystems, such as ponderosa pine, and reduce risk of fire leaving the installation or damaging valuable resources or structures; **Insect and Disease Control** – systematic survey and sanitation harvest to remove infected trees and/or thinning to improve forest health; and **Forest Rehabilitation** – seeding areas of thinning operations, severe burns, erosion control, etc. to improve conditions.

Inventory
Colorado State University conducted a comprehensive inventory of forest resources at Fort Carson and the PCMS in 2001. This inventory and its recommendations (Colorado State University 2001) are guiding the management of Fort Carson and PCMS forest resources. Future remote sensing and inventory will contribute to this database to facilitate improved decision-making to improve forest health.

Fire Management
Fire management is an important aspect of forest management. Military training operations inherently possess an elevated risk of generating increased occurrences of wildfires. The DECAM will continue to thin targeted forested area on boundaries of PCMS to reduce escape risks of wildfires, which are likely to increase due to increased training activities and new live fire ranges. This thinning also improves military maneuver access within this area.

Challenges in forest management on Fort Carson and the PCMS involve balancing the need for wildfire suppression with known benefits of allowing fire to provide for continued sustainment of the native forest ecosystem. Section 4.6, *Fire Management* describes the use of wildfire control to protect forest resources and prescribed burning as a management tool.

Damage Minimization
Certain areas with significant forest resources have restrictions on military activities, particularly mechanized maneuver (Section 4.13, *Special Interest Areas*).

[24] There is a trade-off when managing forest lands for line-of-sight and concealment. The balance should be determined on a site-specific basis, considering military needs and forest management options.

Damage Mitigation
Planting or seeding additional species would be considered if suitable sites and/or planting stock become available. The Colorado State University (2001) inventory includes identification of potential sites for transplanting trees. Both natural resources personnel and military planners will evaluate proposed sites.

Thinning

PCMS
PCMS is the highest priority for forest thinning due to very dense stands near the PCMS boundaries and concerns about fires leaving the installation (Goss 2005). The northern boundary is the ***highest priority*** due to the presence of very dense stands, private homes outside the boundary, and the Federal Aviation Administration tower/radio tower in that area. In addition, prevailing southeasterly winds generally push fires northward, off the installation. The ***second priority*** is to thin dense stands around man-made sites elsewhere on the installation, such as ranch houses and significant cultural sites. The ***third priority*** is within the interior, where most military maneuver training takes place. These stands have already been "thinned" to some extent by that maneuver training. The ***last priority*** is stands in and around canyons and mesas draining the eastern part of PCMS into the Purgatoire River.

The consensus among DECAM resource personnel is to not thin stands on steep slopes (greater than 30%). There are certain circumstances under which that could be done successfully, but for the present, steep slopes should be avoided. At least some old-growth pinon-juniper stands will be left unthinned for the benefit of various species. Those decisions can be made on the ground, as old-growth stands, clumps, or individual trees are identified while stands are being marked.

Several stands on PCMS have been selected for thinning in the first year, as shown in Appendix A of the Forest Management Plan). After the first stands are thinned and any problems are resolved, the intent is to thin stands at rates of 100-500 acres annually until all thinning needs are met. Prescribed burning within thinned stands may be conducted 2-5 years after the initial thinning to control natural juniper regeneration, which could quickly negate the benefits of thinning if allowed to grow.

Comment [rp3]: This area conflicts with some of the FMP recommendations

Fort Carson
Thinning on Fort Carson is used to continue to remove diseased trees, which are identified in Appendix B of the Forest Management Plan. The next priority is to concentrate on reducing fuel loading along firebreaks. Thinning will also improve access for military vehicles and for fire suppression vehicles.

General
Any projects needed to reduce erosion and catch sediment should be done immediately after thinning. After thinning and erosion control operations are completed, the area should be reseeded, if necessary, to native grass species and perhaps some native shrub species, depending on the site. Reseeding should take place no later than early June following thinning in the preceding winter to take advantage of spring precipitation. Avoid mechanical soil disturbance in roundleaf four o'clock locations if possible.

Comment [rp4]: It is unlikely that grass will establish well on the barrens

Post pinon-juniper thinning monitoring will include using 1-4 photo points, per selected thinning unit, which will be established prior to thinning to establish the baseline. Immediately after a stand has been thinned, erosion control projects have been completed, and the area has been reseeded, another series of photos will be taken. About five years after thinning operations, a third (and probably final) series of photos will be taken.

Commercial Forest Products
There is little potential for a commercial forest products program. Commercial harvest is neither consistent with the long-term ecosystem management goals nor practical in terms of current markets or installation security requirements.

Army policy with regard to commercial forest products includes the following requirements[25]:

- continue the evolvement from commercial-oriented forest management to ecosystem-oriented forest management that gives first priority to the mission requirements;
- include planning and NEPA analysis in all timber sale decisions;
- incorporate forest management into INRMPs;
- assure natural resources managers are available and as free as possible of commercial influence;
- ensure natural resources professionals need not rely exclusively on the economic returns of commodity production to accomplish landscape management, compliance, and stewardship; and
- eliminate pressure to conduct unsustainable forest management.

No formal timber management plan has been developed. Past evaluations concluded that the limited forestry potential of the area made timber management impractical. There is, however, some demand for firewood from the general public in the surrounding area. This demand is being reduced because of local burning restrictions due to air quality concerns along the Front Range. A limited local market exists for wood chips and mulch.

Firewood and Wood Chips
The DECAM Forest Management Team has been conducting firewood and wood chip sales since 1992 using by-products of the Fort Carson tree/shrub maintenance program. Fort Carson active duty, retired, and civilian personnel are eligible to participate in the sales. Prices for firewood and wood chips are regularly compared with local prices. Sales are announced in the Fort Carson *Mountaineer*. Sales are only held when there is sufficient firewood and woodchips to financially justify them.

American elm wood cannot be sold due to Colorado Springs and Colorado Department of Agriculture ordinances, which prohibit the storage of elm wood to reduce breeding sites for the European elm bark beetle (*Scolytus multistriatus*). This beetle is a vector for the Dutch elm disease that infects most elm species and kills the tree. Elm wood may be sold when the bark is stripped off. This is no longer a significant issue as most native American elms are gone from the Installation.

The sales program benefits the community and the installation by reducing the amount of wood products in the landfill. Funds generated from the sales are used for forestry equipment purchases and seedlings.

Commercial harvesting of the PCMS forest historically included the production of firewood, fence posts, and wood chips. There is now no commercial forest products program at the PCMS. Potential markets are limited to firewood and fence posts.

[25] Memorandum for Assistant Chief of Staff for Installation Management from Ray Clark, Principal Deputy Assistant Secretary of the Army (Installations and Environment), 2000, *Army Forest Resources Conservation*.

Forest Insects and Disease
Fort Carson is minimizing forest insect and disease problems using an integrated pest management program. Overall objectives are to keep the loss from insects and disease to a minimum by using good silvicultural practices, regular monitoring, and quick reaction to any new pest problems that might arise.

Insect and parasite threats to forests on Fort Carson and PCMS include Ips beetles (both *Ips pini* and *Ips calligraphus*), mountain pine beetle, pine pitch mass borer, twig beetle, and mistletoe infestations. There are Ips beetle and mountain pine beetle infestations in ponderosa pine at Camp Falcon Scout Camp and at Turkey Creek Ranch on Fort Carson. The Camp Red Devil vicinity currently has over 300 acres of Ips and twig beetle infestation

Comment [rp5]: spp. as both Ips pini and Ips calligraphus occur

Comment [rp6]: Camp Red Devil vicinity currently has over 300 acres of Ips and Twig beetle infestation

Control is primarily via thinning and removal of affected trees to achieve a basal area of 60-80 square feet per acre. Fort Carson is part of aN MOU between the Department of Defence and the U.S. Forest Service, Forest Health Management section, which enables DECAM to request assistance regarding forest entomology and pathology issues, with potential funding for these efforts.

Porcupines are damaging forest resources at the PCMS, and future control programs may need to be conducted where they have become a problem. Control measures, such as live trapping and relocation, have been successful on Fort Carson and will be utilized at the PCMS, as needed. The pinon pitch mass borer commonly infests pinon pines at the PCMS. Expertise from other agencies may be used if new or more serious insect or disease problems are detected.

4.3.3 Proposed Management

Project: Forest Management
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), stewardship
Funding Priority: Class 0
Project Timing: All objectives – annually or ongoing indefinitely
Regulatory Coordination: None required

Goal. Manage the forest ecosystem to support the military mission while maintaining ecosystem integrity, forest health, and wildlife habitat.

Objective 1. Implement the Forest Management Plan (DECAM 2006).

Objective 2. Determine a level of forest density that maximizes ecosystem health and function, while providing for military training requirements for concealment and realism.

Objective 3. Protect the forest resource from insects and disease.

Objective 4. Obtain information regarding optimal tree spacing for minimal soil impacts with various troop movements.

Objective 5. Manage wildland fire to maximize ecosystem health.

Objective 6. Thin selected stands on PCMS by 2007; resolve any problems that may arise; and thin additional stands at rates of 100-500 acres annually until all thinning needs are met, subject to availability of funding.

Objective 7. Use prescribed burning within thinned stands 2-5 years after the initial thinning, as appropriate.

Objective 8. Use thinning on Fort Carson to remove diseased trees, reduce fuel loading, improve forest health, and improve access for military training and for fire suppression.

Objective 9. After thinning, conduct erosion control and reseeding to native grass species and perhaps native shrub species, if needed.

Objective 10. Use photo points to monitor the success of pinon-juniper thinning.

Objective 11. Sell firewood and woodchips generated by forest management activities and reduce the quantity of wood going into the landfill.

Objective 12. Investigate potential forest product markets, including firewood, fence posts, and wood chips for power generation.

Objective 13. Ensure that natural resources personnel are as free as possible of commercial influence to accomplish forest management.

4.4 Agricultural Outleases and Mineral Resources

4.4.1 Agricultural Outleasing

Fort Carson and the PCMS have a history of grazing prior to their becoming Army installations. Fort Carson leased approximately 35,000 acres from 1960 to 1973. No grazing has occurred on the PCMS since acquisition in 1983. Grazing leases on Fort Carson have not been issued since 1974 due to potential conflicts with proper land management criteria and the military mission.

Most land on both installations is used by heavy mechanized tracked and wheeled vehicles and for live fire. There is little potential for even limited grazing or intense agriculture in a cost-effective manner while maintaining the level of resource protection essential on Fort Carson or the PCMS.

There are no plans to institute either agricultural or grazing leases since they are not compatible with the military mission, installation security, or ecosystem management strategies. The one possible exception to this is that of harvesting hay to reduce fuel loads in conjunction with other fire management efforts. Such activity would be managed to ensure that plant communities and wildlife habitat are not compromised. Specialized grazing projects (similar to goats grazing Russian knapweed at PCMS) should not be prohibiited if logistical concerns mentioned above are addressed and resource goals can be attained in a cost effective manner (*e.g*., using livestock instead of prescribed fire to reduce fuels loads in select areas).

4.4.2 Mineral Resources

Mineral resources of economic importance in the Pikes Peak Region include sand, gravel, limestone, coal, clay, and gold. Currently, sand and gravel aggregate is the single most important mineral commodity produced in the area. Clay and clayey shales have been mined throughout the area for many years as a

raw material for making steel and manufacturing bricks, tiles, ceramics, and refractories. Coal deposits that lie east of Colorado Springs and gold that lies to the west around Cripple Creek and Victor in Teller County are other potentially important resources. It is estimated that approximately one billion tons of coal lie at a depth that could allow for large-scale strip mining.

4.4.2.1 Current Conditions

Fort Carson
Two permits have been issued by the State of Colorado to mine refractive clay in Section 36 of Township 18 South, Range 67 West on Fort Carson. In view of the military activities conducted at Fort Carson, no additional permits are expected to be issued. The Robinson Brick Company began mining in 1991. Their Permit M-91-003 allows mining in November, December, and January. Also, DFC Ceramics, Inc. is mining under Permit M-90-143. The mine sites are located near the Stone City site on Fort Carson. Limited clay quarrying is occurring. The installation retains the option to renew permits and reopen quarries if required by the military mission.

There are also 11,415.16 acres of federally-owned minerals scattered throughout Fort Carson that have been withdrawn and reserved by federal statute. No mining activity is expected with regard to these mineral rights, again because of military activities and security requirements.

Fort Carson has several inactive sand and gravel borrow pits that were used for road base material and building foundations. Several abandoned mine shafts at Fort Carson and the PCMS have been marked off-limits for safety and cultural resources protection.

PCMS
Historically, gold, silver, and coal were mined in limited quantities on the PCMS. Today, there are no active mines on the installation. There are 130,139 acres of federally-owned minerals scattered throughout PCMS that have been withdrawn and reserved by federal statute. No mining activity is expected with regard to these mineral rights, because of military activities and security requirements.

4.4.2.2 Current Management
The DECAM acts as a liaison between the mining companies, Pueblo County, the State of Colorado, and the U.S. Army. The DECAM has been, and continues to be, available to assist in resolving any problems, questions, or conflicts that may arise.

The DECAM, in consultation with the Colorado Division of Minerals and Geology, ensures that clay mines are properly maintained and reclaimed by the mining companies in accordance with their reclamation plans. All reclamation plans have been coordinated by the DECAM and approved by the state. The DECAM would monitor reclamation in accordance with the company's reclamation plan. Success of all reclamation efforts would be determined based on the following vegetation cover[26]:

Excellent - 0.75 or more seedlings/square foot,
Good - 0.5 to 0.74 seedlings/square foot,
Fair - 0.25 to 0.49 seedlings per square foot, and
Poor - less than 0.25 seedlings per square foot.

[26] This scale depends heavily on pre-treatment site characteristics.

Fort Carson retains options to mine sand or gravel from its quarries. Limited clay quarrying is occurring. The installation retains the option to renew permits and reopen quarries if required by the military mission. A quarry with a commercial operator is currently being operated near the Multiple Purpose Range Complex.

The DECAM is mapping locations of inactive quarries and mine shafts and controls their use by reclaiming and posting the areas to discourage future excavations. Any unauthorized use attributable to the user may result in the user paying for reclamation costs and any fines that may be leveled by the state.

4.4.2.3 Proposed Management

Project: Mineral Resources Management
Justification: Stewardship, multiple use
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely or as needed
Regulatory Coordination: Colorado Division of Minerals and Geology for reclamation

Goal. Monitor and control the use of quarries and mines to ensure that all damage is mitigated and that any damage occurring to the land resource is properly reclaimed in a timely manner.

Objective 1. Act (the DECAM) as a liaison between the mining companies, Pueblo County, the State of Colorado, and the U.S. Army to resolve problems and conflicts.

Objective 2. Identify inactive borrow pits; determine their contents; assess their potential values; and if necessary, reclaim them, unless they are potentially useful.

Objective 3. When borrow sites are opened, require reclamation planning, ensure it is implemented upon closure, and coordinate with relevant county and state agencies.

4.5 Cantonment Area Management

4.5.1 Current Conditions

The urban landscape is an ecological factor of significant importance that provides important wildlife habitat, an aesthetically-pleasing environment, and a means to help protect troops, residents, and workers from harsh hot winds, blowing snow, summer heat, and noise. Fort Carson strives to maintain a well-planned, functional, and maintained urban landscape.

Since the founding of Fort Carson, trees and turfgrass have been planted, many of which are not suited for the arid climate. Established trees must be included into new landscape plans. Additionally, many acres of turfgrass, such as Kentucky bluegrass, require a large amount of water during hot, dry summers, which conflicts with Fort Carson's water and energy conservation program. With the exception of select high profile areas, all other areas of planned turf should be minimized and replaced with rock, native grasses, or appropriate Xeriscape plantings

4.5.2 Current Management

Cantonment Area landscaping activities are accomplished on Fort Carson and the PCMS as a coordinated management effort with the following parties:

- various contracts used to accomplish landscaping duties;
- routine grounds maintenance and enhancement requirements performed by the Base Operations Contract, under the direct supervision of DPW including activities, such as pruning, tree planting, maintenance; and
- various mission-driven agronomic activities performed by the DECAM Resource Sustainment Branch, including command-directed emergency pruning, tree/shrub maintenance, tree/shrub planting, and transplanting.

In managing natural resources in the Cantonment Area, Fort Carson acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (Office of the President 1994). The memorandum's requirements include:

- using regionally native plants for landscaping;
- using construction practices that minimize adverse effects on the natural habitat;
- reducing pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- implementing water-efficient practices; and
- creating demonstrations of these practices to promote use elsewhere.

The Fort Carson urban forest community is managed utilizing an integrated management approach in four basic areas.

Tree risk management – preventing and correcting potentially hazardous trees by a systematic evaluation. This evaluation ranks trees based on seven types of tree defects: decayed wood, cracks, root problems, weak branch unions, cankers, poor tree architecture, and dead tree tops, branches. Trees that are identified as hazardous are scheduled to be removed if other corrective actions, such as pruning, cannot remedy the hazard.
Tree replacement and planting - replacing trees that were removed or planting new ones to enhance aesthetics.
Pruning and maintenance - ongoing to reduce some risk of potentially hazardous trees, improve aesthetics, and tree health.
Emergency response - post-storm surveys to remove existing tree hazards and to identify potential hazards caused by weather events.

4.5.2.1 Tree and Shrub Plantings and Pruning

The DECAM Resource Sustainment Team provides professional guidance to government agencies and contractors on all aspects of landscaping, to include plant selection, planting techniques, pruning techniques and maintenance on Fort Carson and the PCMS. Activities range from providing guidance as well as services for maintained grounds to planting essential concealment for armored tactical vehicles in Training Areas (Section 4.3, *Forest Management*). Trees, shrubs, and ground covers are drought-tolerant species recommended by the Colorado State University Extension Service for Fort Carson and the PCMS. Many of these are listed in the Agronomy section (Appendix B) in *The Installation Design Guide* (DPW 1997).

Recent reductions in personnel within the DECAM and mission realignment have caused a requirement for the use of troop labor to water and maintain trees and shrubs. Future availability of this labor pool is

uncertain. In FY06 the requirement for maintaining the urban forest resource was assigned to DPW with the Base Operation Contract implementing all necessary actions.

DECAM has annually organized and participated in Earth Day/Arbor Day events. In 2006 the National Arbor Day Foundation recognized Fort Carson as a 'Tree City USA' for the 20th consecutive year. Fort Carson will also be appraised by the 'Tree City USA' for the 5th consecutive Growth Award for the 2007 calendar year.

Fort Carson

All landscape plantings on Fort Carson require irrigation and maintenance to survive during the establishment period. DECAM Resource Sustainment Team personnel monitor the health of plant within all formal landscapes within the cantonment area and provide guidance/oversight to all agencies involved.

Survivability is the ultimate objective for all landscape plantings. Species are selected for their ability to survive once established and their ability to conserve water. When possible, native plants are used. Plantings are considered successful if 90% of the trees survive for two years after transplanting. After the initial establishment period, which in the Prairie ecosystem can take as long as five years of normal precipitation, trees do not receive additional irrigation. However these trees continue to be maintained with fertilizing, drought proofing, and insect or disease control, if needed.

Established trees and shrubs are valuable assets and, when feasible, need to be relocated from construction projects and the demolition of older buildings. Since 1989, hundreds of trees and shrubs have been transplanted with large tree spades, which can move a tree as tall as 16 feet with a 12-inch diameter trunk (measured at the diameter breast height). Trees and shrubs moved by this method are utilized for landscaping, windbreaks, and erosion control.

Cost savings of moving trees are substantial. The appraised replacement value of a 50-year old, 16-foot Colorado blue spruce with a 12-inch diameter trunk in excellent condition is $4,000.00 (based on the replacement cost formula in the International Society of Arboriculture Guide for Plant Appraisal). A tree this size costs about $450.00 to move. Trees and shrubs moved by this method survive approximately 90% of the time, resulting in significant cost savings to the government.

Due to major construction projects at Fort Carson, there is an emphasis on transplanting trees from proposed construction sites to replace dead and dying trees elsewhere. The availability of these mature trees will increase during 2007-11 due to construction to support new troop units being assigned to Fort Carson.

Providing technical guidance on proper pruning and the removal of dead plants is important to improve the long-term health of trees and shrubs on Fort Carson. Safety is another significant benefit for maintaining this resource for the local community. Visibility is improved at road intersections when hanging limbs are trimmed. Also, heavier branches that overhang buildings, sidewalks, and cars can easily be blown down during strong winds, resulting in potential property damage and personal injury.

The DECAM developed a *Tree and Shrub Pruning Guide,* which can be found within the *Installation Design Guide* (DPW 1997) to assist all responsible agencies and personnel with maintaining existing landscape. Improper pruning by untrained personnel has left stubs of tree branches, stripped bark, cut shrub branches at ends rather than at their origin, and removed lower limbs of specimen conifers and shrubs.

Extensive pruning and dead tree removal may be required for soft wood trees, such as elm, ash, and cottonwood, in the spring following an early frost in the fall or a dry winter. High winds and snowstorms can also cause extensive damage to trees and shrubs. Identification and removal becomes a top priority during these periods to prevent the spread of insects, disease and minimize safety hazards.

4.5.2.2 Turfgrass Management

The DECAM provides technical assistance on the establishment, maintenance, and care of turfgrass and landscaped areas on Fort Carson and the PCMS. The *Installation Design Guide* (DPW 1997) includes a watering guide and general Cantonment Area landscape specifications for low maintenance seeding, sod establishment, no irrigated seeding, and irrigated turfgrass maintenance. The DECAM and DPW completed a Xeriscape Master Plan in 2003 in response to growing requirements to conserve water. This plan should be implemented at every opportunity.

4.5.2.3 Coordination

The DECAM coordinates the urban forest program with DPW, Colorado State University, Colorado State Forest Service, City of Colorado Springs Forestry Department, and other local agencies involved in urban forest management. This coordination is designed to implement and improve urban forest planning and implementation, while ensuring adherence to all federal, state and local laws and regulations.

The DECAM provides technical guidance to the DPW and Base Operations Contract, Corps of Engineers, Directorate of Contracting, Directorate of Community Activities, and individual residents on all aspects of applied Urban Forestry, such as species selection, planting, site selection, xeriscaping, and proper pruning. The DECAM directly supports the Directorate of Contracting as a subject matter expert and provides guidance for the development of work specifications and other aspects of contract documentation. Upon request, the DECAM interacts directly with contractors providing interpretation and/or clarification as deemed necessary by the Directorate of Contracting.

4.5.3 Proposed Management

Project: Cantonment Area Management
Justification: Stewardship; quality of life improvement; meeting national and 4th ID and Fort Carson priorities regarding energy conservation, native biodiversity, pollution reduction, and water conservation; support of Vision 2020
Funding Priority: Not applicable since funding is through other sources.
Project Timing: All objectives - ongoing indefinitely or annually.
Regulatory Coordination: None required

Performance Goal. Continue to be the primary lead for all urban forest related projects on Fort Carson and maintain the “Tree City, USA” designation from the National Arbor Day Foundation.

Sustainability Goal. Achieve a greater than 80% survival rate for new plantings. Plant two trees for every tree removed.

Goal 1. Provide clear, logical, effective and efficient management of the landscaped and semi-improved grounds portion of the Fort Carson and the PCMS Cantonment Areas, which includes the following elements:

- provides a safe and pleasant environment for personnel who work and live on the installation;

- prevents damage or loss of valuable agronomic resources from insects, disease, wind, construction damage, and/or neglect; and
- provides for the improvement and multiple use of improved grounds to increase wildlife habitats, enhances outdoor recreational activities, decreases soil erosion, improves air quality, saves energy, alleviates noise, and develops visual and windbreaks throughout the Cantonment Areas.

Goal 2. Provide quality urban forest management that provides for the greatest survival of new plantings.

Objective 1. Provide technical guidance to the DPW and the Base Operations Contract to ensure all turfgrass and landscaped areas are properly maintained.

Objective 2. Ensure that Fort Carson is sustaining the urban forest by maintaining the number of trees within the Cantonment Area. Trees removed for cause will be replaced and maintained. The urban forest resource on Fort Carson and the PCMS will be preserved and expanded to enhance aesthetics and provide benefits, such as visual barriers, windbreaks, decreased heating costs, reduced soil erosion, and enhanced safety.

Objective 3. Provide guidance on pruning shrubs and trees and the removal of dead plants to various agencies as an essential objective for the long-term health of trees and shrubs on the installation and ensuring the safety of personnel and structures.

Objective 4. Manage natural resources occurring within Cantonment Areas consistent with other natural resources objectives within this INRMP.

Objective 5. Implement requirements listed in the 1994 White House Memorandum on federal landscaped grounds.

Objective 6. Annually plan, organize, and participate in Arbor Day celebrations and meet standards established by the National Arbor Day Foundation to achieve recognition as a 'Tree City USA', depending upon available funding.

Objective 7. Implement the Xeriscape Master Plan.

4.6 Fire Management

4.6.1 Current Conditions

4.6.1.1 Ecological Framework

Fire represents an ecological factor of significant importance in the development and structure of nearly every terrestrial ecosystem. A policy of aggressive, strict fire control has not been consistently cost-effective or responsive to land management objectives. Most importantly, the policy has failed to acknowledge the natural role of fire in the biotic and abiotic systems in this region. Evolution of a highly sophisticated detection and suppression organization has, through the use of mechanized equipment and highly trained personnel, markedly reduced acreage burned by wildfire, but costs can be high.

It is now accepted that many communities are dependent upon fire for their continued existence. Reductions in fire frequency and burned areas allow natural vegetative succession to advance. Many vegetative communities are more productive in terms of livestock and wildlife forage and browse during

serial successional stages. Fire exclusion can steadily impact productivity levels by allowing succession to advance toward climax communities. At Fort Carson and the PCMS fire exclusion promotes the establishment of pinon-juniper associations into deeper soil areas for military training concealment.

Fire is a necessary component of a healthy ecosystem that promotes diversity, controls insects and disease, and aids in controlling invasive weed infestations. However, fires generated by military training activities often occur in extremely elevated numbers and intervals, thereby causing unacceptable damage to critical resources. Fire can directly damage some species, such as one-seeded juniper and pinon pine, both species critical to providing military concealment during training exercises. Species such as ponderosa pine may benefit from fire at some phenological stages. Other plant species are more intermediate in their responses.

Fort Carson's fire management program considers these effects in decisions regarding wildfire suppression and prescribed burning as they relate to mandates to provide for military training while striving to maintain a vital, developing, and diverse ecosystem.

The DECAM has three roles in the Fort Carson and the PCMS fire management policy. The first role is as an on-site advisor to the Incident Commander. When a fire occurs, a DECAM representative recommends fire suppression options as they relate to resource protection. The second role is to actively assist the Fire Department with suppression and prescribed fire management and planning. The third role is selecting locations for prescribed fires. Generally, prescribed fires are used on Fort Carson and the PCMS to reduce natural fuels on the range and promote habitat improvement. If fuels are not controlled, rangeland wildfires may get out of control.

4.6.1.2 Types of Fires

All fires are classified as either wildland fire (or simply wildfire) or as prescribed burning. ***Wildland Fire*** is defined[27] as "*a fire occurring on wildland that is not meeting management objectives and thus requires a suppression response*." These fires often burn with intensities capable of causing loss of life, detrimental impacts to natural resources, and damage to or destruction of man-made developments. ***Prescribed burning*** is defined as the "*controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allows the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives*."

4.6.2 Current Management

Fort Carson assisted the Department of the Army with developing an *Integrated Army Wildland Fire Management Policy*, which was completed in 2004. This policy provides guidance on the following:

- development of installation Integrated Wildland Fire Management Plan, which is expected to be completed in 2007;
- designation of installation Wildland Fire Program Managers;
- incorporation of National Wildfire Coordinating Group (NWCG) organizational standards into installation organizational structures to accommodate cooperation and integration with other federal, state, and local wildland fire organizations across jurisdictional boundaries;
- certification, training, and fitness standards for wildland fire management personnel;
- prescribed burning policy;

[27] National Wildfire Coordinating Group definitions.

- use of firebreaks; and
- funding responsibilities.

4.6.2.1 Wildfire Management

A DECAM goal with regard to wildland fire management is to facilitate military personnel with planned training opportunities while reducing the possibility of uncontrolled wildland fire escaping boundaries of Fort Carson and the PCMS. Measures of success include:

- safe operations, which resulted in zero accidents or injuries to wildland firefighters involved;
- prescribed fire operations conducted on live fire ranges at Fort Carson and the PCMS to create buffer zones;
- PCMS prescribed fires conducted for fuel reduction and habitat improvement;
- Mountain Plover habitat improvement on Training Area 54 (Fort Carson) and Training Area 4 (PCMS);
- prescribed fire plan and burn permits in compliance with Colorado Department of Public Health and Environment requirements; and
- protection of Mexican Spotted Owl habitat, in accordance with Section 4.12.1, *Federal-listed Species*, which requires that all wildfires be suppressed in Mexican Spotted Owl Management Areas.

Unacceptable resource impacts are avoided as much as possible through rapid, aggressive suppression. When a large and/or potentially significant resource impact wildfire occurs, a DECAM member responds to the fire site. A full range of initial suppression actions, from high-intensity aggressive actions to low intensity surveillance activities, are planned to meet the management objectives of individual land units, while being cost effective. The application of options is flexible and subject to revision as conditions change. Such planned actions are based upon land management objectives, values at risk, and costs associated with suppression strategies.

Suppression actions are based upon planned analysis consistent with land management objectives including the threat to life and property. DECAM personnel provide advice to the on-site Incident Commander concerning suppression methods that may be used to minimize resource losses. No wildfire situation, with the possible exception of a threat to human life, requires unnecessary exposure of fire fighters and equipment to dangerous situations.

In areas where a high level of protection has been identified, fire suppression consists of responses that usually completely suppress or control the fire. High suppression protection is broken into three resource protection subcategories of critical, high, or moderate. For example, housing areas or other structures on Fort Carson and the PCMS may be classified as “critical” protection, but Training Areas may be classified as “moderate” protection. Therefore, each would have a different response mode.

Another option could be that on a particular portion of an area, a relatively high level of protection is needed during hot burning periods, but a lower level of protection would be justified when the risk of resource damage or large fires is low. Under these circumstances, two distinct operational responses to fires in one area during different periods of the fire season could be used to reduce suppression costs and to enhance resource benefits.

Regardless of the level of protection, the Incident Commander makes the decision to determine "how" each fire is to be handled for initial response. The DECAM representative is at the fire site to advise the Incident Commander on suppression options that would protect resources.

Specific tactics for the suppression of wildland fires are generally taken or adapted from the *Field Reference Guide for Control of Wildlife Fires* (National Wildfire Coordinating Group 1989).

4.6.2.2 Prescribed Fire

Prescribed fire strategies differ from suppression strategies in that primary goals include using fire to achieve planned objectives. Prescribed fire strategies within specific prescriptions are categorized by two types of ignitions.

Unplanned ignitions are unscheduled fire starts not ignited by managers. Ignition times are not known in advance although the resulting fire may be used to accomplish predefined management objectives, as per a written prescription.

Planned ignitions are ignited to accomplish predefined resource management objectives. These types of fires occur on a defined area having prepared control lines (constructed, natural, environmental, etc.) in place, and they require a written prescription. Approved burn plans are provided to the Colorado Department of Public Health and Environment to obtain permits.

Fire management is an important aspect of forest management at Fort Carson and the PCMS. Military training operations inherently possess an elevated risk of generating increased and unnatural occurrences of wildfires.

Prescribed fires are used to reduce fuel loading on perimeters of main firing ranges on Fort Carson and PCMS in support of training/readiness. These ranges include the MultiPurpose Range Complex and the small and large impact areas on Fort Carson and the Live Fire Maneuver Range and small arms ranges on PCMS (about 50,000 total acres).

Prescribed fires also protect the high value resources on the installation, as well as adjoining private land. Prescribed fires are used in an integrated management approach to control noxious weeds. Fires reduce the amount of vegetative matter present on a noxious weed site, improving the efficacy of herbicides used to control the weeds. Fires may also be used to burn off some weed species prior to seeding native grasses.

Prescribed burning can be used to enhance or create Mountain Plover habitat. These birds are attracted to burned areas.

Due to the dynamic nature of land damage imposed on Fort Carson and the PCMS, specific areas will not be identified within this INRMP for prescribed fire. Mostly, prescribed fires are started to reduce excessive understory vegetation. This vegetation, if left uncontrolled, may contribute the fuel mechanism for a larger and more uncontrollable wildfire.

One exception is a requirement to prescribe burn a buffer zone between Booth Mountain and ranges to keep military mission-related fires from entering habitat for the Mexican Spotted Owl.

Prescribed Fire Plan
The DPW Fire and Emergency Services has developed a *Fort Carson Fire and Emergency Services Prescribed Fire Plan, U.S. Army, 2006* (Wolf and Cullan 2006), which is an example of annual prescribed burning planning for Fort Carson and PCMS. The primary purpose of the Plan is to "*facilitate military personnel with planned training opportunities, while reducing the possibility of an uncontrolled wildland fire escaping the boundaries of the installation or the Piñon Canyon Maneuver Site (PCMS)*."

Objectives of the Plan are as follows.

- Utilize fire efficiently, economically, and safely for fuels treatment activities with the least impact on basic resources and environmental quality.
- In active weapons, munitions firing range project blocks, create a minimum of a 100-foot strip of burn along all perimeters, which will be sufficient to contain any unintentional starts and facilitate military personnel with planned training schedules.
- For project blocks that are other than weapons or munitions use, support rangeland management with a goal of species conversion, invasive species control, or watershed improvement/ maintenance.

Fort Carson has Prescribed Fire Permit Areas, which are separated into several Project Blocks, which are further divided into Burn Units. PCMS has one Prescribed Fire Permit Area, which is divided in a similar manner. There are two Timber Stand Improvement areas (Camp Falcon and Turkey Creek Ranch) on Fort Carson where a Piles Permit is used to remove a large number of dead trees and trees showing signs of Ips beetle infestation. Thinning timber stands to reduce drought stress may also be considered (Wolf and Cullan 2006).

The Plan includes the following information regarding implementation of burns on the above units:

- burn area descriptions,
- sensitive features,
- environmental, cultural, and natural resources present,
- public information/education,
- broadcast burn or pile burn prescription,
- organization and required resources,
- decision criteria for firing,
- prescribed fire notifications,
- ignition,
- monitoring,
- safety,
- communications,
- trigger points, and
- incident action plan.

The annual plan also includes an Air Quality – Smoke Management Contingency Plan.

4.6.2.3 Fire Monitoring
Operational monitoring can be defined as the systematic process of collecting and recording data on fuels, topography, weather, air quality, fire behavior, and fire effects to provide a basis for evaluating and

adjusting current and future fire management programs. The primary intent of wildfire monitoring is to gain information necessary to make daily decisions regarding fire suppression actions, meet agency requirements, and provide sufficient information for documentation of fire management decisions.

Specific reasons for monitoring wildfire include the following:

- safety concerns,
- obtaining fire behavior prediction information,
- obtaining fire effects information,
- ensuring that fires remain in a desired containment area,
- alerting managers of potential problems,
- identifying and evaluating smoke dispersal patterns,
- determining if objectives are being met,
- keeping line management personnel appraised of situation and actions,
- providing information to the public, and
- collecting cost expenditure information.

Monitoring actions will be used alone or in conjunction with fire control actions. Three fire monitoring options have been identified for use. These fire monitoring options are based on two key attributes, fire potential and resource concerns.

4.6.2.4 Let-burn Areas

Fires occurring in impact areas will have a let-burn suppression strategy. Roads, firebreaks, or natural barriers will be sufficient to contain the fire. Safety considerations should be given to all areas within 1/2 mile of impact areas. These areas may also impose safety hazards to firefighters due to live, unexploded ordnance or incendiaries within or adjacent to these areas.

4.6.3.5 Fire Protection Areas

Watersheds

Negative erosion impacts usually occur if slopes are steep, soils are shallow and/or coarse, and burn intensities are high. In these instances, suppression is the desired method of control, if practical and cost-effective.

Riparian Areas and Wetlands

On perennial streams or other waterways, chemical fire retardants should not be used. On all riparian habitat, surface-disturbing equipment should be totally restricted or areas flagged where equipment has to be used, such as at a new stream crossing.

Other Land Ownerships

Fires on Fort Carson or the PCMS that have the potential to burn onto other ownerships will be suppressed. As a general “rule of thumb”, fires should be initially attacked immediately if they are within 1/2 mile of ownerships with housing developments or within 1/4 mile of undeveloped ownerships. Unless otherwise indicated in the plans, military lands adjoining housing subdivisions will be classified as critical protection and all other adjoining lands will have a moderate protection classification.

Cultural Sites

Wildfires will be attacked if they are within 1/4 mile of identified cultural sites. The responsible fire manager and/or archaeologists will be contacted before any fireline construction is initiated.

Forested Sites
In general, all forested sites on Fort Carson and the PCMS have a very high resource value due to use for military training activities, mitigation of accelerated erosion, and wildlife habitat. Also, the pinon-juniper vegetation type is very slow-growing and practically impossible to re-establish. Fires should be initially attacked within 1/4 mile of any forested site, and any fire occurring within a forested site will be classified as critical protection, unless previously identified as a let-burn area for management purposes.

4.6.2.6 Firebreaks
Approximately 72 miles of firebreaks encompass Fort Carson. They are maintained by mechanically removing the vegetation 3-4 times annually. This practice has resulted in fugitive dust and soil erosion problems, as well as an increased maintenance cost. There are numerous eroded areas along firebreaks that have resulted from the removal of vegetation.

DECAM prepared an EA for a firebreak along part of the northern boundary of the PCMS, which has been completed. This area is particularly important since the construction of the Live Fire Maneuver Range in that area. Prescribed burning and roadways are currently being used to contain fires in this part of PCMS.

Forested Area Thinning
In 2003 DECAM thinned 93 acres of forested area on the northern boundary of PCMS to reduce escape risks of wildfires, which are likely to increase due to the new Live Fire Maneuver Range. This thinning also improves military maneuver access within this area. Thinning will be used on Timber Mountain on Fort Carson in 2007.

4.6.2.7 Training
The Fort Carson Fire and Emergency Services provides DECAM wildland fire personnel annual refresher training. In addition, DECAM wildland fire personnel attend local or Fort Carson Fire and Emergency Services Training Center classes. The DECAM provides training to Fire and Emergency Services personnel on chainsaw safety and use. Both departments work together to keep abreast of current techniques, training, and equipment.

4.6.2.8 Fire Management Coordination
The DECAM shares funds with the Fort Carson Fire and Emergency Services for supplies and equipment. The DECAM equips and maintains three HUMVEE brush trucks, 1,000-, 1,200- and 1,500-gallon tenders, and a 5,000-gallon water tanker. Each year, the DECAM provides support to Fire and Emergency Services.

The DECAM coordinates and consults with the National Wildfire Coordinating Group, federal, and state agencies, universities, DPW, the Fort Carson Fire Department, local land owners, or any other agency or organization that will have concerns or input. Applicable permits, such as an air quality burning permit or Section 404 permit, are acquired prior to any fire management activity. Fort Carson has cooperative agreements with the Colorado Springs Fire Department, El Paso County, and the U.S. Forest Service to provide mutual aid for the suppression of wildland fires on the installation and surrounding area.

Pursuant to the Fort Carson-Pinon Canyon Military Lands Withdrawal Act, section 2905(a)(3), Fort Carson and BLM will have a memorandum of understanding concerning the management of Fort Carson and PCMS. As part of that memorandum, BLM will, upon request by the Fort Carson Garrison

Commander, provide backup assistance in suppression of fires at either location, subject to reimbursement from Fort Carson.

Fire suppression activities within areas of concern for the Mexican Spotted Owl will be coordinated with the USFWS with full suppression the goal. Section 4.12.1, *Federal-listed Species, Mexican Spotted Owls*, citing the *Biological Assessment and Management Plan for the Mexican Spotted Owl on Fort Carson* (Gene Stout and Associates 2002b), has the following objective and task regarding fire suppression.

Objective 3. Implement strategies to mitigate negative effects to Mexican Spotted Owl from wildfire and natural catastrophic events.

Task 3.1: Suppress wildfires in Mexican Spotted Owl management areas.

- *Suppress wildfires in TA 38, TA 39, and TA 45, Multi-Purpose Range Complex, and ranges 143, 145, and 147:* All wildfires on TA 38, 39, and 45; the Multi-Purpose Range Complex; and ranges 143, 145, and 147 are suppressed on a high priority basis. If a fire starts, Fort Carson Fire Department dispatch is called. The closest fire crew is at Turkey Creek Ranch; the response time is approximately 40 minutes.
- *Suppress wildfires on Airburst Range 123 Safety Fan*: If a fire starts on the Airburst Range, Air Force National Guard personnel, along with some civilians, respond. The Airburst Range crew uses a 1,500-gallon tender truck fight all fires. If the fire grows larger than 2-4 hectares/5-10 acres, the Fort Carson Fire Department is called to assist.
- *Suppress wildfires on Booth Mountain and Timber Mountain*: All wildfires on Booth Mountain and Timber Mountain are suppressed with immediate response year-round.

4.6.2.9 Fire Prevention

Various restrictions are placed on military activities likely to cause fires during periods of high wildfire danger, and there are regulations on the use of open fires. Prescribed burning (Section 4.6.3.2, *Prescribed Fire*) has significant fire prevention aspects due to the reduction in fuels and their use around high fire danger areas.

4.6.3 Proposed Management

Project: Fire Management
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), stewardship, support of Vision 2020, protection of human property and health
Funding Priority: Class 0
Project Timing: Objective 6 - 2011, all other objectives - ongoing indefinitely
Regulatory Coordination: None required

Goal. Prevent and manage wildfires, utilize prescribed burning to sustain or enhance training mission capabilities, and maintain ecosystem biodiversity and functionality.

Objective 1. Provide natural/cultural resources management-related recommendations relative to fire suppression activities to Fort Carson Fire and Emergency Services personnel; ensure wildlife and endangered species habitat enhancement/protection is considered during fire management activities.

Objective 2. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety requirements.

Objective 3. Focus fire prevention activities in a cost efficient manner in priority areas of Fort Carson and the PCMS.

Objective 4. Annually assist Fire and Emergency Services prepare a Prescribed Fire Plan.

Objective 5. Educate the Fort Carson community and the general public on the benefits of fire as an integral part of the natural ecosystem.

Objective 6. Conduct an analysis of the Boise Interagency Fire Center research of green stripping vegetation methodology by 2011 to include the type of seed to be planted and the proper configuration (*e.g*., width, number of strips) in a prototype seeding program using test plots.

Objective 7. Continue coordination and cooperative mutual aid agreements for fire suppression or management for natural resource benefits.

Objective 8. Continue cooperation between the DECAM and Fire and Emergency Services for training and assistance with prescribed and wildland fire.

Objective 9. Enhance or increase Mountain Plover habitat or numbers using prescribed burning in Training Area 54 to encourage nesting in this area and not on the ranges.

Objective 10. Suppress fire in potential Mexican Spotted Owl habitat as the highest priority.

Objective 11. Prescribe burn a buffer zone between Booth Mountain and ranges to keep military mission-related fires from entering habitat for the Mexican Spotted Owl.

Objective 12. Use prescribed burning to enhance the noxious weed management program.

4.7 Training Resources Sustainability

4.7.1 Maneuver Damage Program

The Fort Carson Maneuver Damage Control (MDC) Program is an important component of the land management program. Specific components of the MDC program can be found in Fort Carson Regulation 350-10, *Maneuver Damage Control Program*.

The native range resource is one of the most significant assets for meeting the military training goals at Fort Carson and the PCMS. Historically, both Fort Carson and the PCMS were misused in terms of land utilization. Today, established principles of land management are being applied to maintain or improve the range resource and ensure that military training goals are met. Some maneuver damage is unavoidable as part of the training objective; however, the MDC program is used to minimize unnecessary maneuver damage. Coordination among the DECAM, DPTM/G3 (Range Control Division/ITAM), and land users will ensure the accomplishment of goals of both proper land conservation and the training mission.

4.7.1.1 Current Management

Wet Weather Deferment
In the past, military training at Fort Carson was conducted in virtually all weather conditions. Soils and vegetation at Fort Carson and the PCMS are susceptible to maneuver damage when the soils are wet. The PCMS is protected from unnecessary wet weather maneuvering through provisions outlined in the PCMS Environmental Impact Statement (U.S. Department of Army 1980).

Since 1985, training at the PCMS has been accomplished with the understanding that damage due to military training activities is directly related to soil moisture conditions. Land resource damage attributable to military training use is highest when soil moisture content is the greatest. Presently, when soil moisture conditions are determined to be too wet, it is suggested that training activities be suspended or shifted in scope and/or extent until soil conditions are determined to be more optimal. When compatible with training urgency, from a natural resource conservation perspective, it is within the best interest and welfare of the land and the military to restrict off-road use of training lands during these periods of wet and/or thawing soils.

Fort Carson also has a wet weather deferment program as part of the MDC program. As part of standard operating procedures to train, military units are required to obtain the concurrence of DECAM prior to training in Amber or Red conditions. The Commanding General, Fort Carson, is the final approval authority for same.

Training Guidelines
Guidelines regarding vehicular movement have been developed and are incorporated into Fort Carson Regulation 350-10. These guidelines include responsibilities to be aware of Environmental Awareness materials, minimization of unnecessary off-road maneuver, Limited Use Area restrictions, avoidance of erosion and sediment control structures, cultural resources site protection, digging restrictions, pollution prevention, tree protection, and similar items.

Maneuver Damage Assessments
When training on Fort Carson and the PCMS, military troop units are responsible for reimbursement to rehabilitate sites damaged through negligence or malice. Such damage includes such items as tree loss, damage to facilities, wetland damage, fence or sign damage, damage in off-limits or limited use areas, unfilled excavations, etc. This process achieves two objectives. First, a mechanism is provided to expedite the rehabilitation of disturbed land by making the user responsible for the necessary land restoration. Next, overall damage is reduced by emphasizing the importance of maneuver damage avoidance. In other words, if the user is careful, less damage will be inflicted on the land resources and less cost will be incurred to repair the land.

DECAM personnel physically inspect Training Areas after completion of all significant (battalion task force or larger) field exercises. Damage is mapped, and if it is deemed excessive, costs are estimated to mitigate damage. Units are assessed costs via memoranda from the Director, DECAM to unit commanders. There is a dispute resolution process for disputed costs. Funds collected are used by the DECAM to transplant trees, evaluate damaged cultural sites, replace fences, signs, etc., or conduct similar mitigation.

Immediate Damage Repair
The smoothing/filling/seeding of ruts, hull defilades, tank traps, neutral pivot steers, etc. are conditions that require immediate reclamation. These areas need to be reseeded immediately to prevent soil erosion, dust pollution, and prevent the establishment of noxious weeds. Immediate repair of this damage will be accomplished using procedures within the Land Rehabilitation and Maintenance program (Section 5.1.2).

Long Term Replacement of Destroyed Trees
The replacement of destroyed trees using transplants is described in Section 4.3 (*Forest Management*). Funding for this program is derived from the MDC program.

Unit Participation
Fort Carson military personnel play an active role in the reduction of maneuver damage through the implementation of the Unit MDC program. Each company-sized or larger unit that uses downrange, including National Guard and Reserve units, must have one person attend MDC training. MDC training is offered monthly and more often as needed with DECAM and ITAM personnel generally rotating training responsibilities. Combat engineer units have provided extensive support to the erosion control program by building and maintaining erosion control structures. All units reclaim areas impacted by creation of fighting positions, tank traps, and vehicle concealment excavations.

Each unit is required to have a certified MDC Officer (E7 or higher) when training downrange. Certification lasts for one year. While deployed, the unit MDC Officer briefs unit commanders regarding maneuver conditions (*i.e.*, green, amber, red), which are based on soil moisture. The MDC Officer also ensures spills are cleaned-up and Training Areas are policed prior to troops leaving the field. Units must also have internal Maneuver Damage Repair Teams, which have the capability to repair relatively minor damage to training lands, fences, etc. This team's responsibility also includes small spill cleanup and after-action area police.

4.7.1.2 Proposed Management

Project: Maneuver Damage Control
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), stewardship
Funding Priority: Not applicable. See Section 7.4.5, *Operations and Maintenance Funds*
Project Timing: All objectives - ongoing indefinitely
Regulatory Coordination: None required

Goal. Minimize and mitigate damage to training lands necessary to sustain the military mission indefinitely on Fort Carson and the PCMS.

Objective 1. Implement a wet weather deferment system to alter or restrict training during periods of wet and/or thawing soils.

Objective 2. Coordinate with and assist ITAM personnel with training unit MDC personnel.

Objective 3. Physically inspect Training Areas after all battalion task force and larger field exercises; assess damage; and coordinate with ITAM for mitigation and rehabilitation.

Objective 4. Use programmed funds to mitigate and rehabilitate maneuver damage using immediate or more long-term mitigation/rehabilitation.

Objective 5. Annually review, in coordination with G3/DPTM, review effectiveness of training restrictions with regard to their effectiveness in maintaining the capabilities of Fort Carson and the PCMS to sustain the military mission and recommend necessary adjustments.

4.7.2 Rest/Rotation/Deferment Program

An essential component of the land management program is to provide a means to reduce military impacts to Training Areas or portions of Training Areas during which repairs can be implemented or natural restoration processes can occur. The rest/rotation/deferment program provides such benefits to training land sustainability at Fort Carson and the PCMS.

The term "rest" refers to withdrawal of an area from mechanized maneuver; other military activities may occur in many cases. The term "rotation" refers to regularly resting areas on a rotational basis to avoid cumulative damage that is time consuming or expensive to repair; rotations may also allow certain types of training (typically dismounted) during rest periods. The term "deferment" refers to removing a specific damaged area from certain types of training (typically mechanized maneuver) to either rehabilitate or allow natural restoration.

4.7.2.1 Current Management

Maps 4.7.2.1a and 4.7.2.1b show Training Areas and habitat types that overlay them for Fort Carson and PCMS, respectively. These maps should be useful for understanding below references to Training Areas.

Fort Carson

Because of the limited land available for military training activities at Fort Carson, a rest/rotation program was not feasible. Therefore, Fort Carson initiated a deferment program in 1989, which rests areas identified as critical. The deferment program allows for approximately 8,000 acres to be set aside from use for three years or more. Approximately 7,000 acres were deferred from use in 1989. Restricted area signs were posted, and portions of these areas were reseeded in 1989 and 1990. Then in 1992, approximately 6,000 acres were rested for three years, and the original 7,000 acres were returned for use. The program currently has about 400 acres deferred.

Vehicles may pass through these areas on existing roads and trails, but only dismounted training is permitted within the balance of the area being rested. The selection process for the area to be rested is based on current condition and location relative to sensitive areas, such as wetlands and important habitat, while taking into consideration impacts to military training opportunities. Areas identified to be included into the deferment program are selected in close coordination and consultation among DECAM, G3/DPTM, and unit personnel. During this selection process, all parameters are considered, such as:

- condition of the land;
- compliance with current DoD, DA, federal, state and local laws and regulations; and
- impacts to the attainment of the training mission.

Once all areas identified for rest are delineated and signs are posted in the field, maps are provided to the G3/DPTM by the DECAM.

Figure 4.7.2.1a Fort Carson Training Areas and Habitat Types

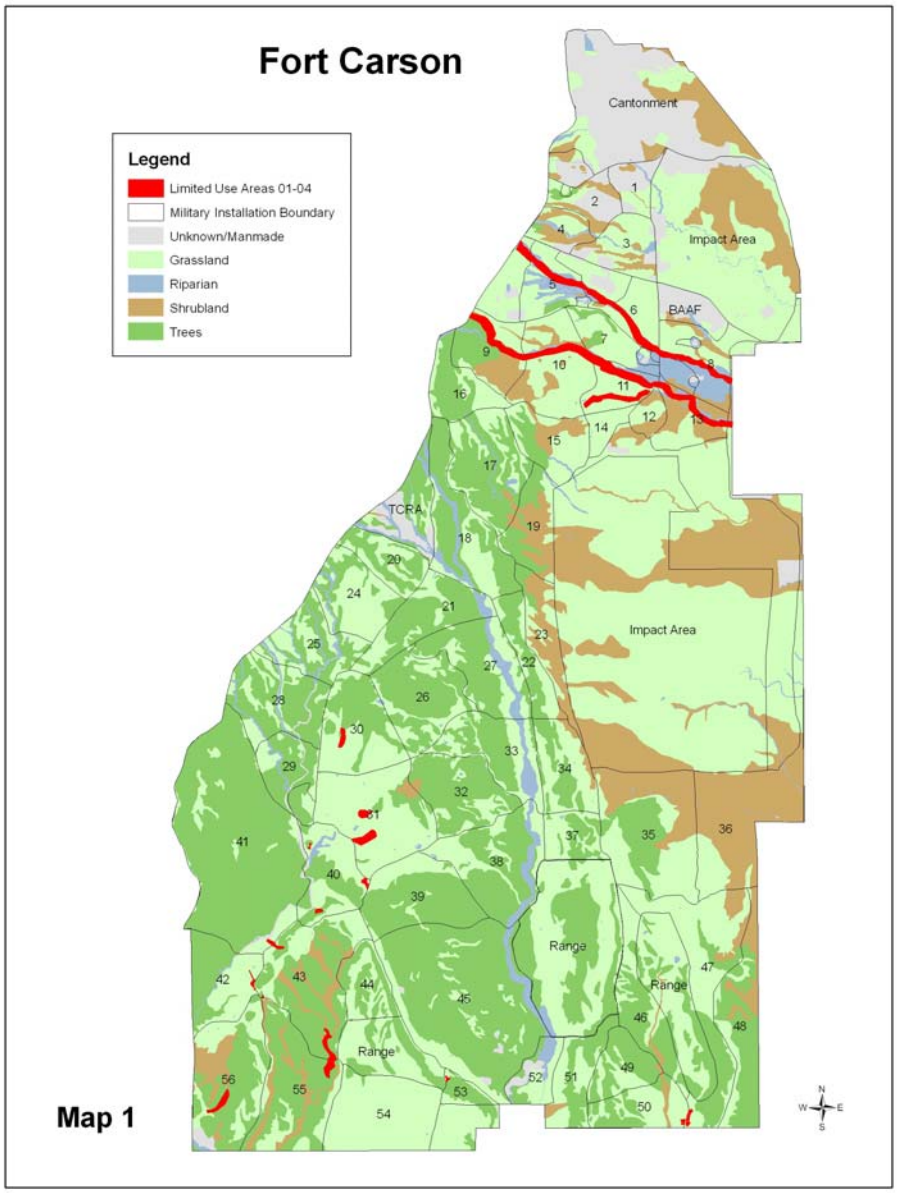
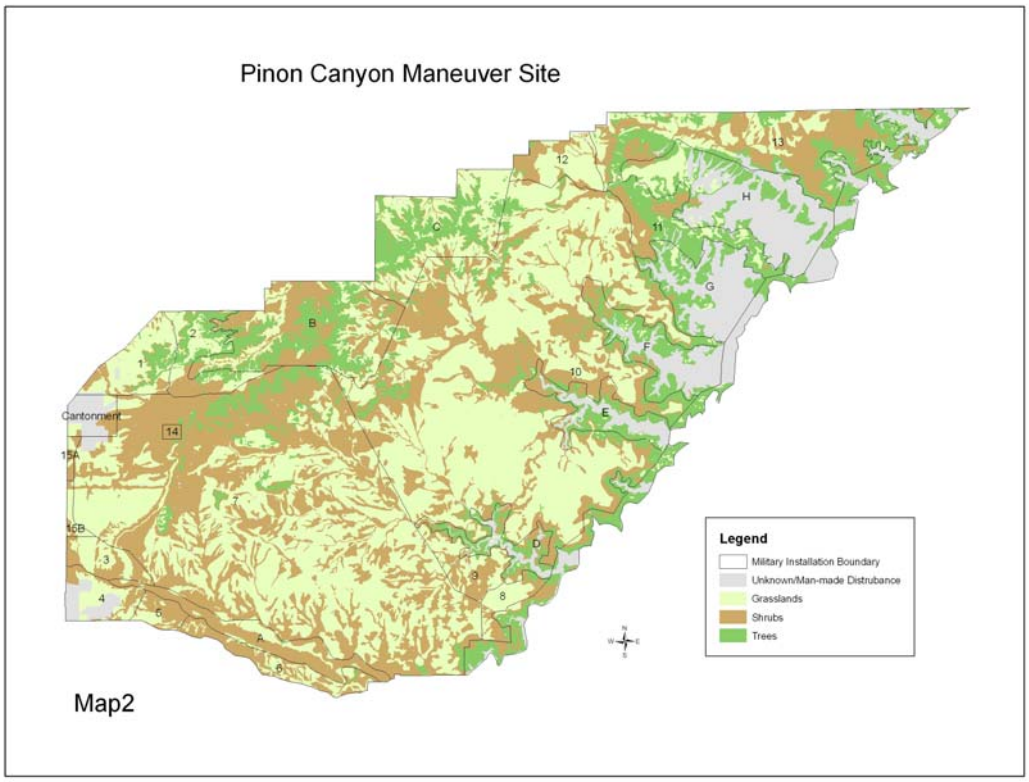


Figure 4.7.2.1b PCMS Training Areas and Habitat Types



PCMS

In 1985 a rest/rotation program was implemented for the five large Training Areas at the PCMS as was detailed in the PCMS Environmental Impact Statement (U.S. Department of Army 1980). This system allowed for approximately three-fifths of trainable lands on the PCMS to be rested for two entire growing seasons. Lands were rested for two years and then rotated into use as other lands that had been in use were rotated back into rest. This system conserved training lands, but its limitations on military training options were too severe to allow the Army to meet its training needs.

In 1990 the system was changed. The PCMS was divided into 24 Training Areas to allow for greater flexibility and deferment of approximately 50% of the available Training Area at any given time. Dismounted training was allowed in areas deferred from mechanized training, and a new rotation was implemented (DECAM 1990). Beginning in fall 1992, approximately 92,000 acres of available maneuver lands were being rested for a period of two years.

In 1997 the system was again adjusted to provide more site-specific rehabilitation options and increase military training options. The 24 designated Training Areas were unchanged; however, units could use a combination of Training Areas to form a maneuver box, such as is often used in Training Areas 7 and 10, to accommodate certain larger area, training requirements. Certain Training Areas are available only for dismounted training (those designated with letters). Lettered areas are always available for dismounted training. Smaller, numbered Training Areas (1, 2, 3, 4, 5, 6, 8, and 9) are rested as needed.

There is also a provision to use deferment designations to protect site-specific rehabilitation sites in damaged portions of maneuver boxes. The end result of the rest/rotation/deferment program at the PCMS is that virtually all areas of the PCMS (except the Cantonment Area and the Wildlife Area/Safety Buffer along the canyon rim) are open to some types of training virtually all of the time. Damaged areas are identified and referred to ITAM for repair, and sensitive areas are protected from potentially damaging training.

Restricted Training Areas B and C were formerly the Soil Protection Area. The Soil Protection Area was off-limits to all training from 1983 until 1990 when it was open to dismounted-only training through 2004. However, since the area has recovered over the past 20 years, most of it was opened to mechanized military maneuver in 2005. Remaining protection areas (dismounted training only) consists of Soil Protection Sites (Figure 3.4.2.1b).

Reclamation Planning

Deferring use of areas for three years and protection from mechanized training provide an opportunity for the development and implementation of reclamation planning for damaged areas, while providing for the biological and physiological requirements of the soil/plant community. Reclamation plans identify improvements needed to reclaim rested areas and are essential for the overall accomplishment of the stated goals of this program. These plans include, as a minimum:

- duration of rested/deferred areas;
- locations of and justification for construction of erosion control structures, small check dams, and road/trail reclamation;
- reseeding of disturbed areas;
- cost/benefit analyses, which are to be performed prior to the implementation of any project; and
- project evaluations and monitoring criteria.

Most rehabilitation projects are, by definition, those accelerated by military training or those than reduce training capability. Thus, planning and implementation of these will largely be the responsibility of the ITAM LRAM program (Section 5.1.2). Many, however, may fall within responsibilities of the DECAM Watershed Management program (Section 4.2) or DPW roads maintenance areas.

Success or failure of rehabilitation efforts is assessed using methods appropriate for the extent of the project (*e.g.*, Range and Training Land Assessment, photographs, visual). Assessments include monitoring changes in species composition, vigor, and density of native vegetation; seeding success; and erosion control success.

4.7.2.2 Proposed Management

Project: Rest/Rotation/Deferment Program
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), stewardship
Funding Priority: Class 0
Project Timing: All - ongoing indefinitely
Regulatory Coordination: None required

Goal. Minimize damage to training lands; protect sensitive features of training lands; and provide a means to rest or repair heavily damaged training lands to indefinitely sustain the military mission on Fort Carson and the PCMS.

Objective 1. Implement the Fort Carson/PCMS deferment program and the PCMS rest/rotation program, in coordination with G3/DPTM, including developing reclamation plans for those lands being rested and assessing results of the rest periods.

Objective 2. Select candidate deferment areas and obtain concurrence from G3/DPTM and the chain of command to impose minimal training restrictions required to rehabilitate these areas.

Objective 3. Develop reclamation plans; determine plan implementation responsibility; repair approved deferment areas; monitor repairs; and open areas to normal use as soon as feasible.

4.8 Water Resources Management

4.8.1 Current Conditions

4.8.1.1 Surface Water

Fort Carson
Fort Carson lies within the Arkansas River basin, and Fountain Creek is the major surface drainage feature in the northeastern portion of the Installation. Streams flow from the northwest to the southeast. The intermittent streams of Rock Creek and Little Fountain Creek converge and drain into Fountain Creek 2-3 miles east of Fort Carson. Turkey Creek and Beaver Creek flow through or adjacent to the Installation and enter the Arkansas River to the south.

Ten surface water gauging stations were installed on or near Fort Carson streams and reservoirs for continuous monitoring of the water flow. Surface water gauging stations were discontinued by 1998 at six of these stations. Year-round monitoring is conducted at Rock Creek above Fort Carson, Rock Creek near Fort Carson, Turkey Creek near Fountain (seasonally-operated), Turkey Creek above Teller Reservoir, and Turkey Creek near Stone City. Additionally, a satellite data collection platform was installed on Teller Reservoir in 1991 for the purpose of transmitting real-time reservoir elevations to Fort Carson through a cooperative agreement with the USGS. This information is utilized for water right administration by both the installation and the Colorado Division of Water Resources to evaluate the quantity of water flow diverted for use by the installation and the amount of water recharge and release from Teller Reservoir.

An average annual yield of 155 acre-feet/square mile was estimated for Bear Creek, a similar drainage basin, to the Little Fountain, Little Turkey, Rock, and Turkey creeks using regression equations based on characteristics of channel geometry. The combined inflow upstream from Fort Carson of Little Fountain, Little Turkey, Rock, and Turkey creeks is estimated to average 8.64 cubic feet/second. The actual inflow to Fort Carson is less than this quantity because of stream flow diversions for municipal and domestic water supplies. Pumping groundwater from alluvial aquifers upstream from Fort Carson also reduces the quantity of stream flow entering the installation (Leonard 1984).

The average water flow on and near Fort Carson is about 2-5 cubic feet/second. Some streams can be expected to have no flow at some time during the year. Flow characteristics of major drainages are summarized in Table 4.8.1.1.

Table 4.8.1.1. Flow Characteristics at Selected Stream Flow Gauging Stations At or Near Fort Carson

USGS Station Name and Number	Latitude-Longitude	Drainage Area (mi^2)*	Period of Record	Discharge		
				Mean Annual ($ft.^3/s$)*	Maximum (ft^3/s) (Date)	Minimum (ft^3/s)
Rock Creek above Fort Carson	38 42'27" 104 50'46"	6.79	5/78-Present	2.49 (1978-2005)	770 (6/10/97)	0
Rock Creek near Fort Carson	38 41'49" 104 49'39"	7.79	5/78-9/98	1.84 (1978-98)	770 (6/10/97)	0
Rock Creek near Fountain	38 39'16" 104 44'48"	16.9	5/78-9/88	3.39 (1979-87)	176 (8/2/86)	0.01
Little Fountain Creek above Keaton Reservoir	38 40'54" 104 51'29"	11.0	5/78-9/88	5.88 (1978-98)	914 (6/9/97)	0
Little Fountain Creek near Fort Carson, CO	38 40'49" 104 51'08"	11.8	5/78-9/89	4.08 (1978-98)	914 (6/10/97)	0
Little Fountain Creek near Fountain, CO	38 38'33" 104 44'49"	26.9	5/78-9/88	5.46 (1979-1987)	1,290 (8/23/86)	0
Little Turkey Creek near Fountain, CO	38 37'37" 104 51'55"	9.59	5/78-9/88	1.57 (1979-1987)	226 (7/28/82)	0
Turkey Creek near Fountain, CO	38 36'42" 104 53'39"	13.0	5/79-9/87 5/95-Present	1.88 (1978-98)	850 (6/10/97)	0
Turkey Creek above Teller Reservoir, near Stone City	38 27'54" 104 49'33"	62.3	5/78-Present	3.67 (1978-2004)	3,640 (8/20/82)	0
Turkey Creek near Stone City	38 25'56" 104 49'58"	71.5	5/78-11/84 6/87-Present	0.71 (1978-2004)	83 (5/30/95)	0
Bear Creek near Colorado Springs, CO	38 49'13" 104 53'29"	7.56	1949-1972	1.63	6.3 (6/4/57)	0.20

* mi^2 - square miles; ft^3/s - cubic feet per second

Figure 4.8.1a Fort Carson Drainage

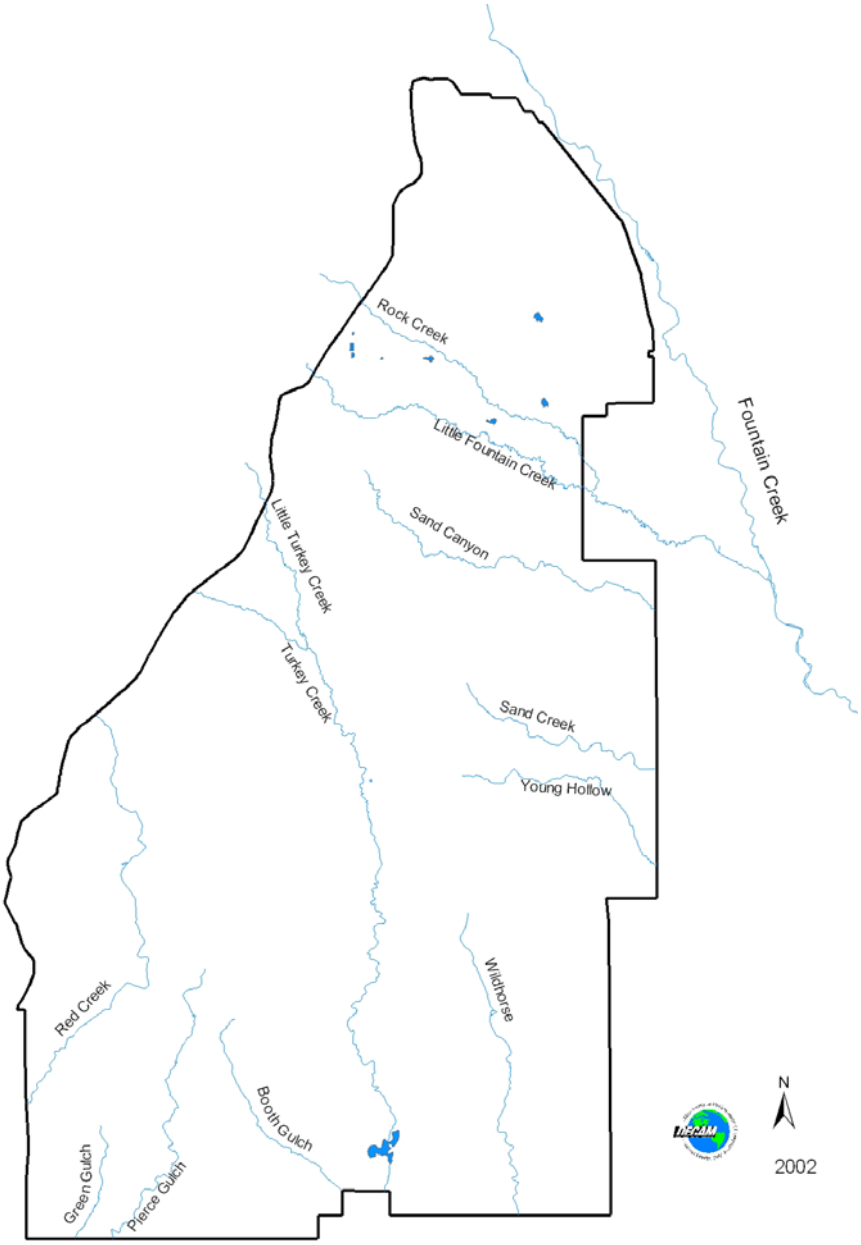
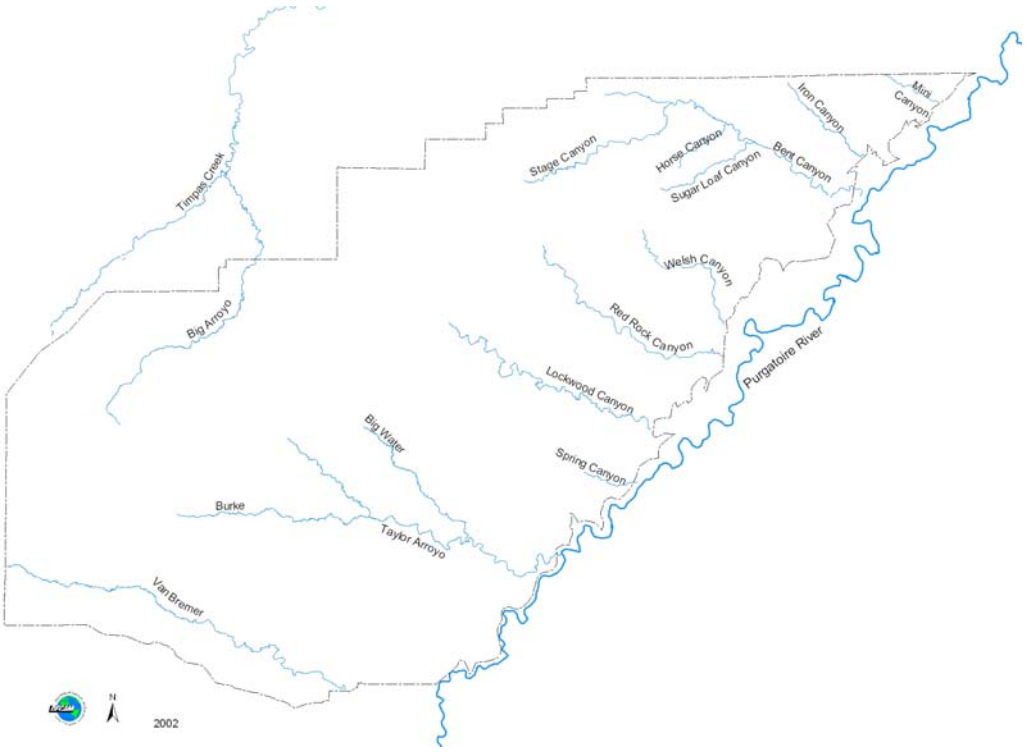


Figure 4.8.1b The PCMS Drainage



There are approximately 146 surface acres in 12 reservoirs for fishery and wildlife resources. The closest surface waters to the Cantonment Area are man-made impoundments that are primarily used for recreational fishing, including Haymes, Townsend, and Northside reservoirs and Wildlife Complex (formerly the Bird Farm Recreation Area) reservoirs. Teller Reservoir, located at the southern portion of the installation (south of Range 143 - Multi-Purpose Range Complex), provides erosion and sediment control to downstream environs and recreational fishing. Figure 4.8.1a shows major Fort Carson drainages and reservoirs.

Floodplain

A 100-year floodplain is associated with drainages in the Cantonment Area. Floodplain maps are available at DPW.

PCMS

The PCMS includes several major drainage systems (Figure 4.8.1b). The Big Arroyo drainage system is located in the northwest region and flows into Timpas Creek, approximately three miles northwest of the PCMS. The Purgatoire River and numerous ephemeral, intermittent, or perennial tributaries are also

located within and adjacent to the PCMS (Bramblett 1989). The Purgatoire River, which flows in a northeasterly direction, is a seventh-order tributary of the Arkansas River.

Altitude differences in the Purgatoire River basin cause climatic variations, which, in turn, affect stream flow. During years with average and above-average snowpack, such as occurred in 1984, 30-50 percent of the annual stream flow of the Purgatoire River occurs during April and May. During the rainfall-runoff period, May through October, flash floods occur intermittently. Releases from Trinidad Reservoir, located about 53 miles upstream from the stream flow gauging station on the Purgatoire River near Thatcher, affect stream flow on an intermittent basis (Von Guerard *et al.* 1987).

Except for Purgatoire River near Thatcher, Chacuaco Creek at the mouth near Timpas and Purgatoire River at Rock Crossing near Timpas, the effective drainage-basin area for all sites was adjusted for stock-watering reservoirs in each watershed. For watersheds that had effective drainage areas of less than approximately 30 square miles, peak-discharge estimates were calculated using regression equations developed by Livingston and Minges. For watersheds that had effective drainage areas greater than 75 square miles, the regression equations developed by McCain and Jarrett were used. Where effective drainage area ranged from 40 to 75 square miles, both sets of regression equations were used to calculate flood flows (Von Guerard et al. 1987)

4.8.1.2 Groundwater

Fort Carson
The availability, movement, and quality of groundwater is largely dependent on the distribution, permeability, and composition of the rock units that comprise the aquifers. Successively older sedimentary rock units uplifted with the Rocky Mountains are exposed from east to west in the installation (Leonard 1984).

Groundwater at Fort Carson occurs in both alluvial and bedrock aquifers. Alluvial aquifers are formed from unconsolidated deposits of stream alluvium that are moderately permeable. However, their dependability is limited by their areal extent, thickness, and available recharge. The alluvial aquifers are capable of providing well yields from 10 to more than 100 gallons per minute (Leonard 1984).

The principal bedrock aquifer at Fort Carson is the Dakota-Purgatoire aquifer, which is comprised of massive bedded sandstones in the Dakota Sandstone and Lytle Sandstone Member of the Purgatoire Formation. This bedrock aquifer can yield 10 gallons per minute, but local fracturing can increase the permeability and yield to over 200 gallons per minute. Recharge to bedrock aquifers is from infiltration of precipitation and stream flow in areas where the aquifer is exposed at the land surface. Discharge occurs mostly from well pumping and leakage through overlying formations (Leonard 1984).

PCMS
The surface geology at the PCMS is predominantly sedimentary limestone, shale, and sandstone; basalt dikes occur along the southern boundary. The Dakota Sandstone and the Purgatoire Formation occur throughout a large part of the installation and are the principal source of groundwater in the area (Von Guerard *et al.* 1987).

Due to the climatic water regime, groundwater has been historically the predominant source of water for the PCMS. This water supply was obtained through a series of wells or springs for the decreed usage of domestic or livestock water. Inspection of drillers' logs and on-site inspection during the well inventory

indicated that most wells were completed in the Dakota-Purgatoire aquifer. From 1967 through the early 1980s, a system of pipelines that originated at more productive springs and wells was installed to improve the efficiency and areal distribution of the domestic and stock-water supply. Primary sources of groundwater on the installation are the Dakota Sandstone Formation and the Cheyenne Sandstone Member of the Purgatoire Formation (Von Guerard *et al*. 1987).

Groundwater movement in the northeastern parts of the PCMS generally is toward the northeast, and groundwater movement throughout the remainder of the PCMS is toward the east and southeast. Recharge of the aquifer is primarily from precipitation and subsurface inflow from adjoining areas. Where outcrop areas are traversed by ephemeral streams, occasional flood flows provide some local recharge of very limited areal extent. Wells in the Dakota-Purgatoire aquifer have reported yields that range from less than 10 to 500 gallons/minute. Well yield in unfractured parts of the Dakota-Purgatoire, which are known to occur at the installation, are likely to be less than 300 gallons/minute (Von Guerard *et al.* 1987).

4.8.1.3 Water Quality

Fort Carson

The quality of surface and groundwater on Fort Carson is good. Water from most streams and aquifers on the western portion of the installation is suitable for irrigation and would be potable if treated for biological contaminants. Surface water runoff flowing across the installation can be degraded due to the interaction with surface soils that contain high concentrations of dissolved solids. As surface water flows eastward across Fort Carson, it picks up sediments (*i.e.*, dissolved solids) that are then concentrated through evaporation. However, water from the eastern portion of Fort Carson is still suitable for irrigation with proper management practices. Water from bedrock aquifers would be potable if treated to reduce the concentration of some chemical constituents (Leonard 1984).

An investigation of groundwater quality in the vicinity of the Fort Carson golf course in 1981 was conducted to determine impacts resulting from applications of waste water effluent on the golf course. As a result of the data gathered in this initial study, a program was begun in 1983 to sample water from three observation wells twice each year; samples were analyzed for nutrient content (NO2, NO3, NH4, and organic nitrogen). Over 10 years of monitoring data indicated no apparent problems with water quality. Therefore, monitoring was discontinued in 1994.

Teller Reservoir is listed as an impaired water body on Colorado's Section 303(d) list. The impairment is due to a fish consumption advisory, which has been imposed due to biological accumulation of naturally occurring mercury in fish tissues. The DECAM has mandated a catch-and-release fishing program in this body of water to reduce the potential for a public health issue. The reservoir is now dry, but it will be available for fishing when it refills.

PCMS

Analyses of 26 water-quality samples collected at 24 wells and one spring that obtain water from the Dakota-Purgatoire aquifer were used to characterize the quality of groundwater at the PCMS. On-site measurements of water temperature, specific conductance, and pH were made at the time of sampling. A radiochemical analysis was performed at selected wells since large concentrations of radioactivity are typical of water from the Dakota-Purgatoire aquifer. Without treatment, groundwater in the study area is generally not suitable for domestic or public-supply use (Von Guerard *et al*. 1987).

As much as 95 percent of groundwater sites sampled had concentrations of selected constituents that exceeded water-quality standards for domestic or public-supply use. The aquifer can continue to be a source of water for wildlife and for stock use. The natural presence of large concentrations of dissolved solids, sulfate, iron, manganese, and radiochemical constituents limits the usefulness of groundwater from the aquifer as a domestic water supply. Large concentrations of nitrate, chloride, fluoride, and selenium may further exclude certain wells as sources of drinking water (Von Guerard *et al.* 1987).

Should the need occur to obtain additional water for consumptive use, investigations will be implemented to determine the treatment required to bring the water within limits of drinking water standards. If this situation does occur, baseline data that has been collected will expedite the investigation process.

During the last 140 years, Fort Carson and the PCMS have been used primarily for either livestock grazing or military training activities. Livestock grazing on a semi-arid ecosystem can increase runoff and sediment yields through selective degradation of rangeland resources.

Unrestricted military training activities also contribute to the overall degradation of the land and likewise contribute to increased runoff and sediment yields. Effects of these impacts are of concern to the military and to downstream water users.

Coordination
Water resources are managed on Fort Carson and the PCMS as a coordinated management effort with the following parties:

- USGS,
- NRCS,
- USFWS,
- U.S. Department of Justice,
- U.S. Army Corps of Engineers,
- CDOW,
- Colorado Department of Public Health and Environment, and
- Colorado State Division of Water Resources.

General
AR 200-1, *Environmental Protection and Enhancement*, (Department of the Army 1997b) establishes the following objectives for water resources on Army lands.

- Conserve all water resources.
- Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
- Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
- Provide drinking water that meets applicable standards.
- Cooperate with federal, state, and local regulatory authorities in forming and implementing water pollution control plans.
- Control or eliminate runoff and erosion through sound vegetative and land management practices.
- Consider nonpoint source pollution abatement in all construction, installation operations, and land management plans and activities.

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 describe programs within the responsibility of the Natural and Cultural Resources Division of DECAM. Section 4.2, *Watershed Management*, describes sediment monitoring and modeling.

The monitoring of surface water and groundwater quality is within both environmental compliance and natural resources programs within the DECAM. Fort Carson must monitor and protect its surface water and groundwater resources to maintain compliance, but portions of these programs are not natural resources responsibilities within the Army and, thus, are not a required part of this INRMP. Groundwater management is generally within the DECAM Environmental Compliance, Restoration, and Prevention Division.

4.8.2 Current Management

The water resources management program on Fort Carson and the PCMS consists of the following major activities:

- watershed/sedimentation monitoring,
- watershed/sedimentation management/enhancement,
- project reviews for erosion and sediment control, and
- compliance with federal and state laws and regulations.

Many water resources program responsibilities involve compliance with the Federal Water Pollution Control Act (Clean Water Act) and its National Pollutant Discharge Elimination System, administered by the Environmental Protection Agency. The DECAM represents Fort Carson on the Lower Fountain Water Quality Management Agency and in the Section 208 of the Clean Water Act planning process as established in the Areawide Water Quality Management Plan. Participation in the management sub-region ensures Fort Carson input in future stream classification designations and areawide management planning.

The use of water from Fort Carson surface and subsurface sources is governed by Colorado water law. All use or diversion of water must be coordinated with the DECAM prior to utilization to preclude legal ramifications. Any construction activity within the 100-year floodplain in El Paso County requires a Floodplain Development Permit issued by El Paso County.

The water resources program includes nonpoint pollution, which includes minimizing damage during military training activities and emphasizes the use of reclamation proceedings. Storm water pollution prevention plans are prepared whenever required, and best management practices for individual facilities are implemented whenever they are economically feasible. Wetlands protection is an important facet of the program. Maintenance facility water pollution prevention is a major program.

All proposed construction projects that disturb land areas greater than five acres are required to have a Storm Water Discharge General Permit for Construction Sites, in accordance with provisions of the Clean Water Act, under the National Pollutant Discharge Elimination System permitting process. Fort Carson has worked with the U.S. Army Corps of Engineers, Pueblo, CO office to develop a Regionalized Section 404 (Clean Water Act) Permit (5 Jun 2003 – 4 Jun 2008) to cover standard operating procedures for erosion control methods specific to Fort Carson and the PCMS. This permit greatly reduces reporting

requirements and improves accomplishment of erosion control projects. Any nonstandard projects would use the regular Section 404 permitting process.

Fort Carson protects soils, and thus, surface water, through modifications to the military mission. Fort Carson mitigates military activity impacts to surface waters through implementation of this INRMP, including implementation of the Integrated Training Area Management program (Section 5.1) and implementation of the Master Planning process.

Monitoring

Water quality monitoring is important to measuring ecosystem health. Land-based environmental degradation eventually affects water quality and aquatic ecosystems dependent upon good water quality. Data describing hydrologic conditions and a baseline assessment of hydrologic conditions are necessary to determine effects of military training on the hydrology of Fort Carson and the PCMS.

The DECAM maintains an Inter-Service Support Agreement with the USGS for water resource investigations. This cooperative agreement was established for Fort Carson in 1978 and for the PCMS in 1982.

The DECAM developed a multi-agency monitoring team in 1998. The team designs, monitors, and assesses erosion and sediment transport mechanisms on Fort Carson and the PCMS and relates land degradation to military activity. The team is comprised of representatives from the USGS, Southwest Watershed Research Center (Agricultural Research Service), two offices of the NRCS, Army Research Office, and the DECAM.

The watershed management program divides the installation into hydrological units. Each unit is managed for military training, mitigation, and remediation of maneuver damage using plant materials and construction of multiple erosion control features. The approach incorporates wildlife habitat enhancement, visual resource considerations, and cultural resource protection. Several watershed management test sites exist at Fort Carson and the PCMS.

Investigations of water resources for Fort Carson and the PCMS are tailored for their specific geographic region. Investigations are tailored to obtain water resources information to achieve a proficient long-range water utilization and management plan. Investigations at the PCMS are in response for the collection of basic hydrologic records required by the PCMS Environmental Impact Statement.

Fort Carson

Fort Carson monitors surface and groundwater to regularly assess effects of land use at Fort Carson on water quantity and quality. A network of water-quality sampling sites in ground and surface water was established in 1977 as part of the evaluation of water resources. Sufficient data and information were collected from these sites to define and describe the general status of water-quality conditions, and consequently, the collection of these data was terminated. In many cases they were discontinued due to data showing no significant impacts on water quality by Fort Carson activities (DECAM 1997).

Groundwater Monitoring

Groundwater monitoring wells have been installed throughout the Cantonment Area to assess groundwater quality with types and concentrations of contaminants (if any) and to determine if there are contaminated sites impacting groundwater.

Established and newly constructed well sites have been inventoried and utilized to determine water levels, well yields, and geographic units on and around Fort Carson. Data from this total network of approximately 100 wells have been used in several technical evaluations of the water resources on the installation. Water-level measurements in approximately 30-35 selected observation wells are made annually in the spring, and hydrographs are annually produced showing water-level changes, trends, and changes in groundwater storage.

Surface Water Monitoring

Year-round surface water flow gauging is conducted on seven water diversions at Fort Carson to maintain water rights on these diversions. These flow gages are operated by the USGS and are equipped with satellite data transmitters similar to the satellite data transmitter on Teller Reservoir, which is used to help determine the amount of water flowing onto the installation via Turkey Creek and the amount of water recharge and release from the reservoir. A continuous sediment sampler was installed on Red Creek, but it is no longer in use. Ten surface water-gauging stations were installed on streams for continuous monitoring of the water flow to determine the quantity of surface water entering and leaving Fort Carson.

Since the beginning of this program in 1978, changes in data collection requirements have resulted in a reduction in the number of water-gauging stations. The Corps of Engineers had temporarily abandoned the Turkey Creek gauging station near Stone City during 1984 due to rechannelization of the site. A concrete weir was reinstalled in 1987 at a site further downstream to monitor seepage from Teller Reservoir, but it was subsequently abandoned when the site was move further downstream. This site monitors most of the seepage from the ends of the dam as well as any releases that will be made through the gating system installed in 1990. Measurement of the water releases from the reservoir support the goal for the protection of the interests of the Department of the Army during the administration of the Teller Reservoir Water Right, pursuant to the Colorado Water Law regulated by the Colorado Division of Water Resources. Two drains on the down-toe of the dam are monitored, using a satellite data transmitter. Seepage from these drains may not enter the main channel at times due to losses from infiltration and evaporation.

Termination of the following surface water gauging stations occurred from October 1988 to October 1998: 1) Rock Creek near Fountain, 2) Little Fountain Creek above Keaton Reservoir, 3) Little Fountain Creek near Fort Carson, 4) Little Fountain Creek near Fountain, 5) Little Turkey Creek near Fountain, and 6) Rock Creek near Fort Carson. The USGS operates and maintains streamflow-gauging stations and computes and reports quarterly stream flow records for seven diversion stations on Fort Carson. All of these sites were instrumented with satellite data collection platforms in FY 2000. In addition, the USGS operates stream flow-sediment sites previously operated by the Agricultural Research Service on Red Creek (seasonally, peak-flows only) and Pond 46.212 (annual maximum storage only). The Red Creek gauge was re-located downstream of Sullivan Park on Red Creek in FY 2000.

In 1991 a satellite data collection platform was installed on Teller Reservoir to transmit real-time reservoir elevation and stored contents data to Fort Carson. This occurred through a cooperative agreement with the USGS. Both Fort Carson and the Colorado Division of Water Resources utilize this information for water right administration to evaluate the quantity of stream flow into Teller Reservoir and the amount of water recharge and release from the reservoir. During 2000-2001 instrumentation was installed on the emergency spillway and two drains (to measure the amount of leakage/seepage from the dam).

The continuous monitoring of water flow over the installation ensures that seasonal water demands will be available for management and utilization and will validate Fort Carson's beneficial use of decreed water rights. Comparisons of water flow data from previous years reveal trend information pertinent for management and utilization. Implementation of water management practices ensures the availability of water, through the decreed water rights retained by Fort Carson, to maintain natural resources and support the military training mission. A network of five meteorological stations and three seasonally-operated rain gauges was installed on Fort Carson in 1999 to develop a comprehensive database of water inputs across time and space, as described in Section 5.6, *Meteorological Data Collection*.

PCMS

Ground Water Monitoring
Van Guerard *et al.* (1987) sampled and analyzed ground water quality at one spring and 24 wells that draw water from the Dakota-Purgatoire aquifer at the PCMS.

Surface Water Monitoring
Basic hydrologic records provide information required by the 1981 PCMS EIS. Maintaining a hydrologic monitoring network provides pertinent information necessary to monitor the effects to the lower Arkansas River basin resulting from land use on the PCMS. The monitoring network provides a means of recording extreme hydrologic events that occur on the installation, while maintaining a long-term data base on stream flow contributions, dissolved solids, and suspended-sediment that flow into the Purgatoire River.

Most of the stream flow-gauging station network at the PCMS is operated seasonally, from April through October. Exceptions include the inflow site on the Purgatoire River, near Thacher (07126300), which are operated year-round as a comparison site for inflows and outflows of sediment and stream flow into/from the PCMS, and at Van Bremer Arroyo (07126200) near Model (court-decreed site), which is also operated year-round.

Nine stream flow monitoring stations, operated by the USGS, that record daily and flood-flow discharges on all major surface-water sources in the installation are listed in tables 4.8.2a and 4.8.2b. The Van Bremer Arroyo near Model and the Purgatoire River near Thatcher monitoring stations were installed in July 1966. Other monitoring stations were installed from March through May 1983. The USGS installed stream flow-sediment collection sites on Red Rock and Bent Canyons in 2000.

Early in the study period a thorough data collection phase was initiated in an effort to obtain baseline data. Daily water temperature and specific conductance measurements were recorded at seven stream flow monitoring stations. Four stations were equipped for collection of sediment samples during runoff events. Following this initial base line data collection period, the following parameters were deleted in 1991:

- daily sediment sampling, collection of daily specific conductance, and water temperature data at Big Arroyo and Bent Canyon;
- collection of daily specific conductance and water temperature data at Red Rocks Canyon; and
- chemical analysis at all sites.

Currently operating sites are listed in Table 4.8.2b.

Water Diversions

Water diversions are an important aspect of surface water management throughout Colorado. Water diversions on Fort Carson are generally old and in need of repair or replacement. In close coordination with the City of Fountain, USGS, and the Colorado Water Commissioner, Fort Carson constructed a new water diversion and associated gauging station at the Keaton Reservoir site after the City of Fountain breached Keaton Dam.

There is a need for diversion replacement at Merriam's Little Fountain, Merriam's Rock Creek, Ripley, and Gale Ditch. In 2006 Fort Carson plans to replace water diversions at Merriam's Rock Creek Diversion and at Gale Ditch using USFWS-administered contracts.

There is a need to put water back into Rock Creek to capture it again further downstream at 3M ditch. This will enable Northside Reservoir, the Dog Ponds, and Haymes Reservoir to maintain water levels during summer drought periods. This would require approximately 2,000 feet of buried irrigation pipe from the outlet at Gale Reservoir to Rock Creek. The 300-foot pipeline from Cottonwood Springs to the ditch feeding Northside Reservoir requires replacement to help keep Northside Reservoir filled with water during summer drought periods.

Small Bird and Large Bird ponds have leaking bottoms. The problems are being evaluated and the ponds will be renovated in 2007 under a USFWS-administered contract.

Table 4.8.2a Stream Monitoring Stations On or Near the PCMS

USGS Station #	USGS Station Name	Drainage Area (square miles)	Period of Record	Stream Type	Daily Suspended Sediment Collected
07120620	Big Arroyo near Thatcher	15.5	March 1983 to Present	e	yes
07126130	Van Bremer Arroyo near Thatcher	80.6	March 1983 to May 1985	e	no
17126140	Van Bremer Arroyo near Tyrone	132	May 1985 to Present	e	no
07126200	Van Bremer Arroyo near Model	175	July 1966 to Present	p	yes
07126300	Purgatoire River near Thatcher	1,935	1 July 1966 to 1976; 1977 to Present	p	yes
07126325	Taylor Arroyo below Rock Crossing near Thatcher	48.4	March 1983 to Present	e	yes
07126390	Lockwood Canyon Creek near Thatcher	41.4	April 1983 to Present	e	yes
07126415	Red Rocks Canyon Creek at mouth near Thatcher	48.8	May 1983 to Present	e	yes
07126470	Chacuaco Canyon Creek at mouth near Timpas	424	May 1983 to 1992	e	yes
07126480	Bent Canyon Creek at mouth near Timpas	56.2	May 1983 to Present	e	yes
07126485	Purgatoire River at Rock Crossing, near Timpas	2,635	June 1983 to Present	p	yes

Table 4.8.2b Current Surface Water Station Operation

Station Location	Continuous Stream Flow	Peak Flow Only	Daily Sediment Load
[1]Big Arroyo near Thatcher		X	
[1]Van Bremer Arroyo near Tyrone	X		
Van Bremer Arroyo near Model	X		X
Purgatoire River near Thatcher	X		
[1]Taylor Arroyo below Rock Crossing near Thacher	X		X
[1]Lockwood Canyon Creek near Thacher	X		X
[1]Red Rocks Canyon Creek at mouth near Thatcher		X	X
[1]Bent Canyon Creek at mouth near Timpas		X	X
Purgatoire River at Rock Crossing	X		
[1] Seasonally operated April though October.			

Dam Safety
Fort Carson has responsibilities for the safe operation and maintenance of dams on Fort Carson and the PCMS[28]. Responsible parties include the DECAM and DPW. DECAM responsibilities include co-supervising (with DPW) the Fort Carson Dam Safety Engineer; operational responsibility for dams and water diversions to facilitate wildlife, recreational, wetland, wildfire, and water-rights programs; and monitoring condition and safety of dams on a minimal 5-year schedule. This inspection occurred in 2004 and should occur again in 2009. DPW responsibilities include co-supervision of the Dam Safety Engineer, real property records, and coordination of dam construction and/or repairs. The U.S. Geological Survey operates a network of piezometers and conducts cross-section surveys of Teller Reservoir dam on a regular basis.

Townsend, Haymes, North Side, Lytle, Womack, Small Bird, Large Bird, and Gale reservoirs require varying amounts of work done to insure the integrity of the dams. Work varies from removing vegetation growing on the dam, to installing weir plates to measure seepage. Work plans have been developed for each of the above mentioned reservoirs.

4.8.3 Proposed Management

Project: Water Resources Management
Justification: Compliance with Clean Water Act and Colorado water laws, stewardship
Funding Priority: Class 0
Project Timing: Objective 2 - 2007; Objective 5 – by 2009; Objective 6 - 2010; Objective 9 - 2008; other objectives – annually or ongoing indefinitely
Regulatory Coordination: Colorado Division of Water Resources (Clean Water Act and Colorado Water Law), U.S. Army Corps of Engineers, Colorado State Engineer and Dam Inspector

[28] Attachment 2 within June 29, 2000 letter from Director, DECAM to Office of State Engineer, Colorado Division of Water Resources.

Goal 1. Through integration of the land rehabilitation, reseeding, and erosion control programs, ensure that surface water quality standards meet state requirements.

Goal 2. Measure the quantity of water resources on Fort Carson and the PCMS to evaluate the capability of water resources to meet multiple-use demands of the U.S. Army on a sustained basis.

Objective 1. Cooperate with other agencies to comply with the Clean Water Act and Colorado water law with regard to natural resources management.

Objective 2. By 2007 evaluate the replacement of a water diversion at Ripley Water Diversion; implement results.

Objective 3. Maintain all water diversions and water right gauging stations to efficiently collect water use data.

Objective 4. Use water quality data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options.

Objective 5. Partner with DPW, USGS, 416th Engineering Command of the U.S. Army Reserves, and State Engineer Office to ensure all dams are properly inspected and maintained and meet state dam inspection/maintenance regulations. The next scheduled dam inspection will occur no later than 2009.

Objective 6. Repair Townsend, Haymes, North Side, Lytle, Womack, Small Bird, Large Bird, and Gale reservoirs by 2010.

Objective 7. Accomplish water-quality data collection, stream flow sediment data collection, and associated data analysis by USGS for Fort Carson and the PCMS.

Objective 8. Inspect 100 erosion control dams annually.

Objective 9. Install a pipeline from Gale Reservoir to Rock Creek and replace the failing pipeline from Cottonwood Springs to the ditch feeding Northside Reservoir by 2008.

4.9 Water Rights Management

The Constitution of the State of Colorado, under Article XVI, *Mining and Irrigation*, are the statutes through which water rights are to be implemented, managed, and enforced. The statues are commonly referred to as the Appropriation Doctrine.

All water rights must be put to beneficial use, or they could be subject to abandonment. Accordingly, the DECAM manages Installation water rights for beneficial use. Military training activities are often dependent on these rights, and their loss can have a significant impact on Fort Carson and the PCMS (DECAM 2005a).

4.9.1 Current Conditions

Water rights on Fort Carson and the PCMS directly support the training mission by assuring adequate water supplies for the support and rehabilitation of natural resources on Fort Carson and the PCMS. The

abandonment of a water right, as specified by the Colorado Division of Water Resources, equates to water that the use is lost and can no longer be utilized.

Fort Carson

Streams entering and originating on Fort Carson are primarily ephemeral with some being perennial. Stream flow is diverted through a series of adjudicated water right decrees, and numerous water rights have one to several of the following decreed usage categories:

- recreation,
- fish management,
- firefighting,
- irrigation,
- military use,
- livestock use, and
- domestic and industrial.

Water rights for Fort Carson are judicially administered under Water Division Number 2, within Water Districts 10, 12, and 14. Water rights are administered from tributaries that originate generally to the west of Fort Carson; however, some tributaries originate from the installation proper. Tributaries that Fort Carson retains water rights for, and are administered under Water Division Number 2, are as follows:

- Little Fountain Creek,
- Little Turkey Creek,
- Red Creek,
- Rock Creek,
- Sand Canyon Creek,
- Turkey Creek, and
- Wild Horse Creek.

There are 50 surface and subsurface water rights that are retained on Fort Carson by Fort Carson. Of the 34 surface water rights, 20 are surface diversion ditches and 14 are reservoir storage rights. Of the 16 subsurface water rights, nine wells are currently installed. Seven wells are classified as future wells, which will not be installed until required.

The combined inflow upstream from Fort Carson of Little Fountain, Little Turkey, Rock, and Turkey creeks is estimated to average 8.64 cubic feet/second, or 6,240 acre-feet/year. The actual inflow to Fort Carson is less than this quantity because of stream flow diversions for municipal and domestic water supplies. Pumping groundwater from alluvial aquifers upstream from Fort Carson also reduces the quantity of stream flow entering the installation (Leonard 1984).

PCMS

Water rights for the PCMS are judicially administered under Water Division Number 2, Water Districts 17 and 19. Water rights are administered from arroyos and canyons that originate generally to the north and west of the PCMS, with some arroyos and canyons originating from the installation proper. Arroyos and canyons that supply water to the installation and are administered by Water Division Number 2 are as follows:

- Bent Canyon,
- Big Arroyo,
- Van Bremer Arroyo,
- Lockwood Arroyo,
- Red Rock Canyon,
- Stage Canyon,
- Taylor Arroyo,
- Van Bremer Arroyo, and
- Welsh Canyon.

4.9.2 Current Management

Water rights are monitored by Fort Carson personnel with legal matters coordinated with the Fort Carson Judge Advocate General Office and the U.S. Department of Justice. Each water right, with exception of some early rights, for Fort Carson and the PCMS contain the following information:

- appropriation date - the date the water was diverted;
- adjudication date - the date the court recognizes for priority assignments;
- decreed use (beneficial use) - a decreed amount of water measured in either cubic feet per second or acre-feet; and
- point of diversion - the location of the point of appropriation in a township and range grid coordinate system.

Surface and subsurface water rights are the primary source of water for natural resources on Fort Carson and the PCMS outside of the Cantonment Areas. The loss of a water right would cause a significant impact on the native resources that utilize that water for survival. The water rights project was developed to maintain compliance with the Appropriation Doctrine and the "*Amended Rules and Regulations Governing the Diversion and Use of Tributary Ground Water in the Arkansas River Basin*" and to prevent water rights from being listed as abandoned.

4.9.2.1 Surface Water

Surface water rights contain a decreed amount of water in which to support the decreed usage of the right. Pursuant to the Colorado State Water Law Appropriation Doctrine, surface water rights must be measured through diversion structures to monitor the amount of water appropriated throughout the irrigation season (15 April through 15 November). Records obtained through the monitoring phase of the water rights program support the utilization of the water right. These records are provided annually to the Colorado Division of Water Resources, the agency that implements and enforces Colorado Water Law.

4.9.2.2 Subsurface Water Rights

Subsurface (well) water rights have rules and regulations developed that regulate the use of wells to prevent injury to more senior surface water rights and to comply with Colorado's interstate compact obligations to Kansas. As with surface water rights, water is distributed within Colorado according to the doctrine of prior appropriation. Because ground water rights are often junior to the controlling rights and because wells have a lagged effect on stream flow, specific rules have been adopted to ensure that the use of wells does not injure more senior water rights. These rules and regulations do not apply to exempt domestic, stock, or fire protection wells. Also, wells that are permitted and\or decreed as non-tributary are exempted from these rules.

To allow the use of wells without injury to senior water rights, the Colorado State Engineer has developed the "*Amended Rules and Regulations Governing the Diversion and Use of Tributary Ground Water in the Arkansas River Basin*". These Rules require that wells cease use unless they are used in accordance with an "*Augmentation Plan*" approved by the state and State Engineer or a "*Substitute Water Supply Plan*" approved by the State Engineer. Augmentation water can be water that is imported from another basin or a non-tributary source or water from a right in priority that is not diverted, but rather is left in the stream so that it is available to other rights. Such augmentation water must be made available to the stream in the appropriate amount, time, and place so as to offset any injury to a senior water right caused by well use. Fort Carson adheres to these "*Amended Use Rules*" by joining the Colorado Water Protective Development Association and procuring water for augmentation.

To determine the amount of augmentation water needed for each well, accurate measurements of well use are necessary. The "*Amended Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin*" was developed for this purpose. These Rules require that the well owner installs a totalizing flow meter or that a power coefficient be determined that allows the amount of water diverted to be calculated using the electrical consumption of the pump.

All wells (six wells, with two of these wells having two meters) classed as tributary on Fort Carson have totalizing flow meters to measure use. Measurements are reported monthly to the Colorado Development Water Association. A person approved by the State Engineer must verify every four years that these flow meters are in accurate working condition. For wells that are not being used and are not connected to a power source, these metering requirements can be avoided by submitting a Notice of Inactive Well. Fort Carson has three inactive wells falling into this category. The PCMS does not have any wells classed by the State Engineer as tributary. Therefore, there are no PCMS wells that must be monitored and reported to the state.

The following are wells on Fort Carson that are classed by the State Engineer as tributary and therefore fall under jurisdiction of the *Amended Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin*:

Fort Carson Tributary Wells - Monthly Meter Reports and Meter Calibration Rules Required

- Well # 1005880 – Wildlife Well
- Well # 1005881 – ARA Well
- Well # 1005882 – ASA Well
- Well # 1005884 – Turkey Creek Ranch Well
- Well # 1005886 – South Recondo Well
- Well # 1005888 – Range 145 Well

Fort Carson Tributary Wells - Inactive

- Well # 1005883 – ASA Well #2
- Well # 1005885 – Red Devil Well
- Well # 1005887 – MPRC Well

Section 4.8, *Water Resources Management*, is closely related to water rights management in that water resources management includes the maintenance/replacement of water diversions and monitoring activities associated with water rights are accomplished within that program.

4.9.3 Proposed Management

Project: Water Rights Management
Justification: Compliance with Clean Water Act and Colorado Water Law, sustainment of the capability to support the military mission (Sikes Act)
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely
Regulatory Coordination: Colorado Water Commissioner, Colorado Division of Water Resources, Colorado State Engineer, the State of Colorado

Performance Goals: 1. Repair Gale Ditch; 2. report all usage to the State Water Commissioner on a quarterly basis; and 3. repair Ripley Ditch.

Sustainability Goal: No water rights abandoned.

Goal. Maintain, monitor, and use water rights to support natural resources and the training mission to prevent the designation of water rights as abandoned.

Objective 1. Ensure no water rights are considered for abandonment.

Objective 2. Monitor and report all water rights use to the Colorado Water Commissioner, in close coordination and consultation with the USGS.

Objective 3. Assure beneficial use of all adjudicated water rights.

Objective 4. Assure all water rights are utilized for their originally adjudicated purposes.

Objective 5. Quantify water use relative to water rights.

Objective 6. Ensure compliance with the State of Colorado Water Law by recording and reporting all adjudicated water diverted for beneficial use on Fort Carson and the PCMS.

Objective 7. Ensure that key personnel are trained in water rights laws/regulations necessary to effectively comply with Colorado water rights requirements.

Objective 8. Implement the DECAM portion of the *Annual Substitute Water Supply Plan* with the Colorado Water Protective Development Association.

Objective 9. Purchase augmentation water from the Colorado Water Protective Development Association and adhere to state well metering rules to meet requirements of the "*Amended Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin*".

Objective 10. Maintain involvement as a member of the Arkansas Basin Roundtable that will facilitate regional collaboration, communication, and coordination to enhance water rights management on Fort Carson and the PCMS

Objective 11. Implement well meter validation program to ensure compliance with state well use reporting requirements.

Objective 12. Initiate planning and feasibility determination of future survey of surface and ground water rights at the PCMS.

Objective 13. Use USGS to maintain and read Fort Carson water systems gauging stations and submit quarterly diversion data to the State Water Commissioner and DECAM; use USGS to maintain satellite transmitters and all water diversions.

Objective 14. Using global positioning system technology, map all existing surface and ground water rights; develop a GIS database with associated rights tagged to each right.

4.10 Wetland Management

4.10.1 Current Conditions

Wetland functions and values include, but are not limited to the following: ground water recharge, ground water discharge, flood flow alteration, sediment stabilization, sediment or toxicant retention, nutrient removal or transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage, and recreation. Executive Order 11990, *Protection of Wetlands* (1977) and the Clean Water Act (1977) require no net wetland losses on federal lands in the United States.

Wetland impacts are sometimes unavoidable, particularly relative to construction projects and some military training scenarios. In some cases, off-site impacts from training activities and construction can have an adverse effect on wetland functions. In areas where concentrations of wetlands are high, training activities and/or construction projects have the highest potential to intrude on existing wetland sites DECAM 2005a).

Fort Carson

Fort Carson is included in the National Wetlands Inventory (NWI) (USFWS 1992). Original data showed 487.9 acres of wetlands on Fort Carson. There has been considerable ground-truthing of sites to improve the quality of the original data, as described in DECAM (1997). The current estimate of wetlands on Fort Carson is 1,028 acres.

Wetlands on Fort Carson are generally characterized as linear (*e.g.*, streambeds) or small and isolated. Linear wetlands occur along intermittent and perennial stream channels and tributaries, primarily Rock, Little Fountain, Turkey, Little Turkey, Red, Sand, and Wild Horse creeks. Isolated wetlands usually occur where a dam has been built for erosion control or for water storage; most are only 1-2 acres in size. The largest downrange wetland is on the upper reaches of Teller Reservoir, encompassing about 100 acres. In addition to cattails, common wetland species are cottonwood and willow. Some wetlands have been invaded by tamarisk, which currently is the primary wetland management concern. About six springs occur on Fort Carson, and they have very small associated wetlands. There are also a number of wetland areas scattered throughout the Cantonment Area, typically in natural or stormwater runoff drainages and in an area south of Butts Army Airfield (site of the old golf course and now a wildlife management area).

PCMS
The current estimate of wetlands on the PCMS is 361 acres compared to the 1992 National Wetlands Survey 4,776-acre estimate. The significant reduction in wetland acreage is due to the administrative removal of the Purgatory River section from Department of Army management to U.S. Forest Service Management. These data were obtained the same as described above for Fort Carson. Most wetlands on the PCMS are associated with side canyons that are tributary to the Purgatoire River and water developments.

4.10.2 Current Management

Wetland management on Fort Carson and the PCMS consists of and embodies all elements related to compliance of the Clean Water Act, Section 404, as well as applicable executive orders, Department of Army regulations, and state laws. The wetlands management program adheres to provisions of the Clean Water Act to ensure the protection from irresponsible and unregulated discharges of dredged or fill material that could permanently alter or destroy valuable water resources on Fort Carson and the PCMS.

4.10.2.1 Wetlands Inventory

Baseline Inventory
Development of sound wetland management plans requires knowing the location, type, quantity, quality, and functions of Fort Carson and the PCMS wetlands.

Flight lines, flown in 1983, for Fort Carson and the PCMS were obtained for wetland signature classification by the USFWS, NWI Team. National High Altitude Photography Color Infrared images, at a scale of 1:58,000, were used for signature classification. A site visit to Fort Carson and the PCMS was conducted by the NWI team for signature verification prior to image signature classification. Wetlands were delineated using the Cowardin Method (Cowardin *et al*. 1979).

In 1991 the 1983 flight lines, images, and the resultant draft production map were reviewed by the DECAM and the USFWS. Another review occurred in 1993 to ensure the signature classification and delineation changes were represented throughout Fort Carson and the PCMS. Cartographic inventories of wetlands on Fort Carson and the PCMS were documented on 1:24,000-scale topographic maps and were incorporated into the GIS to facilitate rapid evaluation of alternative and integrated management strategies. Baseline data estimating total wetland acreage on Fort Carson (1,076 acres) and the PCMS (4,776 acres) were collected in 1993.

Another wetland inventory was completed in 2004 to establish an estimate of wetland acres lost or gained due to military use and/or management practices. Results of this inventory will be tabulated and available for comparison to 1993 data in FY 06 (DECAM 2005a).

As part of this effort, the DECAM has two full-time permanent Department of Army staff members certified in wetlands delineation by the U. S. Army Corps of Engineers. This certification is lifetime. The DECAM would be required to do additional certifications as the need arises.

4.10.2.2 Wetland Baseline Studies

During 1996-97, a Legacy grant was used to study wetland community constituents and their distribution as well as various physical parameters at 10 sites on Fort Carson[29] and five sites at the PCMS[30]. No

[29] Wetland Program for Fort Carson, Colorado, 1996

decline was noted in representative wetlands, and no statistically significant increases in measured constituents were identified. These studies will be used to provide baselines for future wetland evaluations.

4.10.2.3 Wetland Rehabilitation and Mitigation

The decline of wetland values and functions that can be attributed to an activity and responsible party can be rehabilitated/mitigated at the expense of the responsible party. The responsible party has an option to provide input into the rehabilitation management strategies. The DECAM reserves the right to define final rehabilitation/mitigation practices. A contractual agreement will be established to ensure enforceability of rehabilitation procedures and compensatory measures. All Corps of Engineers-permitted activities occurring in jurisdictional wetlands must strictly adhere to mitigation requirements of the permit.

The term "*mitigation*" is used broadly to mean a reduction of net loss of wetland resources and narrowly to mean wetland creation to compensate for a permitted wetland loss. The term is used in the broadest sense in this INRMP to reflect "*avoidance, minimization, rectification, reduction, or compensation for resource losses*" (33 CFR 320.4(r)).

Mitigation is a three-tiered procedure for reducing net losses of wetlands on Fort Carson and the PCMS. The procedure is formally explained in the Environmental Protection Agency, Clean Water Act Section 404(b)(1) Guidelines and implemented by the Corps of Engineers when imposing permit conditions. The three tiers are avoidance of impacts whenever possible, minimization when impacts cannot be avoided, and compensation for impacts that cannot be minimized. Alternatives are mandated if the project can be practicably moved to another site where less damage is done to wetlands (40 CFR 230.10(a)). The following are descriptions of DECAM procedures to mitigate wetlands.

Avoidance

Environmental Protection Agency's Section 404(b)(1) Guidelines specify that "*no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences*" (40 CFR 230.10(a). On Fort Carson and the PCMS, avoidance of impacts receives the highest priority for minimization of impacts to wetlands.

A decision to move a project out of a wetland and into an upland location is based on the purpose of the project and an analysis of available alternative sites. A site is water-dependent if "*the activity associated with a discharge that is proposed for a special aquatic site.... [requires that site] to fulfill its basic purpose*" (40 CFR 230.10(a)(3). A project will be relocated to an alternative site if it is practicable to relocate the project and there would be less environmental damage at the alternative site.

Minimization

Minimization is the process used to reduce impacts to wetlands as much as possible when it is not practicable to locate the project entirely outside of existing wetlands. "*No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem*" (40 CFR 230.10(d)). All proposed projects on Fort Carson and the PCMS are reviewed for avoidance criteria as the first priority for wetland protection. If impacts cannot be avoided, minimization of impacts is the next priority. The DECAM is responsible for this review and coordination with the Corps of Engineers Albuquerque District Office in Pueblo, Colorado.

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[30] Wetlands Monitoring Program For Pinon Canyon Maneuver Site (PCMS), Model, Colorado, 1998

Compensation
Compensatory mitigation is the activity of compensating for loss of wetland functions at one location by replacing them at another. It is the intent of the Corps of Engineers and the Environmental Protection Agency to require compensation for authorized losses of wetland functions whenever practicable (Mitigation MOA §II.C.211).

Compensation as a means of preserving wetlands is the last alternative for proper management on Fort Carson and the PCMS for the following reasons:

- compensation is, by far, the most costly form of management;
- success of creating, restoring, and preserving wetland values is never guaranteed; and
- compensatory mitigation acreage is calculated on the basis of functional replacement rather than territorial extent.

In most cases a minimum of one-to-one acreage replacement of wetlands is required to achieve no-net-loss of values. However, this ratio may be greater where the functional values of the wetland(s) being impacted are demonstrably higher. Conversely, the ratio may be less than one-to-one for areas where functional values associated with the wetland being impacted are demonstrably low and the likelihood of success associated with the mitigation proposal is high[31].

Management strategies for wetland restoration and creation should provide an adequate margin of safety to reflect the expected degree of success associated with the management strategy. If a 20 percent success rate is expected, then five acres of wetlands would be created for every one acre impacted. In the absence of more definitive information on functions and values of specific wetland sites, a minimum of one-to-one acreage replacement may be used as a reasonable surrogate for no-net-loss of functions and values. The Natural and Cultural Resources Division, in coordination and consultation with the Corps of Engineers, will determine the proper ratio of acreage replacement.

Kinds of Compensatory Mitigation
Types of compensatory mitigation can be grouped into the following categories.

In-kind mitigation refers to the case where the impacted wetland and the compensation tract are both of the same wetland classification. An example would be replacing an impacted riparian area by repairing another riparian area with comparable values.

Out-of-kind mitigation replaces an impacted wetland with a wetland of a different kind and is less likely to replace impacted functions. An example would be compensating for damage to a cattail marsh by expanding a riparian area.

On-site mitigation refers to mitigation on the same parcel of land as the impacted wetland. It is the preferable alternative to ***off-site mitigation***, where impacted functions are replaced in a different landscape and ecosystem. If mitigation must be performed off-site, it should be located within the same drainage basin if possible.

Restoration returns a former wetland to its pre-disturbance conditions. Restoration is highly encouraged because of the higher probability of success.

[31] Memorandum of Agreement between the Environmental Protection Agency and the DA concerning the determination of mitigation under the Clean Water Act Section 404(b) (1) Guidelines, November 15, 1989.

Creation, in contrast to restoration, tries to establish a wetland area and normally requires an artificial source of water. Due to the high cost and lower probability of success, this alternative is not preferable for management purposes on Fort Carson or the PCMS. However, the Installation has created numerous new wetland sites incidental to erosion control dam construction.

Preservation attempts to replace an impacted wetland by protecting a different existing wetland from future disturbance. On Fort Carson and the PCMS, this practice is discouraged because preservation does not compensate for current wetland losses, but simply reduces future impacts. Furthermore, wetlands proposed for preservation are likely protected by law.

Mitigation banking establishes a large mitigation project to replace smaller, anticipated disturbance elsewhere on Fort Carson and the PCMS. Subsequent construction projects compensate for their wetland impacts by crediting acreage from the already existing mitigation bank. Mitigation banking will be addressed on a case-by-case basis.

4.10.2.4 Wetland Project Review

The Corps of Engineers project review provides for the consideration of environmental, social, and economic concerns of the public. A Corps of Engineers permit is required if a structure is planned to be constructed in Waters or Navigable Waters of the United States or when a discharge of dredged or fill material into a Water or Navigable Waters of the United States occurs due to any action taken.

The wetland review process is designed to accomplish the goal of the Clean Water Act, Section 404. Any proposed activity occurring on Fort Carson and the PCMS is subject to a review under all federal regulatory permit processes. Compliance with all federal regulations is mandated prior to commencement of the proposed activity.

The DECAM, in coordination and consultation with the Albuquerque District Corps of Engineers, is responsible for the overall review process of proposed activities conducted on Fort Carson and the PCMS to determine if parameters of the activity fall under the Clean Water Act, Section 404. All review processes covered by the jurisdictional boundaries of Section 404 are coordinated by the Cooperative Conservation Team, DECAM.

Activities involving dredging or filling of waterways or wetlands must be reviewed early in the project design phase by the DECAM prior to the onset of any activity. Projects involving dredging and filling of waterways or wetlands that fail to follow this required review are halted until the required review is completed.

If an activity is determined as jurisdictional under Section 404, the proponent must assign a point of contact for the entire project. The following are responsibilities of the designated point of contact:

- ensure that coordination and all parameters of the Clean Water Act permit, impact minimization, and mitigation proposals are accomplished for the proposed project;
- maintain a working understanding of the acquired Clean Water Act permit for the proposed project to maintain compliance under the permit;
- ensure the Corps of Engineers and the DECAM are provided any changes from the original project, that may arise;
- upon completion of the project, ensure accomplishment of impact minimization techniques and the mitigation proposal and provide the DECAM with the following written documentation: the cumulative amount (in the units outlined on each permit) of dredge or fill activity that occurred in

the waterway or wetland and progress reports on impact minimization techniques and monitoring proposals; and

- confirm that any change, prior to project implementation, has authorization from the Corps of Engineers and the DECAM, under the Section 404 permit.

Review Process Steps

The first step in the review process for jurisdictional activities is the review of activities for "*avoidance*". Proposed activities are reviewed to determine water dependency. If water dependency is not established as a parameter for the activity, an alternate upland site is to be provided. Implementation of the proposed activity on the alternate upland site removes the jurisdictional boundaries of the Clean Water Act, Section 404 and removes the requirement for a permit.

If water dependency is determined, the review of activities for impact minimization is accomplished. An EA must be conducted for the entire project to determine the amount of impact that will result from proposed activities. An EIS would be required if significant impacts are found. The EA and the EIS (if one is required) are the responsibility of the proponent and are tracked by the point of contact.

All EAs and EISs will be coordinated with the DECAM NEPA Coordinator. Each EA will be handled on a case-by-case basis. Impact minimization techniques, as defined by the proponent, are required to reduce the impact the activity will have on waterways and wetlands. Impact minimization techniques may, in some cases, produce a finding of "*no impact*" or "*minimal impact*".

Impact minimization on water resources must be outlined in a contractual documentation by the proponent. Impact minimization must be incorporated into such documentation so minimization activities can be enforced and implemented. If impact minimization is not enforceable or implementable, the project is not permitted. The extent of an impact can be reduced by the restoration of the environment to its previous condition or better.

The DECAM will review impact minimization parameters to determine adequate coverage and has the authority to accept, alter, or deny impact minimization proposals.

Impact Minimization

Mitigation proposals are a form of impact minimization that are implemented in association with other impact minimization techniques. In close coordination and consultation with the DECAM, the proponent is responsible for developing mitigation proposals and impact minimization techniques. The proponent must review the entire proposed project, including cumulative impacts the project will have on the waterway or wetland, and develop a mitigation proposal that will adequately minimize the impact and compensate for the aquatic ecosystem loss.

In coordination and consultation with the DECAM, the proponent's point of contact must oversee mitigation proposals to ensure that all identified parameters are being met and provide the necessary coordination and written documentation to the DECAM. Only mitigation proposals that are implementable or enforceable will be forwarded to the Corps of Engineers for issuance of a permit. The DECAM will review mitigation proposals to determine adequacy of analysis and ability to accomplish the identified mitigation goals. The DECAM will then forward the permit request to the Corps, modify the proposal, or deny the mitigation proposal as incomplete.

The Corps of Engineers permit process requires coordination with the USFWS and the State Historic Preservation Office to allow for the assessment of potential impacts to protected species and cultural resources.

Monitoring
Monitoring is an integral part in assessing the success or failure of any environmental impact minimization and mitigation technique.

Enforcement monitoring ensures that mitigation is being performed, as described in the contractual documentation, and ensures that mitigation requirements and penalty clauses are written into all contractual documents. It also ensures that these provisions are enforced. Before mitigation can take place, it must be budgeted, scheduled, and manpower-assigned.

Effectiveness monitoring measures the success of the mitigation effort and/or the environmental effect. This must be a scientifically based, quantitative investigation. Generally, qualitative measurements are not acceptable. However, it is not necessary to measure everything that may be affected by the action, only enough information to judge the method's effectiveness. Parameters normally monitored are changes in vegetative cover, densities, species composition and frequency, and variation in overall area of the wetland.

Monitoring will be administered toward determining whether permit conditions are in compliance and to determine if the mitigation proposal's functions and values were achieved as planned. It is the responsibility of the proponent to provide the DECAM with the monitoring methodology utilized for mitigation activities and impact minimization. The proponent is responsible for overseeing the mitigation proposal, impact minimization monitoring, and monitoring documentation and providing this documentation to the DECAM.

The DECAM will review the monitoring methodology and documentation to determine the validity of the monitoring proposal to adequately address the success or failure of the project. The DECAM will then either accept, deny, or make appropriate suggestions on how to improve the monitoring proposal. If subsequent monitoring indicates that the impact minimization and mitigation project is not successful, it is the responsibility of the proponent to provide new impact minimization and mitigation techniques.

4.10.2.5 Technical Assistance
The DECAM may seek technical assistance from any of the following agencies regarding wetlands management or monitoring:

- USFWS,
- U.S. Army Corps of Engineers,
- NRCS,
- Environmental Protection Agency,
- USGS,
- CDOW, and
- Colorado Division of Water Resources.

4.10.3 Proposed Management

Project: Wetlands Management
Justification: Compliance with the Clean Water Act, Colorado laws, NEPA, and the Endangered Species Act; stewardship, compliance with Executive Order 12608 (*Protection of Wetlands*) for "no-net-loss"
Funding Priority: Class 0

Project Timing: Objective 8 – partially by 2007; Objective 9 - 2010; other objectives - ongoing indefinitely or as-needed
Regulatory Coordination: U.S. Army Corps of Engineers (Clean Water Act, Section 404)

Performance Goal. No net loss of wetland resources on Fort Carson and the PCMS as determined by the National Wetland Inventory Method using the FY93 survey as the baseline.

Sustainability Goal. No overall loss of wetland resource quality on Fort Carson and the PCMS as determined by the trend survey compared with 1993 baseline.

Goal. Preserve, conserve, manage, develop, and restore wetlands and riparian vegetation to ensure no-net-loss of wetland resources on Fort Carson and the PCMS, as determined by the National Wetland Inventory using the 1993 survey as the baseline (adjusted for changes in land administration), and comply with other wetland regulatory instruments.

Objective 1. Maintain a database on wetland resources at Fort Carson and the PCMS using monitoring to ensure that waters and wetlands of Fort Carson and the PCMS are protected from irresponsible and unregulated discharges of dredged or fill material.

Objective 2. Compile site-specific information needed for the protection and enhancement of wetlands on Fort Carson and the PCMS.

Objective 3. Compare results of 2005 wetlands inventory with 1993 baseline data (adjusted for changes in land administration) to evaluate compliance with no-net-loss of wetlands.

Objective 4. Use the NEPA environmental review process to evaluate impacts on wetlands, which could result from new construction or other activities.

Objective 5. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.

Objective 6. Review all proposed project specifications and training plans for potential impacts to wetland resources; when necessary, coordinate with the Corps of Engineers and obtain appropriate permits.

Objective 7. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland; maintain at least two personnel who are trained and certified to assist in the delineation of jurisdictional wetlands to the level that effective coordination with the Corps of Engineers can be accomplished.

Objective 8. Administer the Corps of Engineers Regional Permit acquired for erosion control structures, including quarterly reporting of all impacts to jurisdictional wetlands. Reapply for this permit in 2007.

Objective 9. Repeat wetland baseline studies in 2010 to determine physical and biological changes in wetland communities on Fort Carson and the PCMS.

Objective 10. Support the development of environmental analytical models to assist decision makers and promote initiatives to protect and enhance ecosystems on a programmatic basis, including the use of

inventories, partnerships with resource agencies, and such practices as wetland replacement and rehabilitation.

Objective 11. Support research designed to develop and implement new wetland evaluation/rehabilitation and replacement techniques.

Objective 12. Augment the existing plant specimens identifying family, genus and species with descriptive characteristics and maintain a herbarium with laminates of labeled wetland plants.

4.11 General Fish and Wildlife Management

Having a large and diverse land base, landscapes of Fort Carson and the PCMS provide an essential component of the military training mission. Both installations are ecologically healthy landscapes that provide real-world training opportunities for troops. The management challenge is to maintain both common and rare pieces of the landscape, preserving our native heritage, while it is used for seemingly incompatible goals by the military. Not only do wildlife populations and troops benefit from the Army's stewardship, but Installation lands provide recreational opportunities for troops, their families, and the public.

Wildlife management sections of this INRMP (this section; Section 4.12, *Rare and Listed Species Management;* and 4.13, *Special Interest Areas*) are based on the following:

- management objectives identified by the DECAM as related to the military mission at Fort Carson and the PCMS;
- interagency coordination between the DECAM, USFWS, and the CDOW;
- research and management reports provided by research personnel (Andersen and Rosenlund [1991] summarize most of these for the PCMS for the period 1983-1991; see Reference Section for list of research publications and reports for Fort Carson and the PCMS.); and
- the Integrated Natural Resources Management Plan (Gene Stout and Associates 2002c).

Wildlife habitats on Fort Carson and the PCMS are diverse and cover large tracts of relatively undeveloped land. Although land use impacts are different than those typically found in the region (*e.g.*, housing development, livestock grazing, mineral extraction), maintaining wildlife habitats within the regime of military training requires active management by DECAM. Habitats that are disappearing in the vicinity of these installations are maintained, sometimes in a relatively natural state, in large tracts. The quality and size of regionally disappearing habitats provides unique management opportunities to DECAM wildlife managers. It also emphasizes the necessity to properly manage these habitats in a sustainable manner, emphasizing native species management and real-world landscapes for military training.

Native species conservation is a cornerstone of ecosystem management. Fort Carson is taking appropriate steps via this INRMP and numerous studies, peer reviewed publications, and reports that have preceded it to ensure that overall ecosystem functions and sustainability are not compromised at either Fort Carson or the PCMS.

Specific fish and wildlife management programs are described in this section. Wetland management is described in Section 4.10. Forest management programs are described in Section 4.3. Programs to manage and protect sensitive and listed species are described in Section 4.12. Programs designed to manage

special interest areas are described in Section 4.13. Urban habitat management programs are described in Section 4.5. Fire management aspects of habitat management are described in Section 4.6. Section 5.4 describes recreational aspects of game management.

4.11.1 History of Fish and Wildlife Management

Fort Carson
Prior to military acquisition in 1942, wildlife management activities were conducted to a limited extent by state and federal agencies and private landowners. Primary management activities consisted of stocking fishing reservoirs and controlling species viewed as pests or nuisances.

The establishment of a Rod and Gun Club in 1958 generated a moderate amount of interest in managing wildlife resources of Fort Carson, which included the operation of a game bird farm. In 1965 Fort Carson entered into its first Cooperative Plan for the Development of Fish and Wildlife with the USFWS (formerly the Bureau of Sport Fisheries and Wildlife) and the CDOW (formerly the Department of Game, Fish, and Parks). The CDOW conducted periodic game surveys, proposed harvest recommendations, and released stocks of antelope and non-native chukar on the installation and adjacent lands. Suitable waters were incorporated into the USFWS fish stocking program. Fish stocking from USFWS hatcheries continued until 2000 when the USFWS stopped providing recreational fish to Department of Defense waters.

A more intensive wildlife program has developed in the last 20 years with the expansion of the DECAM (formerly the Division of Environmental, Energy, and Natural Resources). Research activities were conducted in the early 1980s on birds of prey, small mammals, bobcats, elk, and mule deer populations on the Installation. In the late 1980s a brood stock reservoir and a natural spring were constructed for greenback cutthroat trout in partnership with the USFWS. In the 1990s management focused primarily on sensitive species and listed species management. Installation-wide systematic surveys for small mammals and song birds were conducted. Fort Carson funded and participated in installation and regional investigations of the Mountain Plover, Mexican Spotted Owl, Burrowing Owl, Peregrine Falcon, and the Preble's Meadow Jumping Mouse.

In 1998 DECAM petitioned the Colorado Wildlife Commission to have Fort Carson become a game management unit in its entirety to improve management of expanding elk herds in the unpredictable environment of military training. In previous years calendar conflicts between training and the regular combined big game seasons precluded hunting on the installation. Big game season length was been expanded to give more flexibility to wildlife managers. The increased season length provides greater flexibility for Fort Carson wildlife managers to manage elk populations.

PCMS
Prior to military acquisition of the PCMS in 1982, wildlife management activities in the area were conducted to a limited extent by state and federal agencies and private landowners. Primary management activities consisted of pest management and setting harvest levels for mule deer and pronghorn antelope. Bighorn sheep were re-introduced, and and turkey were successfully introduced in areas adjacent to the Purgatoire River canyon between 1982 and 1985; additional turkey transplants were accomplished in 1989.

Surveys for raptors, deer, and pronghorn were conducted annually from 1980 to 1983 by the DECAM, USFWS, and the CDOW as part of the scoping process for the appraisal of training sites that finally

resulted in the purchase of the PCMS. From 1998 through 2005 the DECAM funded research through universities, which resulted in numerious masters/doctoral dissertations and peer reviewed publications:

- aquatic fauna (Fausch *et al*. 1985, Fausch and Bramblett 1988, Bramblett 1989, Bramblett and Fausch 1991a-b, Herrmann and Davis 1991, Lohr and Fausch 1996 and 1997);
- non-game avifauna (Laurion 1985; Youkey 1990; Youkey and Meslow 1988, 1989);
- raptors (Andersen 1988, 1990, 1991a-c, 1994, submitted for publication a-b; Andersen and Rongstad 1985, 1989a-c; Andersen *et al.* 1989; Andersen *et al.* 1986, 1988, 1989, 1990; Giron Pendleton *et al*. 1991; Knight *et al*. 1989);
- small mammals (Ribble 1985a-b, Ribble and Samson 1987);
- swift fox (Covell 1992, Joyce [thesis not completed], Karki undated and 2003, Kitchen 1999, Kitchen *et al*. 1999, Miller 1989 and 1998, Miller *et al.* 1992 and 2000, Rongstad *et al*. 1989, Schauster 2001, Schauster *et al*. 2002a and b, Thompson and Gese 2006a and b, Wisniewski 1993);
- coyotes (Gese 1987, 1990, 2006; Gese and Andersen 1993; Gese and Rongstad 1985, 1989; Gese *et al*. 1987, 1988a-b, 1989a-b; Gese *et al*. 1991);
- bobcat (Anderson 1985, 1986, 1987a-b, 1988, 1990; Jackson 1985; Stephenson 1988a-b);
- mule deer (Gerlach 1987; Gerlach *et al.* 1985; Gerlach and Vaughan 1985, 1991; Gerlach *et al*. 1986; Stephenson 1989; Stephenson and Vaughan 1989); and
- pronghorn antelope (Firchow 1986, Firchow and Vaughan 1985, Firchow *et al*. 1986a-c, Gerlach and Vaughan 1990).

The *References* section indicates other reports and publications associated with projects at the PCMS during this period. The 1988-94 activities report (Canestorp *et al*. 1995) indicates the degree to which the USFWS partnered with the U.S. Army in the years following these initial survey/research stages of the natural resources program on the PCMS.

From 1996-2003 intensive research (Joyce thesis not completed, Karki undated and 2003, Kitchen 1999, Kitchen *et al*. 1999, Miller 1998, Miller *et al.* 2000, Schauster 2001, Schauster *et al*. 2002a and b, Thompson and Gese 2006a and b) was conducted on the swift fox, a candidate species under the Endangered Species Act, which was later deemed, warranted but precluded from listing. Other wildlife related work involved recording observation of species of interest to management, resolving on-site wildlife conflicts, providing assistance to other wildlife agencies, and maintaining the wildlife check station program. In Spring 2004 a prescribed burn, a first of its kind on the PCMS, was done to meet habitat requirements of the Mountain Plover.

4.11.2 Current Conditions

A list of vertebrate wildlife species known to occur on Fort Carson is included in Appendix 4.11.2a. A list of vertebrate wildlife species known to occur on the PCMS is included in Appendix 4.11.2b. These lists are updated as new species are confirmed.

Fort Carson

Fort Carson is a large and relatively undeveloped tract of land that is close to a large urban population. This quality offers the advantage of providing unique opportunities for fishing, hunting, watchable wildlife, birding, and other non-consumptive uses to a large number of people. This landscape is used intensively by the military, creating management challenges not experienced by most land management agencies.

This list is regularly updated as new species are confirmed. The *Land Condition Trend-Analysis Installation Report, Fort Carson Military Reservation, Colorado* (Gordon 1989) also contains a listing of wildlife species found on the installation, and Kennedy (1997) documented small fish distribution on Fort Carson.

Breeding water bird populations are not extensive, but the Mallard, American Coot, Pied-billed Grebe, and Blue-winged Teal are fairly common nesting species in years when water resources are available. During spring and fall migrations waterfowl species congregate on Installation impoundments especially Teller and Northside reservoirs. Teller Reservoir, when water is available, supports a diverse array of water birds during the winter. Twenty-seven species of hawks and owls are known to use Fort Carson, including the Mexican Spotted Owl, Bald Eagle, and Peregrine Falcon. Use of riparian habitats within Fort Carson by Peregrine Falcons nesting west of Fort Carson was documented by Enderson and Craig (1997). Common large mammals include mule and white-tailed deer, elk, pronghorn, mountain lion, and black bear.

There are approximately 146 surface acres in 12 reservoirs. Eight of these reservoirs are managed for sport fishing, with Fort Carson selling up to 5,000 annual fishing permits in the 1980s. The other reservoirs support populations of native fish, water birds, and amphibians. The 1996-1997 *Small Fish Distribution Survey* (Kennedy 1997) indicated the distribution of nine small fish species at 35 sampling points on Fort Carson.

The status of amphibians and reptiles on Fort Carson is not well documented. Fort Carson may be within the geographical range of invertebrate species of special concern, but few invertebrate surveys have been conducted on either installation.

PCMS

The Reference section of this INRMP lists over 80 theses, dissertations, publications, and reports that have been generated from studies of wildlife species at the PCMS, as part of baseline studies required by the Environmental Impact Statement for Army use of these lands (U.S. Department of Army 1980). Since these studies, other surveys and research have continued to add to the PCMS species database and understanding of ecological processes on the PCMS, particularly impacts of military activities.

Fausch *et al*. (1985), Bramblett (1989), Fausch and Bramblett (1988, 1991), Bramblett and Fausch (1991a, 1991b), and Lohr and Fausch (1996, 1997) studied fish distribution in the Piñon Canyon stretch of the Purgatoire River and its intermittent canyon tributaries on the PCMS. At the time of these surveys, no nonnative fish were found in the Piñon Canyon stretch of the Purgatoire River. A 1993-94 survey (Lohr and Fausch 1994) in the same areas found the exotic common carp for the first time.

The PCMS may be within the geographical range of invertebrate species of special concern, but few invertebrate surveys have been conducted. Invertebrates (insects) were studied as part of PCMS aquatic studies in the 1980s and early 1990s, with unique species documented (Andersen and Rosenlund 1991). Bramblett and Fausch (1991a, 1991b) surveyed benthic macroinvertebrates in the Purgatoire River and 10 ephemeral tributary canyons adjacent to and on the PCMS in 1983 and 1987-1989. Species assemblages sampled during this study were representative of southwestern, eastern, Rocky Mountain, and widespread faunas. Compared to other plains streams, the fauna sampled was less diverse.

No federally-listed species of benthic macroinvertebrates are known to exist on the PCMS. Aquatic invertebrate surveys on the PCMS in the early 1980s documented the presence of dobsonflys (*Corydalus cornutus*) within the Arkansas River drainage of Colorado. Prior to the PCMS surveys, dobsonflys were not known to occur on the eastern slope of Colorado. A new state record for *Erpetrogomphus designatus* (dragonfly) was also found during the PCMS aquatic survey work (Bramblet and Fausch 1991a).

Although a considerable data related to amphibian and reptile records have been collected for both installations, systematic surveys for these groups have not been conducted. There is considerable interest in declining numbers and species of amphibians, and there is a need to determine the extent of this nationwide decline on Fort Carson and the PCMS.

4.11.3 Current Management

Several DECAM natural resources programs provide significant benefits to wildlife habitat and populations, including wetlands management, water quality management, invasive species control, fire management, law enforcement, and environmental awareness programs. In general, details for these programs will not be repeated below except by reference.

The following discussions of fish and wildlife management on Fort Carson and the PCMS begin with general habitat management activities that benefit many species, followed by game and nongame management activities. Individual species or species groups are generally not discussed except when DECAM makes significant provisions for a single species. Listed species are discussed in Section 4.12, *Rare and Listed Species Management*.

4.11.3.1 General Habitat Management for All Species

The Fort Carson natural resources program is certified with the Wildlife Habitat Council. This certification requires that Fort Carson meet various criteria, such as conservation education and habitat management programs. Certification must be renewed every three years.

Management activities that conserve and enhance native habitats will sustain viable wildlife populations on Fort Carson and the PCMS. Fort Carson is committed to managing wildlife habitats to sustain biological diversity on Fort Carson and the PCMS. All new land use activities proposed for both installations are reviewed internally by DECAM functions for their potential impacts to wildlife species and wildlife habitat. During the review process, potential impacts are evaluated, and project changes to mitigate impacts are recommended. Major projects, whether proposed by DECAM or another directorate are formally reviewed through the NEPA process (see Section 5.8.2, *NEPA and Natural Resources Management*). The Environmental Protection Officer training program, implemented by DECAM, provides training to troops regarding significant, wildlife-related issues.

4.11.3.1.1 Habitat Protection

Principal methods for mitigating military training impacts relative to habitat protection are a Training Area deferment program on Fort Carson, a rest/rotation/deferment program on the PCMS, and protecting sensitive or otherwise ecologically unique areas from military damage through training restrictions, as described in Section 5.1.3, *Training Requirements Integration*. Section 4.7.2, *Rest/Rotation/Deferment Program*, describes the Fort Carson deferment program and the PCMS rest/rotation/deferment system.

At Fort Carson, mechanized military training is prohibited in the Cantonment Area, all impact areas, and areas described in Section 4.13, *Special Interest Areas*. At the PCMS mechanized military training is prohibited in the Cantonment Area, Wildlife Protection Area, Soil Protection Sites; on the Hogback; in

Taylor, Spring, Lockwood, Red Rocks, Welsh, Iron, Bent, and Stage-Sugarloaf canyon areas; and Gilligan's Island (protection of round leaf four o'clock) (Section 4.13, *Special Interest Areas*).

4.11.3.1.2 Habitat Enhancement

Revegetation
Revegetation practices that enhance existing or potential indigenous wildlife populations and communities are featured. Vegetative manipulation and rehabilitation procedures feature native species with the objective of restoring and maintaining native ecosystems. Various sections within this INRMP describe programs that use revegetation to accomplish various goals, including improved wildlife habitat (*e.g*., sections 4.2, *Watershed Management*; 4.3, *Forest Management*; 4.7.1, *Maneuver Damage Program;* and 5.1.2, *Land Rehabilitation and Maintenance*).

Fire Management
The effect of fire suppression on shortgrass prairie and pinon-juniper woodland communities on Fort Carson and the PCMS is not well documented. Grasslands, however, are fire-adapted communities composed primarily of fire-tolerant and fire-resistant plants and are adapted to periodic fire at regular intervals. Shortgrass prairies historically experienced fire at 5-30 year intervals. Specific information regarding fire management on Fort Carson and the PCMS is in Section 4.6, *Fire Management*.

Invasive Species Control
Non-native and/or noxious weeds pose threats to native habitats, endangered species, and plant community composition and diversity. More specifically, they threaten wetland ecosystems, complicate land restoration projects, and in general, threaten ecosystem functionality. Fort Carson is dedicated to the prevention of introduction of invasive species as well as their control, per Executive Order 13112, *Invasive Species*. Section 4.14, *Noxious Weed Management* describes programs to control invasive species. Animal pests are discussed in sections 4.15, *General Pest Management*, and 5.2, *Natural Resources Enforcement and Human Health and Safety*.

Water Development
The maintenance and development of water sources for wildlife on Fort Carson and the PCMS is a major emphasis of habitat management. A scarcity of free water is characteristic of semiarid shortgrass prairie and pinon-juniper woodland communities. Water developments for wildlife should mitigate impacts to wildlife from military training by improving wildlife distribution. Additionally, many natural water sites have been degraded through prolonged cattle grazing prior to military acquisition of the PCMS.

The following is a list of existing and potential types of water developments on Fort Carson and the PCMS:

- small reservoirs;
- springs/seeps;
- dirt ponds (erosion control dams with a storage capacity no greater than 2 acre-feet);
- windmills;
- dip tanks (strategically constructed and located to enhance wildland fire suppression capabilities downrange, which also provide water for wildlife);
- pipelines with water tanks;
- solar powered submersible pumps; and
- guzzlers.

About 60 guzzlers were installed on Fort Carson in the 1980s to provide water for game bird species. In later years, guzzlers were modified with the addition of half-barrel water storage structures to accommodate big game animals. These are maintained as needed. In 2006 Fort Carson purchased five 750-gallon wildlife water guzzlers to install downrange. Fort Carson will continue to pursue management elements to mitigate and provide water for big game and other species whose normal activities are disrupted by military training.

Habitat at selected windmill sites on the PCMS was improved in 1988-1989 (Sharps 1988). High maintenance windmills have been recently converted to submersible pumps powered by photovoltaic solar panels.

General Habitat Improvement

The DECAM installed nest boxes and created brush piles (primarily from Christmas trees) for birds and small mammals. Brush piles are located in areas that maximize habitat improvement potential and minimize their potential as fire hazards, and/or their ability to contribute unnecessary fuel for wildfires. Trees and shrubs were planted in the Bird Farm (now the Wildlife Complex) area that had historically been cleared for agriculture. Windbreaks were designed and planted to provide wildlife habitat, protect soils, and abate air pollutants. Range seeding projects use native species that are valuable for wildlife whenever possible (Section 5.1.2, *Land Rehabilitation and Maintenance* and Section 4.2, *Watershed Management*). Old fences that can injure wildlife were removed, and fences were installed or repaired to prevent trespass livestock grazing. A few bat boxes have been constructed to enhance roost site potential near remote living quarters on the PCMS. The DECAM regularly partners with local scout troops who periodically construct and install houses for bluebirds and other cavity-nesting species.

4.11.3.2 Game Species Management

Fort Carson, in partnership with the CDOW and the USFWS, is responsible for managing game species on Fort Carson and the PCMS. There are 52 games species on Fort Carson and the PCMS. The major seasons, which draw the most hunters annually, are elk, deer, antelope, coyote, quail, turkey, and waterfowl.

4.11.3.2.1 Population Monitoring

Aerial deer surveys were conducted annually after the discovery of Chronic Wasting Disease on Fort Carson in 2005. Aerial population counts for pronghorn and elk are also conducted, subject to funding and the degree of cooperative surveying with CDOW. Consultation with the CDOW and the USFWS indicates that additional monitoring is not required by Fort Carson. If in the future either of these agencies requests a monitoring program for any game species on Fort Carson or PCMS, the DECAM will assist the requesting agency in obtaining the required information.

Harvest statistics, anecdotal observations, and discussions with the CDOW indicate that native game populations of most intensely hunted species on Fort Carson and the PCMS are capable of sustaining an annual harvest at rates established by the DECAM and the CDOW.

However, Fort Carson's elk population is believed to be well below what it was several years ago, probably due to effects of the recent drought and the frequency and type of training conducted on the Installation. The number of big game licenses the state of Colorado sells for Fort Carson lands should be re-evaluated, based on current population estimates and harvest levels. The 2005 Fort Carson elk herd was estimated to be about 350 animals, down from an estimated high population of 800-1000 animals in

1999. An annual or bi-annual re-evaluation of expected big game harvests may also assist in controlling the spread of Chronic Wasting Disease.

4.11.3.2.2 Harvest Management

The CDOW and Fort Carson control the harvest of game animals at Fort Carson and the PCMS. Fort Carson consults with the CDOW to establish game harvest objectives for both installations, and the CDOW establishes the season structure, dates, and number of permits sold to the public. Fort Carson places additional restrictions on hunting based on the military mission, management objectives, environmental conditions, and safety. These are identified in the wildlife management regulation 7ID & FC Reg 200-6.

In addition to applicable federal and state laws and regulations, hunters at Fort Carson and the PCMS must adhere to Army regulations and polices. Fort Carson can limit the number of hunters allowed access and impose restrictions on the type of weapons used to harvest game. These requirements may be more restrictive than state regulations. Section 5.4, *Wildlife-based Recreation Management*, describes these requirements and policies.

Hunters are required to return a census form following each day period of hunting activity, including information about wounded and harvested animals, their locations, and the number of hours spent hunting. DECAM wildlife personnel also interview hunters about locations and numbers of game animals. The DECAM coordinates with the CDOW to use hunter-collected harvest data to establish big game season structures and bag limits on Fort Carson and the PCMS. The CDOW conducts additional monitoring of game species as needed to establish harvest regulations. Fort Carson cooperates with these efforts, consistent with available personnel and resources.

4.11.3.2.3 Species-specific Habitat Management

Habitat management, in addition to prescriptions described in Section 4.11.3.1, *General Habitat for All Species*, is not planned for any game species except nesting geese.

In the 1990s the DECAM improved and created habitats for nesting waterfowl by constructing islands in reservoirs, constructing goose nesting structures, and closing waterfowl nesting areas to recreational activities, which could interfere with nesting waterfowl. In recent years, resident geese in the Pikes Peak region have become pests on golf courses and parks, including the golf course on Fort Carson. Because of this Fort Carson will discontinue constructing structures for nesting geese. The DECAM will continue to protect and enhance existing waterfowl nesting sites and develop new sites for ducks and other birds as the opportunity becomes available.

Waterfowl are not known to present a Bird Air Strike Hazard on Fort Carson. Although ducks congregate at Northside Reservoir in fall and to a lesser extent in spring, Butts Army Airfield personnel have not communicated a need to address this issue. DECAM wildlife personnel will meet periodically with Airfield personnel to solicit feedback on the issue.

4.11.3.3 Fisheries and Aquatic Systems Management

Fort Carson

Sport fishing on Fort Carson is regulated by the wildlife management regulation 7ID & FC Reg 200-6. Fort Carson maintains a warm-water and a cold-water fishery and stocks three reservoirs for recreational fishing. Habitat improvements for aquatic organisms have been made at each reservoir through the years

with chipped and bundled recycled Christmas trees collected from Fort Carson housing. Reservoir designations as cold-water or warm-water fisheries may vary from year to year, dependant on the availability of trout, water availability, and permit sales. Naturally-occurring mercury has been found in sampled tissues of all fish species found within Fort Carson

Fort Carson fishing reservoirs are popular with both the general public and Fort Carson Soldiers and their families who often fish there before or after duty hours. In the 1980s Ft. Carson sold up to 5,000 annual fishing permits, with the recreational fisheries supported by catchable trout provided by the USFWS. The USFWS eliminated the stocking of catchable trout on military waters in 2000. The current number of annual fishing permits sold is not known but is probably less the 1,000 per year, with the current program supported by limited purchases of commercial rainbow trout.

No Fort Carson reservoirs are currently designated as warm-water, catch-and-release fisheries. Until North Side, Small Bird, Big Bird, and Teller reservoirs went dry during the recent drought, they were stocked with largemouth bass, bluegill, black crappie, and channel catfish.

Womak, Haymes, and Townsend reservoirs are managed as cold-water fisheries. These reservoirs are stocked with rainbow trout and channel catfish purchased from private fish rearing companies in Colorado.

In 1998, 3,000 greenback cutthroat trout were stocked into Townsend Reservoir as an experiment to determine the response of this species to urban recreational fishing. The study showed that greenbacks returned at rates significantly lower than domestic rainbow trout and survived under heavy angling pressure for over one year. This one study indicated that greenbacks can be used in urban recreational fishing programs. They are no longer being stocked as part of the cold-water fishery program on Fort Carson.

In addition to the three ponds managed for sport fishing, there are other ponds maintained by the wildlife office to support various recreational activities. There are four ponds in the Wildlife Demonstration Area. The area is used primarily for dog training, birding, and education. These ponds are not stocked, and fishing is prohibited in the Wildlife Demonstration Area. Pond #1 has a small island and is popular for dog training. All Fort Carson and PCMS ponds and reservoirs are closed to dog training during the waterfowl-nesting season, April through July. West Haymes Reservoir is permanently closed to hunting, fishing, and dog training and is only accessible with permission from the DECAM Wildlife Office. The primary use for West Haymes Reservoir is environmental education and nesting and migrating waterfowl. Annually, hundreds of school children benefit from the extensive riparian area, beaver ponds, and cattail marshes surrounding the pond. Consistent with the Disabled Sportsmen's Access Act, has provided handicapped access on Large Bird and Womack lakes.

The microscopic parasite, *Myxobolus cerebralis,* causes an infection, commonly known as whirling disease, in various fishes of the salmonid family. Whirling disease was first discovered in Colorado in 1987. By 2000 it was known in nine state hatcheries. It is also present in private commercial fish hatcheries. About half of the state hatcheries have eradicated the disease and are now classed as whirling disease negative. Having received state and federal trout infected with whirling disease, Fort Carson's waters are considered whirling disease positive. The stocking of whirling disease positive fish is allowed on Fort Carson.

PCMS

Fishing is not allowed on the PCMS. Military training on the PCMS could have adverse impacts on downstream aquatic systems due to increased siltation and oil spills. To document the pre-training status of aquatic systems downstream of the PCMS Training Areas, aquatic studies (Fausch *et al*. 1985, Bramblett 1989) were completed in PCMS side-canyons and the Purgatoire River east of the PCMS.

The Purgatoire River and its tributaries in the PCMS harbor depauperate ichthyofauna consisting of 11 native species in five families. Six cyprinid species dominated the community: central stoneroller, red shiner, flathead chub, sand shiner, fathead minnow, and longnose dace. The remainder of the ichthyofauna consisted of a catostomid (white sucker), two ictalurids (black bullhead and channel catfish), a cyprinodonid (plains killifish), and a centrarchid (green sunfish). No non-native species were captured in the mainstem of the Purgatoire River or in side canyons of the PCMS during either 1983 (Fausch *et al*. 1985) or 1987-1989 (Fausch and Bramblett 1988, Bramblett 1989) despite introductions of sereral species, including largemouth bass, spotted bass (*Micropterus unctatus*), bluegill, and walleye (*Micropterus salmoides*) upstream in Trinidad Lake (Jim Melby, CDOW, personal communication). However, non-natives, such as common carp, have been captured in the mainstem and recently at the northern boundary of the PCMS. The absence of nonnative species may be due to the periodic high flows coupled with clay soils and constraining canyon walls, which result in a harsh flow regime and high turbidities that prevent fish species that have not evolved in a similar ecological setting from becoming established. Minckley and Meffe (1987) demonstrated that nonnative fishes were unable to resist flooding in unregulated streams of arid regions in Arizona and New Mexico. Great Plains watersheds dominated by native fishes are increasingly rare and are of conservation interest to a number of state and federal partners involved in the Central Shortgrass Prairie Ecoregional Assessment.

Benthic macroinvertebrates of the Purgatoire River and the PCMS side canyons represent a unique benthic macroinvertebrate community, where representatives of the Southwest, Rocky Mountain, and Eastern faunas co-exist. The connection with the Arkansas River has allowed the westward dispersal of typical eastern species, such as the dragonfly (*Erpetrogomphus designatus*, Hagen) (a new state record), the damselfly (*Argia modestas*, Hagen), and the elmid beetle (*Stenelmis* sp.) into the Purgatoire River. However, species that are characteristic of permanent southwestern streams are also present, such as the caddis fly (*Chimarra utahensis*, Ross) and the megalopteran (*Corydalus cornutus*, Hagen). This assemblage of western, eastern, and other widespread macroinvertebrate species is probably a reflection of available dispersal tracts and the high quality habitat present in the Purgatoire River that must be preserved if these species are to persist into the future (Andersen and Rosenlund 1991).

Management recommendations for aquatic systems on and near the PCMS are summarized from Fausch *et al.* (1985) and Bramblett (1989).

a) Exotic fish species will not be stocked in the tributaries of the Purgatoire River controlled by the U.S. Army.
b) Due to training schedules of troops at the PCMS, and concerns about the introduction of exotic species, recreational fishing will not be allowed at the PCMS.
c) Take appropriate measures to prevent erosion that will cause siltation in the aquatic environment, especially riffle habitat of the Purgatoire River.
d) Repair and maintain boundary fences to prevent damage to riparian zones by cattle.
e) Prohibit mechanized infantry training in riparian zones and evaluate possible impacts of side canyons.

f) Take appropriate measures to prevent chemical spills or other forms of pollution resulting from Army activities that may enter the aquatic environment.

Monitoring

Due to the dynamics of wetland/aquatic ecosystems, surveys of the aquatic biota and habitat should be conducted every 3-5 years on a continuing basis to evaluate long-term impacts of military training activities. Aquatic trend sites have been established in the side canyons and along the Purgatoire River. These sites should be sampled on a 3-5 year basis and/or after significant environmental impacts have occurred in the watershed upstream of these sites. Many aquatic sampling sites currently are located off the PCMS and could be included in the CDOW Aquatic Sampling Program.

4.11.3.4 Nongame Management

4.11.3.4.1 Population Monitoring

Surveys and population monitoring programs for non-game species is generally restricted to habitats and sites occupied or suspected to be occupied by sensitive species. Vertebrate groups suspected of having the most regionally declining species on both installations are amphibians and grassland avifauna. Planned surveys/monitoring programs for these groups are discussed in Section 4.12, *Rare and Listed Species Management*.

4.11.3.4.2 Species-specific Habitat Management

No specific management actions for species or groups are recommended in addition to those identified below or those identified in Section 4.11.3.1, *General Habitat for All Species*. However, land use projects or proposals at Fort Carson and the PCMS will be closely reviewed for impacts to sensitive or species of special concern.

4.11.3.4.3 Avifauna Management

Most avifauna species are protected by the Migratory Bird Treaty Act or other legal instrumentalities (Section 1.4.4, *Migratory Bird Legal Instrumentalities*). Thus, management for these species is discussed in Section 4.12.2, *Migratory Bird Treaty Act Compliance*.

4.11.3.4.4 Amphibian and Reptile Management

In 1993 and 1994 (Bunn unpublished data), DECAM conducted horned lizard surveys at the PCMS, primarily to determine distribution of the Texas horned lizard and the short horned lizard. At that time the Texas horned lizard was a candidate species for listing under the Endangered Species Act. It is currently a species of special concern. Road transects were used to determine relative abundance and distribution of these two species. Radio-telemetry was used to determine habitat selection and home range. Although a considerable number of amphibian and reptile records have been collected for both installations, systematic surveys for these groups have not been conducted. There is considerable interest in declining numbers and species of amphibians, and there is a need to determine the extent of this nationwide decline on Fort Carson and the PCMS.

4.11.3.5 Fish and Wildlife Research

Although monitoring programs provide useful information, it is difficult to draw sound conclusions about causes of observed trends without carefully designed research. Evaluation of current management practices, impacts of current and proposed training schemes, the historic role of fire and its potential use as a management tool, and long-term population studies are examples of needed research on Fort Carson and the PCMS.

Long-term studies of wildlife populations are relatively rare, yet they provide some of the most important insights into population processes and management. Valuable information on wildlife populations of Fort Carson and the PCMS is available as a result of past and ongoing research, as well as ongoing surveys and monitoring studies.

Those reports, peer-reviewed publications, dissertations, and theses denoted with an asterisk (*) in the References Section were a direct result of baseline ecosystem research on the PCMS following Army purchase of these lands in 1983. This intensive group of baseline studies provides an unprecedented opportunity to evaluate impacts of training on these lands in the future.

Fort Carson has sponsored or conducted such an extensive list of research and survey materials on Fort Carson and PCMS that it is difficult to access all original data and results, particularly those documents that are stored at universities or at other agencies. There is a need to create a central database for such projects.

Recommendations for future research at the PCMS were presented in final management reports (Andersen and Rongstad 1989a, Gerlach and Vaughan 1990, Gese and Rongstad 1989, Rongstad *et al*. 1989, Stephenson and Vaughan 1989, Youkey and Meslow 1989). Fish and wildlife management recommendations for PCMS were summarized by Andersen and Rosenlund (1991).

Fort Carson is continuing to conduct pertinent research at Fort Carson and the PCMS. Kitchen (1999) and Kitchen *et al.* (1999, 2000a, and 2000b) described competition between swift foxes and coyotes and various aspects of coyote activity on the PCMS. Schauster (2001) and Schauster *et al.* (2002a) studied swift fox population ecology. Schauster *et al*. (2002b) evaluated various survey methods for monitoring swift fox abundance. Karki (2003) studied the effects of coyote removal on swift fox population ecology. Miller *et al*. (1998) surveyed for parasites of swift foxes, and Miller *et al*. (2000) used the PCMS to survey for infectious diseases of swift foxes. A more recent study (Thompson and Gese 2006a and b) evaluated differences between military owned/used lands and nonmilitary owned land (*i.e*., grazed). Another study (E. Joyce, thesis not completed) measured pre-emergence pup survival and den site selection.

An antelope fawn survivability study on PCMS was begun in Spring 2006. This study will continue for two years.

The PCMS was used for research into hantavirus in Colorado (Calisher *et al*. 1995, Beaty and Calisher 2000). Both Mexican Spotted Owl and Peregrine Falcon (Endersen and Craig 1997) studies were completed in recent years on Fort Carson.

4.11.3.6 Wildlife Disease Management

Some important wildlife-related diseases are known to occur on Fort Carson and/or the PCMS, including chronic wasting disease, plague, hantavirus, West Nile Virus, and avian influenza (flu). The primary proponent for disease-related intervention is Fort Carson Preventative Medicine. The DECAM provides information regarding the plague to Preventative Medicine and information related to chronic wasting disease to the CDOW.

Chronic Wasting Disease
Chronic wasting disease was documented on Fort Carson in January 2005, in a deer killed during the rifle big game season. In meetings with the CDOW, it was agreed that 1) management actions would be taken to slow the spread of the disease; (2) testing of harvested and road-killed animals would be the primary method of disease surveillance; (3) steps would be implemented to increase hunter compliance for chronic wasting disease testing of harvested animals; and (4) population surveys would be implemented. After three deer harvested in November 2005 tested positive for the disease, disease surveillance was expanded to include the collection of deer and elk showing symptoms of the disease.

Plague
The plague is probably present on Fort Carson and the PCMS annually. During the course of annual prairie dog surveys, records are kept for sites where the presence of plague is suspected. If these sites are within areas that could impact public health, Preventative Medicine is notified. The Fort Carson team reduced the potential human and pet exposures to bubonic plague by treating 3,467 prairie dog holes with insecticide following bubonic epizootics in 1998.

Hantavirus
Deer mice (and other field rodents) can carry the virus that causes Hantavirus Pulmonary Syndrome and present a potential threat to human health. The disease is transmitted by the inhalation of the aerosolized virus found in the feces and urine of rodents. Deer mice, known carriers of the virus, are present on Fort Carson and the PCMS. Personnel who work around mice and mice droppings must take precautions before cleaning up droppings or removing dead mice. Further information on this disease and means to prevent it are in Appendix I of the Integrated Pest Management Plan (7th ID and Fort Carson, 2001a). Fort Carson coordinated a major study by Colorado State University of rodents and the prevalence and transmission of hantavirus at the PCMS (DECAM 2000a).

The DECAM does not monitor hantavirus. However, precautions are taken to protect field crews and personnel working or temporarily housed at sites where the disease could be present.

West Nile Virus
West Nile Virus is maintained in an enzootic cycle that involves mosquitoes of the genus *Culex* and birds or most recently horses. Both encephalitis (inflammation of the spinal cord and brain) and meningitis (infection of any of the membranes that surround the brain or spinal cord) are the most frequently reported symptoms in severe cases of West Nile Virus.

Control strategies include reducing mosquito populations by draining impoundments that provide breeding sites, timely applications of larvicides, and education of personnel. Educational pamphlets provided to Fort Carson personnel stress avoiding locations that harbor mosquitoes, limiting the time outdoors when mosquitoes are most active, wearing long-sleeved shirts and pants, using properly installed window screens to exclude mosquitoes from homes and buildings, and the prudent use of personal insect repellents. Repellents with DEET (N,Ndiethyl-3-methylbenzamide) has been shown to be an affective against mosquitoes. Products with at least 20% DEET are recommended. Permethrin, an insect repellent, which been approved by the Environmental Protection Agency and the Armed Forces Pest Management Board, is affective if applied to clothing and other fabrics. Permethrin is not intended to be applied directly to the skin.

In September 2002 an American Crow (*Corvus brachyrhynchos*) found dead in the Cantonment Area of Fort Carson was found to have died of West Nile Virus. Preventive Medicine and Pest Management monitored and managed the virus using mosquito traps, larvicides, and the testing of dead birds. The virus quickly spread (as it did throughout most of Colorado). The virus apparently peaked in 2003 on Fort Carson, based on analyses of dead birds.

Avian Influenza
Avian flu[32] is a disease caused by a virus that infects domestic poultry and wild birds (primarily geese, ducks and shorebirds). Each year, there is a bird flu season just as there is for humans and, as with people, some forms of the flu are worse than others.

Avian flu strains are divided into two groups based on the pathogenicity of the virus—the ability of the virus to produce disease.

Low Pathogenicity Avian Influenza: Most avian flu strains are classified as low pathogenicity and cause few clinical signs in infected birds. These generally do not pose a significant health threat to humans. However, two strains, H5 and H7 strains, can mutate into highly pathogenic forms.
High Pathogenicity Avian Influenza: This type of avian influenza is frequently fatal to birds and easily transmissible between susceptible species. The strain that is currently of concern in Asia, Europe, the Middle East and Africa is the H5N1 highly pathogenic strain.

Currently, the highly pathogenic strain of H5N1 avian influenza is not present in the United States. It is possible that the highly pathogenic strain of H5N1 avian influenza will spread to this country, and the U.S. Government is taking steps to prepare for and minimize the potential impact of the occurrence of this disease in the U.S..

Fort Carson would respond to avian flu outbreaks as part of a coordinated effort with other agencies should this disease spread to the U.S. and particularly the area near Fort Carson or PCMS.

4.11.4 Proposed Management

Project: General Fish and Wildlife Management
Justification: Stewardship; improvement of quality of life; human health protection; support of national initiatives; indirect and direct support of Endangered Species Act, the Sikes Act, Migratory Bird Treaty Act, Executive Order 13186, and other federal/state laws; mitigation of military mission; and support of other agencies' projects
Funding Priority: Class 0
Project Timing: Objectives 13 and 27 – by 2011; all other objectives - ongoing indefinitely or annually.
Regulatory Coordination: CDOW; USFWS if birds protected under the Migratory Bird Treaty Act are affected or federal-listed species are affected, which could require Section 7 consultation

Sustainability Goal. Sustain training land health to prevent federal or state listing of species found on the Installation or prevent listing of critical habitat.

Goal 1. Manage game species populations in collaboration with the CDOW and the USFWS.

[32] Avian flu information was taken from a fact sheet produced by the USFWS in Spring 2006 and distributed via e-mail to the DoD Partners in Flight program.

Goal 2. Identify gaps in knowledge of species occurrences and distribution on Fort Carson and the PCMS.

Goal 3. Integrate species and habitat management within the context of the military mission and conservation priorities defined by state, federal and Army laws and regulations, executive orders, and conservation organizations.

Goal 4. Provide for public safety and health and mitigate and prevent property damage by nuisance wildlife and/or wildlife diseases, including chronic wasting disease, on Fort Carson and the PCMS.

Objective 1. Maintain membership in the Arkansas River Habitat Partnership Program.

Objective 2. Annually inspect 20% of existing guzzler structures and maintain as required.

Objective 3. Maintain programs on Fort Carson and the PCMS that meet requirements for certification by the Wildlife Habitat Council.

Objective 4. Conduct aerial elk and deer surveys annually on Fort Carson and a pronghorn survey on PCMS. Determine future survey intervals and data needs based on review of results of these surveys and the species management status of the CDOW.

Objective 5. Collect and summarize into reports hunting-related statistics (*e.g*., harvest, hunter effort) to monitor harvest trends of game species and develop harvest strategies in conjunction with the CDOW.

Objective 6. Support CDOW game species monitoring projects, *i.e*. bighorn sheep counts, consistent with available personnel and resources.

Objective 7. Meet annually with the CDOW for the purpose of establishing harvest objectives and season structures for Fort Carson and the PCMS.

Objective 8. Maintain cold water fisheries program on Fort Carson consistent with available water and funds. Purchase hatchery fish to maintain the program March through September. Preferrably stock only salmonids that are whirling disease free; others identified as suitable for Fort Carson's waters, through consultation with the USFWS and CDOW, may also be stocked.

Objective 9. Repair and maintain fishing piers and signs at fishing reservoirs; repair and maintain handicap access ramps at Small Bird and Womack reservoirs.

Objective 10. Maintain water levels in fishing reservoirs as required to support the sport fishing program and other forms of wildlife recreation.

Objective 11. Continue to prohibit angling at PCMS to protect native small fishes in the Purgatory River drainage.

Objective 12. Conduct amphibian surveys on Fort Carson; inventory 20% of the Installation annually, subject to availability of funds.

Objective 13. Conduct surveys for the triploid checkered whiptail on the PCMS by 2011.

Objective 14. Support pronghorn-coyote research at the PCMS proposed to begin FY07.

Objective 15. Cooperate with CDOW efforts to educate hunters and the general public on chronic wasting disease and efforts to monitor for the disease on Fort Carson and the PCMS; provide written information to hunters at Fort Carson and the PCMS, to include the latest information regarding the disease, precautions for handling carcasses, and disease testing.

Objective 16. Maintain ongoing chronic wasting disease surveillance program, in conjunction with the CDOW.

Objective 17. Increase hunter compliance with specimen collection requirement.

Objective 18. Incorporate data collection related to the plague as part of the annual prairie dog surveys.

Objective 19. Notify Fort Carson Preventative Medicine of suspected plague sites that potentially threaten public health.

Objective 20. Submit samples, if available, to El Paso County Health Department for plague testing.

Objective 21. Educate the public about chronic wasting disease and plague.

Objective 22. Ensure DECAM personnel and others who may come into contact with deer mice are aware of the dangers of hantavirus and precautions pertinent to prevention of exposure.

Objective 23. Educate the public about wildlife issues, *e*.g., chronic wasting disease, through the *Mountaineer* and wildlife education programs.

Objective 24. Disseminate (1) information on West Nile Virus to Fort Carson residents and workers, (2) identify and disseminate methods for reducing the potential of contracting West Nile Virus, (3) disseminate information about reporting possible cases on West Nile Virus, and (4) collect and transport dead birds, especially corvids suspected of having West Nile Virus, to officials at the El Paso County Department of Health.

Objective 25. Support national and regional wildlife initiatives by providing species information to government agencies and non-governmental conservation organizations and participating in workshops, working groups, and recovery teams.

Objective 26. Mitigate impacts to habitat by military training activities using education and awareness (also see Section 5.1.4, *Sustainable Range Awareness*); locating and identifying in the field important habitat sites, such as nesting, roosting, and breeding sites; and monitoring impacts to identify areas for rehabilitation and/or rest.

Objective 27. Complete an inspection of known locations that have the possibility of supporting maternal roosts for any bat species by 2011.

Objective 28. Explore establishing a partnership with Ducks Unlimited to create wetlands in Bird Farm reservoirs no longer used for sport fishing. The purpose of the partnership is to establish habitat condidtions beneficial to nesting and migrating waterfowl and amphibians.

Objective 29. Review the current distribution of sources available to wildlife downrange and evaluate potential development of these to benefit wildlife. Purchase and install wildlife guzzlers in areas lacking water developments to mitigate movements of big game species forced to move because of military training. Partner with organizations and the CDOW to assist in the purchasing, placement, and repair of guzzlers.

Objective 30. Establish food plots composed of native forbs and grasses and dry-land grains at various locations on Fort Carson. Partner with the CDOW to assist in species selection and location selection.

Objective 31. Inter-seed cool season grasses for elk forage production at various locations on Fort Carson. High priority sites are grasslands adjacent to pinion-juniper woodlands damaged by training or drought. Partner with the CDOW to assist in species selection and location selection.

4.12 Rare and Listed Species Management

The rare and listed species management program on Fort Carson and the PCMS is a proactive program, whereby on-going surveys and management strive to avert conflicts between protected species and the military training mission. The general philosophy is to cooperate proactively and aggressively with the USFWS and the CDOW in identifying, documenting, and mitigating potential impacts prior to the development of a known or potential issue or problem.

4.12.1 Federal-listed Species

4.12.1.1 Current Conditions

Neither Fort Carson nor PCMS have any known federal-listed plant species. The following federal-listed species are known or potentially occur on one or both Installations.

Greenback Cutthroat Trout

The greenback cutthroat trout, federal-listed as Threatened (Colorado-listed as Threatened), is the only native trout in the South Platte River and Arkansas River drainages. It was introduced into Lytle Pond in the Turkey Creek Protected Species Area. The Turkey Creek population was one of the first recovery efforts for this species by the USFWS within the Arkansas River drainage. Greenbacks are no longer present in Lytle Pond, with eggs and young fish not transferred for over 10 years.

Although the Fort Carson greenback project at Lytle Pond was instrumental in securing a future for the trout in the early stages of the recovery process, the program was disbanded due to availability of larger sites within the Arkansas River drainage. In 1988 the USFWS introduced greenbacks into Townsend Reservoir as an experimental put-and-take fishery species. This species does not occur on the PCMS.

Arkansas Darter

The Arkansas darter, federal-listed as a Candidate species and Colorado-listed as Threatened, was introduced into Lytle Pond in 1980. They have done well and have been stocked into springs in Training Areas 5, 8, 21, 33, 38, and the Small Impact Area on Fort Carson. A population established itself in a perennial portion of Turkey Creek, probably as a result of a flood event at Lytle pond. Fort Carson is actively

involved with state recovery efforts for this species by providing darters to the CDOW for transplanting elsewhere in the Arkansas River drainage. This species does not occur on the PCMS.

Bald Eagle

The Bald Eagle, federal-listed as Threatened, is an uncommon winter resident (late October through late February). Most records are from the northern region of the installation, probably because of the presence of several prairie dog colonies in the Cantonment and the Small Arms Impact Range and along Fountain Creek east of the installation. A winter roost probably exists on Fountain Creek east of Fort Carson, but the location is unknown. The Bald Eagle was not found during a complete survey for nesting raptors conducted on Fort Carson during the 1982 and 1983 breeding seasons. The density of Bald Eagles probably increases during big game hunting seasons on Fort Carson and the PCMS, scavenging viscera left by hunters. The Bald Eagle does not nest on Fort Carson or within its region of influence. It has never been seen on Fort Carson during the breeding season.

On the PCMS, Bald Eagles are winter residents and migrants, primarily using the southwestern grassland area. No evidence of active eyries was found through 1991 (Andersen and Rosenlund 1991). The Bald Eagle Protection Act specifically protects the Bald Eagle.

Mexican Spotted Owl

The Mexican Spotted Owl is federal-listed as threatened, and the State of Colorado also lists it as threatened. On Fort Carson, it is only known as a winter resident in the rugged canyons on Booth and Timber mountains. Training Areas where this species is probably most likely to be encountered are 38, 39, and 45, in the southern half of the installation. The Mexican Spotted Owl is not known to occur on the PCMS.

More detailed information on the Mexican Spotted Owl and its management is available in the *Biological Assessment and Management Plan for the Mexican Spotted Owl on Fort Carson* (Gene Stout and Associates 2002b). Natural threats to this species on Fort Carson are habitat loss resulting from catastrophic wildland fire and predation by larger birds of prey. Human threats that are potentially important are off-road military maneuvers, large concentrations of dismounted troops or bivouacking near diurnal roost trees, birding, and falconry. Johnson and Reynolds (1997) studied the responses of Mexican Spotted Owls to Colorado Air National Guard over flights, and they (Johnson and Reynolds 1998) reported on the general distribution, habitat, and ecology of the species in Colorado. Both studies were supported by Fort Carson and the Colorado Air National Guard. Bunn *et al.* (1996) studied home range, habitat use, and effects of training on a radio-tagged Mexican Spotted Owl that wintered on Fort Carson.

Potential Federal-listed Species

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*), federal- and state-listed as threatened, potentially occurs on Fort Carson. Surveys conducted in 1995 and 1996 (Bunn *et al*. 1995, Bunn 1996), totaling 10,825 trap nights, did not find evidence that this species occurs on the Installation. Although historic records indicate the species was once found as far south as the Broadmoore (near the north boundary of Fort Carson), this species is not currently known to occur in significant numbers south of the Air Force Academy.

The black-footed ferret (*Mustela nigripes*), federal- and state-listed as endangered, is not currently known to occur on Fort Carson or PCMS. Surveys for the ferret were conducted in the late 1970s on Fort Carson. PCMS was considered for a future release site for black-footed ferrets, but due to the limited acreage and distribution of prairie dog colonies on the installation, the program is currently suspended.

Ute's ladies tresses (*Spiranthes diluvialis*, federal-listed as Threatened) have the potential to exist on Fort Carson, but none have been found (Douglas *et al*. 1995). No federal-listed (Endangered, Threatened, or Candidate) plant species are known to occur on Fort Carson (DECAM 2000b).

4.12.1.2 Current Management

AR 200-3 (Department of the Army 1995a) states (Section 11-2(a-e)) that the Army has five primary requirements under the Endangered Species Act:

1) to conserve listed species,
2) not to "jeopardize" listed species,
3) to "consult" and "confer",
4) to conduct a biological assessment, and
5) not to "take" listed fish and wildlife species or to remove or destroy listed plant species.

Fort Carson is committed to these five primary requirements.

Fort Carson is committed to accomplishing all goals and objectives designed to meet the intent and purposes of the Endangered Species Act. Personnel at all levels are aware that mission requirements must be accomplished in harmony with requirements of this Act. Mission requirements cannot justify actions violating this law, and all land uses, including military training, testing, recreation, etc. are subject to requirements of this Act for the protection of listed species and their habitats. The key to successfully balancing mission requirements and the conservation of listed species is long-term planning and effective management to prevent conflicts between these competing interests.

Fort Carson routinely seeks informal USFWS review of installation plans and/or designs. If there is any question whether an action may affect a listed species or its habitats, Fort Carson informally consults with the USFWS to determine the need for formal consultation. Fort Carson recognizes that working closely and cooperatively with the USFWS through informal consultation to develop mutually satisfactory courses of action is not only in the Army's best interest but is also in the best interest of protected species.

It is a Fort Carson goal to conserve biological diversity on its lands relative to the accomplishment of its mission. Natural ecosystems play a vital role in maintaining a healthy environment, and training realism, which can best be accomplished by protecting the biological diversity of natural organisms and the ecological process that they perform and of which they are a part. Conserving biological diversity minimizes the number of species that must be protected as threatened and endangered.

4.12.1.2.1 Biological Assessments/Endangered Species Management Plans

Fort Carson has been preparing combined biological assessments (BA)/endangered species management plans (ESMP) for listed and proposed species on Fort Carson and/or the PCMS, including areas used by tenant organizations. Preparation and researching of BA/ESMPs are given first priority relative to endangered species management on Fort Carson and the PCMS. Examples of combined BA/ESMPs are those prepared by Fort Carson for the Mountain Plover (Gene Stout and Associates 2002a), Mexican Spotted Owl (Gene Stout and Associates 2002b), and black-tailed prairie dog (Bunn 2004).

BA/ESMPs may be combined for more than one species, provided that the combined plans satisfy requirements listed below. This INRMP is the implementing document for ESMPs and all relative

cooperative plans. Commitments for action on the part of Fort Carson within subsequent BA/ESMPs will take precedence over provisions of this INRMP if they are in conflict.

BA/ESMPs will prescribe specific measures to meet Fort Carson conservation goals for the subject species. BA/ESMPs will be consistent with Department of Army Endangered Species Management Guidelines or other guidance on the subject species or habitat, unless the USFWS requires otherwise. At a minimum, installation ESMPs will include:

- objective, measurable criteria which, when met, would meet Fort Carson conservation goals for the listed species, established in consultation with the USFWS, and milestones for achieving the goals;
- specific management guidelines and actions necessary to meet Fort Carson conservation goals for the species;
- information on the species and associated habitat distribution and the size of the installation's population;
- a long-term inventory and monitoring plan;
- estimates of the time, cost, and personnel needed to carry out measures needed to achieve conservation goals;
- a checklist for use by those monitoring installation compliance with BA/ESMPs, which identifies actions, tasks, and steps required to effectively implement BA/ESMPs over their projected life; objective milestones for achieving conservation goals; and primary conservation measures specified in BA/ESMPs; and
- means to prevent impacts resulting in a potential legal take, resulting from Army activities.

4.12.1.2.2 Critical Habitat

The National Defense Authorization Act of 2004 states that, "*The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation*. Based on this, the USFWS has determined that, where applicable, federal critical habitat designation is not warranted if the INRMP includes the following three criteria.

1. The plan provides a conservation benefit to the species. Cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan [*i.e.*, those areas deemed essential to the conservation of the species]. A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, ensuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

Response: Flora and fauna inventory, habitat management, wildlife population management, federal-listed species protection, and numerous other projects discussed in this INRMP will provide a cumulative conservation benefit to the species.

2. The plan provides certainty that the management plan will be implemented. Persons charged with plan implementation are capable of accomplishing objectives of the management plan and have adequate

funding for the management plan. They have the authority to implement the plan and have obtained all necessary authorizations or approvals. An implementation schedule (including completion dates) for the conservation effort is provided in the plan.

Response: The Fort Carson Garrison Commander has the authority to implement the INRMP, which will be accomplished by the DECAM staff, as scheduled (Appendix 7.3) and budgeted (Section 7.4, *Implementation Funding Options* and Section 7.5, *INRMP Implementation Costs*).

3. The plan provides certainty that the conservation effort will be effective. The following criteria will be considered when determining the effectiveness of the conservation effort. The plan includes (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for these parameters by which progress will be measured are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided; and (5) a duration sufficient to implement the plan and achieve benefits of its goals and objectives.

Response: Goals, objectives, and long-term ecosystem needs, based on land use sustainability for the Fort Carson mission, have been analyzed and considered extensively in collaboration with persons contacted while preparing this INRMP. Goals and objectives are defined for the INRMP as a whole (Section 1.2) and for each individual project within the INRMP (chapters 4, 5, and 7, as summarized in Appendix 7.3). The INRMP will be evaluated through monitoring programs, including the Environmental Performance Assessment System (internal by the DECAM every 18 months and via U.S. Army Installation Management Command every three years), the Environmental Quality Report, and reviews by other interested parties. The Installation Status Report, Part II is a mechanism by which the performance of the environmental program (including natural resources management) is evaluated by the Garrison Commander. When the USFWS issues new biological opinions, this INRMP will be adjusted, as needed, to implement requirements of those biological opinions.

4.12.1.2.3 National Environmental Policy Act

NEPA, implemented by AR 200-2 (Department of the Army 2002), applies to actions taken in managing listed and proposed species. Consultation under Section 7 of the Endangered Species Act does not replace NEPA requirements. In preparing and staffing BA/ESMPs, proponents ensure that they satisfy NEPA requirements. Proponents normally prepare environmental assessments for activities, including developing BA/ESMPs that affect federal- or state-listed or proposed species (AR 200-2). NEPA requires an environmental impact statement if an ESMP will significantly affect a listed or proposed species, critical habitat or proposed critical habitat, or the human environment (AR 200-2). To avoid unnecessary delay, proponents should provide complete NEPA documentation for early inclusion with recommendations or reports on ESMPs.

4.12.1.2.4 Major Construction Activities

For major construction activities or other activities having similar physical impacts on the environment, the Endangered Species Act requires Fort Carson to request concurrence on a submitted list of proposed and listed species that may be present in the action area or to request such a list from the USFWS. The USFWS has 30 days in which to concur with the submitted list or provide the requested list.

If a listed species or critical habitat may be present in the action area, Fort Carson must begin a biological assessment within 90 days of receipt of the list to avoid having to revalidate the species list with the USFWS before commencing the biological assessment. Fort Carson must complete the biological assessment with a determination of effect within 180 days unless a different period is agreed to by the USFWS. If Fort Carson determines that a listed species or its associated habitat does not occur or does not have the potential to occur in the action area and the USFWS concurs in the determination, a biological assessment is not required, and the consultation process ends.

If a proposed species and/or associated critical habitat occurs or has the potential to occur in the action area, Fort Carson must confer with the USFWS if the action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. Once the biological assessment process begins, Fort Carson may not enter into any contract for construction or begin construction before it completes the biological assessment, and if required, formal consultation.

4.12.1.2.5 Awareness Training Program

The DECAM has established a mandatory on-going training program for personnel who may have contact with listed or proposed species and/or associated critical habitat. This training program will be accomplished through the Sustainable Range Awareness component of the ITAM program (Section 5.1.4) and the Conservation Awareness program (Section 5.3) and will address the following topics:

- identification of listed species and markings that identify restricted areas;
- actions necessary to avoid injury to listed species and the associated habitat;
- relevant and applicable requirements of the Endangered Species Act and applicable regulations;
- the importance of protecting listed species and biological diversity; and
- Army policy that mission accomplishment must be consistent with the conservation of listed species and critical habitats.

4.12.1.2.6 Inventory

Identifying and documenting the location of listed, proposed, and candidate species on Fort Carson and the PCMS are crucial to effectively balance mission and conservation requirements. There is no reason to suspect that unknown populations of currently federal-listed species exist at Fort Carson or the PCMS.

4.12.1.2.7 Reintroduction and Introduction of Listed, Proposed, and Candidate Species

Fort Carson will support the reintroduction and introduction of federal- and state-listed, proposed, and candidate species on Fort Carson and the PCMS, unless military training activities would be adversely affected. Reintroduction or introduction onto Fort Carson or the PCMS will not occur without a thorough assessment of the impact on the environment, mission requirements, and the cost/benefits of the proposed action. Prior to reintroduction or introduction, the DECAM will obtain the approval of the USFWS, CDOW, Installation Management Agency, and Headquarters, Department of Army.

4.12.1.2.8 Federal-listed Species Management

A management plan (Section 4.12.1.2.1, *Biological Assessments/Endangered Species Management Plans*) either has been or will be prepared for each federal-listed species on Fort Carson and/or the PCMS. Below are species-specific management objectives.

Greenback Cutthroat Trout

Fort Carson is located at the eastern edge of the native historical distribution of the Greenback Cutthroat Trout, and greenbacks have been introduced into Lytle, Duck, and Little Turkey Creek ponds as well as into a perennial portion of Turkey Creek.

In 1979 the U.S. Army constructed Lytle Pond (approximately 1.0 surface acre) in a 15-acre wildlife set-aside area in the northwestern corner of the intersection of routes 9 and 11 and developed a 120-meter long, spring-fed spawning and nursery stream connecting the spring and pond. In 1981, 40 greenbacks from Cascade Creek were introduced into Lytle Pond. By 1985 a successful spawning population was established. To maintain genetic diversity in the Lytle Pond greenbacks, an additional 50 Cascade Creek greenbacks from McAlpine Pond were introduced into Lytle Pond in 1985. Greenback cutthroat trout in Lytle pond have attained sizes larger than was previously thought possible, primarily due to the relatively constant water temperature and the abundance of aquatic invertebrates.

The first Arkansas River catch-and-release, greenback cutthroat trout fisheries (and only urban reproducing greenback fishery) opened at Lytle Pond in 1989. Lytle Pond remained open to 25 permitted anglers until 2000, when the quality of Lytle Pond became degraded due to beaver modifications to the habitat in the spring area. Greenbacks had spawned in the spring area upstream form Lytle Pond. Possibly a result of some modifications to Lytle Spring and a campaign to rid the stream of beaver activity, two greenbacks that may have been trying to spawn were observed in the spring of 2001 (personal communication Bobby Day). This fishing program may be re-initiated in the future.

In 1985 greenbacks were introduced into Duck Pond (1.34 surface acres) in Training Area 21. Duck Pond is approximately one mile downstream from Lytle Pond and is connected to Lytle Pond by an underground pipeline. Both Duck and Little Turkey Creek ponds no longer have greenbacks. Irregular water delivery, siltation, and beaver activity have altered these ponds to a condition of being no longer suitable as trout habitat. Due to the inconsistency of Duck Pond's ability to hold water, a significant project to improve the water delivery system was accomplished in 1993.

Mitigation required to meet Fort Carson's conservation responsibilities includes the designation of a no military training buffer zone around each greenback pond and maintenance of a no digging zone near the underground pipeline connecting Lytle and Duck ponds. The total land area designated as buffers zones and removed from training is approximately 20 acres. Digging near the pipeline must be coordinated with the DECAM Wildlife Office as required in the Range 127 Environmental Assessment. The duration of military training restrictions at the ponds is indefinite. Although the USFWS does not have authority to make exemptions to the Endangered Species Act, USFWS representatives stated that if Fort Carson mission requirements require the recovery of the land currently allocated as a greenback refugium, the fish could be moved to another site without negatively impacting recovery goals or the species (Letter from Bruce Rosenlund (USFWS) to Tim Prior (Fort Carson), 30 July 1979). Recovery of land allocated to the trout by Fort Carson would require formal consultation, as required in Section 7 of the Endangered Species Act.

Primary conservation activities associated with management of this species are protection from mission impacts, water and habitat management, and law enforcement. Fort Carson's conservation goals are designed to protect the population of greenbacks in Lytle Pond and to maintain habitat conditions conducive to supporting a reproducing greenback population in Lytle Pond. Greenbacks or eggs from Lytle Pond are available for restoration projects in the Arkansas River drainage.

Although the Fort Carson greenback project at Lytle Pond was instrumental in securing a future for the trout in the early stages of species recovery, its importance to the recovery of the species has diminished (Bruce Rosenlund personal communication). Due to limited recruitment, Fort Carson's greenbacks are not counted as one of the 20 stable greenback populations required for delisting the species. The causes for limited recruitment in Lytle Pond are related to the small size of the pond, limited spawning substrate, and predation by birds and mammals. Although not essential to the delisting process, Fort Carson's greenbacks were important as a small brood stock refugium and for experimental fishing programs (Bruce Rosenlund personal communication).

Although no greenback cutthroat trout are currently present in Lytle Pond following dam repairs in 2006, the DECAM plans to maintain Lytle Pond as a brood stock refugium for native fish species. Spawn or fry from these ponds would be available to the CDOW and the USFWS for restoration projects elsewhere in the Arkansas River drainage.

Arkansas Darter

In 1980 Arkansas darters were caught adjacent to Fountain Creek near the town of Fountain Colorado and introduced to Lytle Pond on Fort Carson. During the late 1980s and early 1990s, surplus darters from Lytle Pond were transplanted into Cottonwood Spring, Turkey Spring, Duck Pond, Golf Course East Pond, Mary Ellen Ranch Spring, Route 8 Stock Tank, and Little Spring. Since the relocations, Arkansas darters have also been introduced into the Small Arms Impact Area Pond and at the confluence of Orchard Canyon and Turkey Creek. Subsequent surveys during the late 1990s have shown that darters have adapted to their relocation sites in all but the Route 8 Stock Tank. Each relocation site has slow-moving, spring-fed waters, an abundance of watercress, and an absence of predatory fish species, a combination that seems attractive to Arkansas darters. A population established itself in a perennial portion of Turkey Creek, probably as a result of a flood event at Lytle Pond.

Species that are candidates for federal listing as threatened or endangered are not protected under the Endangered Species Act. Because candidate species may be listed in the future, Fort Carson considers them in making decisions that may affect them.

No management practices appear necessary in most ponds. Beavers have altered the habitat reducing the amount of watercress in Lytle Spring. A large amount of silt has been added to areas used by darters. Management of the spring has included beaver control and removing some of the silt. It is unknown what effects beavers have to the darter population at Lytle Spring. Arkansas darters are described as a 'boom or bust' species, so beaver control should assist the habitat returning and with it the continuation of Arkansas darters flourishing there. The CDOW is using Fort Carson stock for transplanting into suitable waters off-Post to help the recovery of the species.

Bald Eagle

There are no training restrictions associated with the management of the Bald Eagle. Primary conservation activities associated with this species are actions reducing the risk of secondary poisoning. Prairie dogs, major prey of the Bald Eagle in winter, are sometimes killed with fumatoxin (active ingredient - aluminum phosphide), which combines with moisture in the soil to emit carbon dioxide. This restricted use of pesticides prevents ingestion of contaminated prey, which could result in the death of a Bald Eagle. Bald Eagles are also susceptible to electrocution by power lines/poles on Fort Carson, as evidenced by the loss of Golden Eagles to electrocution along Route 1 and Route 8.

Mexican Spotted Owl
The *Biological Assessment and Management Plan for the Mexican Spotted Owl on Fort Carson* (Gene Stout and Associates 2002b) has the following goal and objectives:

Goal. Protect and enhance Mexican Spotted Owl populations and habitat in accordance with the Endangered Species Act, as amended (16 USC 1531 *et seq*.).

Objective 1. Protect Mexican Spotted Owls when on Fort Carson.

Task 1.1: Restrict military training activities, in coordination with G-3/DPTM, that pose risks to Mexican Spotted Owls and associated habitat.

- *Schedule Training:* As necessary, schedule intensive training activities (*e.g.*, off-road vehicular traffic, bivouac) to avoid impacts to winter roosting Mexican Spotted Owls during November 15 - February 28. Schedule training activities, as necessary that could disturb owls in ranges and Training Areas that do not have owl habitat. Low intensive training (*e*.g., small unit dismounted activities, foot patrol) would not be affected by these scheduling changes.

Task 1.2: Restrict recreational activities that pose risks to Mexican Spotted Owls.

- *Access Control:* During the winter season when Mexican Spotted Owls are likely to occur (November 15 - February 28) control access by recreational and other non-military users to activities that will not impact winter roosting owls. Falconry will not be permitted in Training Areas 38, 39, and 45. Hunting will be permitted unless it is demonstrated to be a significant risk to Mexican Spotted Owls. Birding that may affect Mexican Spotted Owls will not be permitted in Training Areas 38, 39, and 45.

Objective 2. Protect sites and habitats used by Mexican Spotted Owls on Fort Carson.

Task 2.1: Mitigate negative effects to Mexican Spotted Owls from military training.

- *Monitor effectiveness of mitigation*: After 1 March each year (end of winter season), DECAM personnel will monitor the buffer zone to ensure roost sites and associated buffer zones have not been disturbed.

Task 2.2: Mitigate negative effects to Mexican Spotted Owls from other Army-sanctioned activities.

- *Mitigation*: Mitigation efforts for military training (Task 2.1) will also serve to mitigate effects from other Army-sanctioned activities.

Objective 3. Implement strategies to mitigate negative effects to Mexican Spotted Owl from wildfire and natural catastrophic events.

Task 3.1: Suppress wildfires in Mexican Spotted Owl management areas.

- *Suppress wildfires in TA 38, TA 39, and TA 45, Multi-Purpose Range Complex, and ranges 143, 145, and 147:* All wildfires on TA 38, 39, and 45; the Multi-Purpose Range Complex; and ranges

143, 145, and 147 are suppressed on a high priority basis. If a fire starts, Fort Carson Fire Department dispatch is called. The closest fire crew is at Turkey Creek Ranch; the response time is approximately 40 minutes. When military units are on site, initial suppression efforts may be initiated by subject unit, as deemed necessary, safe and effective.

- *Suppress wildfires on Airburst Range 123 Safety Fan*: If a fire starts on the Airburst Range, Air Force National Guard personnel, along with some civilians, respond. The Airburst Range crew uses a 1,500-gallon tender truck fight all fires. If the fire grows larger than 2-4 hectares/5-10 acres, the Fort Carson Fire Department is called to assist.
- *Suppress wildfires on Booth Mountain and Timber Mountain*: All wildfires on Booth Mountain and Timber Mountain are suppressed with immediate response year-round.

Objective 4. Monitor Mexican Spotted Owl populations on Fort Carson.

Task 4.1: Monitor Mexican Spotted Owl populations.

- *Monitor Mexican Spotted Owls*: Coordinate with the USFWS to establish monitoring protocols of Mexican Spotted Owls that are known to be on post. Cooperate with other Mexican Spotted Owl monitoring programs that may occasionally involve Fort Carson lands.
- *Use monitoring as a tool for adaptive management*: Use monitoring to assess the effectiveness of mitigation and other management actions over time (see Task 2.1). This will include annual winter monitoring.

Task 4.2: Support research on the Mexican Spotted Owl.

- *Use research as a tool for adaptive management*: As the need arises, use research projects to assess the effectiveness of mitigation and other management actions over time.

As outlined in Section 4.6, *Fire Management*, Fort Carson intends to prescribe burn a buffer zone between Booth Mountain and ranges to keep military mission-related fires from entering habitat for the Mexican Spotted Owl.

4.12.1.3 Proposed Management

Project: Federal-listed Species Management
Justification: Endangered Species Act, stewardship
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely or annually.
Regulatory Coordination: USFWS

Performance Goal. Achieve 100% compliance with requirements of the Endangered Species Act, to include jeopardy opinions issued by the USFWS.

Sustainability Goal. Reduce encroachment risk to military readiness by minimizing seasonal and year-round training deferments resulting from endangered species conflicts.

Goal 1. Ensure no jeopardy opinions are issued to Fort Carson by the USFWS due to Army actions that would be expected to directly or indirectly reduce the survival or recovery of a listed species.

Goal 2. Protect and enhance federal-listed wildlife species and associated habitat, in compliance with the Endangered Species Act.

Goal 3. Sustain training land health to prevent federal- or state-listing of species found on the Installation and prevent listing of critical habitat.

Objective 1. Maintain a federal-listed animal and plant species list for Fort Carson and the PCMS.

Objective 2. Consult and confer with the USFWS regarding endangered species issues for Fort Carson and the PCMS; coordinate listed species mitigation with DECAM, other directorates, and military trainers.

Objective 3. Develop, as required, and implement ESMP/BAs for federal-listed species, using Section 7 consultation with the USFWS.

Objective 4. Proactively and solicit participation and involvement with the re-introduction of threatened or endangered species, when such involvement is beneficial to the designated species and does not interfere with the military training mission on Fort Carson or the PCMS.

Objective 5. Actively participate with other agencies in the management of federal-listed species.

Objective 6. If species that are federal-listed are found on Fort Carson or the PCMS or if species already known on Fort Carson or the PCMS become federal-listed, develop an inventory/monitoring program for these species in consultation with the USFWS.

Objective 7. Provide information to Range Control or other installation entities as needed to protect sensitive or listed species.

Objective 8. Assist the CDOW with recovery efforts for the Arkansas darter by trapping this species on Fort Carson for restocking projects. Assist the USFWS and CDOW with introductions of this species into new sites on Fort Carson.

Objective 9. Ensure that secondary poisoning from Army activities does not impact Bald Eagles on Fort Carson and the PCMS.

Objective 10. Notify the USFWS in the event of a Bald Eagle electrocution on Fort Carson or the PCMS.

Objective 11. Continue mapping and cataloging listed, proposed, and candidated species occurrence on the PCMS and Fort Carson.

Objective 12. As needed, provide technical assistance for wire/pole modifications to ensure that power lines on Fort Carson and the PCMS do not accidentally electrocute Bald Eagles (or other large raptors).

Objective 13. Survey known Mexican Spotted Owl wintering sites for signs of disturbance or habitat loss.

Objective 14. Represent Fort Carson in the Mexican Spotted Owl Southern Rocky Mountain Working Group, which requires attending 2-4 regional meetings per year.

Objective 15. Conduct Mexican Spotted Owl presence-absence surveys at potential nesting canyon sites on the PCMS.

Objective 16. Identify areas for prescribed burning to protect Mexican Spotted Owl wintering habitat; implement this burning.

Objective 17. Use GIS and spatial imagery to identify unknown potential wintering habitat for the Mexican Spotted Owl on Fort Carson.

4.12.2 Migratory Bird Treaty Act Compliance

4.12.2.1. Current Conditions

Approximately 300 species of birds protected by the Migratory Bird Treaty Act are known to occur on Fort Carson and the PCMS (appendices 4.12.1.2a and 4.12.1.2b).

4.12.2.2 Current Management

Protection for these species is mandated through the Migratory Bird Treaty Act, Executive Order 13186, and a USFWS proposed rule, as described in Section 1.4.4, *Migratory Bird Legal Instrumentalities*. The Fort Carson is dedicated to protecting migratory birds and their habitats on Fort Carson and the PCMS. Particular conservation emphasis will be directed toward protection of sensitive species of migratory birds and their habitats, which are identified as declining or sensitive species by the USFWS (Birds of Conservation Concern), the Colorado Natural Heritage Program (2005), and the Colorado Division of Wildlife (*i.e*., Northern Harrier, Swainson's Hawk, Ferruginous Hawk, Golden Eagle, Prairie Falcon, Mountain Plover, Burrowing Owl, Short-eared Owl, Lewis's Woodpecker, Williamson's Sapsucker, Gray Vireo, Pinyon Jay, Curve-billed Thrasher, Virginia's Warbler, Black-throated Gray Warbler, Cassin's Sparrow, Rufous-crowned Sparrow, and Lark Bunting).

Conservation of migratory bird species is through various DECAM natural resource programs. Additional emphasis on migratory bird conservation will be applied to project reviews and DECAM programs to ensure compliance with the Migratory Bird Treaty Act, which provides for protection against intentional and incidental take, and compliance with Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

Migratory Waterbirds and Waterfowl

Several species of waterbirds and waterfowl have nested in wetlands of Fort Carson, including the Pied-billed Grebe, Double-crested Cormorant, Canada Goose, Mallard, Blue-winged Teal, Cinnamon Teal, Canvasback, and American Coot. By prohibiting dog training and motorized boats (except boats equipped with electric trolling motors) at reservoirs where waterbirds are known to breed, threats to these species during the nesting season are mitigated.

Raptors

Twenty-seven species of hawks, eagles, and owls are known to occur on Fort Carson and the PCMS. Fifteen of these species are known to breed, and four of those are identified as sensitive or protected by the Endangered Species Act. Most raptorial species nesting on Fort Carson and the PCMS are associated with cliffs (Prairie Falcon), large lone trees (Ferruginous Hawk), riparian areas, and pinon-juniper woodland edges (Ferruginous Hawk). Threats to these species as a group are possible impacts from recreational pursuits, possible impacts by individuals who unintentionally flush an incubating or brooding

adult raptor from a nest and prevent the bird from returning to the nest by remaining in the area, secondary poisoning, and electrocution.

DECAM supported a long-term study of the Peregrine Falcon that revealed that although the Peregrine Falcon does not breed on Fort Carson, falcons nesting west of Fort Carson are known to make extensive use of the Installation during the summer breeding season (Enderson and Craig 1995, Enderson and Craig 1997). Approximately one-third of locations of radio-tagged adults were on Fort Carson. Although only general statements can be made regarding site use on the Installation, Enderson and Craig (1995) concluded that the falcons hunting on Fort Carson are attracted to the prey-rich riparian and cliff habitats on the Installation.

Public education regarding the sensitivity of these species to disturbance during the nesting season, combined with the law enforcement efforts of DECAM wildlife officers, will be the primary mitigation to protect nesting raptors on Fort Carson and the PCMS. The DECAM will continue to cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act. Enforcement efforts to protect eagles, hawks, and owls from unlawful take will continue to be a high priority law enforcement focus. The DECAM monitors incidental take by electrocutions and will provide recommendations to the DPW regarding power poles that are known to kill raptors. Implementation of this objective includes gathering data on raptor electrocutions on the Installation to identify raptor-killing poles and investigating methods to reduce the number of electrocutions on the Installation. Recommendations for reducing impacts of power lines on raptors can be found in Avian Power Line Interaction Committee (1996).

Because Peregrine Falcons are on Fort Carson daily during the breeding season, the possibility exists that pest management activities could result in the secondary poisoning of a Falcon or other raptor species. The Rock Dove, or common pigeon, a prey species of the Peregrine Falcon, is sometimes killed with chemical pesticides. Ingestion of contaminated prey could result in death by secondary poisoning. The USFWS has instructed Fort Carson not to use the pesticide Avitrol® (active ingredient - 4-Aminopyridine) to kill pest Rock Doves. Not using this chemical pesticide to control pigeons will also benefit the Prairie Falcon and potentially other bird eating raptors.

Bald and Golden eagles, the Burrowing Owl, and the Ferruginous Hawk are susceptible to secondary poisoning in prairie dog colonies. The prairie dog is an important food to these species, especially in winter. The application of any pesticide must consider the risk of secondary poisoning to these species. In the case of the Burrowing Owl, the effects of prairie dog removal on habitat may also be important.

Specific management activities for the Mexican Spotted Owl are found in Section 4.12.1 *Federal-listed Species*. Specific management activities for the Burrowing Owl are found in Section 4.12.3, *State-listed Species*.

General Avifauna

From 1990 through 1994 DECAM biologists conducted land bird surveys on 60 permanent belt transects at Fort Carson and the PCMS. These surveys were discontinued because the statistical power required to track populations between years was too low except for a few very common species. In 1993 (Bunn unpublished data) DECAM investigated sampling techniques and sample size for monitoring grassland birds and implemented a monitoring program with funds obtained from the Texas Regional Institute for Environmental Studies (Hughes *et a*l. 1996). Under this program, breeding land birds were surveyed

annually at 600 circular point counts points on the PCMS 1995-1997. The program was discontinued in 1998 due to a lack of funds.

The Monitoring Avian Productivity and Survivorship (MAPS) (DeSante *et al*. 2000) is a nationwide effort to monitor bird population dynamics. DECAM participated in the National Partners In Flight Program and operated a MAPS monitoring station from 1993 through 1998. The program was discontinued in 1998 due to a lack of funds.

In 1997 Fort Carson surveyed winter bird populations along Rock Creek at Fort Carson. In 1999 and 2000 wildlife personnel conducted sensitive bird species surveys in tall and mid-grass habitats. DECAM will continue to conduct sensitive bird species surveys annually in selected habitats depending on funding. Mid-grass prairie and cholla and saltbush shrublands are high priority habitats for surveys because of the number of declining species found in these habitats.

4.12.2.3 Proposed Management

Project: Migratory Bird Treaty Act Compliance
Justification: Compliance with Migratory Bird Treaty Act, Executive Order 13186, and a USFWS proposed rule; stewardship
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely
Regulatory Coordination: USFWS

Performance Goal. Zero infractions of the Migratory Bird Treaty Act based on inspections and reported violations.

Goal 1. Maintain compliance with current and future provisions of the Migratory Bird Treaty Act.

Goal 2. Reduce incidental take of migratory birds, particularly take not associated with military training.

Objective 1. Maintain a list of species protected by the Migratory Bird Treaty Act on Fort Carson and the PCMS.

Objective 2. Report raptor-killing poles to the DPW and provide and monitor mitigation efforts to reduce raptor electrocutions on Fort Carson and the PCMS.

Objective 3. Ensure that pest management programs and other government sanctioned actions do not inadvertently affect raptors and other protected species through direct or secondary poisoning.

Objective 4. Provide Soldier and public education regarding protected species, particularly installation employees likely to come in contact with protected species during operations.

Objective 5. Cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

Objective 6. Support bird surveys by the Rocky Mountain Bird Observatory on the PCMS as part of its multi-state grassland bird monitoring program.

4.12.3 State-listed Species

4.12.3.1 Current Conditions

Six state-listed species are known to occur on Fort Carson. The greenback cutthroat trout, Arkansas darter, Bald Eagle, and Mexican Spotted Owl are Colorado-listed, but their management is discussed in Section 4.12.1, *Federal-listed Species* due to their federal status. One state-listed vertebrate species is known to occur on the PCMS. No state-listed plant species is known to occur on Fort Carson or the PCMS. Appendices 4.11.2a and 4.11.2b list state-listed faunal species found on Fort Carson and the PCMS, respectively.

Southern Redbelly Dace

The southern redbelly dace, Colorado-listed as Endangered, has been introduced into Stone City Quarry Reservoir in Training Area 45 on Fort Carson and the Fort Carson Golf Course ponds. Fort Carson is actively involved with state recovery efforts for this species by providing dace to the CDOW for transplanting elsewhere in the Arkansas River drainage. In 2001 dace captured at Quarry Pond were transferred to the J.D. Mumma Native Aquatic Species Restoration Facility, in Alamosa, Co, where they were bred in captivity as part of a state-wide recovery effort (personal communication, Gary Dowler, CDOW Aquatic Biologist). Progeny of the Quarry Pond dace bred at the facility were recently released in the Arkansas River drainage. This species does not occur on the PCMS.

Burrowing Owl

The Burrowing Owl, Colorado-listed as Threatened, is an uncommon summer resident of Fort Carson and is known to have recently bred in Training Areas 3, 9, 10, 54. It is a common summer resident of the PCMS. Most observations of the Burrowing Owl are within black-tailed prairie dogs colonies, but they have occasionally been observed using and raising young at abandoned badger and swift fox dens. The potential distribution of Fort Carson and the PCMS is essentially the same as for the black-tailed prairie dog, but not in each town.

4.12.3.2 Current Management

Fort Carson is sensitive to those species listed as endangered or threatened under state law, but not federal-listed. Fort Carson will cooperate with state authorities to conserve these species. At a minimum, Fort Carson will document the distribution of these species and set forth agreed conservation measures.

Southern Redbelly Dace

Stone City Quarry Reservoir, an abandoned quarry at the extreme southern end of TA 45 became a pond after a natural spring filled it with water. Because of the absence of other fish species and its year-round permanent water, Southern redbelly dace, a Colorado-Endangered species, was introduced there from the Pueblo Depot by the DECAM and USFWS in the mid-1990s. By 1995 the population was well established. Fort Carson is actively involved with state recovery efforts for this species by providing dace to the CDOW for transplanting elsewhere in the Arkansas River drainage. In 2001 dace captured at Quarry Pond were transferred to the J.D. Mumma Native Aquatic Species Restoration Facility, in Alamosa, Co, where they were bred in captivity as part of a state-wide recovery effort (personal communication Gary Dowler, CDOW Aquatic Biologist). Progeny of the Quarry Pond dace bred at the facility were recently released in the Arkansas River drainage. This species does not occur on the PCMS.

Burrowing Owl
The Colorado-listed Burrowing Owl requires prairie dog burrows and associated habitat. Thus, management for the Burrowing Owl is the same as for the black-tailed prairie dog (Section 4.12.4, *Species of Special Concern*).

4.12.3.3 Proposed Management

Project: State-listed Species Management
Justification: Stewardship, support of the military mission
Funding Priority: Class 0
Project Timing: Objective 7 – by 2011, all other objectives - ongoing indefinitely or annually.
Regulatory Coordination: CDOW

Goal. Monitor and manage Colorado-listed species on Fort Carson and the PCMS to the degree possible with available funding.

Objective 1. Consider state-listed in all Fort Carson actions.

Objective 2. Whenever possible, use actions designed for federal-listed species to protect or manage state-listed species.

Objective 3. Maintain a list of state-listed for Fort Carson and the PCMS.

Objective 4. Actively participate with other agencies in the management of state-listed species.

Objective 5. If state-listed species are found on Fort Carson or the PCMS, develop an inventory/ monitoring program for these species, upon which to base management decisions.

Objective 6. Annually survey for breeding Burrowing Owls in known prairie dog colonies.

Objective 7. Investigate the potential for stocking southern redbelly dace into other suitable waters on Fort Carson, in coordination with CDOW and the USFWS by 2011.

Objective 8. Maintain a database of state-listed species locations and provide to Colorado Natural Heritage Program.

Objective 9. Continue to participate in a DoD Legacy project researching Burrowing Owls.

Objective 10. Continue mapping and cataloging state listed species occurrences on on the PCMS and Fort Carson.

4.12.4 Species of Special Concern
Species considered here are those identified as sensitive species, priority species, or species of special concern by the Colorado Division of Wildlife, the U.S. Fish and Wildlife Service (USFWS 2002), the Colorado Natural Heritage Program, or Colorado Partners in Flight (Partners in Flight 2000).

4.12.4.1 Current Conditions

4.12.4.1.1 Flora

Fort Carson
Ute's ladies tresses (*Spiranthes diluvialis*, federal-listed as Threatened) have the potential to exist on Fort Carson, but none have been found (Douglas *et al*. 1995). No federal-listed (Endangered, Threatened, or Candidate) plant species are known to occur on Fort Carson (DECAM 2000b). The following Colorado Species of Special Concern plants (DECAM 2000b, as updated) are either known or potentially occur on Fort Carson.

- Dwarf milkweed (*Ascepias uncialis*) - Confirmed in southeastern corner of Fort Carson (DECAM 2000b).
- Arkansas River feverfew (*Bolophyta tetraneuris*) - Large populations in southeastern and southwestern portions of Fort Carson (DECAM 2000b).
- Brandegee wild buckwheat (*Eriogonum brandegei*) - Searches of Morrison formations in 1995 found none (DECAM 2000b).
- Golden blazing star (*Mentzelia chrysantha*) - Common in southern and southwestern portions of Fort Carson (DECAM 2000b).
- Round-leaf four o'clock (*Oxybaphus rotundifolius*) - Large populations in southern portions of Fort Carson (DECAM 2000b).
- Degener penstemon (*Penstemon degeneri*) - 1995 searches found none (DECAM 2000b).
- Ute ladies' tresses (*Spiranthes diluvialis*) - Searches of wetlands in 1994 and 1995 found none, and 1995 and 1996 searches of Turkey Creek found none (Douglas *et al*. 1995). No historic records on Fort Carson.
- Pueblo goldenweed (*Onopsis puebloensis*) - Believed to occur on Fort Carson near its southern boundary.
- Twinevine (*Scarcoslema crispum* (Bentham) - S1; found in 2005.

PCMS
No federal-listed (Endangered, Threatened, or Candidate) plant species are known to occur on the PCMS. The following Colorado Species of Special Concern (as listed within the Colorado Natural Heritage Program) plants are either known or potentially occur on the PCMS (Canestorp 1997, DECAM 2000b, as updated).

- Southern maidenhair fern (*Adiantum capillus-veneris*) - Potential to be on the PCMS; has been found on adjacent Baca County; CNHP imperiled.
- Dwarf indigo amorpha (*Amorpha nana*) - Resident, CNHP imperiled; confirmed in Taylor and Spring canyons (DECAM 2000b).
- Sidecluster milkweed (*Asclepias oenotheroides*) - Potential to be on the PCMS; only Colorado collection was from near Troy, Mesa de Maya; CNHP critically imperiled.
- Dwarf milkweed (*Asclepias uncialis*) - Confirmed in 1990 collection near 'Sue site'; eight known populations now known (DECAM 2000b).
- Ebony spleenwort (*Asplenium platyneuron*) - Potential to be on the PCMS; CNHP critically imperiled.
- Eaton's lip fern (*Cheilanthes eatonii*) - Potential to be on the PCMS; found chiefly in Arkansas River drainage; CNHP imperiled.

- Giant helleborine (*Epipactis gigantea*) - Potential to be on the PCMS; found only in extreme western Colorado but has wide range; CNHP imperiled.
- Colorado green gentian (*Frasera coloradensis*) - Potential to be on the PCMS. None found during 1996 surveys (DECAM 2000b).
- Rayless goldenweed (*Haplopappus fremontii monocephalus*) - Resident; former federal Category C3; CNHP imperiled.
- Yellow stargrass (*Hypoxis hirsuta*) - Potential to be on the PCMS; reported in western Las Animas County over 30 years ago; CNHP critically imperiled.
- Arkansas evening primrose (*Oenothera harringtonii*) - Confirmed on PCMS; CNHP imperiled.
- Round-leaf four o'clock (*Oxybaphus rotundifolius*) - Confirmed in southcentral portions of the PCMS during 1995 and 1997 surveys (DECAM 2000b).
- Purple cliff brake (*Pellaea atropurpurea*) - Potential to be on the PCMS; found elsewhere in Las Animas County; CNHP imperiled.
- Wright's cliff brake (*Pellaea wrightiana*) - Potential to be on the PCMS; CNHP imperiled.
- Dwarf purslane (*Portulaca parvula*) - Resident, CNHP critically imperiled.
- Southern soapberry (*Sapindus saponaria drummondii*) - Resident, CNHP critically imperiled.
- Twinevine (*Scarcoslema crispum* (Bentham) - S1; found in 2001.
- Long hood milkweed (*Asclepias macrotis* (Torrey) - S2; found in 85 and again in 99.
- Texas beargrass (*Nolina texana* (Watson (*N. greenei*)) - S2; found at the base of Mesa de Maya, with potential to exist on the PCMS.

4.12.4.1.2 Fauna

Appendices 4.11.2a and 4.11.2b list faunal species of special concern found on Fort Carson and the PCMS, respectively.

Birds of Conservation Concern includes species that are of concern because of (a) documented or apparent population declines, (b) small or restricted populations, or (c) dependence on restricted or vulnerable habitats. These birds are listed with the intent of avoiding future designations of these species under the Endangered Species Act. The USFWS updates the list of Birds of Conservation Concern on a 5-year cycle. The 2002 report (USFWS) lists 276 species. Fort Carson and the PCMS are within the Southern Rockies/Colorado Plateau and Shortgrass Prairie Bird Conservation Regions; currently there are 17 nesting species and 3 regular migrant species of conservation concern.

Fort Carson

The following vertebrate species of special concern are either known or potentially occur on Fort Carson: ***Amphibians***: northern leopard frog, plains leopard frog; ***Reptiles***: triploid checkered whiptail; ***Birds:*** Northern Harrier, Peregrine Falcon, Prairie Falcon, Swainson's Hawk, Golden Eagle, Short-eared Owl, Mountain Plover, Long-billed Curlew, Williamson's Sapsucker, Black-chinned Hummingbird, Lewis's Woodpecker, Pinyon Jay, Juniper Titmouse, Cordilleran Flycatcher, Gray Flycatcher, Cassin's Kingbird, Loggerhead Shrike, Curve-billed Thrasher, Virginia Warbler, Black-throated Gray Warbler, MacGillivray's Warbler, Green-tailed Towhee, Lazuli Bunting, Cassin's Sparrow, Lark Bunting, Grasshopper Sparrow, Brewer's Sparrow; ***Mammals***: black-tailed prairie dog.

PCMS
The following vertebrate species of special concern are either known or potentially occur on the PCMS. ***Fish***: flathead chub; ***Amphibians***: plains leopard frog; ***Reptiles***: triploid checkered whiptail, Texas blind snake, Texas horned lizard, massasauga rattlesnake, roundtail horned lizard; ***Birds***: Northern Harrier, Peregrine Falcon, Prairie Falcon, Swainson's Hawk, Golden Eagle, Mountain Plover, Long-billed Curlew, Black-chinned Hummingbird, Lewis's Woodpecker, Pinyon Jay, Juniper Titmouse, Gray Flycatcher, Cassin's Kingbird, Loggerhead Shrike, Curve-billed Thrasher, Gray Vireo, Virginia Warbler, Black-throated Gray Warbler, Cassin's Sparrow, Lark Bunting, Rufous-crowned Sparrow, Grasshopper Sparrow, Brewer's Sparrow; ***Mammals***: black-tailed prairie dog, swift fox.

4.12.4.2 Current Management
At a minimum, Fort Carson will document the distribution of these species and set forth agreed conservation measures. Fort Carson recognizes its commitment to obtaining information regarding Species of Special Concern, particularly as they relate to the use of Fort Carson and the PCMS and relationships to military use of these lands. Currently, DECAM monitors the distribution and area of the black-tailed prairie dog, and nesting Mountain Plovers and Golden Eagles. Due to limited funds, DECAM monitors only those species or habitats required by the USFWS, are regionally or nationally important, or having the potential to negatively impact training.

It is not suggested that special surveys be conducted or management practices be drastically altered to accommodate these species in the same manner as federal-or state-listed species. As conscientious land and wildlife stewards, however, it is important to exhibit that Fort Carson is aware that these species are potentially declining.

4.12.4.3 Proposed Management

Project: Species of Special Concern Management
Justification: Stewardship, support of the military mission
Funding Priority: Class 0
Project Timing: Objective 13 – by 2011; all other objectives - ongoing indefinitely or annually.
Regulatory Coordination: CDOW and USFWS

Goal 1. Document occurrences and distribution of species of special concern on Fort Carson and the PCMS to the degree possible with available funding.

Goal 2. Protect sensitive species and their habitats whenever possible by proposing action alternatives.

Objective 1. Consider species of special concern in all Fort Carson actions.

Objective 2. Whenever possible, use actions designed for federal-listed species to protect or manage other sensitive species.

Objective 3. Maintain a list of animal and plant species of special concern list for Fort Carson and the PCMS.

Objective 4. Actively participate with other agencies in the management of species of special concern.

Objective 5. Annually monitor area and distribution of black-tailed prairie dogs.

Objective 6. If funding becomes available, experiment with alternative control methods for black-tailed prairie dogs, including relocation and erecting barrier fences for excluding prairie dogs from Cantonment Areas.

Objective 7. Transplant prairie dogs from improved grounds into former colony sites that have been eliminated by the plague if funding and personnel become available. (Note: Colorado HR 111 prevents intra-county movement of prairie dogs.)

Objective 8. Use flea insecticides to dust colonies in areas close to recreation or high military use areas.

Objective 9. Adhere to the DECAM black-tailed prairie dog management plan (Bunn 2004) to ensure all alternative control methods are considered (such as exclusion, avoidance and dusting).

Objective 10. Annually survey for breeding Mountain Plovers at known sites.

Objective 11. Annually survey known Golden Eagle eyries and monitor nesting success.

Objective 12. Maintain a database of sensitive species locations and provide to Colorado Natural Heritage Program.

Objective 13. Conduct a survey for the roundtail horned lizard and the massasauga rattlesnake, two undocumented, but with a high possibility of occurrence, species on PCMS by 2011.

Objective 14. Conduct community-level vascular plant and vertebrate inventories, documenting and mapping the presence of Species of Conservation Concern.

Objective 15. Due to the importance of the black-tailed prairie dog to eagles, Ferruginous Hawk, Mountain Plover, and the Burrowing Owl, follow goals and objectives defined in the prairie dog management plan (Bunn 2004).

Objective 16. Test the effectiveness of seeding prairie dog colonies killed by plague.

Objective 17. Prepare a management plan for the State-listed Burrowing Owl.

4.12.5 Land Cover and Vegetation Mapping

4.12.5.1 Current Conditions

In 2005, the DECAM and USFWS biologists and managers implemented a monitoring program, which includes the adoption of the ecoregional management approach developed by The Nature Conservancy and employed by the Colorado Natural Heritage Program and the Central Shortgrass Prairie Ecoregional Assessment. Identification of areas of conservation concern, at a scale appropriate to the installation, is the primary element of the program.

At the core of the program, is the development of Land Cover and Vegetation maps. Initial field implementation has been partially funded by Base Realignment and Closure “Pay Ahead” funding to facilitate conservation monitoring and associated management impacts of the increased population of resident Soldiers and training activities to Fort Carson and PCMS natural resources. These maps will be

used with The Nature Conservancy Ecological Land Units approach to identify areas of conservation concern. Identification of areas of conservation concern will be a tool contributing to future monitoring decisions.

The DoD has established the Ecosystem Management Approach for the management of military lands (Goodman 1996). This approach is focused on the structure and functionality of ecosystems to manage military lands to support the training mission and at the same time, to comply with local, regional, and national environmental laws (Tweddale *et al*. 2001).

Information regarding land cover in military grounds is crucial to support DoD objectives (Bourne and Graves 2001). Land cover information at military installations provides a baseline to assess the impact of military training and to address other environmental issues, such as habitat monitoring, ecosystem management, wildfire prevention, prescribed burns, and monitoring invasive species. Land cover and vegetation map layers will provide baseline needed to aid in monitoring and management of the land. Production of these maps will be conducted using Landsat Thematic Mapper imagery, Quick Bird imagery, and standard remote sensing techniques.

4.12.5.2 Current Management

Field work for the Fort Carson land cover map will be completed in spring 2006.

4.12.5.3 Proposed Management

Project: Land Cover and Vegetation Mapping
Justification: Stewardship, support of the military mission
Funding Priority: Class 0
Project Timing: All objectives are to be completed by 2010.
Regulatory Coordination: The CADD/GIS Technology Center, U.S. Army Engineer Research Center and Development has established criteria for data layer production.

Goal 1. Create land cover and vegetation maps with a minimum overall classification of 80% for the purpose of 1) updating vegetation information for Fort Carson and the PCMS, 2) creating tools for the assessment of habitat characteristics to develop wildlife management plans, 3) acquiring baseline information to develop predictive models for species and habitat distribution of species of interest, and 4) identifying areas of conservation concern in the local and regional context.

Goal 2. Develop GIS tools to increase wildlife management effectiveness.

Objective 1. Complete Fort Carson land cover map.

Objective 2. Complete Fort Carson vegetation map.

Objective 3. Upon completion of the Fort Carson land cover map, use probability analysis to predict potential winter habitat for the Mexican Spotted Owl on Fort Carson.

Objective 4. Upon completion of the Fort Carson land cover and vegetation maps, use Ecological Land Unit protocol to identify potential areas of conservation concern.

Objective 5. Upon completion of the Fort Carson land cover map, use FragStats to stratify aerial deer sampling blocks to improve population estimates.

Objective 6. Complete the PCMS land cover map.

Objective 7. Complete the PCMS vegetation map.

Objective 8. Upon completion of the PCMS land cover and vegetation maps, use Ecological Land Unit protocol to identify potential areas of conservation concern.

4.13 Special Interest Areas

4.13.1 Current Conditions

Wetlands are described in Section 4.10, *Wetlands Management*; cultural resources are briefly identified in Section 5.5, *Cultural Resources Protection*. Below sections describe other special interest areas on Fort Carson and the PCMS.

Fort Carson

Special interest areas on Fort Carson are shown in Figure 4.13.1.

The ***Bird Farm*** (634 acres) is adjacent to Highway 115, north of Training Area 9 and west of Training Area 5. The Bird Farm, which includes the DECAM Wildlife Office, is used for conservation education, a waterfowl nesting refuge, dog training, and angling. It is off-limits to most military training. Bird Farm lakes are closed to dog training during the waterfowl-nesting season.

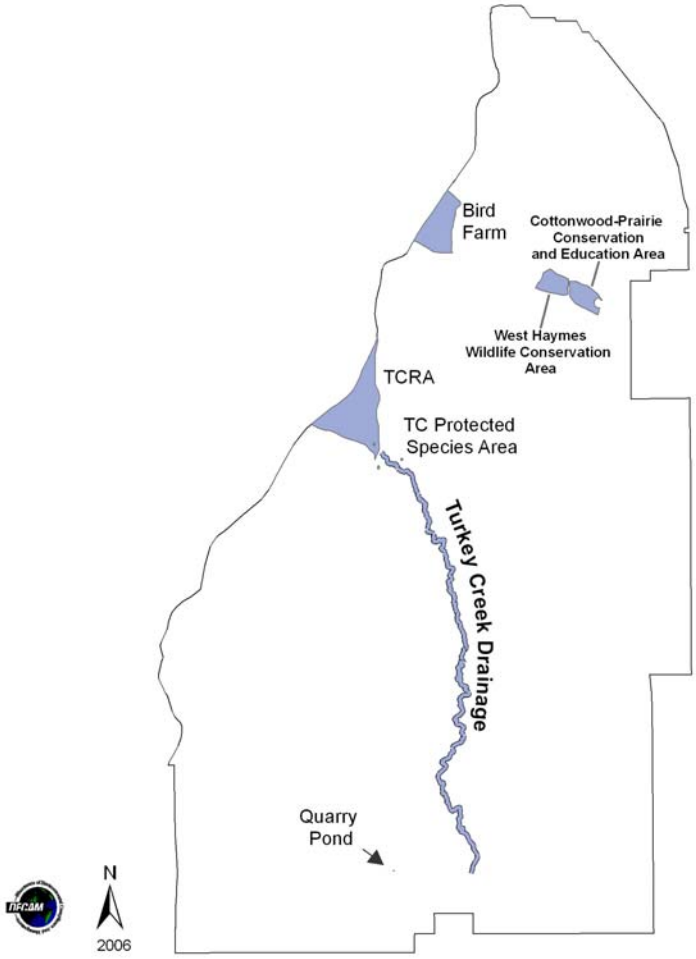
The ***Cottonwood-Prairie Conservation and Education Area*** (246 acres) is in the southwestern corner of Training Area 8; it was formally known as the Wildlife Demonstration Area. It is used to train dogs, for conservation education, and as a waterfowl nesting refuge. All vehicles are restricted to established parking areas unless authorized by the DECAM. It is closed to dog training during the waterfowl nesting season. Tactical military training and hunting are prohibited activities.

The ***West Haymes Wildlife Conservation Area*** (219 acres) is on the eastern side of Training Area 7. It is used for conservation education, a waterfowl nesting refuge, and low impact outdoor recreation, such as nature photography and birding. The area is off-limits year-round to most military training and most outdoor recreation, including dog training, hunting, and fishing.

The ***Turkey Creek Recreation Area*** (1,235 acres) is adjacent to Highway 115, north of Training Area 20. It is used for birding, photography, picnicking, camping, trail rides, and similar events. It has an outdoor rental facility as well as a building for social events. This area is home to the Fort Carson Mounted Color Guard. The area is closed to hunting and most types of military training.

The ***Turkey Creek Protected Species Area*** (70 acres) is just southeast of Turkey Creek Recreation Area. The area is primarily used as a refuge for the greenback cutthroat trout and Arkansas darter. This refugium hosts one of the most biologically diverse riparian breeding bird communities in the Pikes Peak region and is the site of the DECAM MAPS bird banding station.

Figure 4.13.1 Special Interest Areas on Fort Carson



The ***Quarry Pond***, located in the southeastern corner of Training Area 45, supports one of the largest populations of the southern redbelly dace in Colorado. Dace from Quarry Pond are transplanted by the CDOW to other sites within the geographic range of the species.

PCMS
Special interest areas on the PCMS are shown in Figure 3.4.2.1b, except for the smaller "no-dig" areas.

Soil Protection Sites (4,191 acres) are off-limits to mechanized military maneuver and have very limited administrative vehicular access due to fragile soils in this area.

Canyonlands (29,452 acres) along the Purgatoire River are off-limits to mechanized military maneuver and have very limited administrative vehicular access due to their fragile soils, cultural resources, steep topography, and wildlife/ecosystem values.

Gilligan's Island (58.55 acres) in Training Area 7 is off-limits to mechanized military maneuver because of extremely fragile soils and incidentally provides protection for round leaf four o'clock plant.

The ***Hogback*** (3,778 acres) is off-limits to mechanized military maneuver and has very limited administrative vehicular access, primarily due to its cultural resources but in part due to its overall ecosystem values.

The ***Wildlife Protection/Buffer Area*** (10,731 acres) is between the boundary fence and the legal property line. It is off-limits to military training.

No-dig Areas include all of the above areas on the PCMS plus much smaller areas designed to protect isolated features, generally cultural resources. No-dig restrictions are imposed to protect cultural resources and sensitive soils.

4.13.2 Current Management

Management of Special Interest Areas on Fort Carson and the PCMS is described in other sections of this INRMP (*e.g*., Section 4.12.1, *Federal-listed Species* [greenback cutthroat trout management in Lytle Pond]; Section 4.11.3.3, *Fisheries and Aquatic Systems Management*; Section 5.2, *Natural Resources Enforcement and Human Health and Safety*, Section 5.3, *Conservation Awareness*; Section 5.4, *Wildlife-base Recreation Management*).

Some sensitive or limited habitat types that may or may not be included within Special Interest Areas include four-winged saltbush/alkali sacaton shrubland, lowland riparian woodlands, and the barrens plant communities. There is a need to better understand wildlife and plant species occupying these areas.

4.13.3 Proposed Management

Project: Special Interest Areas Management
Justification: Stewardship, quality of life improvement
Funding Priority: Class 0
Project Timing: Objectives 2, 3, and 4 – by 2011; Objective 1 - ongoing indefinitely
Regulatory Coordination: None

Goal. Protect and manage Special Interest Areas to the degree possible with available funding.

Objective 1. Maintain special provisions to protect and manage identified Special Interest Areas on Fort Carson and the PCMS.

Objective 2. Improve access to West Haymes Wildlife Conservation Area, particularly for school groups visiting Fort Carson by 2011.

Objective 3. Improve the trail system in the Cottonwood-Prairie Conservation and Education Area, particularly for school groups visiting Fort Carson by 2011.

Objective 4. Explore establishing a partnership with Ducks Unlimited to create wetlands in Cottonwod-Prairie Conservation and Education Area ponds to establish habitat condidtions beneficial to nesting and migrating waterfowl and amphibians by 2011.

4.14 Noxious Weed Management

Noxious weeds are generally defined as alien (non-native) plants that are directly or indirectly detrimental to economic crops or native plant communities and injurious to livestock or wildlife and the resources they utilize. Noxious weeds threaten wetland ecosystems, complicate land restoration projects, add to the cost of pest management, and in general, threaten ecosystem functionality. Noxious weeds are designated as such by State or Federal law.

Fort Carson is dedicated to the prevention of introduction of invasive species as well as their control, per Executive Order 13112, *Invasive Species*. The Noxious Weed Management Program on Fort Carson and the PCMS is under the Resource Sustainment Branch, Natural and Cultural Resources Division, DECAM.

The Federal Noxious Weed Act (§2814 of 7 USC 360), part of the Plant Protection Act of 2000, mandates federal agencies to (i) have an office or person trained to coordinate an undesirable plant management program, (ii) adequately fund the program, (iii) implement cooperative agreements with state agencies, and (iv) conduct integrated pest management techniques for managing undesirable plant species.

Executive Order 13112 (1999) directs agencies to (i) prevent the introduction of invasive species, (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, (iii) monitor invasive species populations accurately and reliably, (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded, (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species, and (vi) promote public education on invasive species and the means to address them. It also prohibits federal agencies from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the benefits of such actions clearly outweigh the potential harm caused by invasive species.

Colorado Revised Statutes, Title 35, Article 5.5 (*Undesirable Plant Management*) (i) mandates the control of invasive species an all public and private lands and (ii) empowers counties and municipalities to enter into cooperative agreements with federal agencies. The Colorado Department of Agriculture, via the 2004 revised Colorado Noxious Weed Act, (i) created List A, B and C type weeds; (ii) mandated the eradication of 18 species of weeds (List A); (iii) mandated the statewide, phased eradication of five List B species with additional List B species elevated to eradication status each year.

Other relevant legislation includes the Carlson-Foley Act of 1968, Endangered Species Act, Federal Insecticide, Fungicide and Rodenticide Act, Federal Land Policy and Management Act, National Environmental Policy Act, and the Noxious Weed Control and Eradication Act of 2004.

4.14.1 Current Conditions

There are currently 45 state-listed weed species designated for containment, control or eradication. At least 28 state-listed and 17 other county-listed (El Paso, Pueblo, Fremont, and Las Animas) noxious weeds have invaded both natural and urbanized landscapes at Fort Carson and PCMS. There are others

that are being monitored for possible future listing known from both installations (7th ID and Fort Carson 2001b).

Infestations of noxious weeds affect the military's ability to utilize and maintain Training Areas suitable for multiple types of activities by increasing the potential of wildland fires that can restrict training missions and threaten neighboring landowners. Noxious weed infestations adversely impact the success of ongoing natural resource activities targeted at soil erosion control, revegetation, wetland protection, wildlife management, and endangered species management.

All-sized weed infestations occur throughout Cantonment Areas and Training Areas of Fort Carson and PCMS. These weed populations, and others known to occur on surrounding private and public lands, are resulting in (7th ID and Fort Carson 2001b):

- potential negative impacts on military training activities;
- decreased public and private property values;
- reduced wildlife habitat value and diversity;
- possible introduction of alien insects, diseases, and parasites which could affect native plants and/or agricultural crops;
- direct and indirect adverse effects on existing natural resource management activities; and
- adverse impacts on the physiological and ecological health of native plant communities.

In 2004 DECAM staff discovered two populations of African rue (*Peganum harmala*) at PCMS. This is the only confirmed discovery of this Colorado List A noxious weed in the state (Rifici 2004). Eradication and monitoring of this species on the PCMS is governed by an agreement between the DECAM and the Colorado Department of Agriculture.

4.14.2 Current Management

The biology and ecology of many noxious weed species make their control labor intensive and expensive, often requiring long-term efforts consisting of multiple treatments to achieve adequate management. Military activities that disturb native soil and vegetation can promote the establishment of noxious weeds, which are highly adapted to disturbed environments. The Army's policy of reducing the use of chemicals may limit the Fort Carson's ability to control noxious weeds since herbicides are one of the more effective and proven methods of invasive plant control. In addition, Colorado State noxious weed law changes that mandate eradication may reduce or eliminate the use of biological control methods for some listed species (DECAM 2005a). Biocontrol, alone, will not achieve complete eradication.

Noxious Weed Species Priorities

Outlined below are priorities for weed control on Fort Carson and the PCMS. Species addressed include only those that are known to occur on the Installations (updated from 7th ID and Fort Carson 2001b).

- Control efforts at Fort Carson will be focused initially on spotted knapweed, tamarisk, diffuse knapweed, and Canada thistle. At PCMS, African rue, Canada thistle, Russian knapweed, and tamarisk will receive the greatest management attention.
- Small, newly identified populations of any noxious weed on the state list will receive immediate management priority for control over all other weed species (*e.g.*, African rue).
- Weed sites closest to Installation boundaries and on main routes will be of higher control priority than interior sites.

- Weed sites that are rapidly expanding (based on monitoring information) will be controlled at a higher priority than more stable sites.
- Weeds growing in Training Areas that routinely experience higher training impacts, especially ground-disturbing activities, will have a high priority for control.

Noxious Weed Management Plan

The DECAM has prepared the *Noxious Weed Management Plan, Fort Carson & Pinon Canyon Maneuver Site* (7th ID and Fort Carson 2001b), as mandated by the Plant Protection Act of 2000. The prevention of noxious weeds from populating disturbed areas is Fort Carson's first line of defense.

The control of noxious weeds on Fort Carson and the PCMS is of critical importance from both a natural resources management and military readiness perspective. Implementing a comprehensive, long-term weed management program will help promote and sustain the military mission and protect the natural environment by (7th ID and Fort Carson 2001b). Primary elements of this program are:

- enhancing the success of revegetation efforts to replace native vegetation cover, which minimizes soil erosion and restores wildlife habitat that is damaged during military training exercises;
- maintaining soil, water, and vegetation resources that provide a quality military training environment;
- minimizing the impact of military construction and training activities on the spread and establishment of noxious weed species within and outside Fort Carson and PCMS boundaries;
- actively participating on County and regional weed boards; and
- fostering a "good neighbor" relationship with adjacent land owners.

There are several notable differences between Fort Carson and PCMS that affect the ability of noxious weeds to invade, spread, and affect weed control strategies (7th ID and Fort Carson 2001b).

- Fort Carson supports more species of noxious weeds that are mandated for control.
- There is more military traffic and access roads and trails on Fort Carson; therefore, the potential for spreading noxious weed via military vehicles is greater.
- Military training maneuvers are conducted year-round at Fort Carson, but PCMS is utilized less frequently. Environmental restrictions at PCMS, designed to protect fragile soil and vegetation resources during wet soil conditions, help minimize the degree of ground disturbance.
- Despite increasing pressure from city and county regulatory agencies on private landowners adjacent to Fort Carson to control noxious weeds, the surrounding area is more populated and supports more weedy species than the area around PCMS.

Implementation of the Noxious Weed Management Plan (7th ID and Fort Carson 2001b) includes:

- identifying the extent of infestations;
- preventing the encroachment of weeds into uninfested areas;
- detecting and eradicating new weed species introductions;
- preventing the encroachment of weeds into uninfested areas;
- containing and controlling large-scale infestations; and
- monitoring treated areas.

The Noxious Weed Management Plan (7th ID and Fort Carson 2001b) has species descriptions and control techniques for each noxious weed species. Survey of noxious weeds involves visual examination and mapping of areas not previously inspected. Survey is performed on foot, from a vehicle, and using aerial photos. Monitoring noxious weeds involves four related actions: 1) identification and mapping of existing noxious weed locations; 2) prioritizing sites for control; 3) qualitative study of the effectiveness of control efforts; and 4) expansion of existing weed populations. Monitoring can include both quantitative and qualitative means to evaluate effectiveness of control measures. Continued monitoring of sites and formal reports of noxious weed control implementation are important steps in the program.

Each weed management strategy (control, eradication, and prevention) is being employed on Fort Carson and PCMS as part of an integrated plan.

Control programs focus on containing infestations to a density that is compatible with other land management objectives. A 'control' strategy is often the most practical management objective due to cost, severity of the weed problem, and the resistance of weeds to various weed management techniques.

Noxious weed control utilizes an Integrated Vegetation Management strategy using two or more of the following techniques in combination (listed in priority of use): physical/mechanical methods, biological control, chemical methods, cultural methods, and educational tools. Site-specific actions consider the most economic and effective method(s) of containing or controlling undesirable plant species, current scientific evidence and technology, developmental status (phenology) of target species, impacts on the military mission, and potential ecological consequences. Compliance with NEPA and other environmental laws (*e.g*., Endangered Species Act; Clean Air Act; Clean Water Act; Archeological Resources Protection Act; Federal Insecticide, Fungicide, and Rodenticide Act) are reviewed on a case-by-case basis for possible impacts.

Managed grazing with appropriate livestock can also be used to control weed infestations and keep wildland fires at bay. Small ruminant grazers (*i.e*., sheep and goats) repeatedly strip leaves and stems, which damage weeds, and remove weed seed heads, thereby reducing seed production. Selective grazing also places weeds at a less competitive advantage in native plant communities by encouraging growth of native grasses and breaking hard soil crusts for more efficient nutrient cycling.

Eradication means the total elimination of a weed species from an area. This is usually only achievable on smaller scale infestations and for new listed weed species invading the installations. It requires intensive management efforts over many years and continual monitoring to detect any reinvasion as seed may be viable for as short as one year and as long as 50 years.

Prevention is the most cost-effective and practical approach to weed management; however, it is often unachievable in highly disturbed habitats, such as Fort Carson and PCMS. Methods of preventing weed establishment and encroachment include limiting seed dispersal, containing neighboring infestations, minimizing soil disturbance, revegetating disturbed areas, vehicle washing, and maintaining healthy native plant communities. Educational materials are being developed by DECAM to educate Soldiers about the problem and how they can help prevent the spread of noxious weeds.

Noxious Weed Biological Control Program

The noxious weed biological control program is an important component of the Noxious Weed Management Plan (7th ID and Fort Carson 2001b). This work is performed in cooperation with the Texas A&M Agricultural Experiment Station in Amarillo, USFWS, U.S. Department of Agriculture-Animal and

Plant Health Inspection Service, U.S. Department of Agriculture -Beltsville, CABI Bioscience, and the Colorado State Department of Agriculture. The project also includes the U.S. Air Force Academy, Buckley Air Force Base, Monument Fire Center, Rocky Flats Environmental Technology Site, and F.E. Warren Air Force base (Michels *et al*. 2004).

Ten insect species have been released, recovered, and/or established on Fort Carson for spotted and diffuse knapweed control: *Chaetorellia acrolophi*, *Bangasternus fausti*, *Larinus minutus*, *Larinus obtusus*, *Urophora affinis*, *Agapeta zoegana*, *Cyphocleonus achates*, *Metzneria paucipunctella*, *Sphenoptera jugoslavic*, and *Urophora quadrifasciata*. The mite, *Aceria malherbae*, effective on field bindweed has been released at Fort Carson and the PCMS. Currently, there are five species for Canada thistle and/or musk thistle control: *Cassida rubiginosa*, *Larinus planus*, *Urophora carduii*, *Ceutorhynchus litura*, and *Trichosirocalus horridus*. *Rhinocyllus conicus* and *Terellia ruficauda*, two species effective on Canada thistle, were identified as well-established on Fort Carson prior to initiation of the biocontrol program in 1997. In addition, a gall-forming mite (*Aceria anthocoptes*) has been recovered at sites on Fort Carson. Additional testing is in progress on this particular species.

The biological control program is integrated with the other control measures, including herbicide application and burning, to ensure the continued viability of all established insect populations. The use of biocontrol agents has a high priority for weed control on Fort Carson and the PCMS because: 1) reductions in herbicide usage may be possible over the long term; and 2) biological control is viewed as more environmentally benign than many other control methods (7th ID and Fort Carson 2001b, Fort Carson 2000). Risk assessment analyses for impacts to native thistles were incorporated into the program in 2001. All biocontrol agents are evaluated by the U.S. Department of Agriculture - Animal and Plant Health Inspection Service for target specificity prior to release to avoid unintended consequences to the environment.

Biocontrol does not achieve total eradication. Biocontrol is integrated into a total vegetation management program, which means using other methods, such as mowing and chemicals, when necessary. Noxious weed populations can be maintained at tolerable levels with the inclusion of biocontrol practices.

Recent Specific Weed Control Projects

African Rue Control

In 2004 DECAM developed and is implementing the African Rue Management Plan (Rifici 2004) at PCMS. Surveys associated with Phase 1 of this plan are complete with no new plants found in 2005. Eradication methods are in progress, and the original population will be monitored on a limited basis for 10 consecutive years. If additional plants are found, supplementary coordination with the Colorado State Weed Coordinator will be undertaken to ensure compliance with the Colorado Noxious Weed Act.

Tamarisk Control

Fort Carson has a strong commitment to control tamarisk at Fort Carson and PCMS. Tamarisk surveys, using a Cooperative Agreement with the USFWS and Texas A&M University, are ongoing and are anticipated to be completed for both Installations by 2008.

Tests on PCMS during 2003 and 2004 using cut stump treatments with the chemical imazapyr provided 90-100 percent control. This treatment costs a minimum of $500 per acre. Based on limited tests on PCMS in the winter of 2005, it appears that very hot fires will control tamarisk. In 2005 the biological

control program was expanded to include tamarisk control plots on PCMS in anticipation of final federal permitting of the *Diorhabda* leaf eating beetle.

Fort Carson is developing a tamarisk management plan. This plan would become an appendix to the Noxious Weed Management Plan (7th ID and Fort Carson 2001b).

Russian Knapweed Control
In 2003 DECAM personnel began treating Russian knapweed at PCMS with ground-sprayed herbicide. Since 2005 this program has been accomplished by contract, and the contract may be expanded to include tamarisk and whitetop control.

Surveys
Beginning in 2004, DECAM began surveying both Fort Carson and PCMS on a 10-year rotation. Surveys target all Class A weeds, many List B and C weeds, and all county-listed species

Research
Fort Carson was a test site for a Strategic Environmental Research and Development Program 4-year research project for integrated control and assessment of knapweed and cheatgrass on Department of Defense installations (Paschke *et al*. 2005). The study involved biological control, fire, manipulation of soil nitrogen availability, seeding with native late-seral species, and restoration of the soil community. Both species declined in abundance during the study, but a severe drought and overlap with previous biological control sites made it difficult to separate treatment effects.

There is a need to assess and if feasible, test aerial spraying in terms of cost/benefits and efficacy.

Partnerships
Fort Carson has a cooperative agreement with the Upper Arkansas Regional Weed Cooperative, which was developed via a cooperative agreement with the USFWS. Fort Carson's primary roles in this Cooperative are to map weeds in boundary areas of common interests, support an annual weed conference in Canon City, CO, and print and distribute educational materials for the Fort Carson community. This cooperative agreement is in effect until 2008.

Fort Carson has developed agreements with the El Paso County, Pueblo County, and Fremont County Weed Advisory Boards; the Colorado Department of Agriculture (Division of Plant Industry); and U.S. Department of Agriculture - Animal and Plant Health Inspection Service to participate in the regional control of noxious weeds, both on and off the installations, in accordance with the Colorado Weed Management Act. In cases where noxious weeds on adjacent private lands threaten to invade Fort Carson or PCMS lands, cooperative management agreements with neighboring landowners should be considered if deemed a cost effective management strategy.

Fort Carson is part of the Tackling Tamarisk on the Purgatoire (River) Working Group, whose main sponsors are The Nature Conservatory and the U.S. Forest Service. Fort Carson is a member of the Front Range Ecoregional Management Team (Section 4.1.1, *Regional Ecosystem Management Coordination*), which includes regional ecosystem/ecoregional management aspects of noxious weed control. Fort Carson is also represented on the Central Shortgrass Prairie Eco-Regional Assessment group, a public and private consortium, whose agenda includes noxious weed control.

Outreach
DECAM has implemented a program to prepare informational and educational materials on noxious weeds for use in military briefings, school programs, and public meetings. This program includes the development of a noxious weed environmental awareness program for military trainers, Army construction components, and other users.

4.14.3 Proposed Management

Project: Noxious Weed Management
Justification: Compliance with Executive Order 13112 - *Invasive Species* and the Plant Protection Act of 2000; compliance with Colorado Revised Statutes, Title 35 Article 5.5 (*Undesirable Plant Management*); stewardship; sustainability; quality of life improvement
Funding Priority: Class 0
Project Timing: Objective 1 – by 2007, Objective 3 – by 2014, Objective 12 – annually and 2008, Objective 13 – annually and 2007 and 2008, Ojective 14 – by 2009, objectives 8, 15, and 16 – by 2011; and all other objectives – ongoing indefinitely or annually
Regulatory Coordination: El Paso County, Pueblo County, and Fremont County Weed Advisory Boards; the Colorado Department of Agriculture (Division of Plant Industry); and the U.S. Department of Agriculture (Animal and Plant Health Inspection Service).

Sustainability Goal. Control (contain, suppress, eradicate) Colorado high risk weeds, minimizing impacts on adjacent agricultural lands and on regional natural resources, environment and human health but reaching 85% or greater efficacy in treatments.

Compliance Goal. Treat 100% of Colorado Class A weeds each year while working to control, contain, or eliminate 20% of Colorado Class B and C species.

Goal 1. Survey, identify, and control federal-, state-, and county-listed noxious weed species occurring on Fort Carson and the PCMS at 10% of the installations each year.

Goal 2. Prevent the introduction of and control invasive species, per Executive Order 13112, *Invasive Species*.

Goal 3. Within five years, reduce the total acreage of noxious weed species a minimum of 5% annually by selectively treating noxious weed infested land at Fort Carson and the PCMS.

Objective 1. Implement and update, on a 5-year schedule, the Noxious Weed Management Plan (7th ID and Fort Carson 2001b).

Objective 2. Implement the African rue management plan.

Objective 3. Complete the initial inventory and GIS mapping of invasive weeds on Fort Carson and PCMS by 2014, using inventory methods used by the state.

Objective 4. Prioritize, by species and/or location, weed infestations for control.

Objective 5. Maintain overall ecosystem health at a level where noxious weed invasions are uncommon and/or localized.

Objective 6. Treat selected noxious weed species using an integrated approach (biological, chemical, cultural and mechanical) by treating a minimum of 100 and 250 acres annually at Fort Carson and PCMS, respectively.

Objective 7. Conduct annual monitoring to assess effectiveness of noxious weed control projects.

Objective 8. Document benefits of noxious weed management relative to sustaining and promoting the military mission.

Objective 9. Continue to work with Texas A&M University, Colorado State Insectary, and U.S. Department of Agriculture - APHIS to release, redistribute, and monitor biological control agents for noxious weed control. Ensure that proponents provide reports on the status of the projects.

Objective 10. Conduct additional biocontrol research and releases or redistributions of insects for noxious weed species as control agents become available.

Objective 11. Implement the noxious weed outreach program in conjunction with the Conservation Awareness Program.

Objective 12. Renew the cooperative agreement with the Upper Arkansas Regional Weed Cooperative in 2008 and continue working with the Tackling Tamarisk on the Purgatoire Working Group.

Objective 13. Complete Tamarisk Management Plan as an appendix to the Noxious Weed Management Plan by 2007; complete surveys by 2008; and implement the plan as funding permits.

Objective 14. Evaluate the economic and biological effectiveness of aerial spraying of herbicides to control noxious weeds compared to ground spraying using PCMS for testing.

Objective 15. Implement a systematic monitoring program to identify new weed populations and to document the size and abundance of existing weed populations.

Objective 16. Survey drainages in Fort Carson and PCMS for tamarisk; target areas with tamarisk for eradication; and start eradication efforts the year of survey or the year following the survey.

Objective 17. Coordinate with the DECAM Wildlife Office for the protection of wildlife (particularly listed or sensitive species) during weed control operations.

4.15 General Pest Management

An important aspect of environmental conservation/protection is the maintenance of urban landscape. Insect pests can transmit disease to humans and pets. The Department of Defense requires all installations to provide a well-planned and implemented pest management program. Inadequately planned pest management operations can result in pesticide exposures that threaten human health and natural resources while polluting the environment. A sound pest management program must be provided that maintains and safeguards the health, environmental quality, aesthetic values, and ecological balance of the military community by protecting real estate investments from depreciation by pests, while complying with environmental protection and improvement policies (DECAM 2000a).

This section includes noxious weed control in conjunction with routine weed control but does not include the management of noxious weeds, other than within the Cantonment Area of Fort Carson. Noxious weed control is discussed in Section 4.14, *Noxious Weed Management*. Wildlife diseases are discussed in Section 4.11.3.6, *Wildlife Disease Management*.

4.15.1 Current Conditions

Fort Carson recognizes seven general categories of pests that cause significant damage and require control or management (7th ID and Fort Carson 2001a):

- disease vectors and medically important pests (*e.g.*, mosquitoes, black widow spiders, fleas, wasps, certain rodents);
- general household and nuisance pests (*e.g.*, cockroaches, flies, beetles, crickets, spiders, wasps);
- undesirable vegetation (*e.g.*, weeds in ornamental rock areas and turf grass, along fence lines, and on road shoulders and paved surfaces);
- stored product pests;
- real property pests (structural/wood-destroying pests, *e.g.*, carpenter ants, termites);
- pests that destroy beneficial plants (*e.g.*, tussock moths, ash sawfly larvae, golf course pests); and
- vertebrate pests (*e.g.*, birds, snakes, mice, raccoons, stray pets, skunks, bears, mountain lions, road-killed animals).

4.15.2 Current Management

Pest management activities on Fort Carson and the PCMS are under the supervision of the Prevention Branch, Environmental Compliance, Restoration and Prevention Division, DECAM, with all actions subject to the approval of the Installation Pest Management Coordinator. Assistance is required from other organizations and agencies (*e.g.*, Military Police - stray domestic animals and road kills; CDOW - nuisance bears and road kills; Preventative Medicine - pest surveillance, golf course - pest surveillance and control; Wildlife Office – nuisance and/or dangerous wildlife).

4.15.2.1 General

The *Integrated Pest Management Plan, Fort Carson Mountain Post* (7th ID and Fort Carson 2001a) identifies and prioritizes pests and their destructive effects to determine particular levels of protection. Goals of the IPMP are to:

- identify integrated pest management planning requirements identified in AR 200-5;
- describe program elements for health and environmental safety, pest identification, pest management and pesticide storage, transportation, use and disposal;
- reduce reliance on pesticides;
- enhance environmental protection;
- maximize the use of integrated pest management techniques;
- ensure compliance with the DoD pest management program measures of merit; and
- present the estimated or projected costs of implementing the IPMP.

The Fort Carson pest management program is consistent with the Presidential directive (Office of the President 1994) to reduce pesticide use by using integrated pest management (IPM). 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, and the use of mechanical, cultural, and biological control. The IPM comprehensive approach to

pest management or prevention, using methods of pest management in a compatible manner, avoids damage and minimizes adverse side effects to nontarget organisms and the environment.

Pest management efforts are implemented on the basis of surveillance. Pest surveys are used to determine the type of pest, extent of the problem, and pest management technique most appropriate for safe, effective, and economic control. Chemical control is used only when non-chemical techniques are inadequate or impractical. Furthermore, chemical control is not used as a substitute for good sanitary practices or proper building maintenance. IPM is described in more detail in the Integrated Pest Management Plan (7th ID and Fort Carson 2001a).

The Integrated Pest Management Plan discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of most disease vectors (fleas, cockroaches, etc.), protection of facilities, and storage of pesticides. The following discussions of animal and plant control primarily involve the management of natural resources on Fort Carson and the PCMS.

4.15.2.2 Measures of Merit

In 2004 DoD issued the following new pest management measures of merit.

- Through the end of Fiscal Year 2010, 100% of DoD installations will have pest management plans prepared, reviewed, and updated annually by pest management professionals.
- Through the end of Fiscal Year 2010, DoD will maintain the achieved reduction in annual pesticide use on DoD installations. This reduction goal is set at an average of the FY 2002 and 2003 usage, and pesticide applications by contractors shall be included.
- Through the end of Fiscal Year 2010, 100% of DoD installation pesticide applicators will be properly certified (either by DoD or the appropriate state). Direct hire employees have a maximum of two years to become certified after initial employment. Contract employees shall have the appropriate state certification when the contract is let.

The *Integrated Pest Management Plan, Fort Carson Mountain Post* (7th ID and Fort Carson 2001a) is current and is scheduled for a 2007 revision. Due to an expansion in training activities, changes in the State's noxious weed laws, and significant reduction in the Fort Carson Measure of Merit goal, Fort Carson is not expected to significantly reduce pesticide use. All pesticide applicators meet certification requirements. Changes contributing the failure to meet the Measure of Merit pesticide reduction goal include:

- Cantonment Area expansion (facilities) due to the addition of about 10,000 troops as a result of Army realignment;
- a likelihood of increased facility construction at PCMS to accommodate additional troop training requirements;
- increased command emphasis regarding the control of weeds in rocked areas; and
- increased emphasis to adhere to the Plant Protection Act of 2000 (*i.e.*, control invasive species), resulting in a greater need for pest management services on the installation.

Fort Carson has initiated means to reduce pesticide usage, such as the following (updates of DECAM 2000a):

- initiated an intense surveillance program that substitutes military and civilian personnel surveillance time for pesticides and combats insect pests with reduced quantities of pesticides early in the infestation cycle;
- established a system to monitor insect population threshold levels and adopted threshold standards;
- stocked larvae-eating fish, which reduced costs for mosquito control compared to using pesticides;
- replaced algaecide use in ponds with mechanical oxygen-inducing devices;
- replaced pesticides with liquid soap to control honeybee swarms;
- used goats at PCMS to control Russian knapweed;
- initiated one of DoD's most comprehensive biocontrol programs for invasive weeds; and
- purchased and used a new mosquito fogger to further reduce insecticide requirements.

4.15.2.3 Animal Pests

The DECAM Wildlife and the Pest Management sections collaborate to control nuisance pests on the installation. The Pest Management Section primarily deals with wildlife pests, such as skunks, porcupines, raccoons, mice/rats, prairie dogs, squirrels, rabbits, and dead birds. All control efforts are coordinated with the DECAM Wildlife Office prior to implementation.

Comment [WXPS7]: This modified list came from a document that I received after arriving on post. The document identifies responsibilities for GMH, Pest Control and Wildlife.

Whirling disease is discussed in Section 4.11.3.3, *Fisheries and Aquatic Systems Management*. Wildlife diseases are discussed in Section 4.11.3.6, *Wildlife Disease Management*.

Rock Doves populations occasionally reach numbers that present health risks to military and civilian personnel. At such times pest control personnel will either trap and euthanize or shoot individuals from the roost to reduce populations to a manageable number. Because these birds are an important prey species of the Peregrine Falcon, the DECAM does not use the pesticide Avitrol®.

4.15.2.4 Weeds

Weeds in ornamental rock areas and turf grass, along fence lines and on road shoulders and paved surfaces require control using appropriate herbicides. The control of weeds in turf and rock areas helps beautify the Post and adds greater usefulness to recreational areas and public grounds. Control of weeds is extremely important to the overall aesthetics of the installation and receives high priority from the Command (7th ID and Fort Carson 2001a). Noxious weed management is described in Section 4.14.

4.15.2.5 Natural Resources Protection

Following sections are taken from the *Integrated Pest Management Plan* (7th ID and Fort Carson 2001a). Sensitive areas listed on pesticide labels are considered before pest management operations are conducted. No pesticides are applied directly to wetlands or water areas (*e.g.*, lakes, rivers) unless use in such sites is specifically approved on the label and the proposed application is approved by the DECAM. This particularly applies to pesticides applied on or near open water.

Protected migratory birds cannot be controlled without a permit, and no such control has been conducted. The Installation Pest Management Coordinator periodically evaluates ongoing pest management as well as evaluates new pest management operations to ensure compliance with the Endangered Species Act, Clean Water Act, Bald Eagle Protection Act, and the Migratory Bird Treaty Act. Pest management operations that are likely to have a negative impact on endangered or protected species or their habitat require prior approval from the Army Environmental Command Pest Management Consultant and the

DECAM Wildlife Office. Pest management operations will also be required to prepare management prescriptions for pest management operations when the USFWS issues new species listings.

Fort Carson has implemented management prescriptions/actions to reduce the chance of secondary poisoning of American Peregrine Falcons and Bald and Golden Eagles (*Bald Eagle* in Section 4.12.1.8, *Federal-listed Species Management)*.

Installation conservation goals include protection of prey resources of the Bald Eagle and Golden Eagle, and protection of the Burrowing Owl and Mountain Plover. Prairie dog colonies are frequently decimated by plague outbreaks. However, wide-scale epizootic events are uncommon, and some colonies in the region remain intact each year. It is not possible to predict which colonies will be impacted. To avoid complete decimation of the prairie dog population, the DECAM controls prairie dogs only when human health or physical damage to facilities is an issue. The use of rodenticides to control prairie dogs is restricted to the Cantonment Area, Butts Airfield, Range Control, Tent City, and in the vicinity of buildings and foxholes on ranges where troops are likely to encounter prairie dogs. A similar policy is enforced at the PCMS. Prairie dog colonies are surveyed for the Burrowing Owl and Mountain Plover prior to any chemical application.

The Installation Pest Management Coordinator and the DECAM Wildlife Office meet annually to develop guidelines for controlling prairie dogs at sites where human health is at risk.

4.15.3 Proposed Management

Project: General Pest Management
Justification: Quality of life improvement, protection of human health, compliance with Endangered Species Act, achievement of DoD/Department of the Army Measures of Merit
Funding Priority: Class 0
Project Timing: Objective 1 – annually and 2011; all other objectives - ongoing indefinitely or annually
Regulatory Coordination: None required

Performance and Sustainability Goal. Provide a compliant, customer-oriented pest control program that will achieve the Installation sustainability goal "Zero Waste" by eliminating 100 percent of hazardous chemicals or active ingredients used for pest control operations by 2027. In an attempt to reach the zero waste goal by 2027, the short term pesticide reduction goal is 40 percent (8 percent per year) by FY 2011, based on FY 05 pesticide usage.

Goal. Control those plant and animal species that affect human health, quality of life, natural resources management (*e.g.*, reduce ecosystem functionality, displace native species) or the military mission, exclusive of noxious weeds.

Objective 1. Maintain and implement the Integrated Pest Management Plan (7th ID and Fort Carson 2001a) on a five-year cycle, including an update in 2007 and 2011.

Objective 2. Emphasize integrated pest management techniques to minimize the use of pesticides. Pesticides used for noxious weed control will not be counted toward this objective since this is a compliance issue.

Objective 3. Use chemical control as a last resort to control pests; cultural, mechanical, and biological control methods are first priority. When chemical control is required, use the least environmentally toxic pesticide. Utilize new technology, educational opportunities, and the judicial/professional use of chemicals to reduce chemical pesticide use.

Objective 4. Ensure pesticide applicators are fully certified or under the necessary direction of a certified applicator.

Objective 5. Conduct preventive maintenance and surveillance inspections for pests.

Objective 6. Ensure pest management personnel receive adequate formal, as well as on-the-job, training to achieve required pest management certification and to operate at the most efficient level.

Objective 7. Procure, maintain and properly store adequate supplies of pesticides and pesticide dispersal equipment.

Objective 8. Implement a safety program that provides for the safety and well being of all pest management personnel.

Objective 9. Coordinate with the DECAM Wildlife Office for the protection of wildlife (particularly listed or sensitive species) during pesticide operations.

Objective 10. Work with other regional installations to include the entire pest management program within the Front Range Ecoregional Management Team.

5.0 Natural Resources-related Programs

This chapter includes those programs that are directly related to natural resources management, but are not being implemented solely for that purpose. Some, such as Integrated Training Area Management and outdoor recreation, are totally or partially within responsibilities of organizations other than the DECAM. Others are within DECAM but also serve programs outside the scope of this INRMP.

Programs are described in terms of their status (**Current Conditions**) and recent history (**Current Management**) followed by proposed project(s) (**Proposed Management**), if appropriate. These projects may be DECAM budget submissions or submissions by another organization through their own specific budget process (*e.g.*, ITAM's Integrated Workplan Analysis Module) to integrate implementation of this INRMP to the budget process (see Section 7.4, *Implementation Funding Options*).

Projects are described in a goal(s)-objective(s) format to provide concise process descriptions that are compatible with adaptive management analyses and overall INRMP implementation monitoring processes. All goals and objectives are summarized in tabular format in Appendix 7.3. Sustainability and Compliance goals, where applicable, are taken from the *DECAM Performance Plan FY06* (DECAM 2005a).

Each project has a summary description at the beginning of the Proposed Management section. The format is as follows:

Project: Title
Justification: Participation in regional initiatives, Sikes Act, Endangered Species Act, AR 200-3, stewardship, etc.
Funding Priority: Proposed or actual budget classification, if appropriate (Note: If projects include individual objectives with different priorities, the highest is listed.)
Project Timing: Dates to be accomplished, by objective (*e.g.*, 2002, 2002-04, indefinitely, uncertain)
Regulatory Coordination: Agencies with whom coordination is required

5.1 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 and help ensure no net loss of training capability (a Sikes Act requirement). 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. Proper management to support both the military mission and other multiple-use activities is a challenge unique to Defense among managers of public lands.

ITAM provides Army range officers with the capabilities to manage and maintain training lands and support mission readiness and the Mission Essential Task List. ITAM integrates mission requirements derived from the Range and Training Land Program with environmental requirements and environmental management practices. It establishes policies and procedures to achieve optimum, sustainable use of training and testing lands by implementing a uniform land management program (Department of Army 2005). Several documents provide policy and procedural guidance for the ITAM program.

Army-wide Goal. The Army-wide goal for ITAM is to: "*achieve optimum, sustainable use of training lands by inventorying and monitoring land condition, integrating training requirements with land capacity, educating land users to minimize adverse impacts, and providing for land rehabilitation and maintenance*" (Department of the Army 1995b).

ITAM Program Strategy (Department of Army 1995b). The strategy describes roles, responsibilities, and relationships among the functional proponent and supporting organizations, provides an overview of the ITAM policy and guidance, and describes the four ITAM components. The ITAM Program Strategy, along with input provided by Army conservation staff and Range and Training Land Assessment outcomes, provided the foundation and guidance for the ITAM Regulation (AR 350-19) (Department of the Army 2005) and the Procedural Manual (Department of the Army 1999b).

AR 350-19, The Army Sustainable Range Program (Department of the Army 2005). This regulation replaces AR 350-4, which was specific to ITAM. It assigns responsibilities and provides policy and guidance for the Army ITAM program. The regulation includes support for sustainable ranges, assessment of range sustainability, and management of automated and manual systems that support sustainable ranges.

ITAM Procedural Manual (Department of Army 1999b). This document defines Headquarters, Department of the Army, Major Army Command, and installation roles, responsibilities, and Army-wide guidance to implement ITAM. Policies, procedures, and guidance in this manual are essential to achieve and maintain the Army ITAM program. Army mechanisms for program management, review, and information exchange include Program Management Reviews, quarterly newsletters ("The Bridge" published online by the Army Environmental Command), the ITAM website, and the annual ITAM workshop.

Program Management at Fort Carson and the PCMS

Fort Carson and the PCMS were used for research as part of the development of the Army ITAM program, particularly the Land Condition Trend Analysis (LCTA) (now RTLA) component (Section 5.1.1). The ITAM program at Fort Carson and the PCMS formally began in 1989 and was the responsibility of the DECAM. In 2000 proponency of this program changed from the DECAM to the G3/DPTM, Range Control Division, consistent with previous Army-wide changes. Many accomplishments within the ITAM program prior to that changeover are summarized in the 2002-2007 INRMP (Gene Stout and Associates 2002c).

Fort Carson Regulation 350-9, *Integrated Training Area Management (ITAM)* (7th ID and Fort Carson 2001c) was generated (15 August 2001), based upon the above documents. The regulation defines roles and responsibilities of Fort Carson applicable parties.

As part of the ITAM budgetary and planning process, Fort Carson and the PCMS are designated as Category I installations. Category I installations are the largest installations, with most critical training missions and/ or greatest environmental sensitivities to missions.

Primary goals of the ITAM Program at Fort Carson and PCMS are to (Fort Carson 7th ID and Fort Carson 2001c):

- align Fort Carson and the PCMS training land management priorities with the training and readiness priorities on Fort Carson;

- facilitate training to doctrinal standards while advocating tactically responsible conservation and land management practices;
- achieve optimal sustained use of lands for the execution of realistic training and testing by maximizing ITAM efforts;
- implement a management and decision-making process, which integrates training and other mission requirements for land use with sound natural resource management on Fort Carson and the PCMS;
- sustain lands for training readiness and multiple use in accordance with Department of Defense policy;
- ensure cost-effective and technically sound land management methods are applied to LRAM projects;
- educate land users in reasonable/sound land use practices and environmental stewardship; and
- aid in sustaining the installation through sound land management practices and environmental stewardship.

The ITAM program includes the following five component areas (modified from *Integrated Training Area Management (ITAM) Program Strategy* (Department of the Army 1995b)):

- The Range and Training Land Assessment (RTLA), formerly Land Condition Trend Analysis (LCTA) component, is used to inventory and monitor physical and biological resources to meet the multiple-use demands of Fort Carson.
- The Training Requirements Integration (TRI) component integrates Fort Carson military training requirements for land use with natural resources conditions and capabilities to support these requirements.
- The Sustainable Range Awareness (SRA), formerly Training Sustainment Awareness and prior to that Environmental Awareness component improves land user understanding of the impacts of their activities on the environment and how to use the land more efficiently.
- 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.
- The Geographic Information System (GIS) supports planning decision processes to effectively manage land use and natural resources.

Goals and objectives specific to ITAM are found in the *ITAM Program Strategy*, Section 2.1 (Department of Army 1995b). These are incorporated into objectives within this INRMP. ITAM planning involves using the Integrated Workplan Analysis Module for developing projects and providing input into the ITAM budget process.

5.1.1 Range and Training Land Assessment, Formerly LCTA

5.1.1.1 Current Conditions

LCTA was originally designed to focus on the current condition of the land, installation wide, and to collect inventory/benchmark data for each installation. RTLA is designed to organize and improve the LCTA process, incorporate Training Area management goals, and develop useful assessments to achieve and/or maintain these goals.

In short, the RTLA program has evolved to a centralized, installation-level program that focuses first and foremost on installation needs and may provide information to major commands and Headquarters, Department of the Army, as requested[33].

The RTLA component acquires data and assesses information to maximize the capability and sustainability of the land to support live training and testing activities. Installations use RTLA data and information to (Department of the Army 2005):

- develop Conceptual Models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses;
- establish Specific Assessments to determine the status of the training lands with respect to those thresholds as well as success of rehabilitation efforts once implemented;
- recommend boundaries and training load distribution for newly acquired and existing training land, so that the capacity of training land can best support a new or changing training mission and a new intensity load;
- identify LRAM projects;
- ensure that biological considerations are part of the LRAM project prioritization process;
- determine the effectiveness of LRAM projects;
- calculate land condition curves that support Army Training and Testing Area Carrying Capacity methodology (*e.g*., cover, land use, load curves);
- create maps that depict the availability, suitability, accessibility, and capacity of training lands;
- conduct internal encroachment assessments by routinely reviewing plans, such as the INRMP, Integrated Cultural Resources Management Plan, annual burn plan, and Endangered Species Management Plans.

5.1.1.2 Current Management

Background

Inventories conducted on Fort Carson in 1982 and 1983 to determine range sites and their respective condition classes as well as a 1984 vegetative trend study on the PCMS were precursors to the LCTA (now RTLA) program. Fort Carson and the PCMS were pioneer study sites for development of the LCTA program. A study was conducted (Diersing and Severinghaus 1984) to examine effects of Army training activities on soils, vegetation, birds, and mammals. In 1984 research was initiated to estimate optimum levels of tracked vehicle use on non-wooded military lands (Maenius-Mosley 1988). Shaw and Diersing (1989a, 1989b, 1990) examined tracked vehicle impacts on vegetative cover and erosion rates at the PCMS from 1985 to 1987.

Baseline LCTA plots were established in 1984, 1985, and 1986. Most plots were re-read in 1987 and 1988. These baseline LCTA plots were established with assistance from Colorado State University in coordination with the Construction Engineering Research Laboratories, U.S. Army Corps of Engineers. After evaluation and refinement of techniques used in these studies, the LCTA program was implemented at Fort Carson and the PCMS (in 1989).

[33] Center for Environmental Management of Military Lands and Army Environmental Center. 2004 (DRAFT). *Handbook of Effective Practices for Range and Training Land Assessment (RTLA) Coordinators*. Colorado State University, Fort Collins, CO.

A new protocol is being drafted to reflect the recent changes in the former LCTA program. New RTLA monitoring efforts focus more on assessing training land condition in support of installation mission and providing recommendations for the informed scheduling, usage, and rehabilitation of Army land. Protocols should contain the installation's RTLA monitoring goals and objectives in support of the installation's training mission[34].

Methods
The original LCTA plot inventory employed standard methods, permanent field plots, and stratified random sampling and emphasized multiple applications of data collected. The LCTA program developed a herbarium collection (located at the DECAM), which includes a laminated sample of each plant species with pertinent information on each laminated sheet. New specimens are added as they are discovered.

On Fort Carson, 204 permanent LCTA plots were established by 1987, and 206 permanent plots were established on the PCMS by 1989. Sites were selected using a GIS that used satellite vegetation imagery and digital soil surveys. Vegetative cover and soil combinations (polygons) were identified, and LCTA plots (100-meter belt transects) were allocated to these polygons through a stratified random process in proportion to the percent of land that they covered. Tazik *et al.* (1992) describes standard techniques used to allocate and collect data from standard LCTA plots. DECAM-collected LCTA data are available in summarized tables and in DECAM computer files.

Following the transfer of LCTA responsibilities to Range Control Division, G3/DPTM, it was decided to allocate LCTA plots to each Training Area on Fort Carson and PCMS with plots proportionally stratified by vegetation class. In 2001, 357 plots were established on Fort Carson. Each newly allocated LCTA plot was digitally photographed, located using a global positioning system, and digitized into the GIS. The 357 plots include 43 original DECAM plots. A total of 375 plots have been selected for PCMS, including 62 original DECAM plots.

The baseline survey for the additional plots at Fort Carson was completed in 2002. The baseline survey for the additional plots at PCMS was completed in 2005. In 2006 new methodologies are being implemented as necessary to support monitoring goals and objectives of the Specific Assessments outlined in the RTLA Protocol. The RTLA Protocol will be completed in early 2006.

5.1.1.3 Proposed Management

Project: Range and Training Land Assessment
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), compliance with AR-350-4, stewardship
Funding Priority: This is not applicable as ITAM funding is not subject to environmental funding classifications.
Project Timing: Objective 4 – completed by 2008; objectives - as needed or indefinitely.
Regulatory Coordination: None required

Goal. Develop Conceptual Models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses and establish Specific Assessments to determine the status of training lands with respect to those thresholds as well as success of rehabilitation efforts.

[34] Memorandum: *Range and Training Land Assessment Installation Protocol*. Thomas E. Macia, Chief, Training Simulations Division. 30 June 2005.

Objective 1. Determine Specific Assessments (*e.g.*, High-Use Area Assessments, Threatened and Endangered Species Habitat Monitoring, Invasive and Noxious Plant Assessment, Soil Compaction, Land Cover, Vegetation Condition) to be conducted, starting early 2006.

Objective 2. Produce individual RTLA data analyses reports for each Specific Analysis upon completion. Reports will include management recommendations based on conceptual models (*i.e.*, Green, Amber, Red, and Black ratings).

Objective 3. Continue annual monitoring of the 44 RTLA plots in former area of Training Areas B and C at PCMS for comparison against baseline data collected prior to the re-opening of those areas for military maneuvers.

Objective 4. Continue monitoring of permanent RTLA (LCTA) plots and use data to analyze the distribution of military impacts on land over time (trend analysis) as well as to monitor changes in vegetation over time to assist in validating/modifying watershed management practices. The next monitoring at Fort Carson shall be completed in 2007 and the PCMS in 2008.

Objective 5. Update plant collections and species lists as new species are found.

Objective 6. Revise RTLA Protocol annually to incorporate new Specific Assessments and evaluate former Specific Assessments as needed.

Objective 7. Conduct baseline surveys in expansion areas as determined.

5.1.2 Land Rehabilitation and Maintenance

5.1.2.1 Current Conditions

The LRAM component is a key enabler for sustaining realistic training conditions and supporting the personnel, weapons, vehicles, and the mission requirements for the units using the installation (Department of Army 2005). The LRAM component includes programming, planning, designing, and executing land rehabilitation and maintenance projects based on requirements and priorities identified by TRI, RTLA, and LRAM components of ITAM.

LRAM is mitigation for and minimization of impacts of the military mission at Fort Carson and the PCMS. LRAM projects are specifically designed to:

- maintain quality military training lands;
- mitigate severe safety hazards limiting training opportunities;
- minimize long-term costs associated with land rehabilitation, vehicle maintenance, or additional land purchase;
- modify Training Areas to enhance training possibilities; and
- reduce erosion.

More specifically, LRAM can be used to achieve the following:

- improved vegetation cover to enhance training,

- improved vegetation cover to reduce soil loss and protect long-term soil productivity,
- improved vegetation cover to comply with air quality standards by reducing fugitive dust,
- controlled runoff to reduce soil loss and protect riparian resources,
- repair gullies and other watershed damage for safety and to return land for training use,
- controlled sediment transport to protect riparian resources and comply with water quality standards, and
- construct such projects as hardened crossings, HETT on/off loading pads, helicopter landing pads, and others that would enhance the possibilities for military training in the Training Areas of both facilities.

LRAM project funding applies to damaged sites that are not out of environmental compliance and were damaged by training and/or are negatively impacting training. It also applies to projects in Training Areas that enhance training possibilities that fall within current training constraints.

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 or is not caused by military activities, 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. LRAM cannot be used to conduct range modernization projects (Department of Army 2005).

Installations are required to coordinate with the range modernization planning team members to identify, plan, and execute approved LRAM projects. The Sustainable Range Program Web site provides detailed information to support the LRAM project life cycle.

5.1.2.2 Current Management

The change in proponency and personnel in 2001 resulted in a re-evaluation of LRAM priorities. Annual and longer-term LRAM project lists and the methodologies for implementation are maintained. This list remains flexible to react to immediate needs. Beginning in 2003 LRAM projects have been implemented on a more proactive basis. Areas damaged to the point where they restrict military training or create health and/or safety hazards are high priorities.

Reseeding

Reseeding is used in areas that have been disturbed but do not require bank sloping or other intensive site preparation. These are normally areas with relatively flat slopes and more stable soils. A rangeland drill seeder is used for this operation. Some areas may be too rocky or steep to seed with a rangeland drill. In these areas, seed may be broadcast using an appropriate broadcast seeder. Critical areas are those where erosion is a significant concern, generally steeper slopes. These areas are seeded at twice normal rates. Since 2001 the ITAM program has reseeded over 2,600 acres on Fort Carson and 2,400 acres on the PCMS.

All seed should be adapted to the southeastern Colorado region. The use of fertilizers is discouraged in all native seedings.

The DECAM prepared a *General Downrange Seeding Specifications for Fort Carson* (amended from the U.S. Army Corps of Engineers Guide) (DECAM 2001b). This mix was established to accommodate a diversity of site, soil, climate, and topographical conditions. In collaboration with the NRCS, the ITAM

seed mix was amended to increase seeding success in 2003. The seed mix for Fort Carson is predominantly native, and the seed mix for the PCMS is entirely composed of native grasses.

Fort Carson and the PCMS are both located in areas with a high variability in climate influences and soils. This variability is a significant cause of seeding failure on both installations. The past and current practice used is to prescribe one seeding mix comprised of numerous species with a wide range of adaptability for each installation. A better method for attaining the highest success rate would be to plant species that are the most adaptable within each vegetation type or area. The DECAM and ITAM are working closely with other federal agencies to assess the possibility of utilizing variants of these natives that are less affected by military impacts (see Section 4.2.2.3, *Plant Materials Improvements*).

Erosion Control

Erosion control in its broadest definition includes most LRAM projects. In this section it refers to those projects that involve gully erosion. Erosion control usually involves bank sloping, various water flow control structures, and often the use of geotextile and/or rip-rap.

At Fort Carson and the PCMS, historical land use has caused degradation of the vegetation that normally traps, uptakes, and transpires rainfall and snowmelt. Reduction in plant cover results in soil loss by sheet and rill erosion, headcutting, and the formation of large gullies. Montmorillonite clays in the soils allow the sides of erosion courses to remain steep instead of collapsing to a shallower angle of repose and form deep gullies that interfere with training activities.

When plant cover is reduced and soil is disturbed by military training activities, accelerated soil and wind erosion will result. The amount of plant cover on the soil surface at the time of a rain or wind storm is the primary factor in preventing erosion. Canopy and basal cover, species composition, root structure, and distribution are all important factors to reduce erosion. Plants and litter form a protective cover that mitigates impacts of wind and water, promoting favorable surface conditions to improve water uptake.

Remediative bank sloping is the process of contouring the banks of gullies to an angle where vegetation can be successfully established, helping to stabilize and bring an area into hydraulic balance. Bank sloping also allows increased military training by facilitating maneuver and reducing safety hazards. Bank sloping, using various methods has been conducted on a modest scale for years at Fort Carson and the PCMS.

Another method being used to help curtail erosion due to military training at Fort Carson is enhancing erosion control dams throughout Training Areas. Whereas previous design criteria were based solely on slowing surface water movement across Fort Carson and trapping sediments moved due to the water's movement, these new design criteria involve building up material on the back side of existing dams to widen the top of the dams such that military vehicles can traverse them. Sides of dams are also reduced to no more than a 4:1 slope, allowing vehicles to climb and descend them with far less impact. Enhanced dams are reseeded with the normal seed mix for that area, and after vegetation recovery are re-opened for military training use. This process is slated to be undertaken at the PCMS in the near future.

The DECAM conducted the first tests for large-scale bank sloping in 1997. Large-scale bank sloping began in 1998 and 1999 at Fort Carson and the PCMS when more than 816,000 cubic yards and 120,000 cubic yards, respectively, of soil were moved. When vegetation is fully re-established, the result is stabilization of miles of stream channels and protection of downstream waterways from excessive sediment yield. Storm runoff will be retained in vegetation on bank sloped areas. Bank stabilization also

reduces the channelization of maneuver into narrow corridors; these narrow corridors concentrate impacts, which increase requirements for future rehabilitation efforts.

Polzin (1999b) evaluated bank slope site seeding in Training Area 25. He concluded that crimp mulching reduced invasive weeds at rehabilitated sites, reduced bare soils, and increased ground litter. Seeding success was poor, but reasons were uncertain.

Bank sloping has been used in conjunction with other hydraulic controls, such as erosion control dams, an aggressive plant material management, and other erosion control structures. Fort Carson has approximately 350 erosion control dams and numerous erosion control structures, and about 430 erosion control dams have been constructed on the PCMS. Each dam is marked in the field with a project identification number on an aluminum cap. The cap was placed on rebar stock and driven into the dam. Each dam has been located using a global positioning system and digitized into the GIS (DECAM 1997).

ITAM has updated this database for Fort Carson and is in the process of updating the database for the PCMS. ITAM has begun enhancing erosion control dams to facilitate military maneuver. Enhanced dams are widened to 40 feet across the top, and sides are sloped to a maximum 4:1. Enhanced dams are revegetated using the critical area seed mix and are crimp mulched. Any damage to erosion control dams is repaired at the time of enhancement. As of 2005, 48 dams have been enhanced at Fort Carson.

Road/Trail Management

Since Fort Carson opened in 1942, the number and length of roads and trails on the installation have been increasing. The PCMS is experiencing a similar increase of unimproved roads and trails as a byproduct of military training. Unimproved roads and trails contribute to soil erosion and sedimentation by reducing infiltration and concentrating runoff. Eroded trails can be improved with grading, the construction of drainage ditches, and erosion control structures. Duplicate or trails can be smoothed and reseeded.

Hardened Sites

Some staging areas, bivouac sites, helipads, wet area crossings, HET on/off-loading areas, etc. on Fort Carson and the PCMS are used repeatedly for training purposes. This repeated use has resulted in areas that are denuded of vegetation with compacted soils. As a result, these areas significantly contribute to fugitive dust and increased sedimentation. They also have very limited realistic training features. These areas cannot be easily rehabilitated in a cost effective manner to a natural state that can continue to support heavy use, but they often can be hardened using layers of gravel, road base, and small rock to facilitate military use and reduce soil erosion and associated sedimentation into nearby drainages and waterways.

Elements considered in evaluation of potential sites for hardening include:

- historical use for military activities that cause localized soil compaction and related damage,
- potential future use for military activities,
- potential impacts to the native ecosystem, and
- utility to military training activities.

Coordination

Fort Carson. LRAM projects often require coordination with other Fort Carson organizations, particularly the DECAM and Directorate of Public Works. Prior to any construction activities that create

any soil disturbance, an archaeological clearance is obtained by the DECAM. Other activities that require coordination include general NEPA documentation, projects that affect wildlife or its habitat, water dipping, and similar activities.

U.S. Army Corps of Engineers. There may be instances where erosion control structures are planned to be placed in gullies that contribute water directly to existing drainages recognized by the Corps of Engineers as being Waters of the United States, as identified in Section 404 of the Clean Water Act. Any construction of erosion control structure is coordinated with the U.S. Army Corps of Engineers in Pueblo, Colorado to determine if a 404 Permit is necessary prior to construction. If a permit is required, it is processed prior to construction activities. Fort Carson has received Army Regional Permit No. 2002-00707 from the Corps of Engineers[35], which allows most erosion control activities on Fort Carson and the PCMS to occur without separate permitting actions.

Colorado State Permits. The State of Colorado requires that an application for every erosion control dam on Fort Carson or the PCMS be submitted and approved prior to construction. Required information is submitted to the Colorado Division of Water Resources along with a processing fee for approval and processing.

5.1.2.3 Proposed Management

Project: Land Rehabilitation and Maintenance
Justification: No net loss in the capability of the land to support the military mission (Sikes Act), compliance with AR-350-4, stewardship
Funding Priority: This is not applicable as ITAM funding is not subject to environmental funding classifications.
Project Timing: All objectives - as needed or indefinitely
Regulatory Coordination: U.S. Army Corps of Engineers and/or Colorado Division of Water Resources for some projects

Goal 1. Use LRAM efforts to restore and maintain lands to full training support capability.

Goal 2. Coordinate with adjoining private, state, and federal land managers to protect lands from the effects of military training by reducing fugitive dust, soil erosion, and sedimentation within current land management strategies.

Objective 1. Continue to repair and revegetate areas that impact or are impacted by military activities as they become apparent.

Objective 2. Reseed lands damaged by military training using drill, broadcast, or hydroseeding methods.

Objective 3. Continue erosion control dam enhancement program to improve military maneuver.

Objective 4. Implement best techniques for dust control, if needed.

[35] Department of the Army Regional Permit No. CO-97-30278, via Dec. 11, 1997 letter from U.S. Army Corps of Engineers Southern Colorado Project Office, Pueblo, CO.

Objective 5. Maintain prioritized list of restoration projects (*e.g.*, reseeding, erosion control, bank sloping, unnecessary road/trail restoration, hardened sites).

Objective 6. Monitor previously restored areas to determine the effectiveness of reseeding, erosion control, bank sloping, hardening, and other techniques and use results to ensure maintenance of previous project sites and make appropriate adjustments to future LRAM projects.

Objective 7. Continue to develop locally adapted, native seed mixes (capable of withstanding higher/heavier traffic and more fire resistant) by vegetation type for Fort Carson and the PCMS.

Objective 8. Implement limited use and off-limits signage using tactically suitable signs (*e.g.*, Siebert stakes, NATO mine field passage signs).

Objective 9. Use military and DECAM assets to assist with the design and implementation of LRAM projects.

Objective 10. Use external agency support (*e.g.*, NRCS, USGS) to assist and design LRAM projects, as needed.

Objective 11. Coordinate with the DECAM in the use of the programmatic 404 Permit established with the U.S. Army Corps of Engineers to implement routine LRAM projects as much as possible.

Objective 12. Use private contracts for erosion control projects that exceed the internal completion capacity of Fort Carson.

Objective 13. Coordinate with the DECAM to ensure LRAM projects meet environmental requirements (*e.g.*, NEPA, permits, listed species, cultural resources protection).

5.1.3 Training Requirements Integration

5.1.3.1 Current Conditions

The TRI component provides a decision support capability based on the integration of training requirements, land conditions, range facilities, and environmental management requirements. The installation ITAM Coordinator must consult with the DPTM Range Officer, other range organization personnel, trainers, environmental technical staff, natural and cultural resources managers, and other environmental staff members to integrate the following inputs (Department of Army 2005):

- training requirements;
- land management, training management, and natural and cultural resources management data; and
- data derived from the RTLA and Army conservation program components.

TRI provides input for developing and updating the INRMP. TRI also supports range modernization project siting, and training event scheduling and allocation (Department of Army 2005).

5.1.3.2 Current Management

Coordination
A key to successful implementation of the ITAM program is close coordination between Range Control and the DECAM. ITAM, based upon recommendations from the LRAM and RTLA coordinators, initiates processes to recommend land use design and management considerations to trainers and planners and coordinates with them on scheduling and allocating land use for military training with minimum environmental damage. Interfacing land rehabilitation actions with training requirements ensures mission support.

Range Carrying Capacity
The Army is developing a methodology and integrated support system (Army Training and Testing Area Carrying Capacity [ATTACC]) for estimating operations and support costs of using land at Army installations for training and testing purposes (Department of the Army 1999b). Major objectives of ATTACC are:

- to identify training and testing land carrying capacity and
- to establish a model to predict LRAM requirements based on training and testing usage.

Fort Carson is an important test site for establishing maneuver carrying capacities for individual Training Areas using the ATTACC program. This program is within the ITAM program, but software is still in the developmental stages.

The ATTACC program came on line at Fort Carson in 1999. Fort Carson is in the process of obtaining military use information to correlate this use with training land condition information as part of the process of determining training carrying capacities on a Training Area-specific basis. Once completed, ATTACC models would be integrated with the Range Facility Management Support System (RFMSS) to schedule military training at Fort Carson and the PCMS to minimize impacts to the land and its resources and to estimate the costs (LRAM) of repairing damage that is beyond the capability of natural restoration processes. RTLA analyses will be utilized to ground-truth ATTACC results from the RFMSS.

Mission Safety
Some environmental restrictions and programs enhance mission safety. For example, the revegetation of bare landing zones reduces dangerous “brownouts” for rotary wing aircraft. Proper road construction and maintenance improves driving safety. Bank sloping reduces rollover risk for maneuvering vehicles. Fire restrictions reduce the potential for wildfires, which can injure troops or damage equipment.

Training Restrictions
Restrictions on training are sometimes necessary for long-term sustainment of training and ecosystem protection, including environmental compliance. Restrictions on troops training on Fort Carson and the PCMS are within FC Regulation 200-5 (*Maneuver Damage Control Program*), FC Regulation 385-63 (*Firing Ammunition for Training, Target Practice, Administration and Control of Ranges and Training Areas*) and supplemental maps of both facilities which delineate off-limits and limited-use areas and are updated periodically. Some restrictions are directly tied to compliance with various laws and regulations (*e.g*., cultural/archeological resource sites), but many are being implemented according to clear guidance from both Department of Defense and Department of the Army to manage natural resources for long-term sustained military use (*e.g*., limited-use areas, described below).

In some cases, troop units using either Fort Carson or the PCMS must coordinate with the Range Control/ DECAM for site-specific restrictions needed for safety and compliance purposes (*e.g.*, permission to dig large excavations, precluding hitting buried utilities and archeological sites). Troops are briefed regarding training restrictions via monthly Sustainable Range Awareness classes and/or informed of expectations and rules during the scheduling process (see below).

Restrictions are often "invisible" to troops and are imposed during the scheduling process (*e.g.*, Training Area not available; certain firing positions not available for live fire). Other restrictions can be incorporated into training scenarios. For example, troops can be told fenced areas represent known mine fields. Restrictions on off-road travel, removal of vegetation, and the filling of holes can be tactically sound. Off-road travel leaves signs for the enemy to track units or determine unit strength. Removed vegetation and foxholes and other dug areas are indications of unit strength to enemy intelligence. This type of damage can also be defined as "tactical signature" - the evidence a unit leaves behind that can be used by the enemy against them. Reducing tactical signature can equate to reducing maneuver damage in the Training Areas, a concept taught at Fort Carson during Sustainable Range Awareness briefs (Section 5.1.4). Thus, it is important to fit environmental restrictions into tactically-realistic training scenarios.

Limited Use/Rest Rotation/Deferment Program
The purpose of Fort Carson's limited-use area program is to recover key military terrain in as cost- and time-efficient manner as possible. Downrange at Fort Carson, key terrain that has been heavily impacted by military training will be evaluated for possible inclusion in the limited-use area program. Those impacted to the point of imminent critical erosion loss will be included, while not to the point of removing all key terrain in the local vicinity of any given Training Area. This is done to provide rest from use required by the rangeland resource to meet the essential biological and physiological requirements needed to maintain proper health and vigor for maintenance, growth and recovery. It also provides the time and means to perform land rehabilitation and land maintenance operations in heavily degraded areas. In these designated areas, vehicles may drive through on roads and trails, and dismounted training may be conducted off the roads. However, it is not permitted to dig, to bivouac, or to drive vehicles off the roads in these areas. All limited use areas are reviewed on a three-year cycle, in order to determine their recovery status. Under optimum conditions, an area may be re-opened to training in approximately three growing seasons. Section 4.7.2, *Rest/Rotation/Deferment Program* further discusses this program.

5.1.3.3 Proposed Management

Project: Training Requirements Integration
Justification: AR 350-4, stewardship
Funding Priority: This is not applicable as ITAM funding is not subject to environmental funding classifications.
Project Timing: All objectives - ongoing indefinitely or as needed
Regulatory Coordination: None required

Goal. Improve communication between training and land management staff to facilitate the integration of Fort Carson's training requirements for land use on both Fort Carson and the PCMS with the sustained capability of the land to support such use.

Objective 1. Use the RFMSS, Training Resource Management Meetings, and other military training data to find the "best fit" between military missions and facilities usage in terms of identifying Training Areas

that can best support specific training scenarios in a sustained fashion while minimizing or mitigating environmental impacts.

Objective 2. Use training restrictions, when required, to protect sensitive natural and cultural resources and minimize damage to Training Areas.

Objective 3. Whenever possible, incorporate training restrictions into training scenarios and tactical signature/maneuver damage reduction philosophies into unit tactical Standard Operating Procedures.

Objective 4. Evaluate the need for rest-rotation of training lands in terms of mission and environmental cost/benefits annually.

Objective 5. Continue to collect Maneuver Impact Miles data for use in the RFMSS to develop and implement a training scheduling system based on military use carrying capacity (ATTACC), considering the timeliness of necessary software fixes.

Objective 6. Coordinate with DECAM Natural Resources personnel to evaluate the use of Sibert stakes and other tactical signage to enhance military training and attempt to divert such traffic from environmentally sensitive sites.

5.1.4 Sustainable Range Awareness

5.1.4.1 Current Conditions

The SRA component provides a proactive means to:

- develop and distribute educational materials to users of range and training land assets,
- integrate SRA into existing command and/or installation operational awareness activities and events, and
- initiate new events that maximize outreach for the command.

SRA materials relate procedures that reduce the potential for inflicting avoidable impacts on range and training land assets, including the local natural and cultural resources (Department of Army 2005).

5.1.4.2 Current Management

The *Fort Carson Environmental Handbook* (DECAM undated) is designed to provide commanders, unit leaders, and soldiers with an overview of Fort Carson environmental programs. The Handbook includes environmental training programs, pollution prevention and waste minimization, hazardous materials and wastes, spill prevention and response, air emissions, noise pollution, energy conservation, natural and cultural resources, public and agency involvement, and similar topics. ITAM, in conjunction with the DECAM, has produced a Soldiers Field Card, which lists some “do’s and don’ts” of Training Area usage for military personnel.

The Maneuver Damage Control Program briefing is part of an exportable package, which can be transferred to off-Post units, to be used to teach those units prior to their arrival for training on Fort Carson or PCMS, thereby reducing travel costs and administration time on their arrival.

Specific areas of environmental training that are available to military personnel who use Fort Carson and/or the PCMS include:

- monthly (or as needed) courses for Maneuver Damage Control personnel,
- general environmental awareness courses for all personnel,
- Leaders' walk-through courses for incoming unit commanders,
- National Guard/ Reserve Component Pre-camp briefings, and
- SRA/ Maneuver Damage Control classes at units' home stations.

An education strategy encompasses the integration of educational materials with command support. Educational materials provide information about the problem, why it is everyone's problem, and how following existing rules and regulations will help alleviate it. Materials also address issues concerning combat effectiveness and the environment.

Information relative to environmental conservation and protection are provided in presentations, formal and informal briefings, pamphlets, videos, and instructional classes. Materials contain examples of appropriate and inappropriate training actions or vehicular movements along with their consequential effects. The concepts of the Maneuver Damage Control Program are emphasized. The major theme stressed is that environmental deterioration affects overall success of the training and/or tactical mission. The following are also emphasized within the EA program:

- adherence to federal, Fort Carson and Department of the Army/DoD laws and regulations, training procedures that best protect the environment, and training restrictions;
- notification on the location of areas that are off limits as well as areas that are designated limited use areas (the "Limited-use" Land Rest/Rotation Deferment Program);
- Maneuver Damage Control Program;
- proper field operation tactics (to include tactical signature awareness), which minimize damage to the land resource;
- noxious weed control information;
- minimize damage to trees, wetlands, and wildlife habitat (where necessary);
- establishment of a conservation ethic that also promotes the accomplishment of the military training mission;
- safety hazards, such as gullying, etc., which can lead to the loss of personnel (*i.e.*, serious injury or loss of life), and/or to the loss of, or serious damage to equipment;
- badly damaged acreage in Training Areas reduces land available for quality training;
- costs resulting from damage to natural resources place added burdens on already strained budgets (*e.g.*, cleaning up roadways; construction, operation and maintenance of sediment basins; litigation from adjoining landowners; fines for violations of natural resource laws/regulations; lost training time; repair of damaged equipment); and
- damage to highly valued natural resources can discredit the Army in the minds of local citizenry.

5.1.4.3 Proposed Management

Project: Sustainable Range Awareness
Justification: Maintaining the capability of training lands to support the military mission (Sikes Act); National Historic Preservation, Archeological Resources Protection, Clean Air and Clean Water acts; stewardship; increase overall awareness of tactical signature
Funding Priority: This is not applicable as ITAM funding is not subject to environmental funding classifications.

Project Timing: All objectives - ongoing indefinitely or as needed
Regulatory Coordination: None required

Goal 1. Develop an awareness of values of, and requirements for, natural and cultural resources protection on Fort Carson and the PCMS to support sustained military training.

Goal 2. Educate military users to minimize impacts to the land and natural resources to sustain and enhance training.

Goal 3. Increase awareness of tactical signature, increasing combat effectiveness while decreasing the need to recover military impacts.

Objective 1. Provide decision makers with the information needed to make judgments that affect the Range and Training Land Program.

Objective 2. Revise Military Personnel Awareness materials (*e.g*., field card, posters, supplemental maps) as needed to maintain the accuracy and mission-relevancy of these materials.

Objective 3. Present briefings at the New Commanders Course, Training Resource Management meetings, Maneuver Damage Control Officer's training, and others that relate to environmental awareness, conservation, protection, and tactical signature reduction.

Objective 4. Develop or update environmental awareness materials and briefings as needed to ensure support of the military mission, compliance with environmental laws (*e.g*., NEPA, Endangered Species Act, Clean Air Act, Clean Water Act), and stewardship of public lands, while continuing, and where possible enhancing, military training to readiness standards.

5.1.5 Geographic Information System

5.1.5.1 Current Conditions

All aspects of the Fort Carson ITAM Program utilize a GIS to support land use planning decision processes. RTLA data collected provides information to effectively manage land use and natural resources. Information generated is used to help prioritize potential LRAM projects. TRI utilizes the information to ensure adequate, available training lands for doctrinal Army training. Problems due to improper land use are identified in GIS, to be communicated, along with acceptable & tactical solutions, to land users during SRA briefings. The ITAM GIS provides a state-of-the-art information source for today's military decision makers.

Accurate spatial information is available for map production or detailed site analysis. Sample data layers include: ranges/training facilities, roads, observation points, landing zones, impact areas, artillery firing points, air corridors, Training Areas, training constraint areas, utilities, soils, vegetation, firebreaks, a military grid reference system, and digital elevation models.

5.1.5.2 Current Management

The ITAM GIS provides a state-of-the-art information source for military decision makers. Accurate spatial information is available for map production or detailed site analysis. Sample data layers include ranges, training facilities, roads, observation points, landing zones, impact areas, artillery firing points, air

corridors, Training Areas, training constraint areas, utilities, soils, vegetation, firebreaks, a military grid reference system, satellite and aerial imagery, and digital elevation models.

There are three GIS operations that directly affect implementation of this INRMP. The DECAM GIS is described in Section 5.7, *General Data Collection, Storage, and Analysis*. DPW has GIS databases that are needed to implement certain projects within this INRMP (*e.g.*, utility lines, facilities, etc.). Below paragraphs describe the GIS within the ITAM program.

Uses for the ITAM GIS could include recording locations of RTLA plots, providing spatial analyses (soil types, slope, vegetation, etc.) for LRAM project design, showing environmentally sensitive areas, planning military training missions, etc. Given that the Army of today is evolving around the "Digital Division" concept, GIS technology will become a tool more prevalently used for decision-making and problem solving. The ITAM program has two handouts (*What is a GIS?* and *What is Remote Sensing?*) that describe a GIS, remote sensing, and their components and give specific examples of their usefulness to military planners.

The GIS program at Fort Carson began within the DECAM ITAM program. This GIS originally used Geographic Resources Analysis Support System (GRASS), a GIS software package developed by U.S. Army Construction Engineer Research Laboratory. Consistent with other Army ITAM GIS programs, Fort Carson GIS databases were converted to Arc/Info® and its related software. Arc/Info® is used to perform operations on features stored as points, lines, or polygons; ArcGrid® allows manipulation of raster images; ArcTIN® is used for surface modeling; and ArcView® provides a user-friendly environment to query, display, and plot themes.

In 2001 a copy of the DECAM ITAM GIS was transferred to Range Control Division, consistent with the transfer of the total ITAM program. The ITAM GIS uses Arc/Info® 8.1 on a Windows® 2000 operating system that is connected to the Fort Carson local area network. The conversion of this data to a standard format with recognizable names is ongoing.

The use of remotely sensed imagery is an important aspect of GIS technology. In the mid 1990s DPW obtained digital, black and white, orthorectified aerial photographs of Fort Carson. In 2000 the ITAM program obtained digital, color orthorectified aerial photographs at a 2-foot resolution and updated digital elevation models at a 10-foot resolution of the PCMS. In 2003 Fort Carson aerial photos to the same standards were obtained. Fort Carson is using both remote sensing technology and USGS orthophotographs to help decision-making on Fort Carson and the PCMS. In 1998 digitized vegetation maps were completed by the DECAM for both installations. As one example of its use, a Tactical Concealment Map was produced for military use from canopy data.

There is a need to monitor changes to the Fort Carson and the PCMS landscape on a regular basis, particularly to quantify impacts of military activities on the land. The acquisition of aerial photographs and other imagery on a regular basis of both Fort Carson and the PCMS would facilitate such change detection analyses.

There is a significant need to obtain image-processing software (ERDAS Imagine®) to improve the usefulness of image analyses. Such imagery would allow improved 3-D map production, change detection, fly-through virtual data presentations, land cover classification, etc. Hyperspectral imagery would also improve land use classification capabilities. In some cases, for example, individual tree species could be identified instead of only vegetation type. The U.S. Army Space Command, Remote

Sensing Branch is a good source of imagery, and the DoD stores archived imagery in the Commercial Satellite Imagery Library, which is available to Fort Carson through SIPRNET.

It is important for ITAM to be able to directly assist military units planning training missions at Fort Carson and the PCMS. The ITAM program is developing a self-help program whereby ITAM supplies the computer, databases, and technical assistance to military planners. This program allows planners to draw maneuver graphics on custom generated maps. There is a need to transport this technology directly to planners off-Post. This is particularly important considering the number of off-site Active, National Guard, and Reserve units that come to Fort Carson and the PCMS to train. Additional planning capabilities off-site would allow more field time during training periods at Fort Carson and the PCMS.

Fort Carson is using virtual reality (simulated) training to more cost effectively train its soldiers. This training requires GIS databases that accurately portray training features in a 3-D setting. The ITAM GIS has and is developing additional features that have assisted with database development for this type of training.

5.1.5.3 Proposed Management

Project: Geographic Information System
Justification: AR-350-4, stewardship
Funding Priority: Not applicable for ITAM projects
Project Timing: Objectives 1 and 6 – by 2009; objectives 5 and 7 – by 2010; all other objectives - ongoing indefinitely
Regulatory Coordination: None required

Goal. Provide spatial products and analyses to support ITAM program implementation, military mission planning and training, and land use decision-making.

Objective 1. In cooperation with the DECAM and DPW, establish a network among GIS stations; determine database ownership and database standards by 2009.

Objective 2. Use GIS to maintain an historical record of RTLA plots and LRAM projects and to provide updated input to SRA briefings.

Objective 3. Update hardware/software for data collection/analysis, particularly ERDAS Imagine® software.

Objective 4. Obtain digital aerial and satellite imagery (multispectral and hyperspectral) for Fort Carson and the PCMS on a regular basis that can be used to provide analyses of changes in land condition.

Objective 5. Determine requirements for additional remote imagery by 2010, including PCMS expansion area imagery and hyperspectral imagery for both Fort Carson and the PCMS and obtain such imagery, using sources such as the Space Command or the Commercial Satellite Imagery Library, whenever feasible.

Objective 6. By 2009 utilize remote imagery to assist in determining changes in land condition.

Objective 7. Use a global positioning system to digitize features (*e.g*., target lifters, firing positions, signs, structures) for each range and Training Area on Fort Carson and the PCMS by 2010.

Objective 8. Enhance the self-help program for assisting with the planning of military activities on Fort Carson and the PCMS, including the use of the Internet to access GIS databases from remote locations.

Objective 9. Use Modified Combined Obstacle Overlays (*e.g*., avenues of approach, natural and man-made obstacles, key terrain [bridges, high points], fields of fire, line-of-sight) to analyze potential maneuver damage impacts for planned military activities.

Objective 10. Continue to assist with database development for simulated training for troops using Fort Carson and the PCMS.

5.2 Natural Resources Enforcement and Human Health and Safety

A key component of Fort Carson's natural resources management program is conservation law enforcement. Once termed Game Wardens, today's Conservation Law Enforcement Officers are responsible for enforcing a myriad of natural and cultural resource laws and regulations of federal, state and local origin. Army Regulation 200-3, Natural Resources—Land, Forest and Wildlife Management, defines natural resources as, *The viable and/or renewable products of nature and their environments of soil, air, and water. Included are the plants and animals occurring on grasslands, rangelands, croplands, forests, lakes, and streams*.

Gone are the days when Game Wardens simply conducted compliance inspections of hunters and anglers to ensure they were licensed and did not exceed daily bag limits. Conservation Law Enforcement Officers are frequently involved in the protection of rare or unique species and their habitat, the illegal disposition of hazardous and solid wastes, air and water quality issues, and the protection of historic and pre-historic cultural resources.

5.2.1 Current Conditions

History and Authority

Prior to 1983, the Provost Marshal Office (PMO) was responsible for natural resources enforcement on Fort Carson. In 1983 the DECAM was assigned primary responsibility for natural and cultural resource management and enforcement. The PMO still assists with enforcement of wildlife laws and regulations within the limits of existing jurisdictions and at the request of, or in coordination with, Conservation Law Enforcement Officers.

Officers are commissioned as U.S. Law Enforcement Officers by the USFWS[36], Special District Wildlife Managers by the CDOW[37], and Federal Law Enforcement Officers by the DECAM (per Installation Commander's authority). The 1997 Sikes Act Improvement Act includes two specific professional natural resources enforcement items:

- required enforcement of applicable natural resource laws (including regulations) and

[36] Via Memorandum of Agreement for Cooperative Law Enforcement Between the U.S. Fish and Wildlife Service and the Fort Carson Directorate of Environmental Compliance and Management.
[37] Via Memorandum of Agreement for Cooperative Law Enforcement Between the Colorado Division of Wildlife and the Fort Carson Directorate of Environmental Compliance and Management.

- an expansion of Department of Defense authority stating that, "*All Federal laws relating to the management of natural resources on Federal land may be enforced by the Secretary of Defense with respect to violations of the laws that occur on military installations within the United States*."

Both federal and state commissions are necessary due to different jurisdictional areas on Fort Carson (Exclusive and Proprietary) and the PCMS (Concurrent). Individuals who violate any federal, state, DoD, or Fort Carson regulation may be cited, fined, and prosecuted by either the military police, CDOW, USFWS, or DECAM Conservation Law Enforcement Officers, depending on the type of violation and the jurisdiction in which the violation was committed.

Conservation Law Enforcement Officers conduct duties in accordance with the *Standard Operating Procedures (SOP), Law Enforcement Duties and Responsibilities* (DECAM 2005b). Title 10 USC 2671, *Military reservations and facilities: hunting, fishing, and trapping*, requires that all hunting and fishing on an installation be in accordance with the fish and game laws of the state in which it is located and that an act or omission committed on the installation be subject to a like punishment. The Fort Carson Office of the Staff Judge Advocate and the local federal magistrate have approved a *Violations and Monetary Penalties* list. This list contains citable offenses and monetary fines that mirror CDOW violation penalties.

A violator's recreational access privileges may also be suspended by Conservation Law Enforcement Officers via a Suspension Letter signed by the DECAM Director, who is also the Chief of Conservation Law Enforcement. An appeal of the suspension may be petitioned by the violator to the Garrison Commander within 10 days of the suspension issuance. In these cases the Garrison Commander or his delegate will hear the evidence presented by the issuing Officer and the person to whom the violation was issued and make a final decision.

Conservation Law Enforcement Officers and other selected members of the Wildlife Office staff are authorized to deal with nuisance wildlife, such as black bears, mountain lions, and coyotes. The first choice of actions is allowing animals to leave areas on their own, but they may have to be tranquilized, trapped, or hazed. Conservation Law Enforcement Officers are responsible for all complaints and issues regarding birds on Fort Carson and the PCMS.

Conservation Law Enforcement Officers are fully trained professionals, holding both state and federal enforcement commissions and using modern enforcement tools and techniques. Currently, there are four civilian Officers, which also support both PMO and Installation Security in regard to downrange Force Protection requirements. Military Police personnel may be temporarily attached to the DECAM Wildlife Office via a memorandum of agreement between the DECAM and the Fort Carson Provost Marshal Office.

Both CDOW and USFWS are authorized to conduct enforcement operations on Fort Carson and the PCMS, following coordination with the Chief of Conservation Law Enforcement. The CDOW, in particular, directly enforces laws on both installations.

5.2.2 Current Management

Conservation Law Enforcement activities are prioritized based upon the impact violations may have on state- and federally-mandated requirements, protected species and habitats, cultural assets, and regulated operations on the installation. The following list of priorities is not inclusive and may encompass other

concerns as the mission dictates. Enforcement emphasis will change seasonally or with the deployment or redeployment of military units, but these priorities will not change:

Priority 1

Human Health and Safety
Force Protection
Endangered Species Act
Migratory Bird Treaty Act
Bald Eagle Protection Act
Archeological Resource Protection
Native American Graves Protection and Repatriation Act

Priority 2

Game law compliance inspections
Lacey Act

Priority 3

Hazardous Waste Disposal Violations
Clean Water Act
Clean Air Act

Conservation Law Enforcement Officers patrol 373,000 acres separated into two installations that are over 147 miles apart. In comparison, Fort Hood, Texas, consists of 217,000 acres and has 10 full time Conservation Officers.

As the population of Fort Carson increases, so will the demands on its natural resources and the potential for violations. To compensate for this lack of personnel, technology is becoming an important part of the enforcement strategy. Surveillance equipment is used to monitor unsecured access points, and it can be used also to observe endangered species and remote, culturally sensitive sites. Cameras on-hand are not motion-activated and run continuously once turned on, requiring hours reviewing everything recorded for activity. Mechanical deer decoys are used. The procurement of decoys of other species (*e.g.*, cow elk, turkey) will aid in the appropriate utilization of limited personnel resources.

Many investigative priorities are felonies and close coordination is essential with agencies having primary jurisdiction or investigative responsibility. Formal and informal ties have been fostered with enforcement counterparts in the USFWS, CDOW, Military Police, and the Criminal Investigation Division. All DoD citations written are entered into the Military Police Centralized Operations Police Suite, an Army-wide database of violations, and access to this database, the National Crime Information Center, and USFWS and CDOW crime databases is available.

There is not a system in place for collecting and analyzing raw intelligence that does not result in the issuance of a citation. Intelligence received, once properly cataloged, may be useful in solving both old and new cases. Information accumulated can also be useful in targeting enforcement efforts.

A proactive education program is essential to reducing the number of potential violations. Environmental laws are sometimes complicated and do not often receive the emphasis accorded more visible crimes. Law enforcement educational efforts are primarily focused on deterrence and the prevention of violations. Classes during the Environmental Protection Officer's Course, articles in local newspapers, use of the

post-wide e-mail system, public appearances at Fall Fest and National Night Out all appear to be an effective means of relaying the message to the targeted audience.

Conservation Law Enforcement Officers use protocols established by DECAM in conjunction with the CDOW to handle nuisance wildlife complaints on Fort Carson and the PCMS and provide for public safety in the event that a bear, mountain lion, rattlesnake, or other dangerous wildlife is present in the Cantonment Area or areas where Soldiers are training. In the event that a dangerous animal cannot be removed from the Cantonment Area by hazing, the animal is tranquilized and transported downrange.

Training
The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement, to implement the INRMP. All DECAM Conservation Law Enforcement Officers have previously attended a law enforcement academy. The basic training of choice for new Officers is provided by the Federal Law Enforcement Training Center in Glynco, Georgia, plus the USFWS two-week, follow-up game warden track. Afterwards, potential officers must complete a six month apprenticeship on site and show proficiency in a myriad of laws, regulations, techniques and tactics before actually being commissioned by the Director. Additionally, the DECAM requires quarterly weapons qualification/certification and completion of routine cross-functional (Detail) assignments between agencies.

There is a recognized standard requirement of 40-hours of annual refresher training for enforcement officers. Less training creates liability risks in the event of legally debatable officer actions. The National Military Fish and Wildlife Association offers an annual training for experienced officers. This training is 40 hours and uses highly qualified instructors, many of whom have national reputations. The course is open to all of the DoD, is held on various military installations, and Fort Carson has hosted this course more than any other installation. This is the most commonly used course by military installations for refresher training. The CDOW also offers an annual 40-hour enforcement in-service training, which includes defensive tactics and ASP baton re-certification training.

Conservation Law Enforcement Officers are unique in that they are not only responsible for remaining proficient in law enforcement related topics, but training in conservation, environmental law, biology, and wildlife and fisheries management is essential to being effective. The USFWS offers many advanced courses dealing with these topics. Environmental agencies, wildlife organizations, and colleges and universities often provide classes and seminars that can be important to cultivating a well-versed Conservation Officer.

5.2.3 Proposed Management

Project: Wildlife Law Enforcement and Human Health and Safety
Justification: Compliance with all applicable federal and state laws and regulations, maintaining the capability of training lands to support the military mission (Sikes Act), stewardship.
Funding Priority: Class 0; However, primarily Sikes Act funds are used; also conducted incidental to other projects.
Project Timing: Objective 10 - by 2007; all other objectives - ongoing indefinitely
Regulatory Coordination: USFWS, CDOW

Sustainability Goal. Protect natural resources and Soldiers training downrange by maintaining the number of violations at or less than 5 percent of the annual number of permittees. Data collection will begin in FY 07.

Performance Goal. Maintain appropriate level of training and weapons qualification to retain state and federal commissions and maintain a visible presence downrange; achieve 1,000 hours of downrange law enforcement and force protection patrol.

Goal. Ensure military and civilian personnel and activities are in compliance with all natural, cultural and environmental laws and regulations on Fort Carson and the PCMS; identify and cite violators.

Objective 1. Maintain a proactive conservation law enforcement program on Fort Carson and the PCMS.

Objective 2. Strategize, develop, implement, and articulate means of addressing law enforcement priorities.

Objective 3. Coordinate enforcement activities with other agencies, particularly the CDOW and the USFWS.

Objective 4. Place added emphasis on expanding enforcement efforts at the PCMS.

Objective 5. Procure technologies that will enhance the effectiveness of limited enforcement resources.

Objective 6. Ensure Conservation Law Enforcement Officers receive basic and annual refresher training to meet and maintain standards required for enforcement commissions.

Objective 7. Explore other educational opportunities to broaden the expertise of Conservation Law Enforcement Officers.

Objective 8. Obtain appropriate permits and use protocols established by DECAM in conjunction with the CDOW to handle nuisance wildlife complaints on Fort Carson and the PCMS and provide for public safety in the event that dangerous wildlife is present in the Cantonment Area or areas where Soldiers are training.

Objective 9. Protect roads, archeological sites, and listed species habitat from beaver damage.

Objective 10. Construct additional office space at Building 9301 to house a USFWS Agent.

Objective 11. Respond to all complaints and issues dealing with species protected by the Migratory Bird Treaty Act.

5.3 Conservation Awareness

5.3.1 Current Conditions

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The Fort Carson approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the Installations' unique and valuable natural resources, the more responsibly they act toward them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities, such as fish stocking, land rehabilitation, wildfire suppression, etc., can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public naturally supports these easily understood efforts. However, issues such as protection of sensitive areas for little known plant and wildlife species, prescribed burning, permit fees and their uses, etc. require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

5.3.2 Current Management

General

ECOS Communications (1995) prepared the *Pinon Canyon Maneuver Site: Interpretive and Public Use Plan*, in cooperation with the U.S. Army, USFWS, and CDOW. This plan was implemented, which included an entrance kiosk for the Headquarters PCMS area, materials within the Headquarters building to provide information, and guided visits to remote sites.

The DECAM has developed plans for an Environmental Education and Interpretative Center at Fort Carson. There are still possibilities of combining this proposed facility with the Fort Carson Museum and constructing both near the Main Gate.

The DECAM educational program includes programs to educate residents of Fort Carson and the civilian work force about natural resources issues and potential people-wildlife conflicts that might encounter on the installation. The DECAM conducts public meetings and troop training sessions to provide information about natural resources management and urban wildlife issues.

In recent years the DECAM natural resources staff:

- instructed various college courses and chaired the Natural Resources Technology Advisory Board at Pikes Peak Community College;
- presented many papers on a wide range of topics at various scientific meetings;
- wrote many articles for Army publications;
- briefed and conducted downrange tours on erosion and sediment projects and wetlands management;
- produced a comprehensive, illustrated briefing on the Fort Carson and the PCMS range management program;
- instructed over 1,000 Soldiers annually on the importance of erosion and sediment control relating to military training (in conjunction with ITAM);
- produced a videotape for senior leaders on minimizing maneuver damage;
- provided safety briefings for over 2,000 downrange recreationists annually;
- developed an interpretive plan for Fort Carson;
- constructed an artificial wetland at Fort Carson as a wetland demonstration area;
- conducted wildlife educational programs for several thousand youths annually;
- established the Fort Carson Wildlife Education program;
- developed and implemented an Interpretation and Education Plan for Fort Carson and the PCMS;

- provided information and site tours to environmental groups to increase public knowledge of Army stewardship;
- participated in the El Paso TEN Program, which involved teaching in area schools and educating local teachers in Fort Carson environments;
- provided self-help pest management classes on the use of pesticide alternatives;
- redesigned and taught environmental education and compliance courses (in cooperation with ITAM) to military units and provided training aids, including field environmental check lists, for military units; and
- developed Training Area maps identifying land use restrictions for military units**.**

The DECAM has implemented a program to prepare informational and educational materials on noxious weeds for use in military briefings, school programs, and public meetings. This program includes the development of a noxious weed environmental awareness program for military trainers, Army construction components, and other users.

Corporate Lands for Learning
Fort Carson maintains certification with the Wildlife Habitat Council as a Corporate Lands for Learning (CCL) site. The following is among the accomplishments within this program in recent years:

- the signing of a MOU between Pikes Peak Community College, School District 8, and DECAM;
- participation of 180 middle school students in CLL site visits to Haymes Reservoir;
- participation of 25 Conservation Biology students from University of Colorado, Colorado Springs in field trips to various Fort Carson locations;
- meetings with CLL Advisory Board to discuss and improve the CLL program;
- incorporation of CLL themes into the Natural Resource Sustainment module for Fort Carson Environmental Protection Officer course, while retaining mission focus (ongoing);
- development and presentation of a program on coal mining in Colorado to 60 4th grade students at Patriot Elementary School;
- participation on the Mountain Post Historical Center's Exhibit Concept Team to encourage the incorporation of education standards and Natural and Cultural Resources Division efforts on Fort Carson into displays; and
- researching outdoor shelter options at Haymes to facilitate the CLL program.

Use of Media
Fort Carson weekly newspaper, the *Mountaineer*, is the most efficient way for natural resources personnel to access the local community. This newspaper is used to explain programs and gain support for their implementation. Articles target a wide range of readers but may be designed to appeal to specific categories of readers.

Natural resources personnel regularly write articles for the *Mountaineer*, and staff writers also periodically cover natural resources programs. Articles often emphasize current issues, such as hunting and fishing opportunities, prairie dogs, birding, and special events.

Other newspapers, such as the Colorado Springs *Gazette*, occasionally use information about Fort Carson natural resources programs. Examples of articles include hunting, land rehabilitation and conservation, nesting migratory birds, Earth Day activities, threatened and endangered wildlife species, and bear issues. News releases and interviews with outside media are coordinated with the Public Affairs Office.

The Fort Carson natural resources program is occasionally the subject of local television or radio coverage. Fort Carson has its own television channel, which is used for personnel interviews on such topics as hunting, recycling, and current conservation issues.

Special Events
DECAM natural resources personnel promote their programs using special events. Natural resources personnel participate in Earth Day activities by planting trees and shrubs, sponsoring programs for Boy and Girl Scouts, conducting free fishing day, staffing a booth at a local mall, and similar activities as part of overall environmental program participation. In 2005 over 2,100 students attended at least one activity, with a total of 4,324 student contacts. Other special outreach events recently included the Jeep 101/Fall Fest (450-600 attendees), Eggsperience (200-300 attendees), National Night Out (300 attendees), and Extreme Fall Fest (125 attendees).

The Arbor Day celebration is an important part of Fort Carson's designation as a Tree City USA. The Post participates in Free Fishing Day, in coordination with CDOW, each June. The DECAM Wildlife Office assists with various fishing derbies by stocking fish and installing interpretative signs, and the Wildlife Office participates in the Pathways to Fishing program.

Watchable Wildlife
Watchable wildlife is an important resource and activity on Fort Carson and the PCMS. There are many opportunities to observe wildlife, particularly birds. Both Fort Carson and the PCMS are listed in the Colorado Wildlife Viewing Guide (Gray 1992). Section 5.4, *Wildlife-based Recreation Management*, contains additional detail on outdoor activities associated with watching wildlife.

Youth Groups
Youth groups have been involved in various natural resources programs on Fort Carson. Scouts have used Post projects for their conservation merit badges and Eagle Scout projects. Natural resources personnel have provided numerous lectures and slide presentations in local schools on many conservation subjects over the years.

Migratory Bird Treaty Act Education
DECAM personnel are working to establish a Partners-In-Flight Migratory Bird Treaty Act course to be used to train Fort Carson personnel in responsibilities towards migratory bird protection. The USFWS course, Migratory Bird Conservation: A Trust Responsibility, was held at Fort Carson in April 2006.

5.3.3 Proposed Management

Project: Conservation Awareness
Justification: Stewardship
Funding Priority: Class 0
Project Timing: Objective 10 – by 2011; all other objectives - ongoing indefinitely or annually
Regulatory Coordination: None required

Goal. Provide input into education/awareness programs that will instruct Fort Carson personnel, as well as the surrounding community, on the significance of natural resources on Fort Carson and the PCMS.

Objective 1. Improve the general program knowledge of all persons associated with the Natural and Cultural Resources Division, particularly those who come into regular contact with interested persons.

Objective 2. Provide prepared talks, dependent upon personnel and time availability; whenever possible, use these opportunities to explain contemporary natural resources issues and management.

Objective 3. Use newspapers, television, and radio to inform the Fort Carson and surrounding community of matters important to the natural resources program at Fort Carson and the PCMS.

Objective 4. Participate in natural resources events, such as Earth Day, Free Fishing Day, and Arbor Day, to promote the Natural and Cultural Resources Division and/or its programs.

Objective 5. Interact with surrounding communities and professional organizations to exchange information and knowledge on environmental subjects.

Objective 6. Maintain education and awareness programs that meet requirements for certification by the Wildlife Habitat Council as a Corporate Lands for Learning Site and recertify Fort Carson and the PCMS as required.

Objective 7. Support scouting and other youth activities.

Objective 8. Continue to develop the Wildlife Complex to provide effective conservation awareness activities.

Objective 9. Install interpretive signs around selected schools, parks, the Wildlife Complex, and selected reservoirs that provide information relative to natural and cultural resource conservation.

Objective 10. Obtain funding (including potentially private funding) and construct the Environmental Education and Interpretative Center at Fort Carson, to include the Museum near the Front Gate.

5.4 Wildlife-based Recreation Management

Both Fort Carson and the PCMS are large, relatively undeveloped open spaces offering a myriad of outdoor recreational opportunities that directly enhance the quality of life for military and civilian personnel. The Sikes Act mandates that DoD lands with suitable natural resources must be managed to allow outdoor recreational opportunities. Outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples mentioned by the Sikes Act include hunting, fishing, photography, wildlife viewing, boating and camping. Developed or constructed facilities and activities, such as golf courses, tennis courts, baseball facilities, etc., are not included.

Providing for human social uses/needs is an integral part of ecosystem management. The outdoor recreation program is based on providing quality outdoor experiences while sustaining ecosystem integrity. Special consideration is given to protecting critical areas and sensitive species (*e.g.*, cultural resources sites, special interest areas, waterfowl nesting habitat, Mexican Spotted Owl sites) from negative impacts due to outdoor recreation.

5.4.1 Current Conditions

Both military personnel and civilians have equal opportunity for wildlife recreation on Fort Carson and the PCMS, as detailed by 7ID & FC Reg 200-6. Public access to both installations is controlled for

security requirements. Opportunities for recreation are available when they do not conflict with the military mission, natural resource management objectives, environmental protection, security, or safety. Each of these elements has priority over recreational pursuits.

Paragraph 2-10 of Army Regulation 200-3, *Natural Resources -- Land, Forest, and Wildlife Management*, states that access by recreational users, ... *will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use; and at such times as such access can be granted without bona fide impairment of the military mission, as determined by the installation commander*. This regulation further states that withholding public access must be substantiated by a statement in the Integrated Natural Resources Management Plan.

Recreational use may be restricted by the Installation Commander to protect natural resources or to ensure safety, security, protection of government property, or accomplishment of the military mission. The Commander may deny access to Fort Carson or the PCMS. Recreational activities may be excluded from any area designated as off-limits. Recreational activities are not permitted in Training Areas occupied by troops or equipment.

Areas closed by signage or range barriers may not be entered for any reason. Consumptive outdoor recreation activities are restricted in Cantonment Areas, small and large impact areas, Turkey Creek, the Wildlife Demonstration Area, tank tables, aerial gunnery range and Camp Red Devil. Hunting with center-fire or rim-fire rifles or handguns within 1,000 meters of the Installation boundary is permitted. However, it is prohibited to shoot firearms towards the Installation boundary, adjacent private property, Turkey Creek Recreation Area, Camp Red Devil, the DECAM Wildlife Office, or any other area or facility that is closed to hunting. Downrange recreational use is administered by the DECAM in close coordination with Range Control.

Fort Carson

Fort Carson provides a variety of opportunities for outdoor recreation. Fishing reservoirs are stocked monthly with trout from March through September and once annually with channel catfish. On average, about 9,000 lbs of fish are stocked yearly into Fort Carson waters. No limits are placed on public participation. Womack and Small Bird reservoirs have wheelchair fishing access. Hand- and battery-powered boats are allowed on reservoirs when fishing or hunting. Other recreational boating and gasoline powered motors are prohibited. A Range Pass is not needed to fish or recreate in Haymes, Northside, Small and Large Bird, Womack and Gale reservoirs and the Turkey Creek Recreation Area.

Currently, only three reservoirs, Haymes, Womack and Townsend, hold enough water to sustain fisheries. Teller, Small Bird, Large Bird and Northside reservoirs were dry during the recent drought. The DECAM took advantage of the lack of water in Teller Reservoir and dredged the bottom of the lake of sediment and built up a bird nesting island. Water flow to Teller Reservoir from Turkey Creek since the drought has been inconsistent and has not yet reached the impoundment. As the water receded, Small Bird, Large Bird and Northside reservoirs developed cracks and holes in their clay linings and are in need of repair before they will hold water again.

Wildlife game species available include turkey, scaled quail, rabbits, coyote, bear, dove, waterfowl, pronghorn antelope, mule and white-tailed deer, and elk. No wild game species are stocked on the installation. A 2006 aerial survey estimated there were 1,250 deer and 350 elk on Fort Carson. Northside and Teller reservoirs, both of which are currently dry, were the installation's primary waterfowl hunting

areas. Figure 5.4.1a indicates areas open to hunting, fishing, and other outdoor recreation on Fort Carson, exclusive of the Cantonment Area. Impact area boundaries, ranges, and firing ranges, Turkey Creek Ranch, and the Wildlife Complex are restricted or off-limits.

Development of dispersed and reliable water resources are an important means of ensuring that game animals, temporarily displaced by training activities, have access to this important resource. Water guzzlers (rain water collection and storage devices) were previously constructed downrange to provide water to small game animals and birds but were heavily used by big game animals during the drought. Guzzlers require periodic maintenance; of the 36 guzzlers remaining, eight have been restored, and 28 still need repair. Solar powered pumps were installed on well heads downrange in the early 1990s to provide water to big game animals. Only one is currently operational; the others are in need of repair.

Although trapping is identified as a legitimate recreational activity in the Sikes Act, it is not allowed on Fort Carson or the PCMS. Past experience proved that traps were not always checked regularly, and closure of a Training Area for maneuvers may preclude a trapper from retrieving set traps. Additionally, Colorado State law prohibits leg-hold trapping.

The Cottonwood-Prairie Conservation and Education Area (formerly the Wildlife Demonstration Area) is about 300 acres that has been set aside by the installation for non-consumptive activities, such as education, wildlife viewing or dog training. A trail system through the area was previously planned that included informational trail signs and kiosks, but a lack of funding and manpower hindered development.

Fort Carson has physical fitness centers, 14 softball fields, a bowling alley, two baseball diamonds, indoor and outdoor swimming pools, football fields, 10 tennis courts, an archery course and an 18-hole golf course. The installation has numerous neighborhood and general use parks with playground equipment and picnic areas. Scouting and other youth activities are encouraged. A Boy Scout Camp is located near the Wildlife Complex. Turkey Creek Recreation Area is reserved for recreation and historic resources protection.

PCMS

The PCMS currently has virtually no resident community and restricted access, which affects outdoor recreation opportunities. Hunting is the primary activity, and hunters are allowed to camp in designated areas. Other outdoor recreation activities include bird watching, nature study, photography, and similar activities. There is no recreational fishing potential on the PCMS.

A permission letter, issued by the DECAM Wildlife Office, is required to enter adjacent public lands from the PCMS. Permission must be requested from the DECAM Fort Carson Wildlife Office in writing 30 days in advance. Access to adjacent private lands from the PCMS is not permitted.

5.4.2 Current Management

It is Fort Carson policy to provide public access for wildlife-related outdoor recreation when compatible with objectives of multiple-use, environmental conditions/restrictions, natural resource management, and requirements of the military mission. As allowed by the Sikes Act, Fort Carson has an installation wildlife recreational permit system. The Outdoor Recreation Branch, Community Recreation Division, Directorate of Community Affairs, operates a sales outlet for hunting, fishing, and recreational permits.

A state license and a Fort Carson recreational permit are required to hunt and fish on Fort Carson and the PCMS. A release and hold harmless agreement (Indemnity and Authorization CRD ID Worksheet, FC

Form 1075-2), relieving the U.S. Government of liability, must be signed when a permit is purchased. Each recreationist purchasing a permit is issued an installation recreation map and on the back of the map is an extract of all the additional rules that pertain to utilizing Fort Carson. There are 1,500-2,000 permits sold annually, generating about $30,000.00. Per the Sikes Act, proceeds from the sales are utilized for the protection, conservation and management of wildlife and fish on the installation.

Hunting and fishing on Fort Carson and the PCMS are regulated by state, federal, and Fort Carson statutes and regulations. Hunting season harvest objectives, season dates, and type of license are in accordance with state and federal statutes and regulations. In addition to these requirements, Fort Carson regulations (7ID & FC Reg 200-6) imposes additional restrictions, including permit requirements, weapon use restrictions, harvest quotas, and a maximum number of recreationists allowed within any Training Area at any one time. Fort Carson regulations cannot negate state or federal statutes and regulations, but they may be more restrictive.

Procedures for obtaining permits and passes are communicated to the public through various media throughout the year as requirements are modified to accommodate the military mission or personnel requirements. The Wildlife Office has a website sponsored by the USFWS and a telephone recording system that can be used to immediately disseminate pertinent information. The Installation newspaper and e-mail system are also often used.

Fort Carson does not have an active sportsman's committee or rod and gun club. A sportsman's organization on the installation could be used to assess the quality of the outdoor recreational program, help emphasize outdoor recreational projects, and solicit community involvement from a wider variety of sources than are now used.

Information on game species and sport fishing management is found in Section 4.11, *General Fish and Wildlife Management*.

Hunting

Fort Carson and the PCMS are each a state Game Management Unit, units 591 and 142, respectively. The State of Colorado manages the licensing program. Small game licenses are purchased over-the-counter at state licensing agents. The big game hunting season on Fort Carson generally lasts from 1 October through 31 January. The long season is necessary as military maneuvers often preclude access, and harvest expectations for the year may not be met. Big game licenses for Fort Carson and the PCMS are issued by the State of Colorado via an annual draw, with exception of bull elk, which can be purchased over-the-counter. As state-wide harvest expectations for elk have recently been met, the seasons to rifle-hunt bull elk have been narrowed to just two weeks annually. After a quota of licenses for a specific Game Management Unit has been met, prospective hunters not drawing a tag receive a preference point for the next annual draw.

The National Wild Turkey Federation and the CDOW has previously expressed an interest in planting turkey feed plots on Fort Carson. The planting of native seed mixtures, particularly in areas disturbed by military training, would benefit a multitude of wildlife species. The encouragement of other similar partnerships may significantly enhance the quality of hunted species found on the installation.

Fishing
As the population of the Fort Carson military community grows, the pressure on fishing reservoirs is expected to increase correspondingly. Close fisheries monitoring is essential to ensure the quality of the fishing experience and survivability of an expensive commodity. In 2007 trout are being purchased from commercial vendors for $2.73 per pound. Locating cheaper sources of catchable size trout would help stretch limited funds, especially after Small and Large Bird, and Northside reservoirs are repaired. Regular creel censuses are necessary to ensure that the annual stocking rate is commensurate with use.

In 1997 Townsend, Haymes and Womack were stocked with warm water species transplanted from Teller Reservoir. Teller Reservoir was considered mercury-contaminated; thus, anglers have not been allowed to harvest the bass, bluegill, or crappie that were transplanted. As most of these warm water species do not live longer than five years, the policy should be re-evaluated subsequent to testing current fish population for naturally occurring, heavy metals.

5.4.3 Proposed Management

Project: Wildlife-based Recreation Management
Justification: Compliance with Sikes Act and Executive Order 12962, *Recreational Fisheries*, stewardship
Funding Priority: Not applicable since Sikes Act funds are used; also conducted incidental to other projects.
Project Timing: Objective 6 – by 2011, all other objectives – annually or ongoing indefinitely
Regulatory Coordination: None required except for CDOW regulatory support for hunting and fishing

Sustainability Goal. Increase Soldier participation in hunting and fishing programs; data collection will begin in FY 07.

Performance Goal. Provide quality hunting and fishing programs.

Goal 1. Provide a quality wildlife related recreational experience on Fort Carson and the PCMS for military personnel and the public.

Goal 2. Consolidate installation wildlife-recreational administration at the DECAM Wildlife Office (*i.e.*, recreational permit sales, downrange recreational passes, collection of weapon registration forms for the PMO).

Objective 1. Investigate alternative means to allow active duty military personnel to participate in big game hunts.

Objective 2. Operate the wildlife check station five days per week throughout the year; during big game and turkey seasons, operate the station 15 hours per day; for the remainder of the year, operate the station eight hours per day.

Objective 3. Explore the creation of a sportsman's club to evaluate program effectiveness and solicit community involvement in the Outdoor Recreation Program.

Objective 4. Repair guzzlers and solar powered pumps at a rate of 20 percent a year.

Objective 5. Further develop educational and recreational uses of the Cottonwood-Prairie Conservation and Education Area.

Objective 6. Repair Small Bird, Large Bird and Northside reservoirs by 2011.

Objective 7. Identify new sources of procurement for catchable fish.

Objective 8. Conduct regular creel censuses and monitor fishing pressures.

Objective 9. Test warm water species for heavy metal contaminates.

Objective 10. Encourage partnerships with wildlife and game-oriented nongovernmental organizations.

Objective 11. Publicly disseminate information about hunting programs on Fort Carson and the PCMS through public meetings, newspaper articles, and mass mailings to license holders.

Objective 12. Conduct a hunting workshop annually for the military community to explain procedures for obtaining a state license and to highlight hunting opportunities available on Fort Carson and the PCMS.

Objective 13. Manage the Fort Carson fisheries program for approximately 1,000 annual permitted anglers.

Objective 14. Continue to operate the check station at the PCMS in accordance with personnel and funding availability to collect data to validate management goals established by Andersen and Rosenlund (1991).

5.5 Cultural Resources Protection

Cultural resources management at Fort Carson and the PCMS is provided in accordance with the National Historic Preservation Act of 1966 (16 USC Section 470, as amended, 2000) (NHPA), the Archeological Resources Protection Act (16 USC Section 470aa-47011) (ARPA), the American Indian Religious Freedom Act (42 USC), the Native American Graves Protection and Repatriation Act (25 USC Section 3001 *et seq*.) (NAGPRA), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), the DoD Annotated American Indian and Alaska Native Policy (27 October 1999), and AR 200-4, *Cultural Resources Management* (Department of the Army 1997a).

5.5.1 Current Conditions

The Integrated Cultural Resources Management Plan (ICRMP) (Gene Stout and Associates 2002d) is being updated for Fort Carson and the PCMS. The ICRMP contains information on all known cultural resources, previous cultural resources investigations, and plans for future management of cultural resources.

Cultural resources under the stewardship of Fort Carson include, but are not limited to, historic districts, archeological sites, rock art, Native American sacred sites and traditional cultural properties, paleontological localities, and curated collections. Eligibility of cultural resources for inclusion in the National Register of Historic Places (National Register) is the principal, but not the sole, criterion determining management prescriptions. Archaeological sites fall into one of two categories with regard to eligibility.

- ***Eligible***: These resources have been determined eligible for the National Register and therefore are subject to protection. They should not be affected without consultation per Section 106 of the National Historic Preservation Act and development of a plan to mitigate adverse effects.
- ***Not eligible***: These resources have been determined to be not eligible for the National Register and do not require protection from adverse effects.

Resources eligible for inclusion in the National Register are broadly referred to as either historic properties (resources eligible under National Register criteria) or traditional cultural properties (resources eligible because of their cultural significance to Native Americans).

5.5.1.1 Cultural Record

Although Fort Carson and the PCMS are physically discontinuous, the prehistory and history of the two regions are consistent. The first inhabitants of southeastern Colorado likely entered around 12,000 years before present. All major prehistoric and historic cultural periods are represented by the cultural resources of Fort Carson and the PCMS, including the Paleoindian, Archaic, Ceramic, and Protohistoric archeological periods; the Fur Trade era; 19th Century Hispanic and Euroamerican settlement; and 20th Century homesteading, ranching, and military historic contexts.

5.5.1.2 Cultural Resources Inventory

Fort Carson

As of 2006, 79,188 acres (79%) of Fort Carson had been surveyed for archeological sites. These efforts identified 1,663 archeological sites (including 701 isolated finds). Ninety-two have been determined eligible for inclusion in the National Register; the remaining 1,542 sites have been determined to be not eligible. Prehistoric sites number 1,319; historic sites number 240. Forty-six sites are multicomponent, *i.e.,* having both prehistoric and historic components. In addition, 42 of these sites have associated rock art.

All World War II-era properties on Fort Carson have been inventoried, and historic architectural investigations are now focusing on Cold War-era properties. Three National Register-eligible historic architectural districts have been identified on Fort Carson, including the Turkey Ranch Recreation Area Historic District, the Waste Water Treatment Plant and Incinerator Complex Historic District, and the Old Hospital Complex.

PCMS

As of 2006, 173,025 acres (73%) of the PCMS had been surveyed for archeological sites. A total of 5,064 archeological sites (including 3,636 isolated finds) have been identified on the PCMS. Of these, 481 have been determined eligible for inclusion in the National Register, with 4,583 sites determined to be not eligible. Prehistoric sites number 3,893, and historic sites number 690. A total of 481 sites are multicomponent, *i.e.,* having both prehistoric and historic components. National Register-eligible sites include seven historic homesteads, some dating to the 19th Century. The PCMS has extensive and significant rock art resources with 196 rock art features identified and seven confirmed as Native American sacred sites. There are also several sites identified as Native American traditional cultural properties (TCP), including a 2005 MOU between Fort Carson and the Jicarilla Apache Nation for the designation and treatment of the Hogback as a TCP. The PCMS has four paleontological deposits of significance. With exception of a few historic homesteads maintained for seasonal housing, all of the PCMS real property is of late or post-Cold War construction.

5.5.2 Current Management

5.5.2.1 General

Management of Fort Carson and PCMS cultural resources is a mission of the Cultural Resources Program within the DECAM Resources Sustainment Team. Responsibilities of the Cultural Resources Manager (CRM) include reviewing proposed natural resources projects for consideration of cultural resources concerns and coordinating with the public and the three primary partners for cultural resources management: the Colorado State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation, and Native American tribes who claim a cultural affiliation to lands administered by Fort Carson.

The ICRMP outlines the following management objectives:

- comply with federal and state laws and regulations governing the treatment of cultural resources while causing the least disturbance to the military mission;
- conduct maneuver damage assessments and after action reviews of effects to cultural resources and report to the chain of command;
- protect National Register-eligible or potentially eligible resources by fencing, monitoring, and employing other site protection mechanisms;
- evaluate Fort Carson actions in accordance with NHPA and NEPA to minimize impacts to significant cultural resources;
- inventory and evaluate cultural resources for eligibility to the National Register;
- implement cultural resource mitigation and data recovery projects in compliance with applicable laws and regulations balanced with training mission requirements;
- implement a *cultural landscape* planning approach to cultural resources management and evaluate cultural resources for eligibility to the National Register;
- develop efficient management procedures that streamline consultation and focus on significant cultural resources as opposed to those of little or no National Register potential;
- participate in government-to-government consultations with Native American tribes;
- enforce state and federal laws that prohibit vandalism of cultural resources through law enforcement, monitoring, and public awareness;
- curate cultural resources collections in accordance with federal regulations; and
- develop and sustain environmental education and awareness through organized tours, special events, exhibits, videos, and interpretive media.

The ICRMP establishes guidelines, schedules, and standard operating procedures for cultural resources management.

5.5.2.2 Native American Consultation and Coordination

Various laws and regulations require that Fort Carson consult with Native Americans regarding Army activities that may impact resources of cultural significance to Native Americans. Such resources may include natural resources, *e.g.,* plants of medicinal or religious significance. Consultation is coordinated by the CRM. Relevant laws, regulations, and executive guidance are briefly summarized below.

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 National Historic Preservation Act and NAGPRA must be followed. All natural resources activities and projects will adhere to the Fort Carson NAGRPA SOP (Section 6.4 of the ICRMP).

The ***American Indian Religious Freedom Act, Executive Order 13007 (Indian Sacred Sites), and Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)*** address consultation with Native American tribes and requirements to identify and protect resources of ceremonial or traditional significance to Native Americans. Consultation with Native American tribes regarding identification and management of traditional cultural properties is being pursued by the CRM as outlined in the ICRMP and stipulated in the Comprehensive Agreement (2004) between Fort Carson and 11 Native American tribes claiming cultural affiliation to lands administered by Fort Carson.

36 CFR 800, Protection of Historic Properties, the implementing regulations for NHPA, establishes conditions for the requisite inclusion of Native American tribes in the Section 106 process. Section 106 review for natural resources projects and activities will be implemented as outlined in the Fort Carson Section 106 SOP (Section 6.2 of the ICRMP).

5.5.2.3 Natural Resources Management Implications

Natural resources management practices that have potential to adversely affect archeological sites and other cultural resources are outlined below.

Land Rehabilitation and Maintenance and Watershed Management. Of all practices associated with natural resources management on Fort Carson and the PCMS, erosion control and similar projects associated with the LRAM (Section 5.1.2) and watershed management (Section 4.2) programs have perhaps the greatest potential to affect archeological sites. Projects involving excavation, earth moving, and fill deposition can damage or bury archeological sites. Generally, however, effects on archeological sites from reduced erosion are positive.

Wetland Mitigation. The construction of compensatory wetlands (Section 4.10.2.3, *Wetland Rehabilitation and Mitigation*) can involve moderate ground disturbance that can damage archeological sites.

Prescribed Burning. Off-road activities associated with prescribed burning and wildfire control (Section 4.6) can increase erosion, potentially damaging archeological sites, and can damage historic resources.

Outdoor Recreation Programs. Public access associated with hunting, fishing, and other outdoor recreation activities (Section 5.4) has limited potential to increase the risk of vandalism to cultural resources.

Cantonment Area Management. Landscaping is an important aspect of historic district preservation. The planting of trees, windbreaks, etc. could affect the appearance of historic districts on Fort Carson.

All proposed projects with potential to impact cultural resources will be staffed through the NEPA Program Manager within the Sustainability and Environmental Analysis Team, DECAM, for cultural resources review concurrent with the NEPA process. DECAM NEPA Team Leaders and the CRM will implement project review per the Internal Coordination SOP (Section 6.1) of the ICRMP. The CRM will implement further review per Section 106 as necessary and may conduct field investigations to support the project. Even with proper review, natural resources projects still have potential to impact

archeological sites or burials through accidental discovery. Procedures to be followed in the event of accidental discovery are outlined in Section 6.3 of the ICRMP.

Numerous provisions of this INRMP will benefit cultural resources management. These include erosion control as part of *Watershed Management* (Section 4.2), protection of sensitive natural areas (Section 4.13), wetlands protection (Section 4.10), *Sustainable Range Awareness* (Section 5.1.4), *Land Rehabilitation and Maintenance* (Section 5.1.2), Enforcement (Section 5.2), and *National Environmental Policy Act Implementation* (Section 5.8).

5.5.3 Proposed Management

Project: Cultural Resources Protection
Justification: Compliance with various cultural resources laws and regulations, stewardship
Funding Priority: Conducted incidental to DECAM projects external to natural resources projects.
Project Timing: All objectives - ongoing or as needed
Regulatory Coordination: as appropriate - Colorado SHPO, Advisory Council on Historic Preservation, Native American tribes

Goal. Implement this INRMP in a manner consistent with the protection of cultural resources at Fort Carson and the PCMS.

Objective 1. Maintain and implement the ICRMP during the every-day practice of natural resources management on Fort Carson and the PCMS.

Objective 2. Conduct review of proposed natural resources projects for cultural resources concerns via NEPA Team Leaders and the CRM.

Objective 3. Observe protective fencing and/or signs around archeological sites, rock art, or other cultural resources during natural resources management activities.

Objective 4. Implement SOPs for Inadvertent Discovery of Archaeological Resources or Human Remains (Section 6.3 of the ICRMP) and NAGPRA (Section 6.4 of the ICRMP) upon discovery of cultural deposits or features, paleontological deposits, burials, or other potential artifacts or funerary.

Objective 5. Continue to use natural resources management techniques and projects to support cultural resources conservation.

5.6 Meteorological Data Collection

5.6.1 Current Conditions

Weather is often a determining factor in achieving the DECAM Conservation Strategic Goal. Precipitation influences maneuver training impacts on soils and vegetation, *i.e.,* the wetter the soil, the greater the potential for impacts from ruts and soil compaction. Weather extremes also affect implementation of rehabilitation projects, such as bank sloping and reseeding, *i.e.*, wet weather hampers the use of heavy equipment, and dry weather adversely affects reseeding success (DECAM 2001a). An efficient meteorological station network at the PCMS and Fort Carson enhances DECAM watershed management and Maneuver Damage Control programs; ITAM LRAM and RTLA programs; and USGS

stream flow-sediment runoff investigations. Meteorological data collection is included in this chapter due to its collective usefulness for natural resources programs.

5.6.2 Current Management

In 1999 the USGS phased in the operation, maintenance, and computation of meteorological data (including precipitation, air temperature, relative humidity, wind speed, soil moisture, among others) for five meteorological stations at Fort Carson. Similar data has been collected since 1993 at 12 meteorological stations at the PCMS. Stream flow data is currently available on the USGS national web page (http://water.usgs.gov.nwis).

The USGS is responsible for computing, publishing, and summarizing selected meteorological data, establishing an Internet access, and maintaining a historical database for selected climatologic information. Because of the intense nature of thunderstorms during April through October, rainfall data is automatically collected when it occurs.

5.6.3 Proposed Management

Project: Meteorological Data Collection
Justification: Sikes Act (implementation of INRMP), no net loss in the capability of the land to support the military mission (Sikes Act), stewardship
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely
Regulatory Coordination: None

Goal. Monitor and assess the effects of climatic conditions on natural resources management programs and military activities.

Objective 1. Use the USGS to collect meteorological data at meteorological stations and rain gauges on Fort Carson and the PCMS.

Objective 2. Assess the impact of precipitation during the growing season on revegetation projects and coordinate the effect of precipitation on vegetation growth with other elements such as land use.

Objective 3. Use climatic data to help model ecological processes, such as sedimentation rates.

Objective 4. Use weather data to help evaluate impacts of military activities under various weather conditions and use that data to minimize unnecessary military impacts.

Objective 5. Assess feasibility of using climate data in the development of a wet weather deferment program to assist in determining when training restrictions would best mitigate soil/vegetation damage.

5.7 General Data Collection, Storage, and Analysis

5.7.1 Current Conditions

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. Fort Carson is committed to providing efficient, cost-effective systems for data storage and analysis.

5.7.2 Current Management

Desktop Computer System
Computers 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. The Natural and Cultural Resources Division is well-equipped with regard to microcomputers, having quality personal computers with appropriate printers and other peripherals.

Geographic Information System
The GIS provides customer support to the DECAM staff and military troops by providing data, analysis for the enhancement of decision-making purposes, and hard copy documentation/representation to sustain Fort Carson and PCMS training/environmental missions. The GIS is utilized for the support of various natural resource programs. Consistent updates and acquisition of GIS data used for the management of the lands on Fort Carson and the PCMS is essential to the GIS program. It has been, and will continue to be, the GIS policy to aid in the training and development of natural resource personnel to use the GIS for management analysis and map production. The GIS aids in the ability to make informed decisions for the natural resource program.

A GIS allows users to manipulate spatial data (*e.g.,* maps, aerial photos, satellite images) in a similar fashion as a data management program allows the analyses and presentation of mathematical data. Data can be purchased and converted into most software formats, or it can either be scanned or digitized directly from maps or aerial photographs. The GIS can analyze different map layers to show the relationship of one map layer to another. For example, if a project involved putting a line-of-sight antenna in a location, a good GIS could map all areas that could be reached by an antenna of a certain height out to a certain distance.

A common use for the DECAM GIS would be watershed analysis using drainage and soil data layers for the placement of erosion control dams. The GIS could produce a map with all areas having features most conducive to effective dam construction. The GIS could also be used to show the relative capability of Fort Carson to support specific types of proposed military training missions.

Three GIS operations directly affect implementation of this INRMP. The ITAM GIS is described in Section 5.1.5, *Geographic Information System*. The DECAM, DPW, and ITAM have, and will continue to freely share GIS data that does not fall within regulatory and legislative directives to the contrary. Below sections describe the GIS within the DECAM Business and Administration Branch, Business and Environmental Services Division.

The GIS program originally used Geographic Resources Analysis Support System (GRASS), a GIS package developed by U.S. Army Construction Engineer Research Laboratory. A conversion of data and transferal to ESRI's Arc/Info® and its related software was completed in 1996. Several years ago ESRI unified the naming of their GIS to ARCGIS. Within ARCGIS, Arc/Info® is used to perform operations on features stored as points, lines, or polygons; Spatial Analyst® allows manipulation of raster images; 3D Analyst® is used for surface modeling; and ArcView® provides a less robust but still user-friendly environment to query, display, and plot themes. ARCGIS®'s capability of interacting with other database management programs and file formats allows the GIS program to complete analyses with inventory and monitoring databases managed by the Natural and Cultural Resources Division programs.

5.7.3 Proposed Management

Project: Data Storage, Retrieval, and Analysis
Justification: Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP, support of the military mission, stewardship
Funding Priority: Conducted incidental to Class 3 DECAM projects external to natural resources projects.
Project Timing: All objectives - ongoing indefinitely
Regulatory Coordination: None

Goal. Provide automated data processing and analysis to fully support and implement all associated natural resource management programs on Fort Carson and the PCMS.

Objective 1. Upgrade computer hardware and software as needed during the next five years.

Objective 2. Provide GIS support for natural resource personnel, to include installation and upgrade of software.

Objective 3. Continue to assist natural resource management personnel in developing their abilities to utilize the GIS as an analytical tool.

Objective 4. Provide periodic updates to GIS data essential to support natural resource management.

Objective 5. Work with the Directorate of Information Management to facilitate consistent, open data sharing useful for natural resource via connectivity between all Fort Carson and the PCMS entities utilizing GIS.

Objective 6. Work in conjunction with other directorates on Post for future aerial/imagery data acquisition, including funding, hopefully to be acquired on a regular basis.

5.8 National Environmental Policy Act Implementation

The National Environmental Policy Act was created 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 Analysis of Army Actions* (Department of the Army 2002)) require mitigation or full disclosure of damage to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.

5.8.1 Current Conditions

Responsibility
The DECAM is responsible for ensuring that appropriate environmental documentation is prepared and reviewed for all federal actions (*e.g.*, military training, new technology/equipment testing, construction projects, real property actions). There is NEPA documentation for land use, including natural resources management and normal military activities, at Fort Carson (Gene Stout and Associates 2001c). An Environmental Impact Statement is being prepared to address impacts of additional troop units being stationed at Fort Carson (Section 3.1.5.1, *Military Units*).

Decisive planning and coordination are essential for the military mission to be successful. NEPA is an integral part of the planning and environmental review process. Early coordination and an understanding of military unit requirements enhance the ability to adequately assess the potential for adverse environmental impacts, ultimately improving overall mission accomplishments while ensuring environmental compliance.

NEPA Documentation

The most common NEPA document prepared for projects that impact natural resources is a Categorical Exclusion. This simple documentation generally works well for routine projects, such as borrow sites, small digging projects, and similar projects where natural sites are not damaged.

Environmental assessments are required when conditions for categorical exclusions are not met (*e.g.*, large construction projects, actions involving a wide geographic area, when wetlands or other sensitive plant communities may be involved). Environmental assessments require the Garrison Commander's approval, publishing a Finding of No Significant Impact, and waiting 30 days for public comment.

If a Finding of No Significant Impact is not appropriate, the following options are available:

- modify the action to remove significant impacts;
- mitigate significant adverse impacts;
- drop the action; or
- publish a Notice of Intent to prepare an Environmental Impact Statement.

This INRMP is an update of the *Integrated Natural Resources Management Plan and Environmental Assessment, 2002-2006* (Gene Stout and Associates 2002c), which included NEPA documentation. Required additional NEPA documentation for new management actions within this INRMP will be accomplished as these actions are implemented.

Mitigation

Mitigation is an excellent 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 impact. Confine construction to areas where no significant impact 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 fish or wildlife species or creation of habitat for another species.

Mitigation that is identified in a Finding of No Significant Impact is a Class 1 "must fund" for environmental purposes. This provides a reliable mechanism to fund mitigation included in NEPA documents.

5.8.2 Current Management

As part of the planning process the DECAM Environmental Services Branch, Business and Environmental Services Division conducts an environmental review and, following the planning and decision making process, prepares appropriate NEPA documentation. The environmental review is conducted by an interdisciplinary team that investigate the proposed action for potential impacts to land, water, vegetation, air, cultural resources, etc. Recommendations for avoidance, minimization, and mitigation are made through this process.

Natural and Cultural Resources Division personnel are involved in the planning and design phase of many projects. Involvement at this point of the planning process allows personnel to suggest and promote alternative actions and to make recommendations for avoidance of impacts and possible mitigation scenarios. NEPA will ensure that INRMP activities are properly assessed and planned to avoid and minimize impacts.

5.8.3 Proposed Management

Project: Use of NEPA
Justification: Compliance with NEPA and other federal laws affected by individual projects, stewardship
Funding Priority: Conducted incidental to Class 0 DECAM projects external to natural resources projects.
Project Timing: Objective 1 – by 2007; other objectives - ongoing indefinitely
Regulatory Coordination: None, except as required by other laws that might be appropriate for individual actions

Goal 1. Use NEPA to identify projects and activities on Fort Carson and the PCMS that might impact natural resources and work with project planners to resolve issues early in the planning process.

Goal 2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Goal 3. Help Fort Carson comply with NEPA.

Objective 1. Document effects of implementation of this INRMP, as required.

Objective 2. Reference this INRMP in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 3. Classify mitigation as a "must fund" for budgetary purposes.

6.0 Unresolved Issues

It is not unusual for some natural resources-related issues to be at a stage where the path to issue resolution is unknown or uncertain. Reasons for this status might be the political environment, a lack of scientific information, conflicting agendas, costs, or other roadblocks. Issue resolution difficulties will not prevent Fort Carson from continuing to work on resolutions. Recognition and a willingness to deal with such issues are a part of the process itself.

6.1 Noxious Weed Control

Fort Carson has an active and advanced noxious weed control program, as described in Section 4.14, *Noxious Weed Management*. However, the expansion of currently listed noxious weeds and other weeds that could be listed is far outpacing control efforts. The science of biological controls is such that, at present, only large-scale use of herbicides can control large acreages of these weeds. Such herbicide use is not only very expensive, but its environmental side-effects are such that both Department of Defense and Department of Army policies preclude its use. A general lack of control among many neighbors of Fort Carson and the PCMS exacerbates the issue.

Colorado State noxious weed law changes that mandate eradication may reduce or eliminate the use of biological control methods for some listed species (DECAM 2005a). Biocontrol, alone, will not achieve this eradication.

Noxious weeds threaten native ecosystem functionality, and Department of Army policies support sustaining native ecosystem diversity and functionality. Noxious weeds can impact military training, both directly (*e.g.*, puncture type weeds, poisonous weeds, highly dense weeds) and indirectly, such as through reduced capability of the land to support training. Both DECAM and ITAM programs can lessen the impact of expanding noxious weeds, but it must be recognized that the problem is expected to increase.

6.2 Total Maximum Daily Load Limits

Section 303(d) of the Clean Water Act requires the State of Colorado to develop and implement Total Maximum Daily Load limits. If sediment yields and concentrations following storm events become major components of these standards, as suggested by Lane and Levick (2000), Total Maximum Daily Load compliance could impact military activities at Fort Carson and/or the PCMS. High levels of selenium may also become a future factor in such listings, which would have implications for both Fort Carson and the PCMS.

The DECAM is or has monitored both sediment loading and selenium levels in waterways as described in Section 4.2, *Watershed Management*. Both the DECAM and ITAM have programs that can minimize and reduce levels of selenium and sediment in waterways, but neither program is funded to the point where extreme Total Maximum Daily Load reductions could be attained. Both potential Total Maximum Daily Load parameters (sediment and selenium) are exacerbated by disturbance to the land, which is an unavoidable byproduct of military training. When the Colorado Water Resources Division finalizes Total Maximum Daily Load limits, Fort Carson will evaluate its compliance options and respond accordingly.

6.3 Hunting Opportunities for Soldiers

Due to the popularity of Fort Carson and the PCMS with hunters, it is now necessary to have five points[38] accumulated to hunt deer on Fort Carson and 12 points to hunt deer on the PCMS. The number of preference points required precludes active duty military members from hunting deer on either Fort Carson or the PCMS as most military personnel are only stationed at Fort Carson for two to three years. Methods of remedying this inequality are being explored, to include significantly raising permit fees for non-active duty big game hunters or asking the CDOW for a number of doe licenses that can be equitably distributed to active duty hunters.

[38] A point is accumulated annually if a hunter is not drawn to hunt in his/her requested area. Thus, five points requires nonselection for five years.

7.0 Implementation

This INRMP is only as good as Fort Carson's 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 4 and 5.

7.1 Organization

The Natural and Cultural Resources Division, with support from other DECAM divisions, can implement most of this INRMP and fulfill general goals and policies established in Chapter 1 and more specific goals and objectives within chapters 4 and 5. Other Fort Carson organizations identified in Section 2.1, *Fort Carson*, are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during 2007-2011 for improved operations efficiency.

7.2 Personnel

7.2.1 INRMP Implementation Staffing

7.2.1.1 Current Management

The following staffing is required to implement this INRMP within the DECAM and the G3/DPTM

Position	Number	Length	Type
Natural and Cultural Resources Division, DECAM			
Supervisory Natural Resources Specialist	1	Permanent*	GS-13
Resource Sustainment Branch			
Natural Resources Specialist	1	Permanent*	GS-12
Watershed Mgr.	1	Permanent*	GS-11
Noxious Weed Manager	1	Permanent*	GS-9
Management Agronomist	1	Permanent*	GS-9
Forester	1	Permanent*	GS-9
Forestry Tech	1	Permanent*	GS-9
Environmental Protection Assistant (Equipment)	1	Permanent*	GS-7
Biological Science Tech	1	Permanent*	GS-7
Forestry Technician	1	Permanent*	GS-6
Engineering Equipment Operator	2	Permanent*	WG-10
Conservation Compliance Branch			
Natural/Cultural Resources Specialist (Supervisory)	1	Permanent*	GS-12
Fish and Wildlife Specialist (Program Manager)	1	Permanent*	GS-11
Spatial Analyst	1	Contract	GS-11 equiv
Wildlife Research Biologist	1	Contract	GS-11 equiv
Wildlife Field Biologist	1	Permanent*	GS-9
Biological Sciences Technician (Wildlife/LE Leader)	1	Permanent*	GS-11
Biological Sciences Technician (Wildlife/LE)	2	Permanent*	GS-9

* - Full time permanent Department of Army civilians

Not included within the above staffing are temporary/seasonal personnel, support personnel for cultural resources protection, NEPA implementation, GIS support, and others within the DECAM.

ITAM Program, G3/DPTM			
ITAM Coordinator	1	Permanent	Contract
GIS Coordinator	1	Permanent	Contract
RTLA Coordinator	1	Permanent	Contract
LRAM Coordinator	1	Permanent	Contract
LRAM Specialist	1	Permanent	Contract
Field Crew	2	Permanent	Contract

Above staffing does not include personnel within Outdoor Recreation or DPW who support various aspects of INRMP implementation.

7.2.1.2 Proposed Management

There is no requirement for a specific project for staffing since objectives within this area are included within other projects of this INRMP. However, the below goal and objective are appropriate to list.

Goal. Provide staffing of natural resource management professionals required to effectively manage natural resources on Fort Carson and the PCMS (Department of Army 1995a).

Objective. Provide staffing for the Fort Carson natural resources program to effectively implement this INRMP.

7.2.2 Personnel Training

7.2.2.1 Current Management

Fort Carson 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.

Fort Carson plans to send one or more persons to each of the following annual workshops or professional conferences:

- ITAM annual workshop,
- Partners in Flight,
- National Military Fish and Wildlife Association annual workshop,
- North American Wildlife and Natural Resources Conference,
- International Erosion Control Association,
- Society for Ecological Restoration,
- Society of American Foresters,
- Colorado Native Plant Society,

- The Wildlife Society Conference,
- Pikes Peak Community College Natural Resources Technology Advisory Board,
- Rangeland Monitoring Committee,
- Society for Range Management,
- International Society of Arboriculture,
- National Wildfire Coordinating Group Incident Command System qualification courses,
- noxious weed/bio-control workshops,
- Wildlife Habitat Council Annual Symposium, and
- 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. The National Wildfire Coordinating Group offers a variety of courses that may be applicable to members of the Fort Carson wildland firefighting team. DECAM and legal personnel are required to be trained in water rights laws/regulations. Enforcement training is available through various sources. DECAM enforcement training is discussed in Section 5.2, *Natural Resources Enforcement and Human Health and Safety*.

The Wildlife Society, Society of Ecological Restoration, Society of American Foresters, Agronomy Society, Society for Range Management, International Erosion Control Association, and National Military Fish and Wildlife Association are among the professional societies applicable to meeting the needs of Fort Carson 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. The Department of Army annual ITAM meeting is, by far, the best means to obtain professional training in techniques unique to the ITAM program as well as information on requirements to administer installation ITAM programs. Professional natural resources law enforcement depends on proper training of enforcement personnel.

7.2.2.2 Proposed Management

There is no requirement for a specific project for personnel training since objectives within this area are included within other projects of this INRMP. However, the below goal and objectives are appropriate to list.

Goal. Provide training to natural resources personnel implementing this INRMP.

Objective 1. Encourage Natural and Cultural Resources Division and ITAM program personnel to join professional societies and their state/regional chapters as well as be active in them.

Objective 2. Send at least one person to each of the annual workshops or professional conferences discussed above.

Objective 3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to Fort Carson and the PCMS activities.

Objective 4. Ensure that natural resources personnel obtain the one-time or occasional refresher training needed to fulfill job requirements (*e.g.*, enforcement, GIS, NEPA, endangered species documentation/ consultation, firefighter, pesticide application).

Objective 5. Actively participate in training sessions to disseminate knowledge learned at Fort Carson and the PCMS.

Objective 6. Whenever appropriate, author/co-author papers for scientific journals presenting research/ project results.

7.2.3 External Assistance

7.2.3.1 Current Management

The rapid development of natural resources management combined with military personnel cutbacks have resulted in an ever-increasing need ever for outside assistance with natural resources programs on Fort Carson and the PCMS. The growth of environmental compliance requirements has added considerably to the need for specialized external assistance in other areas, including on-the-ground personnel support. It is impossible for Fort Carson to hire the specialized expertise needed for some projects within this INRMP. Fort Carson will require expertise from universities, agencies, and contractors to accomplish tasks within this INRMP. Fort Carson will reimburse parties for much of this assistance.

Personnel Assistance

The DECAM extensively uses ***InterService Support Agreements*** with agencies, particularly the USFWS, to supply well-qualified personnel for programs that have no federal position authorizations.

Another "borrowed personnel" option is through the ***Oak Ridge Institute of Science and Education***. The Oak Ridge Institute of Science and Education involves colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, post-graduates, and associate degree graduates opportunities to gain experience in their respective fields. The normal limit on individual Oak Ridge Institute of Science and Education personnel is three years. Installations may assist in the selection of personnel. The DECAM cultural resources program has used and currently, the Wildlife Team uses Oak Ridge Institute of Science and Education personnel.

Interns from Pikes Peak Community College and Colorado College sometimes provide assistance to DECAM natural resources program.

Volunteers are another potential source of personnel assistance at Fort Carson and the PCMS.

Other Agency Assistance

Fort Carson recognizes the importance of cooperating with federal and state agencies. Sections 2.2, *Other Defense Organizations*; 2.3, *Other Federal Agencies*; and 2.4, *State Agencies*, identify other agencies and organizations with whom Fort Carson has cooperatively worked in recent years. During 2007-2011 Fort Carson will use state and federal agencies, particularly this INRMP's signatory partners, the USFWS and the CDOW, to assist with implementation of various aspects of this INRMP.

University Assistance

Much research done on Fort Carson and the PCMS is through universities (Section 2.6, *Universities and Colleges*). Some research is used to fulfill graduate degree requirements. The Sikes Act Improvement Act

facilitates the use of university research since the proposed language exempts implementation of INRMPs from provisions of the Economy Act, which require strict competition for services.

Other Support
Contractors give Fort Carson access to a wide variety of specialties and fields. A variety of projects could use the support of contractors in the next five years. Contractor and other sources of support will be evaluated on a case-by-case basis during the next five years. ITAM personnel are contract personnel.

7.2.3.2 Proposed Management
There is no requirement for a specific project for external assistance since objectives within this area are included within other projects of this INRMP. However, the below goal and objectives are appropriate to list.

Goal. Provide external specialized skills, personnel, and resources to support the Fort Carson natural resources program.

Objective 1. Implement external support projects, which are described in more detail in appropriate sections of this INRMP.

Objective 2. Consider using InterService Support Agreements, Oak Ridge Institute of Science and Education, and/or volunteers for personnel assistance.

Objective 3. Use state and federal agencies, particularly INRMP signatory partners, the USFWS and CDOW to assist with implementation of this INRMP.

Objective 4. Use universities to assist with implementation of this INRMP.

Objective 5. Use contractors to assist with implementation of this INRMP.

7.3 Project/Program Summary
Projects, goals, and objectives within this INRMP can be used to monitor the effectiveness of natural resources management at Fort Carson and the PCMS. Appendix 7.3 contains a list of projects, goals, and objectives for this INRMP in the order they appear. Goals and objectives are abbreviated from chapters 4, 5, and 7. The list does not include a priority system for two reasons.

- The Sikes Act requires implementation of this INRMP, making it difficult to identify priorities for implementation, which implies priorities for compliance. Federal agencies are required to fully comply with all federal laws.
- Many projects or programs affect obviously high priority species/communities/ecosystems/etc. (federal-listed species, wetlands, etc.) and at the same time affect species/communities/ecosystems/etc. that, prior to the passage of Sikes Act amendments, were not priorities (*e.g.*, nonlisted species, noncritical habitat). It is often difficult to separate the benefactors of many programs.

7.4 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 Fort Carson.

7.4.1 Forestry Funds

Forestry funds are generated from sale of forest products. Individual installations can be reimbursed for approved forest management expenses. The DECAM generates about $1,000 annually from the sale of firewood.

Forestry funds are deposited into the DoD Forest Reserve Account, which funds approved natural resources projects. Such projects include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales. AR 200-3 (Chapter 5) (Department of the Army 1995a) outlines collection and expenditure systems.

Projects anticipated to be funded with forestry funds are listed in Table 7.4.1.

Table 7.4.1 Forestry Funds Projects*

Project	INRMP Section	FY 07	FY 08	FY 09	FY 10	FY 11	Totals
Forest Management	4.3	$1	$1	$1	$1	$1	$5
Totals		$1	$1	$1	$1	$1	$5

* Funding in thousand of dollars.

7.4.2 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 (Department of the Army 1995a). These funds may be used only for the protection, conservation, and management of fish and wildlife on the installation where they are collected, in accordance with this INRMP. They have no year-end (unobligated funds carry over on 1 October). Fort Carson has averaged about $40,000 annually for fish and wildlife management from the sale of permits.

Army policy encourages self-sufficiency with regard to managing game populations on military lands. Fort Carson will, from time to time, examine options to increase Sikes Act income to maintain its quality hunting and fishing program.

Approximately 10% of receipts go to offset costs incurred from the sale of permits. Other projects anticipated to be funded with Sikes Act funds are listed in Table 7.4.2.

Table 7.4.2 Sikes Act Funds Projects*

Project	INRMP Section	FY 07	FY 08	FY 09	FY 10	FY 11	Totals
Natural Resources Enforcement	5.2.3	$13	$25	$15	$15	$15	$83
Wildlife-based Recreation Management	5.4.3	$36	$36	$36	$36	$36	$180
Totals		$49	$61	$51	$51	$51	$263

* Funding in thousand of dollars.

7.4.3 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) (Department of the Army 1995a) 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.

Fort Carson is authorized to request agricultural funds 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 DECAM will be able to effectively compete for them during 2007-2011.

7.4.4 Environmental Funds

The environmental funding process includes identifying current and projected environmental requirements and resources needed to execute the Fort Carson natural resources program and achieve the Conservation Strategic Goal. ***Environmental funds*** are a special subcategory of Operations and Maintenance funds. They are set aside by DoD 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 agency 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.

Most funding for this INRMP implementation is anticipated to come from environmental funds. However, due to ongoing changes in Army funding policies, specific budget data for INRMP information is not available at this time.

7.4.5 Operations and Maintenance Funds

Certain projects within this INRMP are either partially or fully funded with Operations and Maintenance Funds, through DPW. *Noxious Weed Control* (Section 4.14), *Pest Management* (Section 4.15), and dam

safety portions of *Watershed Management* (Section 4.2) are in this category. Most general pest management is not a part of this INRMP. The dam safety program costs approximately $40,000 annually.

Funds that may be collected through the Maneuver Damage Program (Section 4.7.1) are from appropriated training funds. They are converted into Operations and Maintenance funds, which are used to mitigate unwarranted damage to lands from military activities. It is impossible to predict the amount to be collected each year (the goal is zero). It has varied from zero to about $200,000.

7.4.6 Training Funds

Fort Carson and the PCMS, combined, is a Category I installation with regard to ITAM implementation and funding (Department of the Army 1995b). The Web-based Workplan Analysis Module (Web-WAM) is used to channel ITAM funding requests from Fort Carson, through the U.S. Amry Installation Management Command and the Army Training Support Center, to the Office of the Deputy Chief of Staff for Operations and Plans. Fort Carson requires the following ITAM budget for FY 07 through FY 11:

Table 7.4.6: Training (ITAM) Funds Projects*

Project	INRMP Section	FY 07	FY 08	FY 09	FY 10	FY 11	Totals
Range and Training Land Assessment	5.1.1	$240	$249	$310	$286	$292	$1,377
Land Rehabilitation and Maintenance	5.1.2	$5,441	$5,429	$5,920	$6,334	$6,316	$29,440
Training Requirements Integration	5.1.3	$148	$153	$403	$164	$169	$1,037
Sustainable Range Awareness	5.1.4	$19	$19	$19	$19	$19	$95
Geographic Information System	5.1.5	$115	$275	$155	$111	$125	$781
Totals		$5,963	$6,125	$6,807	$6,914	$6,921	$32,730

* Funding in thousand of dollars

Thus, the total ITAM budget for this INRMP is estimated at $32,730,000 for 2007-2011. These estimates will be adjusted as needed each year.

7.4.7 Other Funding

The portions of the outdoor recreation program that are not directly involved with hunting and fishing are funded through the nonappropriated fund and are not included within this INRMP costs.

7.5 INRMP Implementation Costs

Table 7.5 is a summary of funding avenues and dollars required for implementation of this INRMP.

Table 7.5 INRMP Implementation Costs*

Type Funds Anticipated	Section	FY 07	FY 08	FY 09	FY 10	FY 11	Totals
Forestry	7.4.1	$1	$1	$1	$1	$1	$5
Sikes Act	7.4.2	$49	$61	$51	$51	$51	$263
Environmental	7.4.4	Budget data not available.					
Operations and Maintenance**	7.4.5	$40	$40	$40	$45	$45	$210
ITAM	7.4.6	$5,963	$6,125	$6,807	$6,914	$6,921	$32,730

* Funding in thousand of dollars.
** Only dam safety funds are included.

The above table does not include funds from DECAM programs which are not part of the natural resources program (*e.g.*, NEPA, cultural resources, GIS).

Non-appropriated funds are used to defray outdoor recreation costs, exclusive of hunting and fishing programs, associated with this INRMP. However, these costs are not included within this INRMP.

7.6 Implementation Planning

7.6.1 Installation Sustainability Plan

Each year, the Natural and Cultural Resources Division prepares an update of the INRMP in cooperation with stakeholders for approval by the Director, DECAM. Implementation of this INRMP, including any required changes, will be an important aspect of the Installation Sustainability Plan.

7.6.2 Annual Work Plan

Each year, the Natural and Cultural Resources Division Annual Work Plan, or Performance Plan, will be developed jointly with stakeholders. It will be approved by the Director, DECAM to be included as an annual amendment to this INRMP. This annual work plan will be developed and presented to the DECAM by 1 July for the upcoming year budget. Specific items within the Annual Work Plan may be modified or revised as approved by the DECAM. Implementation of this INRMP, including any required changes, will be the focus of the Natural and Cultural Resources Division Annual Work Plan.

7.7 Command Support

Command support is essential to implementation of this INRMP. Many projects for natural resources management within the next five years require command support. The Garrison Commander is personally liable for noncompliance with environmental laws, such as those affected by this INRMP. Thus, he has a personal interest in ensuring that this INRMP is properly implemented.

This INRMP has the support of the Garrison 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 Fort Carson and the PCMS. Implementation of this INRMP is a means to that end.

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* Reports, publications, dissertations, and theses from ecosystem baseline studies on the PCMS as a result of Army purchase. Some of these are not specifically referenced within this INRMP but are included here to provide a more complete list of references for the PCMS.

Agencies and Persons Contacted

The following persons and agencies were either contacted during the draft INRMP preparation phase, asked to review this document, or asked whether they desired to review this document.

Fort Carson

Jim Ahl, Program Operations Manager, Environmental Operations Team, DECAM
Mary Barber, Deputy Director, DECAM
Gary Belew, Program Leader, Cooperative Conservation Team, DECAM
Richard Bunn, Team Leader, Wildlife Team, Cooperative Conservation Team, DECAM
Stephanie Carter, Restoration Program Coordinator, Restoration Team, Environmental Compliance, Team, DECAM
John Cloonan, Team Leader, Wastewater and Drinking Water Team, Environmental Compliance, Team, DECAM
Pam Cowen, Team Leader, Cultural Team, Resource Sustainment Team, DECAM
Michael Farrell, Wildlife Research Biologist, Wildlife Team, Cooperative Conservation Team, DECAM
Brian Goss, Team Leader, Equipment Operations Team, Resource Sustainment Team, DECAM
Russ Hamilton, Environmental Law Specialist, Staff Judge Advocate
Dave Kelley, Team Leader, Pest Control Operations Team, Environmental Operations Team, DECAM
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George (Rusty) Savoy, Integrated Training Area Management Coordinator, Range Control Division, G3/DPTM
Thomas L. Warren, Director, DECAM
Thomas Wiersma, Community Planner, Master Planning Division, DPW
Chris Zimmerman, Biological Science Technician (Wildlife Law Enforcement), Law Enforcement Team, Special Operations Team, DECAM

Other Federal Agencies Review

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State Agency Review

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The Nature Conservancy in Colorado
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The Nature Conservancy in Colorado
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Plan Preparers

Gene Stout and Associates has prepared natural/cultural resources planning documents for over 100 military installations in the United States.

- ***Gene Stout*** - Owner and Principal Author - Mr. Stout has Bachelor of Science and Master of Science degrees in Zoology with an emphasis on wildlife biology. Mr. Stout has 31 years of experience with Department of Defense environmental programs and was responsible for natural resources management and National Environmental Policy Act compliance at Fort Sill, Oklahoma for 18 years.
- ***Jeffrey W. Blythe*** - Cultural Resources Planner - Dr. Blythe has a Bachelor of Arts in Anthropology, a Master of Philosophy in Social Anthropology, and a Ph.D. in Social Anthropology. Dr. Blythe has worked within or for Department of Defense natural and cultural resources programs for 15 years.
- ***Jeffrey S. Trousil*** - Natural Resources Planner - Mr. Trousil has a Bachelor of Sciences in Wildlife. Mr. Trousil worked in the natural resources area within or for various federal agencies (primarily the Department of Army) since 1985 before moving to Gene Stout and Associates in 1997.

Distribution List

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Acronyms

ACUB	Army Compatible Use Buffer
AR	Army Regulation
ARPA	Archeological Resources Protection Act of 1979
ATTACC	Army Training and Testing Area Carrying Capacity
BA	Biological Assessment
CCL	Corporate Lands for Learning
CDOW	Colorado Division of Wildlife
CFR	Code of Federal Regulations
CRM	Cultural Resources Manager
DECAM	Directorate of Environmental Compliance and Management
DMWR	Directorate of Morale, Welfare and Recreation
DoD	Department of Defense
DPTM	Directorate of Plans, Training, Mobilization and Security
DPW	Directorate of Public Works
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESMP	Endangered Species Management Plan
F	Fahrenheit
FC	Fort Carson (used in regulation titles)
GIS	Geographic Information System
ICRMP	Integrated Cultural Resources Management Plan
ID	Infantry Division
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
ITAM	Integrated Training Area Management
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
MAPS	Monitoring Avian Productivity and Survivorship
MDC	Maneuver Damage Control
MOU	Memorandum of Understanding
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
NWI	National Wetlands Inventory
PCMS	Piñon Canyon Maneuver Site
PL	Public Law
PM	particulate matter
PMO	Provost Marshal Office
RFMSS	Range Facility Management Support System
RTLA	Range and Training Land Assessment
SDI	Stand Density Index

SEMS	Sustainability and Environmental Management System
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedures
SRA	Sustainable Range Awareness
TCP	Traditional Cultural Property
TMDL	Total Maximum Daily Load
TRI	Training Requirements Integration
U.S.	United States
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Integrated Natural Resources Management Plan

Fort Carson and Pinon Canyon Maneuver Site, Colorado

Appendices

Appendix 1.4.6. Statutory and Regulatory Instruments that Affect Natural Resources Management on Fort Carson and Pinon Canyon Maneuver Site

Below is a list of the most significant federal and state laws and regulations and other regulatory instruments that may govern implementation of this Integrated Natural Resources Management Plan.

Federal Laws

American Indian Religious Freedom Act (42 United States Code (USC) 1996-1996a)
Americans with Disabilities Act of 1990 (PL 101-336; 42 USC 12101)
Archaeological and Historic Preservation Act of 1974 (PL 93-291; 16 USC 469 *et seq*.)
Archaeological Resources Protection Act of 1979 (PL 96-95:16 USC 470aa-11)
Assimilative Crimes Act (18 USC 13)
Bald Eagle Protection Act (PL 86-70, as amended)
Clean Air Act (as amended through 1990) (42 USC 7401-7642)
Clean Water Act of 1978 (33 USC 1251-1387)
Conservation and Rehabilitation Program on Military and Public Lands (PL 93-452)
Conservation Programs on Military Reservations (PL 90-465)
Endangered Species Act of 1973 (PL 95-632, as amended)
Erosion Protection Act (33 USC 426e-426h)
Federal Facilities Compliance Act of 1992 (PL 102-386; amending 42 USC 6961)
Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136 *et seq*.)
Federal Land Policy and Management Act of 1976 (PL 94-579)
Federal Water Pollution Control Act Amendments of 1972 (PL 92-522)
Fish and Wildlife Conservation Act of 1980 (PL 96-366; 16 USC 2901)
Fish and Wildlife Coordination Act (PL 85-624)
Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation (Amends Public Law 86-797 (Sikes Act) (PL 96-561)
Fort Carson-Pinon Canon Military Lands Withdrawal Act (PL 104-201, sections 2901-2911)
Hunting, Fishing and Trapping on Military Lands (an update to the Military Construction Authorization Act 10 USC 2665)
Migratory Bird Conservation Act (Chapter 257; 45 Stat 1222; 16 USC 715 *et seq*.)
Migratory Bird Treaty Act (PL 65-186; 16 USC 703 *et seq*.)
Mineral Leasing Act of 1920 (30 USC 181 *et seq*.)
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq*.)
National Environmental Policy Act of 1969 (as amended, PL 91-190; 42 USC 4321 *et seq*.)
National Historic Preservation Act of 1966 (as amended, PL 89-665; 16 USC 470 *et seq*.)
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq*.)
Non-game Act (PL 93-366)
Noxious Plant Control Act (PL 90-583)
Noxious Weed Control and Eradication Act of 2004
Outdoor Recreation on Federal Lands (16 USC 4601{1})
Plant Protection Act of 2000 (replaces Federal Noxious Weed Act of 1973 (PL 93-629))
Sikes Act (PL 105-85, as amended; 16 USC 670 *et seq*.)
Timber Sales on Military Lands [An update of the Military Construction Authorization Act] (10 USC 2665)

Watershed Protection and Flood Prevention Act (PL 92419;68 Stat 666, as amended & 86 Stat 667; 16 USC 1001)

Executive Orders and Presidential Memoranda

Executive Order 11593, Protection and Enhancement of the Cultural Environment
Executive Order 11988, Floodplain Management
Executive Order 11989, Off-Road Vehicles on Public Lands
Executive Order 11990, Protection of Wetlands
Executive Order 11991, Protection and Enhancement of Environmental Quality: Amends Executive Order 11514
Executive Order 12898, Environmental Justice
Executive Order 12962, Recreational Fisheries
Executive Order 13007, Indian Sacred Sites
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks
Executive Order 13148, Greening the Government through Leadership in Environmental Management
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
Executive Order 13112, Invasive Species, 1999
Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
Executive Order 13352, Facilitation of Cooperative Conservation
Presidential Memorandum, Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds (April 26, 1994)
Presidential Memorandum, Government-to-Government Relations with Native American Tribal Governments

Department of Defense (DoD) Directives/Instructions

DoD Directive 4150.7, DoD Pest Management Program
DoD Directive 4700.4, Natural Resources Management Program
DoD Directive 4710.1, Archaeological and Historic Resources Management
DoD Instruction 4715.1, Environmental Security
DoD Directive 4715.1E, Environment, Safety, and Occupational Health (ESOH)
DoD Instruction 4715.9, Environmental Planning and Analysis
DoD Instruction 5000.13, Natural Resources
DoD Directive 6050.1, Environmental Effects in the United States of DOD Actions
DoD Directive 6050.2, Use of Off-Road Vehicles on DOD Lands
DoD Directive 7310.5, Accounting for Production and Sale of Forest Products
Department of Defense, American Indian and Alaska Native Policy

Army Regulations (AR)

AR 200-1, Environmental Protection and Enhancement (Department of the Army 1997b)
AR 200-2, Environmental Analysis of Army Actions, 32 CFR Part 651, (Department of the Army 2002)
AR 200-3, Natural Resources, Land, Forest, and Wildlife Management (Department of the Army 1995a)
AR 200-4, Cultural Resources Management (Department of the Army 1997a)
AR 200-5, Pest Management (Department of the Army 1999a)
AR 215-1, Morale, Welfare, and Recreation Activities and Nonappropriated Fund Instrumentalities (Department of the Army 1998)
AR 350-19, The Army Sustainable Range Program (Department of the Army 2005)

Fort Carson (FC) Regulations

FC Reg 200-1, Environmental Protection and Enhancement
FC Reg 200-5, Maneuver Damage Control Program
FC Reg 200-6, Wildlife Management
FC Reg 350-1, Mountain Post Training
FC Reg 350-4, Training, Pinon Canyon Maneuver Site
FC Reg 350-9, Integrated Training Area Management (ITAM)
FC Reg 385-1, Fort Carson Safety Program
FC Reg 385-63, Firing Ammunition for Training, Target Practice, Administration and Control of Ranges and Training Areas

Colorado (CO) Regulations

Colorado Revised Statutes as Amended, Title 33, Wildlife and Parks and Outdoor Recreation
Regulation No. 1 - Emission Control Regulations for Particulates, Smokes, and Sulfur Oxides for the State of Colorado
Regulation No. 3 - Regulations Requiring an Air Contaminant Emission Notice, Emission Permits and Fees
Regulation No. 8 - The Control of Hazardous Air Pollutants
Ambient Air Standards - Metropolitan Denver Air Quality Region, State Air Pollution Control Areas and the State of Colorado
5 CCR 1002 - Water Quality Control Commission
5 CCR 1002-8 - Water Quality Standards and Stream Classification
5 CCR 1003 - Water Quality Control Commission
5 CCR 1003-1 - Primary Drinking Water Regulations

Miscellaneous Guidance

Defending Our Natural Heritage: Natural Resources in the Department of Defense (DENIX: https://128.174.5.51/denix/Public/Library/Heritage/ toc.html)
DoD Biodiversity Initiative
Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers (The DoD Biodiversity Initiative; DENIX: https://128.174.5.51/denix/Public/ES-Programs/Conservation/ Biodiversity/biodiversity.html)
Resources for INRMP Implementation: A Handbook for the DoD Natural Resources Manager (DENIX: http://www.denix.osd.mil/ denix/Public/ES-Programs/Conservation/Legacy/INRMP/inrmphb.pdf)
DoD Commander's Guide to Biodiversity (DENIX: https://128.174.5.51/ denix/Public/ES-Programs/ Conservation/Guide/guide.html)
Installations Environmental Program Management Guide (http://aec.army.mil/usaec/publications/ iepmguide02.pdf)

Appendix 1.6.6. Interagency Correspondence

Attached are copies of correspondence regarding interagency correspondence regarding the development of this INRMP. In addition to attached comments, review comments were received from the U.S. Geological Survey and the U.S. Fish and Wildlife Service in the form of e-mails or edits directly on electronic copies of the INRMP.

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT AGENCY
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CARSON
1633 MEKONG STREET, RM 215
FORT CARSON, CO 80913-4143

REPLY TO
ATTENTION OF

November 1, 2006

Directorate of Environmental
Compliance and Management

Colorado Division of Wildlife
Southeast Region Management
Attn: Mr. Dan Prenzlow
4255 Sinton Road
Colorado Springs, CO 80907

Dear Mr. Prenzlow:

We have carefully examined the Division's comments on the current draft of Fort Carson's Integrated Natural Resource Management Plan (INRMP). We appreciate the comments and have responded to them by making the following changes in the INRMP.

CDOW Comment: The management plan states that you have made damage avoidance and mitigation a priority on training land. However, in order for DOW staff to thoroughly evaluate the Rest-Rotation-Deferment Program section, we recommend including more details on those plans. We see that this section cites certain training areas (identified by letters and numbers) but does not refer to a specific map. We would recommend you attach a map that includes the training zones, along with the habitat types they overlap. It would also be helpful to provide details of which parameters will be analyzed when deciding whether an area is in need of rest or deferment, such as range condition. It is likely that any increase in the number of maneuver activities per year may hinder your goal of recovering certain areas without having defined habitat objectives in place.

FTC Reply: The section discussing the Maneuver Damage Program has been updated to reflect recent changes in the program, as well as recent trends in military training. Maps have been developed per CDOW's request above, and have been inserted in the INRMP near page 119 (final page numbers may shift a little due to additions and deletions during this process).

CDOW Comment: Under the pest management section, we noticed that the INRMP lists black-tailed prairie dogs as a pest species, but does not mention any special management considerations. Considering they are listed in Colorado as a species of special concern, it may benefit your plan to allow for zones that are more tolerant of larger prairie dog colonies. Burrowing owls are also associated with prairie dog colonies, and could benefit from this as well.

FTC Reply: The Black-tailed Prairie Dog Biological Assessment and Endangered Species Management Plan is referenced on page 166 of the INRMP (section: 4.12.1.2.1 Biological Assessments/Endangered Species Management Plans). The importance of the prairie dog to eagles, Ferruginous Hawk, Mountain Plover, and the Burrowing Owl are identified in the plan. The management plan identifies several conservation measures for protecting prairie dog populations including the list below.

a. A ban on prairie dog shooting.

b. Requires evaluation of the effects proposed government actions on prairie dogs and potential mitigation.

c. Annual surveys to track the viability and size of existing colonies.

d. Annual surveys for new colonies.

e. Educating the public and military of the importance of prairie dogs to grassland ecosystems, about laws and regulations protecting prairie dogs on Fort Carson and the Pinon Canyon Maneuver Site (PCMS), as well as other elements.

The plan delineates where and how judicious lethal prairie dog control will be conducted. The circumstances warranting lethal control include protecting human health, resolution of land use conflicts, protecting public safety, and property protection. Indiscriminate lethal control is not permitted on Fort Carson or the PCMS and is only conducted under the direct control of the DECAM.

Regarding the Burrowing Owl, the DECAM is currently preparing an Endangered Species Management Plan for that species. Fort Carson and the PCMS currently are cooperating with other organizations for burrowing owl conservation. Although Fort Carson uses lethal control for prairie dogs consistent with our management plan, no lethal control occurs if Burrowing Owls or Mountain Plovers are present.

The following INRMP changes were made to section: 4.12.4.3 Proposed Management/Project: Species of Special Concern Management (page 183).

Goal. Protect sensitive species and their habitats whenever possible by proposing action alternatives.

Objective. Due to the importance of the Black-tailed Prairie Dog to eagles, Ferruginous Hawk, Mountain Plover, and the Burrowing Owl, follow goals and objectives defined in the Prairie Dog Management Plan (Bunn 2004).

Objective. Test the effectiveness of seeding prairie dog colonies killed by plague.

* Note - An electronic copy of the BTPD Assessment/Management Plan was provided to CDOW - DWM, Steve Cooley, on 19 October 2006.

CDOW Comment: In the forestry management section of the INRMP, it would be beneficial to include some specific projects on which tree species you are attempting to manage. Controlled burns, cutting, and rollerchopping are effective techniques for removal of old growth timber, thus creating a new successional stage of grasses and shrubs. Your plan suggests removing diseased trees and maintaining fire breaks. We agree that there are tremendous opportunities to actively manage for a mosaic of different habitat types. With respect to old snags and tall trees, we suggest protection of identified roosting areas for avian species.

FTC Reply: Removal of old growth timber on Fort Carson does not support Installation goals to protect Mexican Spotted Owl wintering habitat. Old growth also supports cavity nesting birds and rodents on Fort Carson including species identified as Species of Special Concern (U.S. Fish and Wildlife Service

2002) requiring positive conservation actions to prevent future listing. Old growth also occurs in sensitive barrens habitats supporting several species of plants of conservation concern. Due to the juxtaposition of wooded and grassland habitats on Fort Carson, encouraging grass and forb forage plants for games species can be accomplished without removing old growth timber.

CDOW Comment: We noticed that the status of some species of wildlife listed in your plan need updating. On the Fort Carson list, the white pelican and painted turtle are not species of special concern in the state of Colorado. You might also note that the northern leopard frog was recently petitioned for listing under the federal Endangered Species Act. Within the Pinon Canyon list, white pelican and canyon tree frog are not species of special concern, however the blacktailed prairie dog and mountain plover are a state species of special concern with no federal designation.

FTC Reply: The species lists for Fort Carson and the PCMS were reviewed and several changes were made, including needed corrections identified by the Division.

CDOW Comment: Fort Carson Military Reserve
The limited water sources and non-functioning guzzlers may play a role in recent reductions in elk sightings. It seems many of the retention dams appear to have gone dry in the past several years. We understand that many of the guzzlers on, base are getting old no longer hold water. The Division suggests that water guzzlers currently in place be maintained or improved to a functional capacity. Water would benefit many species, including deer, elk, antelope and scaled quail. If needed, our agency has an active volunteer program that could be of assistance in making these repairs.

FC Reply: Fort Carson recently allocated $5,000 to create water sources for big game species. Three 750 gallon tanks were purchased during September 2006 for installation down range. We anticipate installation to be completed prior to late winter/spring of 2007. The following INRMP changes were made regarding guzzlers on Fort Carson.

Page 163 (4.11.4 Proposed Management, Project: General Fish and Wildlife Management); objective inserted:

Objective. Review the current distribution of water resources available to wildlife downrange and evaluate potential development of these to benefit wildlife. Purchase and install wildlife guzzlers in areas lacking water or existing water developments to mitigate movements of big game species forced to move because of military training. Partner with organizations and the CDOW to assist in the purchasing, placement, and repair of guzzlers.

Page 155, (4.11.3.1.2 Habitat Enhancement, Water Development); statement inserted:
In 2006 Fort Carson purchased three 750 gallon wildlife water guzzlers to install downrange.

CDOW Comment: We feel there are several places on Fort Carson that wildlife could benefit from planting food plots, particularly along drainages where historical farmlands have become fallow. These could be in the form of irrigated or non-irrigated seed mixes, dry-land grains, or even cool season grasses. Please contact District Wildlife Manager, Steve Cooley, for further information on guzzlers or food plots.

FTC Reply: In 2006 Fort Carson developed a plant species list for non-irrigated food plots and several sites for food plots were tentatively selected. Fort Carson will coordinate with the Division regarding species selection and placement. The following INRMP changes were made regarding food plots on Fort Carson.

Page 163 (4.11.4 Proposed Management, Project: General Fish and Wildlife Management); objective inserted:
Objective. Establish food plots composed of native forbs and grasses and dry-land grains at various locations on Fort Carson. Partner with the CDOW to assist in species selection and location selection.

Page 163 (4.11.4 Proposed Management, Project: General Fish and Wildlife Management); objective inserted:

Objective. Inter-seed cool season grasses for elk forage production at various locations on Fort Carson. High priority sites are grasslands adjacent to pinion-juniper woodlands damaged by training or drought. Partner with the CDOW to assist in species selection and location selection.

Copies of this letter are being set to Bruce McCloskey, Seth McClean, Shaun Deeney, and Al Trujillo, Colorado Division of Wildlife.

Sincerely,

Thomas L. Warren
Director, Environmental
Compliance and Management

STATE OF COLORADO

Bill Owens, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER

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Southeast Region
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719-227-5200

For Wildlife-
For People

September 21, 2006

Department of the Army
Directorate of Environmental Compliance and Management
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Fort Carson, CO 80913-3456

Re: Fort Carson and Pinon Canyon Maneuver Site Integrated Natural Resources Management Plan and Environmental Assessment for 2007-2011.

Dear Mr. Warren,

The Division has reviewed your request for comment on the Integrated Natural Resource Management Plan (INRMP) and Environmental Assessment for 2007-2011. Upon review of the proposed INRMP, the Division offers the following general comments and suggestions with respect to wildlife. In addition, we offer project specific comments for Fort Carson Military Reservation.

The management plan states that you have made damage avoidance and mitigation a priority on training land. However, in order for DOW staff to thoroughly evaluate the Rest-Rotation-Deferment Program section, we recommend including more details on those plans. We see that this section cites certain training areas (identified by letters and numbers) but does not refer to a specific map. We would recommend you attach a map that includes the training zones, along with the habitat types they overlap. It would also be helpful to provide details of which parameters will be analyzed when deciding whether an area is in need of rest or deferment, such as range condition. It is likely that any increase in the number of maneuver activities per year may hinder your goal of recovering certain areas without having defined habitat objectives in place.

Under the pest management section, we noticed that the INRMP lists black-tailed prairie dogs as a pest species, but does not mention any special management considerations. Considering they are listed in Colorado as a species of special concern, it may benefit your plan to allow for zones that are more tolerant of larger prairie dog colonies. Burrowing owls are also associated with prairie dog colonies, and could benefit from this as well.

In the forestry management section of the INRMP, it would be beneficial to include some specific projects on which tree species you are attempting to manage. Controlled burns, cutting, and rollerchopping are effective techniques for removal of old growth timber, thus creating a new successional stage of grasses and shrubs. Your plan suggests removing diseased trees and maintaining fire breaks, we agree that there are tremendous opportunities to actively manage for a mosaic of different habitat types. With respect to old snags and tall trees, we suggest protection of identified roosting areas for avian species.

-continued-

DEPARTMENT OF NATURAL RESOURCES, Russell George, Executive Director
WILDLIFE COMMISSION, Jeffrey Crawford, Chair • Tom Burke, Vice Chair • Claire O'Neal, Secretary
Members, Robert Bray • Brad Coors • Rick Enstrom • Richard Ray • James McAnally • Ken Torres
Ex Officio Members, Russell George and Don Ament

We noticed that the status of some species of wildlife listed in your plan need updating. On the Fort Carson list, the white pelican and painted turtle are not species of special concern in the state of Colorado. You might also note that the northern leopard frog was recently petitioned for listing under the federal Endangered Species Act. Within the Pinon Canyon list, white pelican and canyon tree frog are not species of special concern, however the black-tailed prairie dog and mountain plover are a state species of special concern with no federal designation.

Fort Carson Military Reserve

The limited water sources and non-functioning guzzlers may play a role in recent reductions in elk sightings. It seems many of the retention dams appear to have gone dry in the past several years. We understand that many of the guzzlers on base are getting old no longer hold water. The Division suggests that water guzzlers currently in place be maintained or improved to a functional capacity. Water would benefit many species, including deer, elk, antelope and scaled quail. If needed, our agency has an active volunteer program that could be of assistance in making these repairs.

We feel there are several places on Fort Carson that wildlife could benefit from planting food plots, particularly along drainages where historical farmlands have become fallow. These could be in the form of irrigated or non-irrigated seed mixes, dryland grains, or even cool season grasses. Please contact District Wildlife Manager, Steve Cooley, for further information on guzzlers or food plots.

Thank you for the opportunity for providing input on the INRMP. We welcome the opportunity to provide further assistance, feel free to contact Area Wildlife Manager, Shaun Deeney at (719) 227-5218, if you have any questions.

Sincerely,

Dan Prenzlow
Southeast Regional Manager

xc: Seth McClean
Shaun Deeney
Al Trujillo

DEPARTMENT OF THE ARMY
HEADQUARTERS, 7th INFANTRY DIVISION AND FORT CARSON
FORT CARSON, COLORADO 80913-5000

REPLY TO
ATTENTION OF:

September 6, 2005

Directorate, Environmental
Compliance and Management

Colorado Division of Wildlife
Bruce McCloskey, Director
6060 Broadway
Denver, Colorado 80216

Dear Mr. McCloskey:

The Directorate of Environmental Compliance and Management at Fort Carson has initiated the process of updating its current Integrated Natural Resources Management Plan (INRMP) (2002-2006). Our revised INRMP will be for the period of 2007-2011.

Our contractor to assist us in this revision is Gene Stout and Associates, a firm that helped us with our current INRMP. It is our intent to hold specific meetings early in the preparation process to discuss any items you wish regarding the new INRMP, specifically including federally listed species and migratory bird management, as well as provide you with a draft of this INRMP for your careful review.

Among other new items, we will include a discussion of the potential use of our INRMP in the event that Fort Carson or Pinon Canyon Maneuver Site is considered for Critical Habitat designation. We will also include a discussion of migratory birds and considerations for Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* and the Proposed Rule to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities, as well as address Birds of Conservation Concern. We also plan to more thoroughly address initiatives relating to acquisition of conservation easements and other actions that mutually enhance the installation's security from incompatible encroachment, while providing additional flexibility to manage wildlife and associated habitat. Finally, our regional approach to management will be more comprehensively addressed within this updated plan, to include the Central Shortgrass Prairie Assessment.

We will provide you with a notification of our projected date of sending you a draft for your 30-day review as soon as we can make an accurate projection of that date. We also plan to conduct initial planning meetings, and we will provide your staff with the ability to attend.

We want to try to reduce the amount of time between the date of the draft and date of final approvals/concurrences. It is always difficult to get these plans through the review process, both internally and externally. We request any assistance and/or advice that you can provide with this matter to keep our INRMP current.

2

We have appreciated your help with our INRMP in the past, and we look forward to this effort. Feel free to contact me at any time at the phone number (719) 526-2022, or please contact Mr. Gary Belew at (719) 526-1694 for any questions you may have.

Sincerely,

Thomas L. Warren
Director, Environmental
Compliance and Management

DEPARTMENT OF THE ARMY
HEADQUARTERS, 7th INFANTRY DIVISION AND FORT CARSON
FORT CARSON, COLORADO 80913-5000

REPLY TO
ATTENTION OF:

September 6, 2005

Directorate, Environmental
Compliance and Management

U.S. Fish and Wildlife Service
Ralph O. Morgenweck, Regional Director
P.O. Box 25486, DFC
Denver, Colorado 80225

Dear Mr. Morgenweck:

The Directorate of Environmental Compliance and Management at Fort Carson has initiated the process of updating its current Integrated Natural Resources Management Plan (INRMP) (2002-2006). Our revised INRMP will be for the period of 2007-2011.

Our contractor to assist us in this revision is Gene Stout and Associates, a firm that helped us with our current INRMP. It is our intent to hold specific meetings early in the preparation process to discuss any items you wish regarding the new INRMP, specifically including federally listed species and migratory bird management, as well as provide you with a draft of this INRMP for your careful review.

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Sincerely,

Thomas L. Warren
Director, Environmental
Compliance and Management

Appendix 2.3.1. Items of Cooperation Among the U.S. Fish and Wildlife Service, Colorado Division of Wildlife, and Fort Carson, Colorado

PURPOSE: The purpose of this document is to specifically list items to be provided by the Colorado Division of Wildlife (CDOW), U.S. Fish and Wildlife Service (USFWS), and Fort Carson for cooperative implementation of the Fort Carson Integrated Natural Resources Management Plan. Items not specifically listed will generally be the responsibility of Fort Carson 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 670a, the Department of Defense, Department of Interior, and the State of Colorado, through their duly designated representatives whose signatures appear on the Fort Carson and the Pinon Canyon Maneuver Site (PCMS) Integrated Natural Resources Management Plan (INRMP), approve the INRMP and below specific items of cooperation among the three agencies.

FORT CARSON AGREEMENT

- Representatives of the CDOW and the USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security. Such personnel may use U.S. Army transportation on a nonreimbursable basis, to include aircraft, for wildlife-related functions on Fort Carson and the PCMS provided such transportation is available without detriment to the military mission.
- Fort Carson shall furnish assistance, facilities, and funding (as necessary and available) to the CDOW and/or USFWS for mutually agreed upon natural resources research and management projects, providing the proposed studies or management programs are compatible with, and in no way limit, accomplishment of the military mission.
- The Sikes Act Improvement Amendments of 1997 provide a mechanism for Fort Carson to directly transfer funds to the CDOW and USFWS for implementation of this INRMP.

USFWS and CDOW AGREEMENT

- The USFWS and CDOW shall provide Fort Carson with a yearly population trend of huntable wildlife species on Fort Carson and the PCMS. Information to be furnished pertaining to wildlife surveys or population trends shall normally be limited to species denoted in Statements of Work for implementation of the INRMP. They shall also apprise Fort Carson yearly of population trends of fish species in waters covered by this INRMP. Information to be furnished pertaining to population trends shall normally be limited to species mutually agreed upon by the parties hereto. Information furnished to Fort Carson will include reference to the condition of the terrestrial and aquatic habitat managed under this INRMP.
- The USFWS and CDOW shall furnish technical assistance for the establishment and development of long-range fish and wildlife management objectives and plans as agreed upon by all parties hereto, and provide technical advice as may be necessary for the implementation and accomplishment of these plans. Both agencies will assist with the training of civilian and military personnel to permit implementation of required management practices. The USFWS and CDOW shall also provide Fort Carson written reports, including appropriate recommendations, on technical studies conducted on lands administered by Fort Carson.
- USFWS and CDOW officials shall possess proper and valid identification when on the

installations.

- The USFWS and CDOW will provide native fish or wildlife for introductions when such transplants are consistent with objectives of the fish and wildlife management plans and when such stock is available.
- The CDOW shall submit to Fort Carson recommended bag-limits and seasons for the harvest of all game and fish species managed under this Plan prior to the season and in sufficient time to permit the formulation and publication of hunting and fishing regulations when necessary. Such bag-limits and seasons will be based upon the population surveys conducted as herein provided, as may be appropriate.

MUTUAL AGREEMENT

- Based upon wildlife species survey data and upon information and data supplied by Fort Carson, the USFWS, and CDOW, the parties hereto shall develop a program for research, monitoring, and the continued management of fish and wildlife resources at Fort Carson and the PCMS, including:
  a. plans for management and conservation of fish and wildlife resources, which shall be subject to review by any of the parties at any time, but not less than annually;
  b. development and improvement of habitat for optimum conditions in keeping with the INRMP objectives;
  c. identification of requirements relative to restoration or restocking of desired species; and
  d. identification of requirements relative to accomplishing the control of native and exotic noxious plant and animal species as may be necessary.
- Public participation in the harvest of fish and game, commensurate with military objectives, shall be permitted, provided such wildlife species are in sufficient abundance to provide for harvest and sustainable population balance through management practices agreed upon by all concerned parties. All persons granted access shall stand at par with each other, and permission to recreate on Fort Carson and the PCMS shall be made on an impartial basis. Such access shall be within manageable quotas subject to safety requirements, military security, and the military training mission.
- All persons engaged in natural resource-related activities, such as hunting, fishing, bird watching, or wildlife photography, on lands or waters administered by Fort Carson shall obtain a Fort Carson access permit. Permit fees shall be uniform and reasonable, and shall be established and collected under applicable Fort Carson and Department of the Army regulations.
- All persons engaged in natural resource-related activities, such as hunting, fishing, bird watching, or wildlife photography, on Fort Carson and the PCMS will be authorized and controlled by the Installation Commander in accordance with applicable federal and state statutes, Colorado Wildlife Commission rulings, Army Regulations, and the INRMP.
- Both the CDOW and USFWS shall provide technical advice and assistance to Fort Carson regarding fish and wildlife management when requested and as agency resources allow. In the event it is mutually agreeable to both the CDOW and USFWS for only one agency to furnish technical advice, then that agency shall assume the responsibility for the particular program area under consideration.
- Enforcement of laws and regulations protecting natural resources or regulating recreational activities are an integral part of Fort Carson's natural resources management program and shall be enforced in support of the INRMP under the direction of the Director of Environmental Compliance and Management.
- Whenever hunting, fishing, or wildlife related recreational activities are allowed on lands or

waters administered by Fort Carson, enforcement of wildlife laws shall be carried out by wildlife management officials under the direction of, or in coordination with, the Director of Environmental Compliance and Management.

a. On areas of Fort Carson and the PCMS under Exclusive Federal Jurisdiction, State of Colorado laws and regulations relative to game and fish bag limits, seasons, and other such conservation measures are operative only as federal law and are enforceable by conservation officials with federal authority.

b. On areas of Fort Carson and the PCMS under Proprietary Jurisdiction, State of Colorado laws and regulations relative to game and fish bag-limits, seasons, and other such conservation measures may be enforced as state laws and are enforceable by conservation officials with state authority.

c. On areas of Fort Carson and the PCMS under Concurrent Jurisdiction, state and federal laws and regulations apply, and are enforceable by conservation officials with either state or federal authority.

- Persons hunting or fishing the lands or waters of Fort Carson or the PCMS shall be required to obtain special Fort Carson hunting or fishing licenses unless exempt by Fort Carson regulations. Funds derived from the sale of these licenses will be used exclusively for the implementation of fish and wildlife portions of the Fort Carson INRMP in accordance with Army regulations and the Sikes Act. Fees charged shall be established by the installation in accordance with Army regulations. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).
- Persons hunting or fishing the lands of Fort Carson or the PCMS must purchase state licenses, tags, and stamps as required by CDOW, unless exempt by CDOW regulations. The CDOW agrees that military personnel stationed in Colorado may purchase hunting and fishing licenses at resident prices.
- No exotic species of fish or wildlife will be introduced on Fort Carson or the PCMS without prior written approval of the Army, CDOW, and the USFWS.
- Hunting, fishing, and other natural resources-related recreation 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 closed to hunting and fishing include but are not limited to impact areas containing unexploded ordnance.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, Fort Carson agrees that any land use change that significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS

The military mission of Fort Carson 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 Fort Carson and PCMS INRMP is the planning document required by the Sikes Act, as amended. This INRMP 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 to new requirements within the Sikes Act, if needed.

(2) This Plan will be reviewed by the CDOW, USFWS, and Fort Carson annually.

(3) No land or forest products from land on Fort Carson or the PCMS will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on Fort Carson or the PCMS 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 Fort Carson and PCMS 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 Fort Carson and PCMS 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 4.3. Forest Management Plan, Fort Carson and Pinon Canyon Maneuver Site

Forest Management Plan

Fort Carson and
Pinon Canyon Maneuver Site

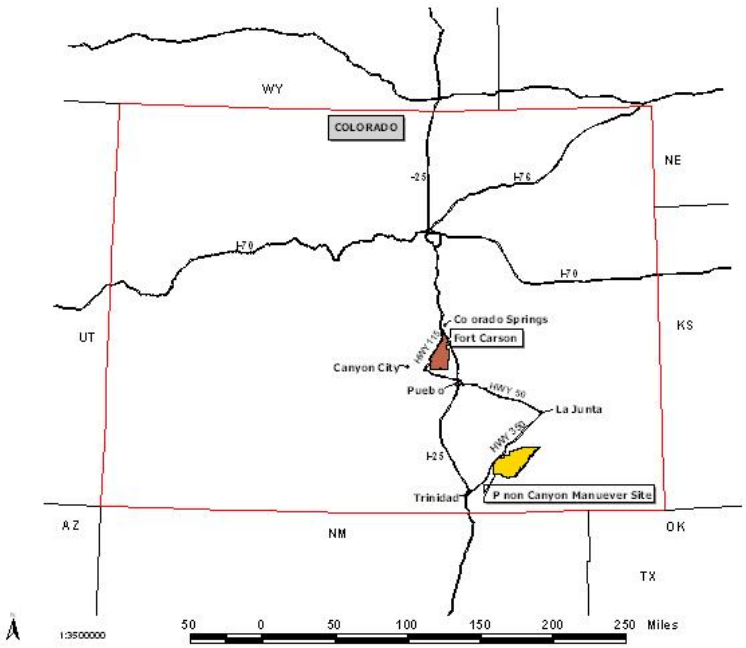
Introduction

Forest ecosystems on the Fort Carson Military Reservation (FCMR) and the Pinon Canyon Maneuver Site (PCMS) are a part of the landscape mosaic. Diverse flora found on FCMR and PCMS provide habitat for numerous wildlife species and concealment for a realistic training environment.

Fort Carson was established in 1942 and contains approximately 137,000 acres of which 50,355 acres are considered forested. PCMS was acquired in 1982 and contains 235,896 acres of which 39,960 acres are classified as forest or woodland. The *Forest Inventory of the U.S. Army Fort Carson Military Reservation and the Piñon Canyon Maneuver Site* (Colorado State University 2001) was utilized for some recommendations in this plan.

Comment [GLB8]: Ask Debra O. what the appropriate acre figure is.

Figure 1. Location of Fort Carson Military Reservation and Pinon Canyon Maneuver Site



B

Colorado State University (CSU) was contracted to design and complete a forest inventory of FCMR and PCMS to assess conditions in the forest ecosystem. The primary focus of this report was species composition and structure, as well as insect and disease infestation, and disturbance characteristics. In July 2001 CSU completed an inventory of 296 individual plots on Fort Carson and 154 individual plots at PCMS.

Other historical studies, such as *Environmental Baseline Descriptions for Use in the Management of Fort Carson Natural Resources* (Keown and West 1978), indicate dramatic changes in woody vegetation. This report suggested that stand density declines in specific southern FCMR watersheds could have been attributed to military training activities during the 1970s.

Objectives

The following objectives are pertinent to the management of forest ecosystems on FCMR and PCMS.

- Provide for the optimum forest densities to enhance and support military training and multiple natural resource uses.
- Improve and then maintain forest health.
- Reduce the risk of wildland fire.
- Protect cultural resource sites.
- Develop and maintain wildlife habitat within the concept of normal forest management practices.

Special Considerations

The following special considerations are pertinent to the management of forest ecosystems on FCMR and PCMS.

- Sustain military training by improving line-of-sight visibility; improve the ability of vehicles and equipment to maneuver within the forest; and provide adequate concealment.
- Enhance fire management by reducing hazardous fuel loads. Reduce the risk of fire(s) moving off the Installation and identify potential let-burn areas.
- Sustain a productive and functional forest ecosystem by maintaining or increasing the diversity of plant and animal species.
- Provide uneven-aged forests through such silvicultural practices as thinning; reduction of dead, dying, and diseased trees; and by culling undesirable species.
- Protect cultural resources, including man-made structures and historic, prehistoric, and paleontological resources.
- Employ best management practices, such as utilizing revenue generated from thinning or pruning to offset expenses and promote thinned forest biomass utilization/recycling.
- Maintain a desirable viewshed for neighboring communities.

Personnel

In-house

The current permanent staff available for forest management operations within the Directorate of Environmental Compliance and Management (DECAM) include: 1 GS-13 Forester (also the Program Leader, Resource Sustainment Team); 1 GS-11 Forester (also the Team Leader, Equipment Operations Team, Resource Sustainment Team), 1 GS-9 Forester, 1 GS-9 Forestry Tech, and 1 GS-6 Forestry Technician.

Contract
Larger thinning or forest prescriptions may require additional resources for implementation.. Contracting may occur through various mechanisms.

Species Components

Forest types and conditions are the result of climate, soils, fires, and historical use. Variations in those factors have resulted in several forest vegetation classifications at both installations.

There is also a relatively high amount of variation in tree density. On FCMR tree density ranged from a low of 0.4 trees per acre to a high of 900 trees per acre, with an average of 206 trees per acre. At the PCMS tree density ranged from a low of 5 trees per acre to a high of 550 trees per acre, with an average of 117 trees per acre. Compared to current typical Colorado Front Range stands, average stand densities on both installations indicate a low or understocked stand density. However, peak densities for both installations fall in the well-overstocked category (CSU 2001).

FCMR has been broken down into 41 vegetation classifications (Polzin 2000), 15 of which are usually considered as forest, woodland, riparian, or shrubland communities (Figure 2). PCMS has been broken down into 26 vegetation classifications, 5 of which are generally classified as forest and woodland communities (Figure 3).

Ponderosa Pine
Stand composition
Ponderosa pine (*Pinus ponderosa)* stands at Fort Carson are similar to typical stand composition found at the lower montane region along most of Colorado's Front Range. Stands are primarily in an early-to-mid successional state, often with a gambel oak understory. Many lower montane stands of ponderosa pine are considered xeric in nature, receiving 15-17 inches of precipitation annually.

At FCMR ponderosa pine stands make upof approximately 16% of forest and woodland communities. The average stand density at FCMR is 154.1 trees per acre with 23.3% canopy cover. A Stand Density Index (SDI) of 0-237 in this forest type is poorly stocked. FCMR has a SDI of 112. At PCMS ponderosa pine is scarce and may be found in a few canyon rims and gullies. In eastern Colorado, ponderosa pine usually climaxes when trees approach 400 years of age (CSU 2001).

Figure 2. Forest and Woodlands on Fort Carson Military Reservation

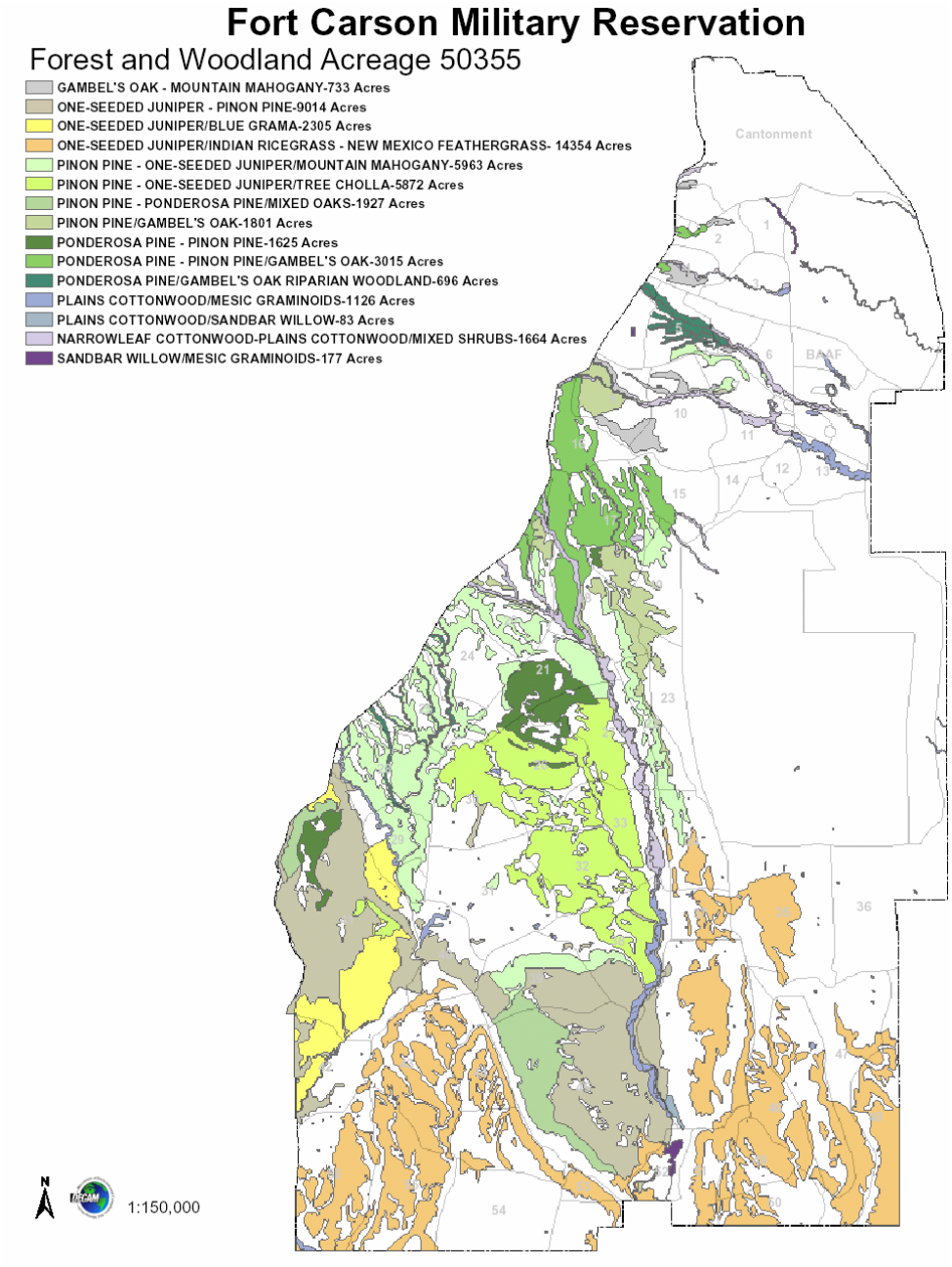
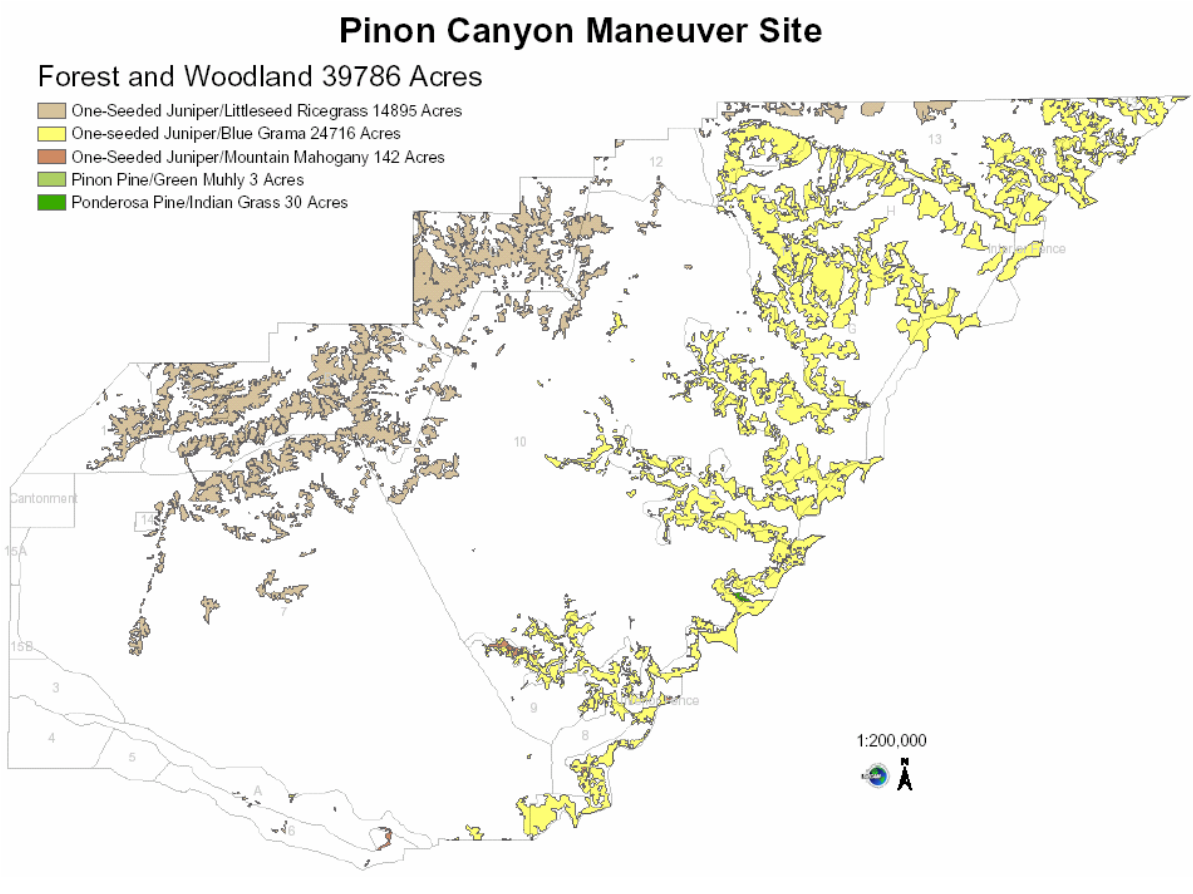


Figure 3. Forest and Woodlands on Pinon Canyon Maneuver Site



Ecological Potential

Due to moisture availability, it is unlikely that ponderosa pine stands will be replaced by Douglas fir succession (Polzin 2000). Cumulative impacts combined with drought and the presence of mistletoe (*Arceuthobium spp*.) can stress ponderosa pine and increase mortality. Stressed ponderosa pine is susceptible to mountain pine beetle (*Dendroctonus ponderosae)* or Ips beetle (*Ips spp.*) outbreaks.

Recommendation

A sanitation harvest is recommended to remove trees that are heavily infested with insects or infected with disease pathogens. Occasional dead trees should be left as snags to enhance wildlife habitat if an acceptable fire hazard is determined.

Pinon and Juniper Woodland

Stand composition

Pinon pine (*Pinus edulis)* and one-seeded juniper (*Juniperus monosperma)* stand composition varies somewhat between FCMR and PCMS (CSU 2001). At FCMR 45% of the pinon and juniper woodland is juniper, and 55% is pinon. At PCMS the dominant species is juniper (91%). The average stand density at FCMR is 210 trees per acre compared to the 117 trees per acre at PCMS.

According to the CSU report, a SDI of 0-162.7 in this forest type is understocked. Both installations fall in this category with FCMR at 140 and PCMS at 78 SDI. Some stands, however, are considerably overstocked.

Extended periods of low precipitation have dramatically increased the abundance of Ips beetle and the mortality of pinon pine throughout the region. Porcupine damage also influences some stands on Fort Carson and the PCMS.

Ecological Potential

Due to low precipitation regimes at PCMS, pinon pine is expected to remain a minor (<9%) component of the stands (CSU 2001).

Recommendations

Thinning of some overstocked stands at PCMS is recommended to reduce extreme wildfire risks to neighboring areas, as well as to control insect/disease infestation, increase understory grasses, and improve trafficability. In some areas with shale and limestone outcrops, thinning should only be considered when fire protection of valuable properties or structures is needed. Pinon pitch mass borer (*Dioryctria ponderosae* Dyar) and Ips beetle infected trees should be removed to curtail infestations. Coarse and fine woody debris from thinning may be left on the ground to promote nutrient recycling and reduce erosion. Thinning of some overstocked stands at FCMR is needed to reduce extreme wildfire risks, improve understory vegetation, and improve trafficability.

Shrubland Community

Stand composition

Gambel oak (*Quercus gambelii*) is primarily found at FCMR as an understory and shrub community (CSU 2001). Oak makes up 8% of the overall forest and woodland composition on FCMR. Other woody shrubs, such as mountain mahogany (*Cercocarpus montanus* Raf.) and skunkbrush (*Rhus trilobata),* are dominant understory species in some stands. Gambel oak usually reaches climax and undergoes senescence at about 80 years of age.

Ecological Potential
Oak species may become a dominant understory species in thinned ponderosa pine stands (Polzin 2000). Some stands of oak on FCMR form dense monotypic overstories. Oak can resprout after being chopped or burned.

Gambel oak stands may be replaced by pinon-juniper succession in the absence of fire cycles. Regionally, Gambel oak populations may be declining from urban expansion into lower montane and foothill regions. At the community level, insect galls (*Cynipids* spp) have altered the aesthetic appeal of many oak stands.

Recommendations
Gambel oak will sustain itself, therefore no action is needed.

Riparian Woodland Community

Stand composition
Narrowleaf cottonwood (*Populus angustifolia*) makes up 1% of the overall forest and woodland composition on Fort Carson (CSU 2001). Other species, such as willows (*Salix alba L.)*, other cottonwoods (*e.g*., narrowleaf cottonwood, *Populus accuminada* plains cottonwood, *Populus deltoides* var. *monilifera),* and Gambel oak, also are found within this community. These riparian communities are important ecotypes that may warrant additional consideration. These communities often have the greatest floristic diversity, which is conducive to having greater faunal diversity. Many avian species utilize these ecotypes for part of their lifecycle.

Recommendations
Continue to provide buffer zones around riparian communities to protect wildlife corridors and habitat. Continue to protect a few mature cottonwood trees from beaver damage (Integrated Natural Resources Management Plan [INRMP] [Gene Stout and Associates 2002a]), Section 4.15.2, objectives 15 and 16). Relocation of some porcupine(s)

(2002 INRMP, Section 4.15.2, Objective 5) may be necessary in some areas. Continue to control or reduce the infestation of tamarisk.

Silvicultural Recommendations

Environmental Considerations

Biological Considerations
There is very little information available that addresses management of pinon-juniper woodlands for multiple uses. Gottfied and Severson (1994) described renewed interest in managing these woodlands for multiple uses, such as producing fuelwood, wildlife habitat, forage for wildlife, watershed production, and other products, such as pinon nuts.

Bassett (1987) reviewed the applicability of prescriptions commonly used in commercial forests to these woodlands. He concluded that single-tree selection and shelterwood methods, which retain a cover of residual trees, likely were the best methods for sustained stand productivity. Single-tree selection can be designed to reduce stand density while retaining a variety of tree age classes, as well as horizontal and vertical diversity. Single tree selection will protect the site from wind and water erosion and is esthetically pleasing. Disadvantages are the difficulty to plan and administer wood sales, damage to residual trees, reduced horizontal diversity over large areas, reductions in the use of prescribed burning, and difficulty of insect and disease control.

The shelterwood method is the harvesting of narrow strips of woodlands or creating small openings. This prescription is beneficial to deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and many small mammals and increases understory vegetation. The actual size of openings may not be critical if the longest distance at which the animal could be seen across an opening does not exceed 600 feet and/or continuous corridors of adequate width are maintained (Gottfried and Severson 1994). It would also sustain military training by improving line-of-sight visibility, improving the ability of vehicles and equipment to maneuver within the forest, and provide adequate concealment (see Special Considerations #1).

Another biological consideration is the treatment of current and future noxious weed problems in forested areas (see INRMP [Gene Stout and Associates 2002a], Section 4.14; Integrated Pest Management Plan [7th Infantry Division and Fort Carson. 2001a]; and the Noxious Weed Management Plan [7th Infantry Division and Fort Carson. 2001b]).

Wildlife Considerations
Some forest and woodland areas on FCMR are utilized by threatened and endangered species, such as the Mexican Spotted Owl (INRMP [Gene Stout and Associates 2002a], Section 4.12.1 and Mexican Spotted Owl Endangered Species Management Plan [Gene Stout and Associates 2002b]).

Gambel oak acorns are eaten by numerous species, including turkey, squirrel, deer, and some migratory birds. Gambel oak is moderately used, relative to other forage and browse species, by Rocky Mountain mule deer in winter and spring with heavier use during summer and fall. Oak species can provide an important food source and habitat for neotropical migratory birds and other wildlife.

Highly nutritious nuts, foliage, and phloem of pinon pine are utilized by numerous wildlife species (INRMP [Gene Stout and Associates 2002a], Section 4.11). Many birds and small mammals cache pinon

nuts as a winter food supply. Mule deer heavily utilize pinon foliage in winter yarding areas; localized feeding can result in trees becoming highlined.

One-seeded juniper berries are an important food source for a number of wildlife species. Berries are abundant, easily accessible, and nutritious. It is estimated that avian population densities may be 70 percent greater during years with abundant juniper berry crops (generally every 2-5 years).

Comment [rp9]: Should be changed to wildlife as several small mammals diets are primarily comprised of JUMO berries

Cultural considerations
Archaeological sites of importance are sometimes found within forest and woodland areas on FCMR and PCMS. These sites may be protected (INRMP [Gene Stout and Associates 2002a], Section 3.4.1)

Stocking Levels

Pinon-juniper: There is a large amount of variability in the available literature regarding recommended stand density in pinon-juniper woodlands. Nineteenth Century conditions likely had a residual density of 20-40 trees per acre. This density range, recommended by (1987) and the Bureau of Land Management, should be considered for purposes of military training, wildfire risk reduction, and forest health on a case-by-case basis.

Ponderosa pine: The U.S. Forest Service, Rocky Mountain and Southeastern experiment stations (Covington 1996, White 1991) have documented some problems associated with overstocked ponderosa pine stands. Besides unprecedented severe large-acreage fires, other ecological consequences of fire suppression in interior ponderosa pine ecosystems include:

- decreased soil moisture and nutrient availability,
- decreased spring and stream flows,
- decreased animal productivity,
- increased concentrations of potentially allelopathic terpenes in pine litter,
- decreased productivity and diversity of herbaceous and woody understory species, and
- decreased tree vigor, especially the oldest age class of pines, and increased mortality in the oldest age classes of trees.

Thinning Considerations
Thinning should be done on an individual stand basis with the following considerations.

- When practical, thinning should promote military accessibility and trafficability of an area.
- Variable density thinning techniques should be considered to promote structural diversity within forest stands.
- Desired effects from thinning efforts may take years or even decades to accomplish.
- Thinning should reduce extreme wildfire risk.
- Diseased and insect infested trees should be removed first in the thinning process.
- A retention of 1-2 snags per acre is recommended for avian and wildlife species.
- Some coarse and fine woody debris may remain to promote nutrient recycling and diverse habitat.

Thinning Methods
Thinning should remove selected trees and large branches, leaving slash in piles or scattered for soil protection, by use of the following techniques.

- ***Logging operations,*** using chainsaws, hydraulic loppers, and chippers to remove individual trees or stands and chipping the slash. Removing slash and chips, lopping and scattering, and/or chipping and scattering are options, depending on the site.
- ***Hydro-ax*** (or other similar equipment) to remove selected trees, retaining downed material for soil protection and wildlife usage.
- ***Prescribed burn*** as a post-thinning method to recycle downed material and reduce regeneration.

Sequence of Work

General Priorities

The sequence of work may be site specific. The following is based on priority of work sequences for both FCMR and PCMS. PCMS is listed first due to the very dense stands that exist near the PCMS boundaries, and due to concerns about fires leaving the installation (Goss 2005).

PCMS

Of all boundary areas of PCMS, the northern boundary area is the ***highest priority*** due to the presence of very dense stands, private homes outside the boundary, and the Federal Aviation Administration tower/radio tower in that area. In addition, prevailing southeasterly winds generally push fires northward, off the installation.

The ***second priority*** is to thin dense stands around manmade sites elsewhere on the installation, such as ranch houses and significant cultural sites.

The ***third priority*** is to thin stands within the interior of the installation, where most military maneuver training takes place. These stands have already been "thinned" to some extent by that maneuver training.

The ***last priority*** is to thin stands in and around canyons and mesas draining the eastern part of PCMS into the Purgatory River. Some of these stands are very difficult to access. They represent a significant fuel load. However, there are fewer private homes nearby, and the prevailing southeasterly winds tend to move fires onto PCMS rather than off PCMS.

The consensus among DECAM resource personnel is to not thin stands on steep slopes (greater than 30%). There are certain circumstances under which that could be done successfully, but for the present, steep slopes should be avoided.

At least some old-growth pinon-juniper stands (the really large diameter trees) will be left unthinned for the benefit of various wildlife species. Those decisions can be made on the ground, as old-growth stands, clumps, or individual trees are identified while stands are being marked. Oneseed juniper is a slow-growing species. Lymbery and Pieper (1983) reported an increase in height of approximately 6.3 inches per decade, with a corresponding increase in stem diameter of 0.5 inch.

Year 1

A number of small stands have been selected for thinning in the first year. Combined, they total about 200 acres. (The map at Appendix A shows all stands that have tentatively been identified at this time for thinning. Together, they add up to 356 acres. The 200 acres thinned in the first year will be the highest

priority stands that have received clearance from cultural and wildlife). The program will start small, identify and correct any problems, and make sure all parties are comfortable with the program.

Years 2-5
After the first stands are thinned and any problems are resolved, the intent is to thin stands that, combined, will total 100 to perhaps as many as 500 acres each year until the thinning need (all priorities) is met. Some vendors will not mobilize to PCMS for less than about 150-200 acres of work.

In addition, there can be benefits to a controlled burn in a thinned stand, about 2-5 years after the initial thinning (Gottfried and Severson 2004). By then, grasses should be sufficiently re-established to recover quickly from a burn. However, the burn should kill natural juniper regeneration, which could quickly negate the benefits of thinning if allowed to grow. Also, there is much less risk in attempting a controlled burn in a thinned stand than there is with attempting a controlled burn in an unthinned, overly dense stand. It may seem counter-intuitive to remove regeneration, but the goal at PCMS is to support military training, rather than produce a sustained yield of forest products.

FCMR

Year 1
Continue to remove diseased trees identified for pest suppression funding (see goal #2 above). Areas are identified on maps (Appendix B).

Years 2-5
Concentrate on reducing fuel loading along existing firebreaks.

Timing of Activities

The below table summarizes the preferred annual timing of forest management practices for FCMR and PCMS.

Activity						
Month	**Monitoring**	**Field Prep**	**Thinning**	**Erosion Control**	**Reseeding**	***Burning**
Jan			x	x		x
Feb			x	x		x
Mar				x		x
Apr					x	x
May					x	
Jun					x	
Jul	x					
Aug	x	x				
Sept	x	x				
Oct		x				
Nov			x			x
Dec			x			x
***Burning would be done in the 2nd - 5th years of plan.**						

Monitoring

Pinon-juniper stands have been thinned in many western states for many years (Gottfried and Severson, 1994). Therefore, a complete quantitative monitoring plan for these forest management operations is not necessary.

- Photo points. Once a stand has been selected for thinning, 1-4 photo points will be selected. A steel rod will be driven into the ground, and Global Position System grid coordinates (in WGS 84) will be determined. At each point, photos will be taken in 1-3 directions with the azimuth recorded for each direction. The first photo on each azimuth will be taken looking toward the horizon. A second photo will be taken looking toward the ground about 10 to 20 feet in front of the photographer. These two photos should give a reasonably clear idea of stand characteristics and the type and amount of understory vegetation. Photos will be labeled and compiled for future reference.
- Immediately after a stand has been thinned, erosion control projects have been completed, and the area has been reseeded, another series of photos will be taken exactly as above, labeled and compiled.
- About five years after thinning operations, a third and probably final series of photos will be taken.
- The DECAM Wildlife Section is leading an initiative to set up a comprehensive monitoring program of the entire land area of Fort Carson and PCMS. Plots will be established within managed forest/woodland stands to be included within this quantitative monitoring program.

Field Preparations

Photo points should be established and photos should be taken during late summer or fall. Stands to be thinned should then be marked with tree paint on the perimeter and on trees to be cut.

Thinning Operations

Winter (mid-December to mid-February) is probably the best time of year to do the actual cutting. Birds are not nesting, and elk and deer are not calving or fawning. Weather conditions and insect conditions are more favorable for working in forested areas than during summer. Additionally, frozen soil has less root compaction and damage.

Erosion Control

Any projects needed to reduce erosion and catch sediment should be done immediately after thinning.

Reseeding

After thinning and erosion control operations are completed, the area should be reseeded to native grass species and perhaps some native shrub species, depending on the site. Reseeding should take place no later than early June following thinning in the preceding winter, to take advantage of spring precipitation.

Prescribed Burning

Prescribed burning should be used, where appropriate, to reduce fuel loads, provide a nutrient flush to soils, reduce competition, and stimulate production of grasses and forbs (Colorado Department of Natural Resources 2004). Maintenance burns will likely be needed within 2-5 years after the initial thinning operation to reduce the reintroduction of juniper into the sites.

Administration

Contract Preparation

Contracting may be a preferred strategy to implement many forest management projects. The DECAM will:

1) develop a Performance Work Statement or Scope of Work addressing performance standards, approach to be taken, and the desired outcome;
2) provide funding; and
3) develop Independent Government Estimates for each forest prescription that will be administered via contract. The Performance Work Statement will be submitted to the Directorate of Contracting or other agency for review and contract administration. DECAM personnel will be the Contracting Officer's Representative for inspection and quality assurance purposes.

Contract Administration

The Fort Carson Directorate of Contracting is one possible avenue for contract administration. However, contracting may be done through the U.S. Army Medical Research Acquisition Activity as part of a cooperative assistance agreement with the U.S. Air Force Academy or through other agencies as appropriate.

Cooperative Assistance

Cooperative Agreements, Memoranda of Understanding, and Memoranda of Agreement with other agencies enable DECAM personnel to request expert assistance in specialized fields, such as entomology and forest pathology, at no cost to DECAM. Such agreements can also provide a contracting mechanism.

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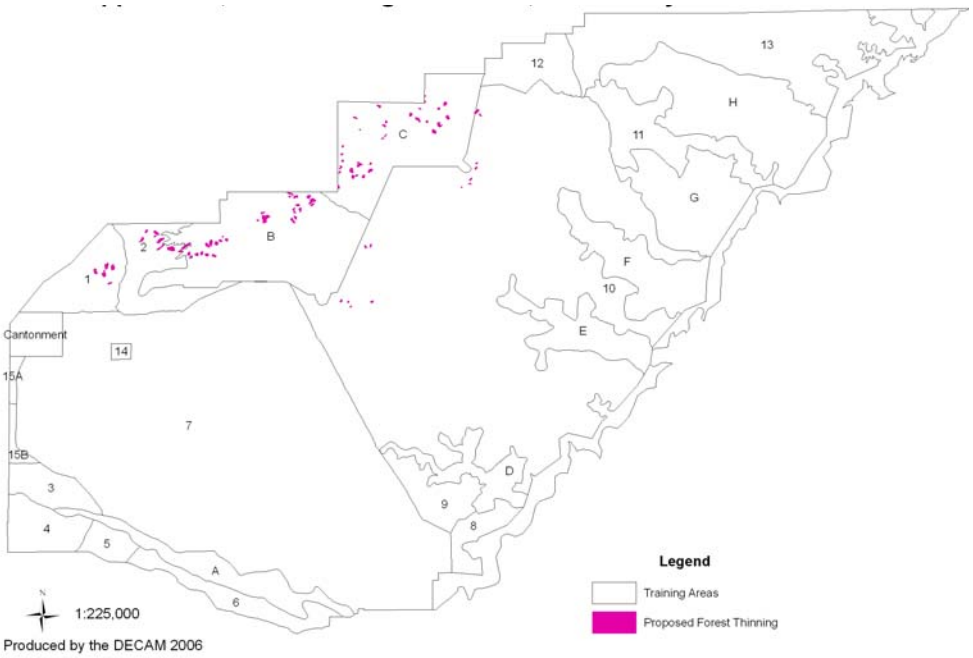
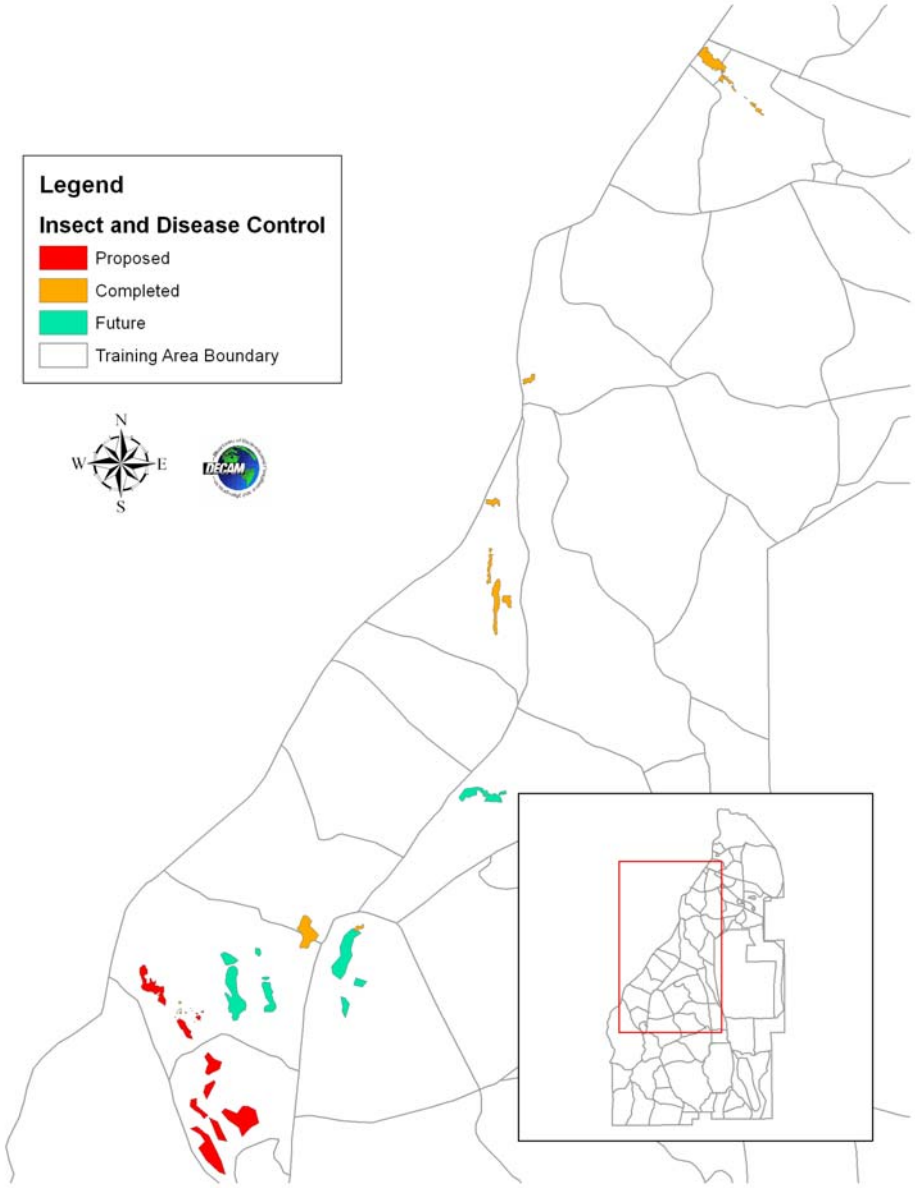
Partnerships

Colorado State University
Colorado Division of Wildlife
Colorado State Forest Service
U.S. Army Medical Research Acquisition Activity
U.S. Forest Service
U.S. National Park Service
U.S. Environmental Protection Agency
U.S. Geological Survey
U.S. Bureau of Land Management
U.S. Fish and Wildlife Service
U.S. Air Force Academy

Appendix A. Forest Management Plan, Pinon Canyon Maneuver Site



Appendix B. Ips Control Areas on Fort Carson



Appendix C. Cooperative Assistance Statement of Work

STATEMENT OF WORK

FOR

**BASIC AGREEMENT
COOPERATIVE ASSISTANCE TO
SUSTAIN AND IMPROVE FOREST HEALTH**

AT THE

U. S. AIR FORCE ACADEMY, COLORADO

AND

FORT CARSON MILITARY RESERVATION, COLORADO

Revised 17 August 2004

1.0 Purpose

This Statement of Work (SOW) provides for cooperative assistance between the U.S. Army Medical Research Acquisition Activity (USAMRAA), the Air Force Center for Environmental Excellence (AFCEE), the U. S. Air Force Academy (USAFA), Fort Carson Military Reservation (FCMR), the U. S. Forest Service (USFS) , and the U.S. Fish and Wildlife Service (USFWS) with forest industry in Colorado to sustain and improve forest health and maintain the aesthetic appeal of forests at the U. S. Air Force Academy, Fort Carson Military Reservation (FCMR), and the Piñon Canyon Maneuver Site (PCMS), Colorado. This SOW provides for a five-year cooperative effort between the Federal Government and forest industry to implement the forest management goals and objectives of the USAFA and FCMR Integrated Natural Resources Management Plans (INRMPs). Implementation of this assistance agreement will be a cooperative effort utilizing the combined expertise of Air Force, Army, USFWS, USFS natural resource managers and cooperating parties.

2.0 Background Information

2.1 Location. The Air Force Academy is an 18,455-acre installation located in El Paso County, Colorado near the city of Colorado Springs. The installation includes approximately 10,000 acres of ponderosa pine, oak, and mixed conifer forest typical of the forest types found along the east facing slopes of the Colorado Front Range.

Fort Carson Military Reservation is an 137,000-acre installation located in El Paso County, Colorado near the city of Colorado Springs. The installation includes approximately 20,844 acres of ponderosa pine, oak, and pinon-juniper forest typical of the forest types found along the east facing slopes of the Colorado Front Range. Piñon Canyon Maneuver Site is an 236,000-acre maneuver area of which 39,960 acres is primarily juniper-juniper with small stands of ponderosa pine, and aspen.

2.2 Forest Condition. USAFA and FCMR forests are currently sustaining elevated levels of mountain pine beetle (*Dendroctonus ponderosae*) and pine engraver beetle (*Ips pini*) infestations. Trees are also stressed by overcrowding and infestations of ponderosa pine dwarf mistletoe (*Arceuthobium vaginatum* spp. *cryptopodum*). Also, Dutch elm disease (*Ceratocystis ulmi,* vector: European elm bark beetle - *Scolytus multistriatus*) is affecting trees on landscaped areas. PCMS woodlands are currently sustaining elevated levels of pinyon pitch mass borer (*Dioryctria spp.)* and pine engraver beetles (*Ips pini*) infestations. Susceptibility of USAFA, FCMR, and PCMS forests to insect and disease attacks has been exacerbated by a sustained drought in the region. Tree mortality is expected to increase unless steps are taken to reduce tree density and remove diseased, dying and insect infested trees.

2.3 Integrated Natural Resources Management Plan. As required by the Sikes Act (16 U.S.C. § 670c), Department of Defense installations must prepare and implement an Integrated Natural Resources Management Plan (INRMP). The INRMP is the principal tool for managing all installation natural resources. The INRMP aids the installation commander by presenting a plan for the conservation and rehabilitation of natural resources that is consistent with the military mission.

2.3.1 The U.S. Air Force Academy INRMP, Section D, includes the following goals and objectives for protecting and sustaining forest health:

- Forest Management Goal # 1: "*Improve forest health by removing diseased and overstocked trees."* Also, Forest Management Goal # 1 includes Management Objective #5: *Perform timber stand improvement operations in pine plantations to remove cull trees and improve forest health and growth.*
- Forest Management Goal # 2: *"Reduce the risk of wildfire by reducing the number of trees per acre and removing understory ladder vegetation."*
- Forest Management Goal # 3: "*Improve growth rates on residual trees, which in turn will reduce the risk of attack by forest insects especially the MPB."*
- Forest Management Goal # 4: "*Improve overall forest aesthetics by removing overtopped poor quality trees in favor of larger healthier trees."*
- Fire Management Goal #1: *Reduce fuel loads to minimize the risk of catastrophic wildfire and create zones of defensible space."*

2.3.2 On Fort Carson Military Reservation and the nearby PCMS, any program that results in the loss of live, viable trees will be discouraged. Exceptions to this management strategy are found in Section 4.3.1of the FCMR INRMP:

- areas where thinning is needed for military operations
- wildlife habitat enhancement
- insect and disease control
- fire prevention measures
- and/or other situations dictated by unforeseen circumstances

The FCMR INRMP, Section 4.3.2, includes the following goals and objectives for protecting and sustaining forest health:

- ***Objective 4.*** Protect the forest resource from insects and disease while ensuring fire is managed to conserve these valuable forest resources.

- ***Objective 6.*** Ensure that natural resources personnel are as free as possible of commercial influence to accomplish landscape management, compliance, and stewardship.
- ***Objective 7.*** Sell firewood and woodchips generated by the pruning program and reduce the quantity of wood going into the landfill.

3.0 Objectives:

The objective of this cooperative effort is to utilize the combined expertise and abilities of the USAMRAA, the AFCEE, the USAFA, FCMR, the USFS and local forest industry to protect and enhance the forest resource on military installations in the region. The Department of Defense seeks the cooperative assistance of forest industry in Colorado to implement certain forest practices prescribed by the USFS Forest Health Protection specialists from the Lakewood Service Center in Fort Collins, Colorado, and by the USFWS staff stationed at the USAFA.

4.0 Responsibilities and Requirements

4.1 The United States Army Medical Research Acquisition Activity, Special Projects Branch will, as Grants Officer, administrate this cooperative assistance agreement under the terms described herein. USAMRAA will, when deemed appropriate and limited by available funds, will review, approve, and award Task Assignments pursuant to this cooperative assistance agreement.

4.2 The United States Department of Agriculture, Forest Service, Forest Health Protection Office, Lakewood Service Center will:

4.2.1 Conduct detection surveys and biological evaluations of insect and disease outbreaks in accordance with the *Memorandum of Agreement between the United States Department of Agriculture and the United States Department of Defense for the Conduct of Forest Insect and Disease Suppression on Lands Administered by the U.S. Department of Defense.*

4.2.2 Prescribe silvicultural treatments and other forest practices to suppress forest insect and disease outbreaks and improve overall forest health.

4.2.3 Assist the U.S. Air Force Academy and Fort Carson Military Reservation with the preparation of Form FS 3400-2, *Forest Pest Management Project Proposal* to request Federal funds appropriated under Section 5 of the Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2101).

4.2.4 Approve and forward, when deemed appropriate, a Form FS 3400-2 request for pest suppression funds to the U.S. Department of Agriculture, Forest Service Pest Suppression office.

4.2.5 Provide leadership and coordination for pest suppression activities on USAFA, FCMR, and PCMS forest lands when activities are funded wholly or in part by Federal funds appropriated under the Cooperative Forestry Assistance Act of 1978.

4.3 The U.S. Air Force Academy (HQ USAFA/CEC) will:

4.3.1 Prepare a Form FS 3400-2 request for pest suppression funds and submit the form to the USFS and HQ AFCEE/TD for review and approval.

4.3.2 Advise all cooperators on security procedures and requirements for access to the U.S. Air Force Academy. HQ USAFA/CEV will identify appropriate access routes and equipment storage and staging areas.

4.3.3 Coordinate as required with all necessary USAFA offices to facilitate cooperator access to project sites.

4.3.4 Provide funding to implement all Task Assignments awarded under the terms of this agreement.

4.3.5 Continue to partner with FCMR on co-use of forest prescription activities, contractors or equipment.

4.4 The U.S. Fish and Wildlife Service Air Force Academy Field Office (USAFA/CECN) will:

4.4.1 Prepare a Task Assignment Statement of Work (SOW) to implement treatments prescribed and funded by the Air Force Academy under the terms of this statement of work (see 4.2.2). The Task Assignment SOW will identify the areas prescribed for treatment and the intended forest composition and structure of the residual forest stand after treatment.

4.4.2 Mark all trees requiring removal at USAFA with tree paint in accordance with the prescribed treatment. HQ USAFA/CECN will identify and map a distinct boundary for each treatment area and identify the number of trees or number of acres to be treated.

4.5 The Air Force Center for Environmental Excellence, Technical Directorate, Installation Support Division (HQ AFCEE/TDI) will:

4.5.1 Provide technical review and approval, when deemed appropriate, of Form FS 3400-2 requests for pest suppression funds submitted by USAFA. HQ AFCEE/TDI will forward approved requests to the Armed Forces Pest Management Board for further review, approval, and submittal to the USFS for funding consideration.

4.5.2 Assist the USAFA with the preparation of Task Assignment Statements of Work and with the preparation of funding documents for Task Assignments submitted to USAMRAA for award under the terms of this agreement.

4.5.3 Provide technical review of proposals to implement Task Assignments specified under this agreement and make recommendation for award or non-award to USAMRAA.

4.5.4 Provide quality assurance inspection for Task Assignments implemented under the terms of this agreement. The HQ AFCEE/TDI Forester shall serve as Grants Officer's Representative for Task Assignments awarded under the terms of this agreement.

4.6 The Directorate of Environmental Compliance and Management (DECAM) Natural Resources Branch will:

4.6.1 Prepare a Task Assignment Statement of Work (SOW) to implement treatments prescribed and funded for FCMR and PCMS under the terms of this statement of work (see 4.2.2). The Task Assignment SOW will identify the areas prescribed for treatment and the intended forest composition and structure of the residual forest stand after treatment.

4.6.2 Mark all trees requiring removal with tree paint in accordance with the prescribed treatment. A FCMR forester will identify and map a distinct boundary for each treatment area and identify the number of trees or number of acres to be treated.

4.6.3 The USFWS may advise DECAM and USAFA Natural Resource Specialists and other cooperators on wildlife issues concerning forestry practices.

4.7 Forest industry partners who have been identified as a Cooperator by official award by a USAMRAA Grants Officer under the terms of this Cooperative Assistance Agreement will:

4.7.1 Review all Task Assignment Statements of Work submitted by USAMRAA and notify USAMRAA within 10 days if a proposal will be submitted pursuant to the Task Assignment. A Cooperator has the option to reject any Task Assignment that the Cooperator is not willing or able to perform.

4.7.2. Conduct a site visit to each project area specified in a Task Assignment SOW accepted for proposal by the forest industry Cooperator. The Cooperator shall meet with the USAFA/CECN or DECAM natural resources staff to clarify expectations of the Task Assignment SOW.

4.7.3 Advise the USAFA or DECAM Natural Resource Specialist and other cooperators on the most economical combination of manpower and equipment necessary to achieve the desired forest condition prescribed in a Task Assignment SOW for all Task Assignments accepted by the forest industry Cooperator.

4.7.4 Prepare a Task Assignment Proposal, within 15 days of receipt from USAMRAA, for all Task Assignments accepted for implementation by the forest industry Cooperator. The Proposal shall identify the mobilization, implementation, and overhead costs required to implement each Task Assignment, and agreed to by the USAFA/CECN Forester, in accordance with the rates identified in this basic assistance agreement.

4.7.5 Prepare invoices for payment for direct costs associated with implementation of awarded Task Assignment awards within 30 days of completion of any Task Assignment or portion thereof.

5.0 TASKS

This SOW provides the requirements for cooperative assistance to assist the Air Force Academy with forest management practices to remove insect and disease infected trees and improve forest health, as specified in the INRMP for the U.S. Air Force Academy. The project areas are within the boundaries of: 1) the United States Air Force Academy located near the city of Colorado Springs in El Paso County, CO; 2) the USAFA Farish Recreation Area located five miles due west of the Academy within the Pike National Forest; 3) Fort Carson Military Reservation near the city of Colorado Springs in El Paso County, CO; and 4) the Piñon Canyon Maneuver Site located 150 miles southeast of Colorado Springs in Las Animas County, CO. Cooperator(s) would be reimbursed at direct cost for labor, materials, and related costs under the conditions set forth herein. All work will terminate when funding is depleted. The Cooperator(s) will be responsible for planning labor, travel, and equipment costs so that expenditures for reimbursement do not exceed available funding. Off-road vehicle access to any job site must be authorized in advance by the designated point of contact for each installation.

5.1 Pine Bark Beetle Tree Removal and Treatment.

5.1.1 Air Force Academy and Farish Recreation Area. The Cooperator(s) shall assist the Air Force Academy with the determination and implementation of techniques to cut down and treat current beetle infested trees in accordance with USAFA INRMP Forest Management Goal # 1: "*Improve forest health by removing diseased and overstocked trees."* , and Forest Management Goal # 3: "*Improve growth rates on residual trees, which in turn will reduce the risk of attack by forest insects especially the MPB."* The number of trees required to be removed will depend upon the number of

trees infested. Approximately 150 trees per year have been cut in the past to prevent spread of pine beetles. The Air Force will mark trees requiring removal. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked by the Air Force and treat the tree stems to prevent insect brood dispersal. Cut trees shall be removed from the installation, or be treated on-site by one of the following three methods: 1) cutting and stacking logs (no more than two logs high) and wrapping infested stems with 6-mil clear 'visqueen' plastic, and sealed around the edges with soil; or 2) de-bark (peel) each log immediately after cutting; or 3) whole-tree chipping, with ships spread to a depth not to exceed 2". Use of option 2 (de-barking) cannot be used during times of beetle emergence from infested trees, and therefore must receive prior approval from USAFA/CECN natural resources. Use of Option 3 (chipping) will also require prior approval from USAFA/CECN natural resources. Logging slash shall be lopped and scattered to a depth of no more than 12", and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per tree basis. As an alternative to delivery at the Building 9030 woodlot, the operator may purchase the wood at the current rate specified by USAFA (currently $10.00 per cord).

5.1.2 Fort Carson Military Reservation and Piñon Canyon Maneuver Site. The Cooperator(s) shall assist DECAM with the determination and implementation of techniques to cut down and treat current beetle infested trees in accordance with INRMP Forest Management Goal # 4: *"Protect the forest resource from insects and disease while ensuring fire is managed to conserve these valuable forest resources"*, and Forest Management Strategy Goal C, # 4: "*Control or reduce insect or disease pathogens."* The number of trees required to be removed will depend upon the number of trees infested. No trees or treatments have been conducted in the past to prevent spread of pine beetles. DECAM will mark trees requiring removal. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked by DECAM and treat the tree to prevent insect brood dispersal. Cut trees shall be removed from the installation or be treated on-site by one of the following three methods: 1) cutting and stacking logs (no more than two logs high) and wrapping infested stems with 6-mil clear 'visqueen' plastic, and sealed around the edges with soil; 2) de-bark (peel) each log immediately after cutting or 3) chip entire tree. Use of option 2 (de-barking) cannot be used during times of beetle emergence from infested trees, and therefore must receive prior approval from the DECAM Forester. As an alternative to delivery at the Building 636 woodlot, the operator may purchase the wood at a rate specified by DECAM (currently $25.00 per cord).

5.2 Roadside Tree Removal. The Cooperator(s) shall assist USAFA with removal of dead or dying trees that are visible from roads within the Air Force Academy. Designated trees will be removed as soon as practical to improve visual quality and forest health along roadsides in accordance with USAFA INRMP Forest Management Goal # 4: "*Improve overall forest aesthetics by removing overtopped poor quality trees in favor of larger healthier trees."* Approximately 100 trees each year need to be removed prior to graduation, which is in late May to early June. There may also be a second removal of trees prior to Parent's weekend in October. The Air Force will locate and mark the trees requiring removal. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked for removal to ground level, and then cut tree stems into firewood up to 8 feet in length. Logging slash shall be removed from the site, or chipped on-site and scattered to a level no deeper than 2 inches. Chipping must be approved in advance by USAFA/CECN natural resources, due to visual concerns. Portions of the tree bole that is merchantable as firewood (diameter greater than 6 inches) shall be transported and dumped into the woodlot adjacent to Building 9030. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per tree basis by size category based upon diameter at breast height (dbh) measured at a point 4.5 feet above ground level. The Cooperator(s) proposal shall specify a rate per

tree based upon the following size classes: 1.0-6.0” dbh, 6.1-12” dbh; 12.1–24.0” dbh, and 24+” dbh. As an alternative to delivery at the Building 9030 woodlot, the operator may purchase the wood at the current rate specified by USAFA (currently $10.00 per cord).

5.3 Dead Tree Felling. The Cooperator(s) shall assist USAFA with implementation of Forest Management Goal # 4: *“Improve overall forest aesthetics by removing overtopped, poor quality trees in favor of the larger healthier trees.”* This Goal shall require felling additional dead trees that are not visible from Academy roadways (dead trees other than those identified under 5.2). The Air Force will locate and mark the trees requiring removal and notify the Cooperator(s) as to their location. Approximately 100 dead trees have been felled annually in past years. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down designated dead trees and leave them on the ground. Logging slash shall be lopped and scattered to a depth of no more than 12”, and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per tree basis. The Cooperator(s) proposal shall specify a rate per tree based upon the following size classes: 1.0-6.0” dbh, 6.1-12” dbh; 12.1–24.0” dbh, and 24+” dbh. The operator may purchase the wood at the current rate specified by USAFA (currently $10.00 per cord).

5.4 Hazard Tree and Miscellaneous Tree Removal. The Cooperator(s) shall assist USAFA with implementation of Forest Management Goal #4 : *“Improve overall forest aesthetics by removing overtopped, poor quality trees in favor of the larger, healthier overstory.”* and Farish Recreation Area INRMP goals under *“Details of the Preferred Alternative, Forest Management, Para. C. Hazards Trees.”* This requirement includes the removal of hazard trees and poor quality trees, generally within improved or semi-improved areas. The Air Force shall mark for removal trees that need to be removed for aesthetic and safety reasons. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked for removal to ground level, and then cut tree stems into firewood lengths up to 8 feet in length and dump into the woodlot adjacent to Building 9030. Logging slash shall be pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail, and lopped and scattered to a height of 12 inches or less. Approximately 100 trees have been treated annually for this purpose. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per tree basis. The Cooperator(s) proposal shall specify a rate per tree based upon the following size classes: 1.0-6.0” dbh, 6.1-12” dbh; 12.1–24.0” dbh, and 24+” dbh. As an alternative to delivery at the Building 9030 woodlot, the operator may purchase the wood at the current rate specified by USAFA (currently $10.00 per cord).

5.5 Ponderosa Pine Restoration Thinning.

5.5.1 Air Force Academy. The Cooperator(s) shall assist the Air Force with implementation of thinning treatments in ponderosa pine stands in accordance with USAFA INRMP Forest Management Goal # 3: “ *Improve growth rates on residual trees, which will in turn reduce the risk of attack by forest insects, especially MPB.”* and Forest Management Goal # 4 : “*Improve overall forest aesthetics by removing overtopped, poor quality trees in favor of the larger, healthier overstory.”* The USAFA Natural Resources Planner will designate priority treatment areas after consultation with USFS Forest Health Management experts. A USAFA natural resources specialist will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. All trees with a dbh of 8 inches or greater will be cut into firewood pieces up to 8 feet in length and dumped into the woodlot adjacent to Building 9030. Alternatively, the operator may purchase this wood at the current rate specified by USAFA (currently

$10.00 per cord). Logging slash shall be lopped and scattered to a depth of no more than 12", and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. Acreage for this treatment has generally been 100 acres per year. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis.

5.5.2 Fort Carson Military Reservation and Piñon Canyon Maneuver Site. The Cooperator(s) shall assist DECAM with the determination and implementation of techniques to cut down and treat current beetle infested trees in accordance with INRMP Forest Management Objective # 3: *Determine a level of forest density that maximizes ecosystem health and function, while providing for military training requirements for concealment and realism, utilizing LCTA data and forest inventory and monitoring data."*. and INRMP Forest Management Goal # 4: *"Protect the forest resource from insects and disease while ensuring fire is managed to conserve these valuable forest resources"*. Additionally, Forest Management Strategy Objective C, #3: *Provide uneven-aged forests*, and Forest Management Strategy goal C, # 4: "*Control or reduce insect or disease pathogens."* Priority treatment areas will be designated by DECAM Natural Resources Planner after consultation with USFS Forest Health Management experts. A FCMR or USFS Forester will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. All logging slash will be chip and scattered on site. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis. The operator may purchase the wood at a rate specified by the DECAM (currently $25.00 per cord) or deliver the merchantable wood to an approved location..

5.6 Mixed Conifer Forest Thinning.

5.6.1 Air Force Academy and Farish Recreation Area. The Cooperator(s) shall assist the Air Force with implementation of thinning treatments in mixed conifer forests in accordance with the USAFA INRMP Forest Management Goal # 3 " *Improve growth rates on residual trees, which will in turn reduce the risk of attack by forest insects, especially MPB."* and Forest Management Goal # 4 : "*Improve overall forest aesthetics by removing overtopped, poor quality trees in favor of the larger, healthier overstory."* A USAFA natural resources specialist will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. Generally this treatment involves cutting smaller diameter trees and more trees per acre to cut than ponderosa pine restoration treatments. All trees with a dbh of 8 inches or greater will be cut into firewood pieces up to 8 feet in length and dumped into the woodlot adjacent to Building 9030. Alternatively, the operator may purchase this wood at the current rate specified by USAFA (currently $10.00 per cord). Logging slash shall be lopped and scattered to a depth of no more than 12", and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. Acreage for this treatment has been approximately 35 acres per year. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis.

5.6.2 Fort Carson Military Reservation and Piñon Canyon Maneuver Site. Priority treatment areas will be designated by DECAM Natural Resources Planner after consultation with USFS Forest Health Management experts. A FCMR or USFS Forester will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. All trees with a diameter at breast height (DBH) of 4 inches or greater are considered to be merchantable wood products, and will be removed from the installation. Logging slash shall be

lopped and scattered to a depth of no more than 12", and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis. The operator may purchase the wood at a rate specified by DECAM (currently $25.00 per cord) or deliver merchantable wood products to an approved location.

5.7 Timber Stand Improvement.

5.7.1 Air Force Academy and Farish Recreation Area. The Cooperator(s) shall assist the Air Force with implementation of timber stand improvement projects in accordance with USAFA INRMP Forest Management Goal # 1: "*Improve forest health by removing diseased and overstocked trees.*" and Management Objective #5: *Perform timber stand improvement operations in pine plantations to remove cull trees and improve forest health and growth.* The USAFA Natural Resources Planner will designate priority treatment areas. A USAFA natural resources specialist will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. Tree sizes will generally be less than 8" dbh. Slash shall be removed from site, or pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail, and lopped and scattered to a height of 12 inches or less. Acreage for this treatment should be approximately 20 acres per year of pine plantation thinning, after all sellable transplants have been sold. There may also be naturally regenerated ponderosa and mixed conifer areas in need of precommercial thinning and cleaning. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis.

5.7.2 Fort Carson Military Reservation and Piñon Canyon Maneuver Site. The Cooperator(s) shall assist DECAM with implementation of timber stand improvement projects in accordance with INRMP Forest Management Objective # 3: *Determine a level of forest density that maximizes ecosystem health and function, while providing for military training requirements for concealment and realism, utilizing LCTA data and forest inventory and monitoring data."* and Forest Management Strategy Objective C, #3: *Provide uneven-aged forests*. Priority treatment areas will be designated by DECAM Natural Resources Planner after consultation with USFS Forest Health Management experts. A FCMR or USFS Forester will either mark trees designated for cutting or simply identify the desired stocking density for the residual stand. The Cooperator(s) will provide the necessary expertise and equipment to safely thin the designated stands to the prescribed basal area density. Acreage for this treatment should be approximately 20 acres per year of pine plantation thinning, after all sellable transplants have been sold. There may also be naturally regenerated ponderosa and mixed conifer areas in need of precommercial thinning and cleaning. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per acre basis.

5.8 Aspen Regeneration Clearcutting. This treatment involves clearcutting 1-2 acre patches of aspen to promote regeneration and is in accordance with the Farish INRMP under "*Details of the Preferred Alternative, Forest Management, Para. A. Aspen Research*." A USAFA natural resources specialist will mark areas designated for clearcutting. The Cooperator(s) will provide the necessary expertise and equipment to safely clearcut the designated aspen stands. Additionally, fencing of the areas to prevent over-browsing of aspen sprouts by elk may be required. All trees with a dbh of 8" or greater are considered to be merchantable wood products. The operator may purchase this wood at a rate specified by USAFA (currently $10.00 per cord). Logging slash shall be lopped and scattered to a depth of no more than 12", and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. Acreage for this treatment will consist of approximately three acres per year. The

Cooperator(s) proposal for reimbursement for aspen clearcutting shall be designated on a per acre basis. The Cooperator(s) proposal for installing elk-proof fencing shall be designated on a per foot of fencing basis.

5.9 Creating Defensible Space for Fire Protection.

5.9.1 Air Force Academy and Farish Recreation Area. This requirement involves reducing vegetative fuel loads near high value properties and structures in accordance with USAFA INRMP Forest Management Goal # 2: *"Reduce the risk of wildfire by reducing the number of trees per acre and removing understory ladder vegetation."* and USAFA INRMP Prescribed Fire Management Goal #1: *Reduce fuel loads to minimize the risk of catastrophic wildfire and create zones of defensible space."* A USAFA natural resources specialist will mark the designated areas for treatment. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked for removal to ground level, and then cut tree stems into firewood lengths up to 8 feet in length and dumped into the woodlot adjacent to Building 9030. Logging slash shall be removed from the site to the Academy compost yard. The number of properties and areas involved may vary, but approximately five acres have been treated annually. The Cooperator(s) proposal for reimbursement for areas treated will be on a per acre basis. The operator may purchase the wood at a rate specified by USAFA (currently $10.00 per cord).

5.9.2 Fort Carson Military Reservation and Piñon Canyon Maneuver Site. This requirement involves reducing vegetative fuel loads near high value properties and structures in accordance with DECAM INRMP Forest Management Objective # 4: *"Protect the forest resource from insects and disease while ensuring fire is managed to conserve these valuable forest resources.* and Fire Management Goal: *Prevent and manage wildfires, utilize prescribed burning to sustain or enhance training mission capabilities, and maintain ecosystem biodiversity and functionality*. and Forest Management Strategy goal B, # 1: *Reduce hazardous fuel loads.* and Forest Management Strategy goal B, # 2: *Reduce the risk of fire(s) moving off the installation.* A DECAM natural resources specialist will mark the designated areas for treatment. The Cooperator(s) will provide the necessary expertise and equipment to safely treat the designated properties. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked for removal to ground level, and then cut tree stems into firewood lengths up to eight feet in length and dumped into the woodlot adjacent to Building 636. Logging slash shall be chipped on site. The number of properties and areas involved may vary, but was approximately 93 acres in 2002. The Cooperator(s) proposal for reimbursement for areas treated will be on a per acre basis. The operator may purchase the wood at a rate specified by DECAM (currently $25.00 per cord).

5.10. Slash Disposal – Chipping. This applies to any operation requiring chipping of logging slash during the performance of tasks described above. The decision to require chipping will be primarily based on anticipated slash loading and visual concerns, and will be made by the installation point of contact. Wood chips may be scattered across up to 50% of the ground, with chip depth not exceeding 2 inches so as to not inhibit the growth of native grasses. Alternatively, chips may be removed from the installation. Up to 20% of the chips may be hauled to a compost site on the base. The Cooperator(s) proposal for reimbursement for areas treated shall be designated on a per acre basis.

5.11 Tree Planting. This activity would occur on an as-needed basis. Seedlings will generally be one or two-year old container-grown ponderosa pine or Douglas fir seedlings, and will be located primarily within logging units that were heavily harvested due to infection with insects and disease. Vexar tubes (or similar apparatus) will be placed around each seedling, and secured with a bamboo stake. Government

will supply seedlings, vexar and stakes. The Cooperator(s) proposal for reimbursement will be designated on a per tree basis.

5.12 Sapling Transplanting and Replanting. In visually sensitive areas, there may occasionally be a need to plant saplings (primarily ponderosa pine) to enhance visual conditions. These transplants will be between 2 and 6" dbh. Because there are areas of saplings (1 – 5" dbh) on the Air Force Academy in need of thinning, these would be removed from one location and replanted elsewhere. The Cooperator(s) proposal for reimbursement will be designated on a per tree basis.

5.13 Tree Pruning. Pruning may be necessary on roadside trees to enhance visual quality. This would generally involve removing lower dead branches. All slash would need to removed from the site. The Cooperator(s) proposal for reimbursement will be on a per tree basis.

5.14 Cone Collection. This activity would occur only sporadically, in years of good cone crops. Cones could be collected using tree climbing with ladders, or cherry-pickers or similar equipment (when accessible and approved by the installation point of contact). Cone collection areas will generally be accessible to motorized vehicles (within approximately 300' of roads), due to the need to haul bushel bags of cones. The Cooperator(s) proposal for reimbursement will be on a bushel basis.

6.0 Special Considerations

6.1 Site Visit Coordination. All Cooperators will schedule and coordinate with the installation point of contact listed in Section 7.0 prior to any on-site visit at a military installation.

6.2 Force Protection. All Cooperators will comply with all security and Force Protection requirements identified by and as directed by the USAFA or FCMR Security Forces.

7.0 Government Points of Contact (POCs)

7.1 U. S. Army Medical Research Acquisition Activity

Ms. Rita Johnson
820 Chandler Street
Fort Detrick, MD 21702-5014
Phone: (301) 619-2359; DSN 343-2359
FAX: (301) 619-2505; DSN 343-2505
E-mail: rita.johnson2@us.army.mil

7.2 U.S. Department of Agriculture - Forest Service

Mr. Jeff Witcosky
Forest Health Management
Lakewood Service Center
U.S. Mail: P.O. Box 25127
Lakewood, CO 80225-0127
Delivery: 740 Simms Street
Golden, CO 80401
Phone: (303) 236-2640
FAX: (303) 236-9542
E-mail: jwitcosky@fs.fed.us

7.3 U. S. Fish and Wildlife Service - Air Force Academy Field Office

Ms. Diane Strohm
USAFA/CECN
8120 Edgerton Drive, Suite 40
USAF Academy, CO 80840-2400
Phone: (719) 333-3308; DSN 333-3308
FAX: (719) 333-3337; DSN 333-3337
Email: diane.strohm@usafa.af.mil

7.4 U. S. Fish and Wildlife Service – Regional Office

Mr. Bruce Rosenlund
755 Parfet, Suite 496
Lakewood, CO 80215
Phone: (303) 275-2393
Email: Bruce_Rosenlund@fws.gov

7.5 Air Force Center for Environmental Excellence

Mr. Kevin Porteck
HQ AFCEE/TDI
3300 Sidney Brooks Road
Brooks City-Base, TX 78235-5112
Phone: (210) 536-5631; DSN 240-5631
FAX: (210) 536-9067; DSN 240-9067
E-mail: kevin.porteck@brooks.af.mil

7.6 U. S. Army Directorate of Environmental Compliance and Management

Mr. Jim McDermott
1638 Elwell St.
Fort Carson, CO 80913
Phone: (719) 526-1329
Email: jim.mcdermott@carson.army.mil

Cooperative Assistance Agreement
to Sustain and Improve Forest Health

FY 04 Task Assignment 01

04 Aug 2004

1.0 Project Area

This Task Assignment is for thinning of approximately 42 acres of ponderosa pine restoration thinning. Both activities are located on Fort Carson Military Reservation (FCMR) at and in the vicinity of Camp Falcon (EC 1480 8320-EC 1550 8260). These thinning operations are to remove beetle-infested trees, to salvage recent mortality, to reduce fuel loads, and improve stocking levels to increase stand health and vigor.

Specific areas to be treated will be described to Cooperator by way of attached maps, and site visits provided by the Directorate of Environmental Compliance and Management (DECAM) Natural Resources (NR) branch. Cooperator should contact DECAM NR representative in the event that location is not clearly understood.

Task Description

These tasks are described in the Cooperative Assistance Agreement to Sustain and Improve Forest Health, sections **5.5 Ponderosa Pine Restoration Thinning, and 5.10 Slash Disposal and Thinning.**

Task 01 (42-acre ponderosa pine restoration unit) includes the following requirements:

2.1 Ponderosa Pine Restoration Thinning: This treatment unit is designed to minimize current and future pine beetle outbreaks by improving stand vigor. It will improve stand health by removing infested ponderosa pine. It will also enhance forest aesthetics by removing overtopped, poor quality trees in favor of a larger, healthier overstory. The unit boundary is not marked. Trees to be left are not marked. A DECAM wildlife representative(s) will flag trees of concern that will not be cut. Cooperator will cut all trees that **<u>are</u>** marked with **<u>blue paint</u>**. Slash will be chipped, as described in section 2.5.

2.2 Tree Removal: The number of trees required to be removed will depend upon the number of trees infested. No trees or treatments have been conducted in the past to prevent spread of pine beetles. DECAM will mark trees requiring removal with **<u>blue paint</u>**. The Cooperator(s) will provide the necessary expertise and equipment to safely cut down trees marked by DECAM and treat the tree stems to prevent insect brood dispersal. Cut trees shall be removed from Camp Falcon or be treated on-site by one of the following two methods: 1) cutting and stacking logs (no more than two logs high) and wrapping infested stems with 6-mil clear 'visqueen' plastic, and sealed around the edges with soil; or 2) de-bark (peel) each log immediately after cutting. Use of option 2 (de-barking) cannot be used during times of beetle emergence from infested trees, and therefore must receive prior approval from the DECAM Forester. The Cooperator(s) proposal for reimbursement for this task shall be designated on a per tree basis. As an alternative to delivery at the Building 636 woodlot, the operator may purchase the wood at a rate specified by DECAM (currently $25.00 per cord).

2.3 Stump Heights: Stump heights for all cut trees shall not exceed 4 inches on the uphill side of the tree.

2.4 Merchantable wood: All wood greater than 8” diameter will be cut into 8’ lengths and dropped off at the Building 636 woodlot. The cooperator has the option to purchase wood at the current rate specified by DECAM (currently $25.00 per cord).

2.5 Slash Disposal: The cooperator will chip all slash, and scatter chips across no more than 50% of the forest floor. Logging slash shall be lopped and scattered to a depth of no more than 2”, and pulled back to a distance greater than 100 feet from any road, parking lot, building, or hiking trail. This depth should not impede vegetative growth, and should dry out quickly enough to avoid attracting Ips (Pine engraver) beetles to the area. Exceptions to slash treatment may be done under the direct guidance of a DECAM wildlife representative. The cooperator may also opt to remove chips from FCMR grounds. DECAM may use or sell the chips as part of forest biomass utilization efforts.

2.6 Quality Assurance: DECAM NR representative and the cooperator will visit each area to be treated before work begins to ensure cooperator understands requirements. DECAM NR representative will inspect areas as work progresses.

2.7 Safety: Cooperator will post warning signs in areas where roads or trails intersect the project area.

2.8 Trash Removal: Cooperator will clean up all trash and other debris resulting from this operation.

2.9 Soil Erosion: Ponderosa pine restoration thinning will be undertaken in such a manner as to minimize soil erosion from precipitation.

Appendix 4.11.2a. Vertebrates Known on Fort Carson

Common Name	Scientific Name	Class	Federal	State
Stoneroller	*Campostoma anomalum*	OSTEICHTHYES		
Grass carp	*Ctenopharyngodon idella*	OSTEICHTHYES		
Brook stickleback	*Culaea inconstans*	OSTEICHTHYES		
Carp	*Cyprinus carpio*	OSTEICHTHYES		
Creek chub	*Semotilus atromaculatus*	OSTEICHTHYES		
Arkansas darter	*Etheostoma cragini*	OSTEICHTHYES	candidate	threatened
Plains killifish	*Fundulus zebrinus*	OSTEICHTHYES		
Mosquitofish	*Gambusia affinis*	OSTEICHTHYES		
Black bullhead	*Ameiurus (Ictalurus) melas*	OSTEICHTHYES		
Channel catfish	*Ictalurus punctatus*	OSTEICHTHYES		
Green sunfish	*Lepomis cyanellus*	OSTEICHTHYES		
Bluegill	*Lepomis macrochirus*	OSTEICHTHYES		
Largemouth bass	*Micropterus salmoides*	OSTEICHTHYES		
Golden shiner	*Notemigonus crysoleucas*	OSTEICHTHYES		
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	OSTEICHTHYES	threatened	threatened
Southern redbelly dace	*Phoxinus erythrogaster*	OSTEICHTHYES		endangered
Fathead minnow	*Pimephales promelas*	OSTEICHTHYES		
Black crappie	*Pomoxis nigromaculatus*	OSTEICHTHYES		
Longnose dace	*Rhinichthys cataractae*	OSTEICHTHYES		
Snake River Cutthroat trout	*Salmo clarki*	OSTEICHTHYES		
Rainbow trout	*Salmo gairdneri*	OSTEICHTHYES		
Brook trout	*Salvelinus fontinalis*	OSTEICHTHYES		
Tiger salamander	*Ambystoma tigrinum*	AMPHIBIA		
Woodhouse's toad	*Bufo woodhousii woodhousei*	AMPHIBIA		
Striped chorus frog	*Pseudacris triseriate maculata*	AMPHIBIA		
Plains leopard frog	*Rana blairi*	AMPHIBIA		special concern
Bullfrog	*Rana catesbeiana*	AMPHIBIA		
Northern leopard frog	*Rana pipiens*	AMPHIBIA	petitioned for federal listing	special concern
Plains spadefoot	*Scaphiopus bombifrons*	AMPHIBIA		
New Mexico spadefoot	*Scaphiopus multiplicatus*	AMPHIBIA		special concern
Snapping turtle	*Chelydra serpentina serpentina*	REPTILIA		
Painted turtle	*Chrysemys picta*	REPTILIA		
Six-lined racerunner	*Cnemidophorus sexlineatus viridis*	REPTILIA		
Triploid checkered whiptail	*Cnemidophorus tesselatus*	REPTILIA		
Many-lined skink	*Eumeces multivirgatus*	REPTILIA		
Lesser earless lizard	*Holbrookia maculata maculata*	REPTILIA		
Short-horned lizard	*Phrynosoma douglassi*	REPTILIA		
Eastern fence lizard	*Sceloporus undulatus erythrocheilus*	REPTILIA		
Eastern yellowbelly racer	*Coluber constrictor flaviventris*	REPTILIA		
Western rattlesnake	*Crotalus viridis viridis*	REPTILIA		
Western hognose snake	*Heterodon nasicus nasicus*	REPTILIA		
Coachwhip	*Masticophis flagellum*	REPTILIA		

Common Name	Scientific Name	Class	Federal	State
Bullsnake	*Pituophis melanoleucus sayi*	REPTILIA		
Western terrestrial garter snake	*Thamnophis elegans vagrans*	REPTILIA		
Plains garter snake	*Thamnophis radix haydeni*	REPTILIA		
Common Loon	*Gavia immer*	AVES		
Pied-billed Grebe	*Podilymbus podiceps*	AVES		
Horned Grebe	*Podiceps auritus*	AVES		
Eared Grebe	*Podiceps nigricollis*	AVES		
Western Grebe	*Aechmophorus occidentalis*	AVES		
Clark's Grebe	*Aechmophorus clarkii*	AVES		
American White Pelican	*Pelecanus erythrorhynchos*	AVES		
Double-crested Cormorant	*Phalacrocorax auritus*	AVES		
American Bittern	*Botaurus lentiginosus*	AVES		
Great Blue Heron	*Ardea herodias*	AVES		
Great Egret	*Casmerodius albus*	AVES		
Snowy Egret	*Egretta thula*	AVES		
Green Heron	*Butorides virescens*	AVES		
Black-crowned Night-Heron	*Nycticorax nycticorax*	AVES		
White-faced Ibis	*Plegadis chihi*	AVES		
Tundra Swan	*Cygnus columbianus*	AVES		
Greater White-fronted Goose	*Anser albifrons*	AVES		
Snow Goose	*Chen caerulescens*	AVES		
Blue Goose	*Chen caerulescens*	AVES		
Canada Goose	*Branta canadensis*	AVES		
Crackling Goose	*Branta hutchinsii*	AVES		
Wood Duck	*Aix sponsa*	AVES		
Green-winged Teal	*Anas crecca*	AVES		
Mallard	*Anas platyrhynchos*	AVES		
Northern Pintail	*Anas acuta*	AVES		
Blue-winged Teal	*Anas discors*	AVES		
Cinnamon Teal	*Anas cyanoptera*	AVES		
Northern Shoveler	*Anas clypeata*	AVES		
Gadwall	*Anas strepera*	AVES		
American Wigeon	*Anas americana*	AVES		
Canvasback	*Aythya valisineria*	AVES		
Redhead	*Aythya americana*	AVES		
Ring-necked Duck	*Aythya collaris*	AVES		
Lesser Scaup	*Aythya affinis*	AVES		
Common Goldeneye	*Bucephala clangula*	AVES		
Bufflehead	*Bucephala albeola*	AVES		
Hooded Merganser	*Lophodytes cucullatus*	AVES		
Common Merganser	*Mergus merganser*	AVES		
Red-breasted Merganser	*Mergus serrator*	AVES		
Ruddy Duck	*Oxyura jamaicensis*	AVES		
Turkey Vulture	*Cathartes aura*	AVES		
Osprey	*Pandion haliaetus*	AVES		
Mississippi Kite	*Ictinia mississippiensis*	AVES		

Common Name	Scientific Name	Class	Federal	State
Bald Eagle	*Haliaeetus leucocephalus*	AVES	threatened	threatened
Northern Harrier	*Circus cyaneus*	AVES		
Sharp-shinned Hawk	*Accipiter striatus*	AVES		
Cooper's Hawk	*Accipiter cooperii*	AVES		
Northern Goshawk	*Accipiter gentilis*	AVES		
Broad-winged Hawk	*Buteo platypterus*	AVES		
Swainson's Hawk	*Buteo swainsoni*	AVES		
Western Red-tailed Hawk	*Buteo jamaicensis calurus*	AVES		
Eastern Red-tailed Hawk	*Buteo jamaicensis borealis*	AVES		
Harlan's Red-tailed Hawk	*Buteo jamaicensis harlani*	AVES		
Ferruginous Hawk	*Buteo regalis*	AVES		special concern
Rough-legged Hawk	*Buteo lagopus*	AVES		
Golden Eagle	*Aquila chrysaetos*	AVES		
American Kestrel	*Falco sparverius*	AVES		
Merlin	*Falco columbarius*	AVES		
Peregrine Falcon	*Falco peregrinus*	AVES		special concern
Prairie Falcon	*Falco mexicanus*	AVES		
Ring-necked Pheasant	*Phasianus colchicus*	AVES		
Wild Turkey	*Meleagris gallopavo*	AVES		
Northern Bobwhite	*Colinus virginianus*	AVES		
Scaled Quail	*Callipepla squamata*	AVES		
Black Rail	*Laterallus jamaicensis*	AVES		
Virginia Rail	*Rallus limicola*	AVES		
Sora	*Porzana carolina*	AVES		
American Coot	*Fulica americana*	AVES		
Sandhill Crane	*Grus canadensis*	AVES		
Black-bellied Plover	*Pluvialis squatarola*	AVES		
Semipalmated Plover	*Charadrius semipalmatus*	AVES		
Killdeer	*Charadrius vociferus*	AVES		
Mountain Plover	*Charadrius montanus*	AVES		special concern
Black-necked Stilt	*Himantopus mexicanus*	AVES		
American Avocet	*Recurvirostra americana*	AVES		
Greater Yellowlegs	*Tringa melanoleuca*	AVES		
Lesser Yellowlegs	*Tringa flavipes*	AVES		
Solitary Sandpiper	*Tringa solitaria*	AVES		
Willet	*Catoptrophorus semipalmatus*	AVES		
Spotted Sandpiper	*Actitis macularia*	AVES		
Whimbrel	*Numenius phaeopus*	AVES		
Long-billed Curlew	*Numenius americanus*	AVES		special concern
Sanderling	*Calidris alba*	AVES		
Semipalmated Sandpiper	*Calidris pusilla*	AVES		
Western Sandpiper	*Calidris mauri*	AVES		
Least Sandpiper	*Calidris minutilla*	AVES		
Baird's Sandpiper	*Calidris bairdii*	AVES		
Pectoral Sandpiper	*Calidris melanotos*	AVES		
Stilt Sandpiper	*Calidris himantopus*	AVES		
Long-billed Dowitcher	*Limnodromus scolopaceus*	AVES		
Common Snipe	*Gallinago gallinago*	AVES		

Common Name	Scientific Name	Class	Federal	State
Wilson's Phalarope	*Phalaropus tricolor*	AVES		
Red-necked Phalarope	*Phalaropus lobatus*	AVES		
Franklin's Gull	*Larus pipixcan*	AVES		
Bonaparte's Gull	*Larus philadelphia*	AVES		
Ring-billed Gull	*Larus delawarensis*	AVES		
California Gull	*Larus californicus*	AVES		
Herring Gull	*Larus argentatus*	AVES		
Forster's Tern	*Sterna forsteri*	AVES		
Black Tern	*Chlidonias niger*	AVES		
Rock Dove	*Columba livia*	AVES		
Band-tailed Pigeon	*Columba fasciata*	AVES		
Mourning Dove	*Zenaida macroura*	AVES		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	AVES		
Yellow-billed Cuckoo	*Coccyzus americanus*	AVES		
Greater Roadrunner	*Geococcyx californianus*	AVES		
Barn Owl	*Tyto alba*	AVES		
Western Screech-Owl	*Otus kennicottii*	AVES		
Great Horned Owl	*Bubo virginianus*	AVES		
Northern Pygmy-Owl	*Glaucidium gnoma*	AVES		
Burrowing Owl	*Speotyto cunicularia*	AVES		threatened
Mexican Spotted Owl	*Strix occidentalis*	AVES	threatened	threatened
Long-eared Owl	*Asio otus*	AVES		
Short-eared Owl	*Asio flammeus*	AVES		
Northern Saw-whet Owl	*Aegolius acadicus*	AVES		
Common Nighthawk	*Chordeiles minor*	AVES		
Common Poorwill	*Phalaenoptilus nuttallii*	AVES		
Black Swift	*Cypseloides niger*	AVES		
Chimney Swift	*Chaetura pelagica*	AVES		
White-throated Swift	*Aeronautes saxatalis*	AVES		
Calliope Hummingbird	*Stellula calliope*	AVES		
Ruby-throated Hummingbird	*Archilochus colubris*	AVES		
Black-chinned Hummingbird	*Archilochus alexandri*	AVES		
Broad-tailed Hummingbird	*Selasphorus platycercus*	AVES		
Rufous Hummingbird	*Selasphorus rufus*	AVES		
Belted Kingfisher	*Ceryle alcyon*	AVES		
Red-headed Woodpecker	*Melanerpes erythrocephalus*	AVES		
Acorn Woodpecker	*Melanerpes formicivorus*	AVES		
Lewis' Woodpecker	*Melanerpes lewis*	AVES		
Yellow-bellied Sapsucker	*Sphyrapicus varius*	AVES		
Red-naped Sapsucker	*Sphyrapicus nuchalis*	AVES		
Williamson's Sapsucker	*Sphyrapicus thyroideus*	AVES		
Ladder-backed Woodpecker	*Picoides scalaris*	AVES		
Downy Woodpecker	*Picoides pubescens*	AVES		
Hairy Woodpecker	*Picoides villosus*	AVES		
Northern Flicker	*Colaptes auratus*	AVES		
Yellow-shafted Flicker	*Colaptes auratus auratus*	AVES		
Red-shafted Flicker	*Colaptes auratus x cafer*	AVES		

Common Name	Scientific Name	Class	Federal	State
Olive-sided Flycatcher	*Contopus borealis*	AVES		
Western Wood-Pewee	*Contopus sordidulus*	AVES		
Willow Flycatcher	*Empidonax traillii*	AVES		
Least Flycatcher	*Empidonax minimus*	AVES		
Hammond's Flycatcher	*Empidonax hammondii*	AVES		
Dusky Flycatcher	*Empidonax oberholseri*	AVES		
Gray Flycatcher	*Empidonax wrightii*	AVES		
Cordilleran Flycatcher	*Empidonax occidentalis*	AVES		
Eastern Phoebe	*Sayornis phoebe*	AVES		
Say's Phoebe	*Sayornis saya*	AVES		
Ash-throated Flycatcher	*Myiarchus cinerascens*	AVES		
Cassin's Kingbird	*Tyrannus vociferans*	AVES		
Western Kingbird	*Tyrannus verticalis*	AVES		
Eastern Kingbird	*Tyrannus tyrannus*	AVES		
Horned Lark	*Eremophila alpestris*	AVES		
Tree Swallow	*Tachycineta bicolor*	AVES		
Violet-green Swallow	*Tachycineta thalassina*	AVES		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	AVES		
Bank Swallow	*Riparia riparia*	AVES		
Cliff Swallow	*Hirundo pyrrhonota*	AVES		
Barn Swallow	*Hirundo rustica*	AVES		
Steller's Jay	*Cyanocitta stelleri*	AVES		
Blue Jay	*Cyanocitta cristata*	AVES		
Western Scrub Jay	*Aphelocoma coerulescens*	AVES		
Pinyon Jay	*Gymnorhinus cyanocephalus*	AVES		
Clark's Nutcracker	*Nucifraga columbiana*	AVES		
Black-billed Magpie	*Pica pica*	AVES		
American Crow	*Corvus brachyrhynchos*	AVES		
Chihuahuan Raven	*Corvus cryptoleucus*	AVES		
Common Raven	*Corvus corax*	AVES		
Black-capped Chickadee	*Parus atricapillus*	AVES		
Mountain Chickadee	*Parus gambeli*	AVES		
Juniper Titmouse	*Parus inornatus*	AVES		
Bushtit	*Psaltriparus minimus*	AVES		
Red-breasted Nuthatch	*Sitta canadensis*	AVES		
White-breasted Nuthatch	*Sitta carolinensis*	AVES		
Pygmy Nuthatch	*Sitta pygmaea*	AVES		
Brown Creeper	*Certhia americana*	AVES		
Rock Wren	*Salpinctes obsoletus*	AVES		
Canyon Wren	*Catherpes mexicanus*	AVES		
Bewick's Wren	*Thryomanes bewickii*	AVES		
House Wren	*Troglodytes aedon*	AVES		
Marsh Wren	*Cistothorus palustris*	AVES		
American Dipper	*Cinclus mexicanus*	AVES		
Golden-crowned Kinglet	*Regulus satrapa*	AVES		
Ruby-crowned Kinglet	*Regulus calendula*	AVES		
Blue-gray Gnatcatcher	*Polioptila caerulea*	AVES		
Eastern Bluebird	*Sialia sialis*	AVES		
Western Bluebird	*Sialia mexicana*	AVES		
Mountain Bluebird	*Sialia currucoides*	AVES		
Townsend's Solitaire	*Myadestes townsendi*	AVES		

Common Name	Scientific Name	Class	Federal	State
Veery	*Catharus fuscescens*	AVES		
Swainson's Thrush	*Catharus ustulatus*	AVES		
Hermit Thrush	*Catharus guttatus*	AVES		
American Robin	*Turdus migratorius*	AVES		
Gray Catbird	*Dumetella carolinensis*	AVES		
Northern Mockingbird	*Mimus polyglottos*	AVES		
Sage Thrasher	*Oreoscoptes montanus*	AVES		
Brown Thrasher	*Toxostoma rufum*	AVES		
Curve-billed Thrasher	*Toxostoma curvirostre*	AVES		
American Pipit	*Anthus rubescens*	AVES		
Bohemian Waxwing	*Bombycilla garrulus*	AVES		
Cedar Waxwing	*Bombycilla cedrorum*	AVES		
Northern Shrike	*Lanius excubitor*	AVES		
Loggerhead Shrike	*Lanius ludovicianus*	AVES		
European Starling	*Sturnus vulgaris*	AVES		
White-eyed Vireo	*Vireo griseus*	AVES		
Blue-headed Vireo	*Vireo solitarius*	AVES		
Cassin's Vireo	*Vireo cassinii*	AVES		
Plumbeous Vireo	*Vireo plumbeus*	AVES		
Warbling Vireo	*Vireo gilvus*	AVES		
Red-eyed Vireo	*Vireo olivaceus*	AVES		
Golden-winged Warbler	*Vermivora chrysoptera*	AVES		
Orange-crowned Warbler	*Vermivora celata*	AVES		
Nashville Warbler	*Vermivora ruficapilla*	AVES		
Virginia's Warbler	*Vermivora virginiae*	AVES		
Northern Parula	*Parula americana*	AVES		
Yellow Warbler	*Dendroica petechia*	AVES		
Chestnut-sided Warbler	*Dendroica pensylvanica*	AVES		
Yellow-rumped Warbler	*Dendroica coronata*	AVES		
Myrtle Warbler	*Dendroica coronata coronata*	AVES		
Audubon's Warbler	*Dendroica coronata auduboni*	AVES		
Black-throated Gray Warbler	*Dendroica nigrescens*	AVES		
Townsend's Warbler	*Dendroica townsendi*	AVES		
Black-throated Green Warbler	*Dendroica virens*	AVES		
Western Palm Warbler	*Dendroica palmarum*	AVES		
Blackpoll Warbler	*Dendroica striata*	AVES		
Black-and-white Warbler	*Mniotilta varia*	AVES		
American Redstart	*Setophaga ruticilla*	AVES		
Worm-eating Warbler	*Helmitheros vermivorus*	AVES		
Ovenbird	*Seiurus aurocapillus*	AVES		
Northern Waterthrush	*Seiurus noveboracensis*	AVES		
MacGillivray's Warbler	*Oporornis tolmiei*	AVES		
Common Yellowthroat	*Geothlypis trichas*	AVES		
Hooded Warbler	*Wilsonia citrina*	AVES		
Wilson's Warbler	*Wilsonia pusilla*	AVES		
Yellow-breasted Chat	*Icteria virens*	AVES		
Hepatic Tanager	*Piranga flava*	AVES		
Western Tanager	*Piranga ludoviciana*	AVES		

Common Name	Scientific Name	Class	Federal	State
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	AVES		
Black-headed Grosbeak	*Pheucticus melanocephalus*	AVES		
Blue Grosbeak	*Guiraca caerulea*	AVES		
Lazuli Bunting	*Passerina amoena*	AVES		
Indigo Bunting	*Passerina cyanea*	AVES		
Dickcissel	*Spiza americana*	AVES		
Green-tailed Towhee	*Pipilo chlorurus*	AVES		
Spotted Towhee	*Pipilo*	AVES		
Canyon Towhee	*Pipilo*	AVES		
Cassin's Sparrow	*Aimophila cassinii*	AVES		
Rufous-crowned Sparrow	*Aimophila ruficeps*	AVES		
American Tree Sparrow	*Spizella arborea*	AVES		
Chipping Sparrow	*Spizella passerina*	AVES		
Clay-colored Sparrow	*Spizella pallida*	AVES		
Brewer's Sparrow	*Spizella breweri*	AVES		
Vesper Sparrow	*Pooecetes gramineus*	AVES		
Lark Sparrow	*Chondestes grammacus*	AVES		
Black-throated Sparrow	*Amphispiza bilineata*	AVES		
Lark Bunting	*Calamospiza melanocorys*	AVES		
Savannah Sparrow	*Passerculus sandwichensis*	AVES		
Grasshopper Sparrow	*Ammodramus savannarum*	AVES		
Slate-colored Fox Sparrow	*Passerella schistacea*	AVES		
Song Sparrow	*Melospiza melodia*	AVES		
Lincoln's Sparrow	*Melospiza lincolnii*	AVES		
Swamp Sparrow	*Melospiza georgiana*	AVES		
White-throated Sparrow	*Zonotrichia albicollis*	AVES		
White-crowned Sparrow	*Zonotrichia leucophrys*	AVES		
Mountain White-crowned Sparrow	*Zonotrichia leucophrys oriantha*	AVES		
Gambel's White-crowned Sparrow	*Zonotrichia leucophrys gambelii*	AVES		
Harris' Sparrow	*Zonotrichia querula*	AVES		
Dark-eyed Junco	*Junco hyemalis*	AVES		
White-winged Junco	*Junco hyemalis aikeni*	AVES		
Slate-colored Junco	*Junco hyemalis hyemalis*	AVES		
Oregon Junco	*Junco hyemalis montanus/shufeldt*	AVES		
Pink-sided Junco	*Junco hyemalis mearnsi*	AVES		
Gray-headed Junco	*Junco hyemalis caniceps*	AVES		
Lapland Longspur	*Calcarius lapponicus*	AVES		
Chestnut-collared Longspur	*Calcarius ornatus*	AVES		
McCown's Longspur	*Calcarius mccownii*	AVES		
Bobolink	*Dolichonyx oryzivorus*	AVES		
Red-winged Blackbird	*Agelaius phoeniceus*	AVES		
Western Meadowlark	*Sturnella neglecta*	AVES		
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	AVES		
Brewer's Blackbird	*Euphagus cyanocephalus*	AVES		
Common Grackle	*Quiscalus quiscula*	AVES		
Brown-headed Cowbird	*Molothrus ater*	AVES		
Orchard Oriole	*Icterus spurius*	AVES		

Common Name	Scientific Name	Class	Federal	State
Bullock's Oriole	*Icterus bullockii*	AVES		
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	AVES		
Brown-capped Rosy-Finch	*Leucosticte australis*	AVES		
Cassin's Finch	*Carpodacus cassinii*	AVES		
House Finch	*Carpodacus mexicanus*	AVES		
Red Crossbill	*Loxia curvirostra*	AVES		
Common Redpoll	*Carduelis flammea*	AVES		
Pine Siskin	*Carduelis pinus*	AVES		
Lesser Goldfinch	*Carduelis psaltria*	AVES		
American Goldfinch	*Carduelis tristis*	AVES		
Evening Grosbeak	*Coccothraustes vespertinus*	AVES		
House Sparrow	*Passer domesticus*	AVES		
Little brown myotis	*Myotis lucifugus*	MAMMALIA		
Montane shrew	*Sorex monticolus*	MAMMALIA		
Hoary bat	*Lasiurus cinereus*	MAMMALIA		
Big brown bat	*Eptesicus fuscus*	MAMMALIA		
Pallid bat	*Antrozous pallidus*	MAMMALIA		
Desert cottontail	*Sylvilagus audubonii*	MAMMALIA		
Nuttall's cottontail	*Sylvilagus nuttallii*	MAMMALIA		
Black-tailed jack rabbit	*Lepus californicus*	MAMMALIA		
Colorado chipmunk	*Tamias quadrivittatus*	MAMMALIA		
Spotted ground squirrel	*Spermophilus spilosoma*	MAMMALIA		
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	MAMMALIA		
Rock squirrel	*Spermophilus variegatus*	MAMMALIA		
Black-tailed prairie dog	*Cynomys ludovicianus*	MAMMALIA		special concern
Abert's squirrel	*Sciurus aberti*	MAMMALIA		
Fox squirrel	*Sciurus niger*	MAMMALIA		
Northern pocket gopher	*Thomomys talpoides*	MAMMALIA		
Botta’s pocket gopher	*Thomomys bottae*	MAMMALIA		
Plains pocket mouse	*Perognathus flavescens*	MAMMALIA		
Silky pocket mouse	*Perognathus flavus*	MAMMALIA		
Hispid pocket mouse	*Chaetodipus hispidus*	MAMMALIA		
Ord's kangaroo rat	*Dipodomys ordii*	MAMMALIA		
Beaver	*Castor canadensis*	MAMMALIA		
Western harvest mouse	*Reithrodontomys megalotis*	MAMMALIA		
Plains harvest mouse	*Reithrodontomys montanus*	MAMMALIA		
Brush mouse	*Peromyscus boylii*	MAMMALIA		
Rock mouse	*Peromyscus difficilis*	MAMMALIA		
White-footed mouse	*Peromyscus leucopus*	MAMMALIA		
Deer mouse	*Peromyscus maniculatus*	MAMMALIA		
Pinyon mouse	*Peromyscus truei*	MAMMALIA		
Northern grasshopper mouse	*Onychomys leucogaster*	MAMMALIA		
Bushy-tailed woodrat	*Neotoma cinerea*	MAMMALIA		
Eastern woodrat	*Neotoma floridana*	MAMMALIA		
Mexican woodrat	*Neotoma mexicana*	MAMMALIA		
Long-tailed vole	*Microtus longicaudus*	MAMMALIA		
Prairie vole	*Microtus ochrogaster*	MAMMALIA		

Common Name	Scientific Name	Class	Federal	State
Meadow vole	*Microtus pennsylvanicus*	MAMMALIA		
Muskrat	*Ondatra zibethicus*	MAMMALIA		
Norway rat	*Rattus norvegicus*	MAMMALIA		
House mouse	*Mus musculus*	MAMMALIA		
Porcupine	*Erethizon dorsatum*	MAMMALIA		
Coyote	*Canis latrans*	MAMMALIA		
Red fox	*Vulpes vulpes*	MAMMALIA		
Gray fox	*Urocyon cinereoargenteus*	MAMMALIA		
Black bear	*Ursus americanus*	MAMMALIA		
Ringtail	*Bassariscus astutus*	MAMMALIA		
Raccoon	*Procyon lotor*	MAMMALIA		
Ermine	*Mustela erminea*	MAMMALIA		
Long-tailed weasel	*Mustela frenata*	MAMMALIA		
Badger	*Taxidea taxus*	MAMMALIA		
Striped skunk	*Mephitis mephitis*	MAMMALIA		
Western spotted skunk	*Spilogale gracilis*	MAMMALIA		
Mountain lion	*Felis concolor*	MAMMALIA		
Bobcat	*Lynx rufus*	MAMMALIA		
Wapiti	*Cervus elaphus*	MAMMALIA		
Mule deer	*Odocoileus hemionus*	MAMMALIA		
White-tailed deer	*Odocoileus virginianus*	MAMMALIA		
Pronghorn	*Antilocapra americana*	MAMMALIA		
Bighorn sheep	*Ovis canadensis*	MAMMALIA		

Appendix 4.11.2b. Vertebrates Known on Pinon Canyon Maneuver Site

Common Name	Scientific Name	Class	Federal	State
Central stoneroller	*Campostoma*	OSTEICHTHYES		
White sucker	*Catostomus commersoni*	OSTEICHTHYES		
Red shiner	*Cyprinella lutrensis*	OSTEICHTHYES		
Common carp	*Cyprinus carpio*	OSTEICHTHYES		
Plains killifish	*Fundulus zebrinus*	OSTEICHTHYES		
Flathead chub	*Hybopsis gracilis*	OSTEICHTHYES		special concern
Black bullhead	*Ictalurus melas*	OSTEICHTHYES		
Channel catfish	*Ictalurus punctatus*	OSTEICHTHYES		
Green sunfish	*Lepomis cyanellus*	OSTEICHTHYES		
Sand shiner	*Notropis stamineus*	OSTEICHTHYES		
Fathead minnow	*Pimephales promelas*	OSTEICHTHYES		
Longnose dace	*Rhinichtthys cataractae*	OSTEICHTHYES		
Tiger salamander	*Ambystoma tigrinum*	AMPHIBIA		
Red-spotted toad	*Bufo punctatus*	AMPHIBIA		
Woodhouse's toad	*Bufo woodhousii woodhousei*	AMPHIBIA		
Plains leopard frog	*Rana blairi*	AMPHIBIA		special concern
Bullfrog	*Rana catesbeiana*	AMPHIBIA		
Plains spadefoot	*Scaphiopus bombifrons*	AMPHIBIA		
New Mexico spadefoot	*Scaphiopus multiplicatus*	AMPHIBIA		special concern
Snapping turtle	*Chelydra serpentina serpentina*	REPTILIA		
Western box turtle	*Terrapene ornata ornata*	REPTILIA		
Six-lined racerunner	*Cnemidophorus sexlineatus viridis*	REPTILIA		
Triploid checkered whiptail	*Cnemidophorus tesselatus*	REPTILIA		
Collared lizard	*Crotaphytus collaris collaris*	REPTILIA		
Great Plains skink	*Eumeces obsoletus*	REPTILIA		
Lesser earless lizard	*Holbrookia maculata maculata*	REPTILIA		
Texas horned lizard	*Phrynosoma cornutum*	REPTILIA		special concern
Short-horned lizard	*Phrynosoma douglassi*	REPTILIA		
Eastern fence lizard	*Sceloporus undulatus erythrocheilus*	REPTILIA		
Glossy snake	*Arizona elegans elegans*	REPTILIA		
Eastern yellowbelly racer	*Coluber constrictor flaviventris*	REPTILIA		
Western rattlesnake	*Crotalus viridis viridis*	REPTILIA		
Ring-necked snake	*Diadophis punctatus arnyi*	REPTILIA		
Corn snake	*Elaphe guttata emoryi*	REPTILIA		
Western hognose snake	*Heterodon nasicus nasicus*	REPTILIA		
Night snake	*Hypsiglena torquata jani*	REPTILIA		
Milk snake	*Lampropeltis triangulum*	REPTILIA		
Texas blind snake	*Leptotyphlops dulcis*	REPTILIA		special concern
Coachwhip	*Masticophis flagellum testaceus*	REPTILIA		
Bullsnake	*Pituophis melanoleucus sayi*	REPTILIA		
Ground snake	*Sonora semiannulata*	REPTILIA		

Common Name	Scientific Name	Class	Federal	State
Plains blackhead snake	*Tantilla nigriceps nigriceps*	REPTILIA		
Blackneck garter snake	*Thamnophis cyrtopsis cyrtopsis*	REPTILIA		
Western terrestrial garter snake	*Thamnophis elegans vagrans*	REPTILIA		
Plains garter snake	*Thamnophis radix haydeni*	REPTILIA		
Pied-billed Grebe	*Podilymbus podiceps*	AVES		
Eared Grebe	*Podiceps nigricollis*	AVES		
American White Pelican	*Pelecanus erythrorhynchos*	AVES		
Double-crested Cormorant	*Phalacrocorax auritus*	AVES		
American Bittern	*Botaurus lentiginosus*	AVES		
Least Bittern	*Ixobrychus exilis*	AVES		
Great Blue Heron	*Ardea herodias*	AVES		
Snowy Egret	*Egretta thula*	AVES		
Green Heron	*Butorides virescens*	AVES		
Black-crowned Night-Heron	*Nycticorax nycticorax*	AVES		
White-faced Ibis	*Plegadis chihi*	AVES		
Snow Goose	*Chen caerulescens*	AVES		
Ross' Goose	*Chen rossii*	AVES		
Canada Goose	*Branta Canadensis*	AVES		
Wood Duck	*Aix sponsa*	AVES		
Green-winged Teal	*Anas crecca*	AVES		
Mallard	*Anas platyrhynchos*	AVES		
Northern Pintail	*Anas acuta*	AVES		
Blue-winged Teal	*Anas discors*	AVES		
Cinnamon Teal	*Anas cyanoptera*	AVES		
Northern Shoveler	*Anas clypeata*	AVES		
Gadwall	*Anas strepera*	AVES		
American Wigeon	*Anas americana*	AVES		
Canvasback	*Aythya valisineria*	AVES		
Redhead	*Aythya americana*	AVES		
Ring-necked Duck	*Aythya collaris*	AVES		
Lesser Scaup	*Aythya affinis*	AVES		
White-winged Scoter	*Melanitta fusca*	AVES		
Common Goldeneye	*Bucephala clangula*	AVES		
Bufflehead	*Bucephala albeola*	AVES		
Ruddy Duck	*Oxyura jamaicensis*	AVES		
Turkey Vulture	*Cathartes aura*	AVES		
Osprey	*Pandion haliaetus*	AVES		
Mississippi Kite	*Ictinia mississippiensis*	AVES		
Bald Eagle	*Haliaeetus leucocephalus*	AVES	threatened	threatened
Northern Harrier	*Circus cyaneus*	AVES		
Sharp-shinned Hawk	*Accipiter striatus*	AVES		
Cooper's Hawk	*Accipiter cooperii*	AVES		
Northern Goshawk	*Accipiter gentilis*	AVES		
Broad-winged Hawk	*Buteo platypterus*	AVES		
Swainson's Hawk	*Buteo swainsoni*	AVES		
Red-tailed Hawk	*Buteo jamaicensis*	AVES		
Western Red-tailed Hawk	*Buteo jamaicensis calurus*	AVES		
Ferruginous Hawk	*Buteo regalis*	AVES		special

Common Name	Scientific Name	Class	Federal	State
				concern
Rough-legged Hawk	*Buteo lagopus*	AVES		
Golden Eagle	*Aquila chrysaetos*	AVES		
American Kestrel	*Falco sparverius*	AVES		
Merlin	*Falco columbarius*	AVES		
Peregrine Falcon	*Falco peregrinus*	AVES		special concern
Prairie Falcon	*Falco mexicanus*	AVES		
Wild Turkey	*Meleagris gallopavo*	AVES		
Northern Bobwhite	*Colinus virginianus*	AVES		
Scaled Quail	*Callipepla squamata*	AVES		
Virginia Rail	*Rallus limicola*	AVES		
Sora	*Porzana carolina*	AVES		
American Coot	*Fulica americana*	AVES		
Sandhill Crane	*Grus canadensis*	AVES		
Semipalmated Plover	*Charadrius semipalmatus*	AVES		
Killdeer	*Charadrius vociferus*	AVES		
Mountain Plover	*Charadrius montanus*	AVES		special concern
Black-necked Stilt	*Himantopus mexicanus*	AVES		
American Avocet	*Recurvirostra americana*	AVES		
Greater Yellowlegs	*Tringa melanoleuca*	AVES		
Lesser Yellowlegs	*Tringa flavipes*	AVES		
Solitary Sandpiper	*Tringa solitaria*	AVES		
Willet	*Catoptrophorus semipalmatus*	AVES		
Spotted Sandpiper	*Actitis macularia*	AVES		
Upland Sandpiper	*Bartramia longicauda*	AVES		
Long-billed Curlew	*Numenius americanus*	AVES		special concern
Sanderling	*Calidris alba*	AVES		
Semipalmated Sandpiper	*Calidris pusilla*	AVES		
Western Sandpiper	*Calidris mauri*	AVES		
Least Sandpiper	*Calidris minutilla*	AVES		
Baird's Sandpiper	*Calidris bairdii*	AVES		
Pectoral Sandpiper	*Calidris melanotos*	AVES		
Long-billed Dowitcher	*Limnodromus scolopaceus*	AVES		
Common Snipe	*Gallinago gallinago*	AVES		
Wilson's Phalarope	*Phalaropus tricolor*	AVES		
Franklin's Gull	*Larus pipixcan*	AVES		
Ring-billed Gull	*Larus delawarensis*	AVES		
Rock Dove	*Columba livia*	AVES		
Band-tailed Pigeon	*Columba fasciata*	AVES		
White-winged Dove	*Zenaida asiatica*	AVES		
Mourning Dove	*Zenaida macroura*	AVES		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	AVES		
Yellow-billed Cuckoo	*Coccyzus americanus*	AVES		
Greater Roadrunner	*Geococcyx californianus*	AVES		
Barn Owl	*Tyto alba*	AVES		
Western Screech-Owl	*Otus kennicottii*	AVES		
Great Horned Owl	*Bubo virginianus*	AVES		
Burrowing Owl	*Speotyto cunicularia*	AVES		threatened
Long-eared Owl	*Asio otus*	AVES		

Common Name	Scientific Name	Class	Federal	State
Short-eared Owl	*Asio flammeus*	AVES		
Common Nighthawk	*Chordeiles minor*	AVES		
Common Poorwill	*Phalaenoptilus nuttallii*	AVES		
White-throated Swift	*Aeronautes saxatalis*	AVES		
Black-chinned Hummingbird	*Archilochus alexandri*	AVES		
Calliope Hummingbird	*Stellula calliope*	AVES		
Broad-tailed Hummingbird	*Selasphorus platycercus*	AVES		
Rufous Hummingbird	*Selasphorus rufus*	AVES		
Belted Kingfisher	*Ceryle alcyon*	AVES		
Lewis' Woodpecker	*Melanerpes lewis*	AVES		
Red-headed Woodpecker	*Melanerpes erythrocephalus*	AVES		
Red-naped Sapsucker	*Sphyrapicus nuchalis*	AVES		
Ladder-backed Woodpecker	*Picoides scalaris*	AVES		
Downy Woodpecker	*Picoides pubescens*	AVES		
Hairy Woodpecker	*Picoides villosus*	AVES		
Northern Flicker	*Colaptes auratus*	AVES		
Yellow-shafted Flicker	*Colaptes auratus auratus*	AVES		
Red-shafted Flicker	*Colaptes auratus x cafer*	AVES		
Olive-sided Flycatcher	*Contopus borealis*	AVES		
Western Wood-Pewee	*Contopus sordidulus*	AVES		
Dusky Flycatcher	*Empidonax oberholseri*	AVES		
Gray Flycatcher	*Empidonax wrightii*	AVES		
Cordilleran Flycatcher	*Empidonax occidentalis*	AVES		
Eastern Phoebe	*Sayornis phoebe*	AVES		
Say's Phoebe	*Sayornis saya*	AVES		
Ash-throated Flycatcher	*Myiarchus cinerascens*	AVES		
Cassin's Kingbird	*Tyrannus vociferans*	AVES		
Western Kingbird	*Tyrannus verticalis*	AVES		
Eastern Kingbird	*Tyrannus tyrannus*	AVES		
Scissor-tailed Flycatcher	*Tyrannus forficatus*	AVES		
Horned Lark	*Eremophila alpestris*	AVES		
Tree Swallow	*Tachycineta bicolor*	AVES		
Violet-green Swallow	*Tachycineta thalassina*	AVES		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	AVES		
Bank Swallow	*Riparia riparia*	AVES		
Cliff Swallow	*Hirundo pyrrhonota*	AVES		
Barn Swallow	*Hirundo rustica*	AVES		
Steller's Jay	*Cyanocitta stelleri*	AVES		
Blue Jay	*Cyanocitta cristata*	AVES		
Western Scrub Jay	*Aphelocoma coerulescens*	AVES		
Pinyon Jay	*Gymnorhinus cyanocephalus*	AVES		
Clark's Nutcracker	*Nucifraga columbiana*	AVES		
Black-billed Magpie	*Pica pica*	AVES		
American Crow	*Corvus brachyrhynchos*	AVES		
Chihuahuan Raven	*Corvus cryptoleucus*	AVES		
Common Raven	*Corvus corax*	AVES		
Mountain Chickadee	*Parus gambeli*	AVES		

Common Name	Scientific Name	Class	Federal	State
Plain Titmouse	*Parus inornatus*	AVES		
Bushtit	*Psaltriparus minimus*	AVES		
Red-breasted Nuthatch	*Sitta canadensis*	AVES		
White-breasted Nuthatch	*Sitta carolinensis*	AVES		
Pygmy Nuthatch	*Sitta pygmaea*	AVES		
Brown Creeper	*Certhia americana*	AVES		
Rock Wren	*Salpinctes obsoletus*	AVES		
Canyon Wren	*Catherpes mexicanus*	AVES		
Bewick's Wren	*Thryomanes bewickii*	AVES		
House Wren	*Troglodytes aedon*	AVES		
Marsh Wren	*Cistothorus palustris*	AVES		
Golden-crowned Kinglet	*Regulus satrapa*	AVES		
Ruby-crowned Kinglet	*Regulus calendula*	AVES		
Blue-gray Gnatcatcher	*Polioptila caerulea*	AVES		
Western Bluebird	*Sialia mexicana*	AVES		
Mountain Bluebird	*Sialia currucoides*	AVES		
Townsend's Solitaire	*Myadestes townsendi*	AVES		
Swainson's Thrush	*Catharus ustulatus*	AVES		
Hermit Thrush	*Catharus guttatus*	AVES		
American Robin	*Turdus migratorius*	AVES		
Gray Catbird	*Dumetella carolinensis*	AVES		
Northern Mockingbird	*Mimus polyglottos*	AVES		
Sage Thrasher	*Oreoscoptes montanus*	AVES		
Brown Thrasher	*Toxostoma rufum*	AVES		
Curve-billed Thrasher	*Toxostoma curvirostre*	AVES		
American Pipit	*Anthus rubescens*	AVES		
Sprague's Pipit	*Anthus spragueii*	AVES		
Bohemian Waxwing	*Bombycilla garrulus*	AVES		
Cedar Waxwing	*Bombycilla cedrorum*	AVES		
Northern Shrike	*Lanius excubitor*	AVES		
Loggerhead Shrike	*Lanius ludovicianus*	AVES		
European Starling	*Sturnus vulgaris*	AVES		
Gray Vireo	*Vireo vicinior*	AVES		
Plumbeous Vireo	*Vireo plumbeus*	AVES		
Warbling Vireo	*Vireo gilvus*	AVES		
Red-eyed Vireo	*Vireo olivaceus*	AVES		
Orange-crowned Warbler	*Vermivora celata*	AVES		
Nashville Warbler	*Vermivora ruficapilla*	AVES		
Virginia's Warbler	*Vermivora virginiae*	AVES		
Northern Parula	*Parula americana*	AVES		
Yellow Warbler	*Dendroica petechia*	AVES		
Chestnut-sided Warbler	*Dendroica pensylvanica*	AVES		
Yellow-rumped Warbler	*Dendroica coronata*	AVES		
Myrtle Warbler	*Dendroica coronata coronata*	AVES		
Audubon's Warbler	*Dendroica coronata auduboni*	AVES		
Black-throated Gray Warbler	*Dendroica nigrescens*	AVES		
Townsend's Warbler	*Dendroica townsendi*	AVES		
American Redstart	*Setophaga ruticilla*	AVES		
Ovenbird	*Seiurus aurocapillus*	AVES		
Northern Waterthrush	*Seiurus noveboracensis*	AVES		
MacGillivray's Warbler	*Oporornis tolmiei*	AVES		

Common Name	Scientific Name	Class	Federal	State
Common Yellowthroat	*Geothlypis trichas*	AVES		
Wilson's Warbler	*Wilsonia pusilla*	AVES		
Yellow-breasted Chat	*Icteria virens*	AVES		
Hepatic Tanager	*Piranga flava*	AVES		
Summer Tanager	*Piranga rubra*	AVES		
Western Tanager	*Piranga ludoviciana*	AVES		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	AVES		
Black-headed Grosbeak	*Pheucticus melanocephalus*	AVES		
Blue Grosbeak	*Guiraca caerulea*	AVES		
Lazuli Bunting	*Passerina amoena*	AVES		
Indigo Bunting	*Passerina cyanea*	AVES		
Dickcissel	*Spiza americana*	AVES		
Green-tailed Towhee	*Pipilo chlorurus*	AVES		
Spotted Towhee	*Pipilo*	AVES		
Canyon Towhee	*Pipilo*	AVES		
Cassin's Sparrow	*Aimophila cassinii*	AVES		
Rufous-crowned Sparrow	*Aimophila ruficeps*	AVES		
American Tree Sparrow	*Spizella arborea*	AVES		
Chipping Sparrow	*Spizella passerina*	AVES		
Clay-colored Sparrow	*Spizella pallida*	AVES		
Brewer's Sparrow	*Spizella breweri*	AVES		
Vesper Sparrow	*Pooecetes gramineus*	AVES		
Lark Sparrow	*Chondestes grammacus*	AVES		
Black-throated Sparrow	*Amphispiza bilineata*	AVES		
Lark Bunting	*Calamospiza melanocorys*	AVES		
Savannah Sparrow	*Passerculus sandwichensis*	AVES		
Grasshopper Sparrow	*Ammodramus savannarum*	AVES		
Song Sparrow	*Melospiza melodia*	AVES		
Lincoln's Sparrow	*Melospiza lincolnii*	AVES		
White-throated Sparrow	*Zonotrichia albicollis*	AVES		
White-crowned Sparrow	*Zonotrichia leucophrys*	AVES		
Mountain White-crowned Sparrow	*Zonotrichia leucophrys oriantha*	AVES		
Gambel's White-crowned Sparrow	*Zonotrichia leucophrys gambelii*	AVES		
Harris' Sparrow	*Zonotrichia querula*	AVES		
Dark-eyed Junco	*Junco hyemalis*	AVES		
White-winged Junco	*Junco hyemalis aikeni*	AVES		
Slate-colored Junco	*Junco hyemalis hyemalis*	AVES		
Oregon Junco	*Junco hyemalis montanus/shufeldt*	AVES		
Pink-sided Junco	*Junco hyemalis mearnsi*	AVES		
Gray-headed Junco	*Junco hyemalis caniceps*	AVES		
McCown's Longspur	*Calcarius mccownii*	AVES		
Lapland Longspur	*Calcarius lapponicus*	AVES		
Chestnut-collared Longspur	*Calcarius ornatus*	AVES		
Bobolink	*Dolichonyx oryzivorus*	AVES		
Red-winged Blackbird	*Agelaius phoeniceus*	AVES		
Western Meadowlark	*Sturnella neglecta*	AVES		

Common Name	Scientific Name	Class	Federal	State
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	AVES		
Brewer's Blackbird	*Euphagus cyanocephalus*	AVES		
Great-tailed Grackle	*Quiscalus mexicanus*	AVES		
Common Grackle	*Quiscalus quiscula*	AVES		
Brown-headed Cowbird	*Molothrus ater*	AVES		
Orchard Oriole	*Icterus spurius*	AVES		
Baltimore Oriole	*Icterus galbula*	AVES		
Bullock's Oriole	*Icterus bullockii*	AVES		
Scott's Oriole	*Icterus parisorum*	AVES		
Cassin's Finch	*Carpodacus cassinii*	AVES		
House Finch	*Carpodacus mexicanus*	AVES		
Red Crossbill	*Loxia curvirostra*	AVES		
Pine Siskin	*Carduelis pinus*	AVES		
Lesser Goldfinch	*Carduelis psaltria*	AVES		
American Goldfinch	*Carduelis tristis*	AVES		
Evening Grosbeak	*Coccothraustes vespertinus*	AVES		
House Sparrow	*Passer domesticus*	AVES		
Pronghorn	*Antilocapra americana*	MAMMALIA		
Coyote	*Canis latrans*	MAMMALIA		
Gray fox	*Urocyon cinereoargenteus*	MAMMALIA		
Swift fox	*Vulpes velox*	MAMMALIA		special concern
Beaver	*Castor canadensis*	MAMMALIA		
Wapiti	*Cervus elaphus*	MAMMALIA		
Mule deer	*Odocoileus hemionus*	MAMMALIA		
White-tailed deer	*Odocoileus virginianus*	MAMMALIA		
Porcupine	*Erethizon dorsatum*	MAMMALIA		
Mountain lion	*Felis concolor*	MAMMALIA		
Bobcat	*Lynx rufus*	MAMMALIA		
Yellow-faced pocket gopher	*Cratogeomys castanops*	MAMMALIA		
Botta's pocket gopher	*Thomomys bottae*	MAMMALIA		
Hispid pocket mouse	*Chaetodipus hispidus*	MAMMALIA		
Ord's kangaroo rat	*Dipodomys ordii*	MAMMALIA		
Plains pocket mouse	*Perognathus flavescens*	MAMMALIA		
Silky pocket mouse	*Perognathus flavus*	MAMMALIA		
Black-tailed jack rabbit	*Lepus californicus*	MAMMALIA		
Desert cottontail	*Sylvilagus audubonii*	MAMMALIA		
Big free-tailed bat	*Nyctinomops macrotis*	MAMMALIA		
Brazilian free-tailed bat	*Tadarida brasiliensis*	MAMMALIA		
House mouse	*Mus musculus*	MAMMALIA		
White-throated woodrat	*Neotoma albigula*	MAMMALIA		
Eastern woodrat	*Neotoma floridana*	MAMMALIA		
Mexican woodrat	*Neotoma mexicana*	MAMMALIA		
Southern plains woodrat	*Neotoma micropus*	MAMMALIA		
Muskrat	*Ondatra zibethicus*	MAMMALIA		
Northern grasshopper mouse	*Onychomys leucogaster*	MAMMALIA		
Brush mouse	*Peromyscus boylii*	MAMMALIA		
Rock mouse	*Peromyscus difficilis*	MAMMALIA		
White-footed mouse	*Peromyscus leucopus*	MAMMALIA		
Deer mouse	*Peromyscus maniculatus*	MAMMALIA		

Common Name	Scientific Name	Class	Federal	State
Pinyon mouse	*Peromyscus truei*	MAMMALIA		
Western harvest mouse	*Reithrodontomys megalotis*	MAMMALIA		
Plains harvest mouse	*Reithrodontomys montanus*	MAMMALIA		
Hispid cotton rat	*Sigmodon hispidus*	MAMMALIA		
Western spotted skunk	*Spilogale gracilis*	MAMMALIA		
Badger	*Taxidea taxus*	MAMMALIA		
Striped skunk	*Mephitis mephitis*	MAMMALIA		
Ringtail	*Bassariscus astutus*	MAMMALIA		
Raccoon	*Procyon lotor*	MAMMALIA		
Black-tailed prairie dog	*Cynomys ludovicianus*	MAMMALIA		special concern
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	MAMMALIA		
Rock squirrel	*Spermophilus variegatus*	MAMMALIA		
Spotted ground squirrel	*Spermphilus spilosoma*	MAMMALIA		
Colorado chipmunk	*Tamias quadrivittatus*	MAMMALIA		
Desert shrew	*Notiosorex crawfordi*	MAMMALIA		
Pallid bat	*Antrozous pallidus*	MAMMALIA		
Big brown bat	*Eptesicus fuscus*	MAMMALIA		
Hoary bat	*Lasiurus cinereus*	MAMMALIA		
Yuma myotis	*Myotis yumanensis*	MAMMALIA		
Townsend's big-eared bat	*Plecotus townsendii*	MAMMALIA		

Appendix 7.3. List of INRMP Goals and Objectives

The below list of **projects** with their ***goals*** and objectives is presented in the order they appear in this INRMP.

Section	Projects/Goals/Objectives*	Implementation Year					
		Indefinitely /Annually/ As Needed	**07**	**08**	**09**	**10**	**11**
4.1.1.2	**Ecosystem Management Coordination**						
	1. Use coordinated planning to manage natural resources to sustain the military training capability. ***2. Promote and participate in regional planning and program implementation for natural resources conservation.***						
	1. Coordinate natural resources planning with planning for the sustainment of the military mission.	x					
	2. Continue to use partnerships with regional agencies and groups including the USFWS, CDOW, USGS, NRCS, The Nature Conservancy, Colorado Partners in Flight, The Rocky Mountain Bird Observatory, and other federal and state agencies for the management of natural resources at Fort Carson and the PCMS.	x					
	3. Continue project funding with the USFWS, USGS, and other partnering agencies for technical assistance for natural resources program support, to include wildlife, fisheries, protected species, and noxious weed management, land rehabilitation, watershed management, water rights, hydrology, wetland surveys, contaminants, GIS, environmental assessment, and administration.	x					
	4. Remain an active partner in regional initiatives, such as the Front Range Eco-Regional Management Team, Central Shortgrass Prairie Eco-Regional Assessment, Greenprint, Peak to Prairie, and others.	x					
	5. Aggressively develop conservation easements and leases through the ACUB program that will improve populations of sensitive species on a regional ecosystem basis on or in close proximity to Fort Carson and the PCMS.	x					
	6. Complete Greenprint Initiative assessment.			x			
	7. Complete Central Shortgrass Prairie Eco-regional Assessment.	x					
	8. Implement the 2006 Legacy project for the Central Shortgrass Prairie Eco-regional Assessment.		x				
4.1.2.2	**Integrated Natural Resources Management Planning**						
	Use coordinated planning to fully integrate the natural resources program at Fort Carson and the PCMS.						
	1. Review this INRMP annually using project goals and objectives to guide reviews; revise projects and budgets as required; coordinate significant changes with the USFWS and CDOW.	x					
	2. Review/update the INRMP at least every five years or						x

Section	Projects/Goals/Objectives*	Implementation Year					
		Indefinitely /Annually/ As Needed	**07**	**08**	**09**	**10**	**11**
	when major changes are made to the natural resources program; coordinate this update with the USFWS, CDOW, USGS, and other partners.						
4.2.3	**Watershed Management**						
	Sustainability. Achieve a 70% reseeding establishment of desirable vegetation on disturbed acreage seeded by DECAM within three growing seasons after seeding. Use watershed monitoring, planning, and management to ensure no net increase in sediment leaving Fort Carson and the PCMS.						
	1. Review, and if still appropriate, implement existing watershed management plans.	x					
	2. Prioritize watersheds on Fort Carson and PCMS and prepare additional watershed management plans for high priority watersheds; begin implementation of each the following year.	x					
	3. Continue to be an active partner with the Lower Fountain Water Quality Management Association by participating as a member of the Technical Advisory Committee to ensure that Fort Carson has input into regional watershed planning and conservation initiatives.	x					
	4. Gather information regarding techniques of vegetation establishment that includes equipment suitability and specific or general proven revegetation methodologies; then implement as appropriate, adapting as monitoring indicates.	x					
	5. Closely review all proposed project specifications and training plans for potential impacts to the land resource.	x					
	6. Ensure that key personnel are trained in land rehabilitation techniques/methodologies.	x					
	7. Update the flora inventory (including herbarium mounts) as new species are found during site-specific surveys, sensitive plant species surveys, and other projects.	x					
	8. Implement the Land Cover and Vegetative Mapping program to provide a basis for monitoring changes in vegetative cover.	x					
	9. Work with the U.S. Army Corps of Engineers, Cold Region Research Laboratory to implement a plant materials development program to identify native and non-native plant varieties best suited for this region and most resistant to military training activities.	x					
	10. In 2007 establish dryland plant material research trials in saline marine soils to develop and plant materials list; complete project.		x	x	x	x	x
	11. Develop more specific seed mixes (by soil type) to meet special land rehabilitation needs.	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		Indefinitely /Annually/ As Needed	**07**	**08**	**09**	**10**	**11**
	12. Measure sediment loss (volume) on Fort Carson, by watershed, using digital imagery with ground-truthing; as access allows; Sullivan Canyon Drainage will be test area.			x	x	x	x
	13. Construct new and maintain existing erosion control structures in critical areas that are deemed necessary to rehabilitate negative erosive effects of fire, military training activities, drought, etc.; use data from Objective 12 to determine needs.	x					
	14. Use the USGS to collect surface water and sediment yield data at Fort Carson and the PCMS.	x					
	15. Use the USGS to investigate methods to quantify effects of military training using remote sensing (satellite imagery) and establish a baseline network of monitored erosion-control reservoirs and streamflow-sediment gauging stations to assess mechanized training impacts on Soil Protection Sites.						x
	16. As resources permit, use the USGS to develop a web site to provide access to hydrologic and meteorological data for Fort Carson and the PCMS.						x
	17. Use knowledge of selenium and its environmental reception to design watershed projects that safeguard the environment from selenium excesses.	x					
	18. Survey and assess sites on Fort Carson and PCMS for selenium; develop and implement plans to mitigate and restore problematic selenium areas.	x					
4.3.3	**Forest Management**						
	Manage the forest ecosystem to support the military mission while maintaining ecosystem integrity, forest health, and wildlife habitat.						
	1. Implement the Forest Management Plan (DECAM 2006).	x					
	2. Determine a level of forest density that maximizes ecosystem health and function, while providing for military training requirements for concealment and realism.	x					
	3. Protect the forest resource from insects and disease.	x					
	4. Obtain information regarding optimal tree spacing for minimal soil impacts with various troop movements.	x					
	5. Manage wildland fire to maximize ecosystem health.	x					
	6. Thin selected stands on PCMS by 2007; resolve any problems that may arise; and thin additional stands at rates of 100-500 acres annually until all thinning needs are met, subject to availability of funding.		x	x	x	x	x
	7. Use prescribed burning within thinned stands 2-5 years after the initial thinning, as appropriate.	x					
	8. Use thinning on Fort Carson to remove diseased trees, reduce fuel loading, improve forest health, and improve access for military training and for fire suppression.	x					

Section	Projects/Goals/Objectives*	Implementation Year					
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	9. After thinning, conduct erosion control and reseeding to native grass species and perhaps native shrub species, if needed.	x					
	10. Use photo points to monitor the success of pinon-juniper thinning.	x					
	11. Sell firewood and woodchips generated by forest management activities and reduce the quantity of wood going into the landfill.	x					
	12. Investigate potential forest product markets, including firewood, fence posts, and wood chips for power generation.	x					
	13. Ensure that natural resources personnel are as free as possible of commercial influence to accomplish forest management.	x					
4.4.2.3	**Mineral Resources Management**						
	Monitor and control the use of quarries and mines to ensure that all damage is mitigated and that any damage occurring to the land resource is properly reclaimed in a timely manner.						
	1. Act (the DECAM) as a liaison between the mining companies, Pueblo County, the State of Colorado, and the U.S. Army to resolve problems and conflicts.	x					
	2. Identify inactive borrow pits; determine their contents; assess their potential values; and if necessary, reclaim them, unless they are potentially useful.	x					
	3. When borrow sites are opened, require reclamation planning, ensure it is implemented upon closure, and coordinate with relevant county and state agencies.	x					
4.5.3	**Cantonment Area Management**						
	Performance. Continue to be the primary lead for all urban forest related projects on Fort Carson and maintain the "Tree City, USA" designation from the National Arbor Day Foundation. ***Sustainability. Achieve a greater than 80% survival rate for new plantings. Plant two trees for every tree removed.*** ***1. Provide clear, logical, effective and efficient management of the landscaped and semi-improved grounds portion of the Fort Carson and the PCMS Cantonment Areas, which includes the following elements:*** ***provides a safe and pleasant environment for personnel who work and live on the installation;*** ***prevents damage or loss of valuable agronomic resources from insects, disease, wind, construction damage, and/or neglect; and*** ***provides for the improvement and multiple use of improved grounds to increase wildlife habitats, enhances***						

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	outdoor recreational activities, decreases soil erosion, improves air quality, saves energy, alleviates noise, and develops visual and windbreaks throughout the Cantonment Areas. ***2. Provide quality urban forest management that provides for the greatest survival of new plantings.***						
	1. Provide technical guidance to the DPW and the Base Operations Contract to ensure all turfgrass and landscaped areas are properly maintained.	x					
	2. Ensure that Fort Carson is sustaining the urban forest by maintaining the number of trees within the Cantonment Area. Trees removed for cause will be replaced and maintained. The urban forest resource on Fort Carson and the PCMS will be preserved and expanded to enhance aesthetics and provide benefits, such as visual barriers, windbreaks, decreased heating costs, reduced soil erosion, and enhanced safety.	x					
	3. Provide guidance on pruning shrubs and trees and the removal of dead plants to various agencies as an essential objective for the long-term health of trees and shrubs on the installation and ensuring the safety of personnel and structures.	x					
	4. Manage natural resources occurring within Cantonment Areas consistent with other natural resources objectives within this INRMP.	x					
	5. Implement requirements listed in the 1994 White House Memorandum on federal landscaped grounds.	x					
	6. Annually plan, organize, and participate in Arbor Day celebrations and meet standards established by the National Arbor Day Foundation to achieve recognition as a 'Tree City USA', depending upon available funding.	x					
	7. Implement the Xeriscape Master Plan.	x					
4.6.3	**Fire Management**						
	Prevent and manage wildfires, utilize prescribed burning to sustain or enhance training mission capabilities, and maintain ecosystem biodiversity and functionality.						
	1. Provide natural/cultural resources management-related recommendations relative to fire suppression activities to Fort Carson Fire and Emergency Services personnel; ensure wildlife and endangered species habitat enhancement/protection is considered during fire management activities.	x					
	2. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety requirements.	x					
	3. Focus fire prevention activities in a cost efficient manner in priority areas of Fort Carson and the PCMS.	x					
	4. Annually assist Fire and Emergency Services prepare a	x					

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	Prescribed Fire Plan.						
	5. Educate the Fort Carson community and the general public on the benefits of fire as an integral part of the natural ecosystem.	x					
	6. Conduct an analysis of the Boise Interagency Fire Center research of green stripping vegetation methodology to include the type of seed to be planted and the proper configuration (e.g., width, number of strips) in a prototype seeding program using test plots.						x
	7. Continue coordination and cooperative mutual aid agreements for fire suppression or management for natural resource benefits.	x					
	8. Continue cooperation between the DECAM and Fire and Emergency Services for training and assistance with prescribed and wildland fire.	x					
	9. Enhance or increase Mountain Plover habitat or numbers using prescribed burning in Training Area 54 to encourage nesting in this area and not on the ranges.	x					
	10. Suppress fire in potential Mexican Spotted Owl habitat as the highest priority.	x					
	11. Prescribe burn a buffer zone between Booth Mountain and ranges to keep military mission-related fires from entering habitat for the Mexican Spotted Owl.	x					
	12. Use prescribed burning to enhance the noxious weed management program.	x					
4.7.1.2	**Maneuver Damage Control**						
	Minimize and mitigate damage to training lands necessary to sustain the military mission indefinitely on Fort Carson and the PCMS.						
	1. Implement a wet weather deferment system to alter or restrict training during periods of wet and/or thawing soils.	x					
	2. Coordinate with and assist ITAM personnel with training unit MDC personnel.	x					
	3. Physically inspect Training Areas after all battalion task force and larger field exercises; assess damage; and coordinate with ITAM for mitigation and rehabilitation.	x					
	4. Use programmed funds to mitigate and rehabilitate maneuver damage using immediate or more long-term mitigation/rehabilitation.	x					
	5. Annually review, in coordination with G3/DPTM, review effectiveness of training restrictions with regard to their effectiveness in maintaining the capabilities of Fort Carson and the PCMS to sustain the military mission and recommend necessary adjustments.	x					
4.7.2.2	**Rest/Rotation/Deferment Program**						
	Minimize damage to training lands; protect sensitive features of training lands; and provide a means to rest or						

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		Indefinitely /Annually/ As Needed	**07**	**08**	**09**	**10**	**11**
	repair heavily damaged training lands to indefinitely sustain the military mission on Fort Carson and the PCMS.						
	1. Implement the Fort Carson/PCMS deferment program and the PCMS rest/rotation program, in coordination with G3/DPTMS, including developing reclamation plans for those lands being rested and assessing results of the rest periods.	x					
	2. Select candidate deferment areas and obtain concurrence from G3/DPTM and the chain of command to impose minimal training restrictions required to rehabilitate these areas.	x					
	3. Develop reclamation plans; determine plan implementation responsibility; repair approved deferment areas; monitor repairs; and open areas to normal use as soon as feasible.	x					
4.8.3	**Water Resources Management**						
	1. Through integration of the land rehabilitation, reseeding, and erosion control programs, ensure that surface water quality standards meet state requirements. 2. Measure the quantity of water resources on Fort Carson and the PCMS to evaluate the capability of water resources to meet multiple-use demands of the U.S. Army on a sustained basis.						
	1. Cooperate with other agencies to comply with the Clean Water Act and Colorado water law with regard to natural resources management.	x					
	2. Evaluate the replacement of a water diversion at Ripley Water Diversion; implement results.		x				
	3. Maintain all water diversions and water right gauging stations to efficiently collect water use data.	x					
	4. Use water quality data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options.	x					
	5. Partner with DPW, USGS, 416th Engineering Command of the U.S. Army Reserves, and State Engineer Office to ensure all dams are properly inspected and maintained and meet state dam inspection/maintenance regulations.				x		
	6. Repair Townsend, Haymes, North Side, Lytle, Womack, Small Bird, Large Bird, and Gale reservoirs.					x	
	7. Accomplish water-quality data collection, stream flow sediment data collection, and associated data analysis by USGS for Fort Carson and the PCMS.	x					
	8. Inspect 100 erosion control dams annually.	x					
	9. Install a pipeline from Gale Reservoir to Rock Creek and replace the failing pipeline from Cottonwood Springs to the ditch feeding Northside Reservoir by 2008.			x			

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4.9.3	**Water Rights Management**						
	Performance: 1. Repair Gale Ditch; 2. report all usage to the State Water Commissioner on a quarterly basis; and 3. repair Ripley Ditch. ***Sustainability: No water rights abandoned.*** ***Maintain, monitor, and use water rights to support natural resources and the training mission to prevent the designation of water rights as abandoned.***						
	1. Ensure no water rights are considered for abandonment.	x					
	2. Monitor and report all water rights use to the Colorado Water Commissioner, in close coordination and consultation with the USGS.	x					
	3. Assure beneficial use of all adjudicated water rights.	x					
	4. Assure all water rights are utilized for their originally adjudicated purposes.	x					
	5. Quantify water use relative to water rights.	x					
	6. Ensure compliance with the State of Colorado Water Law by recording and reporting all adjudicated water diverted for beneficial use on Fort Carson and the PCMS.	x					
	7. Ensure that key personnel are trained in water rights laws/regulations necessary to effectively comply with Colorado water rights requirements.	x					
	8. Implement the DECAM portion of the *Annual Substitute Water Supply Plan* with the Colorado Water Protective Development Association.	x					
	9. Purchase augmentation water from the Colorado Water Protective Development Association and adhere to state well metering rules to meet requirements of the "*Amended Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin*".	x					
	10. Maintain involvement as a member of the Arkansas Basin Roundtable that will facilitate regional collaboration, communication, and coordination to enhance water rights management on Fort Carson and the PCMS.	x					
	11. Implement well meter validation program to ensure compliance with state well use reporting requirements.	x					
	12. Initiate planning and feasibility determination of future survey of surface and ground water rights at the PCMS.	x					
	13. Use USGS to maintain and read Fort Carson water systems gauging stations and submit quarterly diversion data to the State Water Commissioner and DECAM; use USGS to maintain satellite transmitters and all water diversions.	x					
	14. Using global positioning system technology, map all existing surface and ground water rights; develop a GIS database with associated rights tagged to each right.	x					

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4.10.3	**Wetlands Management**						
	Performance. No net loss of wetland resources on Fort Carson and the PCMS as determined by the National Wetland Inventory Method using the FY93 survey as the baseline. ***Sustainability. No overall loss of wetland resource quality on Fort Carson and the PCMS as determined by the trend survey compared with 1993 baseline.*** ***Preserve, conserve, manage, develop, and restore wetlands and riparian vegetation to ensure no-net-loss of wetland resources on Fort Carson and the PCMS, as determined by the National Wetland Inventory using the 1993 survey as the baseline (adjusted for changes in land administration), and comply with other wetland regulatory instruments.***						
	1. Maintain a database on wetland resources at Fort Carson and the PCMS using monitoring to ensure that waters and wetlands of Fort Carson and the PCMS are protected from irresponsible and unregulated discharges of dredged or fill material.	x					
	2. Compile site-specific information needed for the protection and enhancement of wetlands on Fort Carson and the PCMS.	x					
	3. Compare results of 2005 wetlands inventory with 1993 baseline data (adjusted for changes in land administration) to evaluate compliance with no-net-loss of wetlands.	x					
	4. Use the NEPA environmental review process to evaluate impacts on wetlands, which could result from new construction or other activities.	x					
	5. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.	x					
	6. Review all proposed project specifications and training plans for potential impacts to wetland resources; when necessary, coordinate with the Corps of Engineers and obtain appropriate permits.	x					
	7. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland; maintain at least two personnel who are trained and certified to assist in the delineation of jurisdictional wetlands to the level that effective coordination with the Corps of Engineers can be accomplished.	x					
	8. Administer the Corps of Engineers Regional Permit acquired for erosion control structures, including quarterly reporting of all impacts to jurisdictional wetlands. Reapply for this permit in 2007.	x	x				
	9. Repeat wetland baseline studies to determine physical and biological changes in wetland communities on Fort					x	

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	Carson and the PCMS.						
	10. Support the development of environmental analytical models to assist decision makers and promote initiatives to protect and enhance ecosystems on a programmatic basis, including the use of inventories, partnerships with resource agencies, and such practices as wetland replacement and rehabilitation.	x					
	11. Support research designed to develop and implement new wetland evaluation/rehabilitation and replacement techniques.	x					
	12. Augment the existing plant specimens identifying family, genus and species with descriptive characteristics and maintain a herbarium with laminates of labeled wetland plants.	x					
4.11.4	**Fish and Wildlife Management**						
	Sustainability. Sustain training land health to prevent federal or state listing of species found on the Installation or prevent listing of critical habitat. ***1. Manage game species populations in collaboration with the CDOW and the USFWS.*** ***2. Identify gaps in knowledge of species occurrences and distribution on Fort Carson and the PCMS.*** ***3. Integrate species and habitat management within the context of the military mission and conservation priorities defined by state, federal and Army laws and regulations, executive orders, and conservation organizations.*** ***4. Provide for public safety and health and mitigate and prevent property damage by nuisance wildlife and/or wildlife diseases, including chronic wasting disease, on Fort Carson and the PCMS.***						
	1. Maintain membership in the Arkansas River Habitat Partnership Program.	x					
	2. Annually inspect 20% of existing guzzler structures and maintain as required.	x					
	3. Maintain programs on Fort Carson and the PCMS that meet requirements for certification by the Wildlife Habitat Council.	x					
	4. Conduct aerial elk and deer surveys annually on Fort Carson and a pronghorn survey on PCMS. Determine future survey intervals and data needs based on review of results of these surveys and the species management status of the CDOW.	x					
	5. Collect and summarize into reports hunting-related statistics (e.g., harvest, hunter effort) to monitor harvest trends of game species and develop harvest strategies in conjunction with the CDOW.	x					

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	6. Support CDOW game species monitoring projects, i.e. bighorn sheep counts, consistent with available personnel and resources.	x					
	7. Meet annually with the CDOW for the purpose of establishing harvest objectives and season structures for Fort Carson and the PCMS.	x					
	8. Maintain cold water fisheries program on Fort Carson consistent with available water and funds. Purchase hatchery fish to maintain the program March through September. Preferrably stock only salmonids that are whirling disease free; others identified as suitable for Fort Carson's waters, through consultation with the USFWS and CDOW, may also be stocked.	x					
	9. Repair and maintain fishing piers and signs at fishing reservoirs; repair and maintain handicap access ramps at Small Bird and Womack reservoirs.	x					
	10. Maintain water levels in fishing reservoirs as required to support the sport fishing program and other forms of wildlife recreation.	x					
	11. Continue to prohibit angling at PCMS to protect native small fishes in the Purgatorie River drainage.	x					
	12. Conduct amphibian surveys on Fort Carson; inventory 20% of the Installation annually, subject to availability of funds.	x					
	13. Conduct surveys for the triploid checkered whiptail on the PCMS.						x
	14. Support pronghorn-coyote research at the PCMS proposed to begin FY07.	x					
	15. Cooperate with CDOW efforts to educate hunters and the general public on chronic wasting disease and efforts to monitor for the disease on Fort Carson and the PCMS; provide written information to hunters at Fort Carson and the PCMS, to include the latest information regarding the disease, precautions for handling carcasses, and disease testing.	x					
	16. Maintain ongoing chronic wasting disease surveillance program, in conjunction with the CDOW.	x					
	17. Increase hunter compliance with specimen collection requirement.	x					
	18. Incorporate data collection related to the plague as part of the annual prairie dog surveys.	x					
	19. Notify Fort Carson Preventative Medicine of suspected plague sites that potentially threaten public health.	x					
	20. Submit samples, if available, to El Paso County Health Department for plague testing.	x					
	21. Educate the public about chronic wasting disease and plague.	x					

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	22. Ensure DECAM personnel and others who may come into contact with deer mice are aware of the dangers of hantavirus and precautions pertinent to prevention of exposure.	x					
	23. Educate the public about wildlife issues, e.g., chronic wasting disease, through the Mountaineer and wildlife education programs.	x					
	24. Disseminate (1) information on West Nile Virus to Fort Carson residents and workers, (2) identify and disseminate methods for reducing the potential of contracting West Nile Virus, (3) disseminate information about reporting possible cases on West Nile Virus, and (4) collect and transport dead birds, especially corvids suspected of having West Nile Virus, to officials at the El Paso County Department of Health.	x					
	25. Support national and regional wildlife initiatives by providing species information to government agencies and non-governmental conservation organizations and participating in workshops, working groups, and recovery teams.	x					
	26. Mitigate impacts to habitat by military training activities using education and awareness (also see Section 5.1.4, Sustainable Range Awareness); locating and identifying in the field important habitat sites, such as nesting, roosting, and breeding sites; and monitoring impacts to identify areas for rehabilitation and/or rest.	x					
	27. Complete an inspection of known locations that have the possibility of supporting maternal roosts for any bat species.						x
	28. Explore establishing a partnership with Ducks Unlimited to create wetlands in Bird Farm reservoirs no longer used for sport fishing. The purpose of the partnership is to establish habitat condidtions beneficial to nesting and migrating waterfowl and amphibians.	x					
	29. Review the current distribution of sources available to wildlife downrange and evaluate potential development of these to benefit wildlife. Purchase and install wildlife guzzlers in areas lacking water developments to mitigate movements of big game species forced to move because of military training. Partner with organizations and the CDOW to assist in the purchasing, placement, and repair of guzzlers.	x					
	30. Establish food plots composed of native forbs and grasses and dry-land grains at various locations on Fort Carson. Partner with the CDOW to assist in species selection and location selection.	x					
	31. Inter-seed cool season grasses for elk forage	x					

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	production at various locations on Fort Carson. High priority sites are grasslands adjacent to pinion-juniper woodlands damaged by training or drought. Partner with the CDOW to assist in species selection and location selection.						
4.12.1.3	**Federal-listed Species Management**						
	Performance. Achieve 100% compliance with requirements of the Endangered Species Act, to include jeopardy opinions issued by the USFWS. ***Sustainability. Reduce encroachment risk to military readiness by minimizing seasonal and year-round training deferments resulting from endangered species conflicts.*** ***1. Ensure no jeopardy opinions are issued to Fort Carson by the USFWS due to Army actions that would be expected to directly or indirectly reduce the survival or recovery of a listed species.*** ***2. Protect and enhance federal-listed wildlife species and associated habitat, in compliance with the Endangered Species Act.*** ***3. Sustain training land health to prevent federal- or state-listing of species found on the Installation and prevent listing of critical habitat.***						
	1. Maintain a federal-listed animal and plant species list for Fort Carson and the PCMS.	x					
	2. Consult and confer with the USFWS regarding endangered species issues for Fort Carson and the PCMS; coordinate listed species mitigation with DECAM, other directorates, and military trainers.	x					
	3. Develop, as required, and implement ESMP/BAs for federal-listed species, using Section 7 consultation with the USFWS.	x					
	4. Proactively and solicit participation and involvement with the re-introduction of threatened or endangered species, when such involvement is beneficial to the designated species and does not interfere with the military training mission on Fort Carson or the PCMS.	x					
	5. Actively participate with other agencies in the management of federal-listed species.	x					
	6. If species that are federal-listed are found on Fort Carson or the PCMS or if species already known on Fort Carson or the PCMS become federal-listed, develop an inventory/monitoring program for these species in consultation with the USFWS.	x					
	7. Provide information to Range Control or other installation entities as needed to protect sensitive or listed species.	x					
	8. Assist the CDOW with recovery efforts for the	x					

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	Arkansas darter by trapping this species on Fort Carson for restocking projects. Assist the USFWS and CDOW with introductions of this species into new sites on Fort Carson.						
	9. Ensure that secondary poisoning from Army activities does not impact Bald Eagles on Fort Carson and the PCMS.	x					
	10. Notify the USFWS in the event of a Bald Eagle electrocution on Fort Carson or the PCMS.	x					
	11. Continue mapping and cataloging listed, proposed, and candidated species occurrence on the PCMS and Fort Carson.	x					
	12. As needed, provide technical assistance for wire/pole modifications to ensure that power lines on Fort Carson and the PCMS do not accidentally electrocute Bald Eagles (or other large raptors).	x					
	13. Survey known Mexican Spotted Owl wintering sites for signs of disturbance or habitat loss.	x					
	14. Represent Fort Carson in the Mexican Spotted Owl Southern Rocky Mountain Working Group, which requires attending 2-4 regional meetings per year.	x					
	15. Conduct Mexican Spotted Owl presence-absence surveys at potential nesting canyon sites on the PCMS.	x					
	16. Identify areas for prescribed burning to protect Mexican Spotted Owl wintering habitat; implement this burning.	x					
	17. Use GIS and spatial imagery to identify unknown potential wintering habitat for the Mexican Spotted Owl on Fort Carson.	x					
4.12.2.3	**Migratory Bird Treaty Act Compliance**						
	Performance. Zero infractions of the Migratory Bird Treaty Act based on inspections and reported violations. ***1. Maintain compliance with current and future provisions of the Migratory Bird Treaty Act.*** ***2. Reduce incidental take of migratory birds, particularly take not associated with military training.***						
	1. Maintain a list of species protected by the Migratory Bird Treaty Act on Fort Carson and the PCMS.	x					
	2. Report raptor-killing poles to the DPW and provide and monitor mitigation efforts to reduce raptor electrocutions on Fort Carson and the PCMS.	x					
	3. Ensure that pest management programs and other government sanctioned actions do not inadvertently affect raptors and other protected species through direct or secondary poisoning.	x					
	4. Provide Soldier and public education regarding protected species, particularly installation employees	x					

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	likely to come in contact with protected species during operations.						
	5. Cooperate with USFWS Special Agents to enforce the Bald Eagle Protection Act and the Migratory Bird Treaty Act.	x					
	6. Support bird surveys by the Rocky Mountain Bird Observatory on the PCMS as part of its multi-state grassland bird monitoring program.	x					
4.12.3.3	**State-listed Species Management**						
	Monitor and manage Colorado-listed species on Fort Carson and the PCMS to the degree possible with available funding.						
	1. Consider state-listed in all Fort Carson actions.	x					
	2. Whenever possible, use actions designed for federal-listed species to protect or manage state-listed species.	x					
	3. Maintain a list of state-listed for Fort Carson and the PCMS.	x					
	4. Actively participate with other agencies in the management of state-listed species.	x					
	5. If state-listed species are found on Fort Carson or the PCMS, develop an inventory/ monitoring program for these species, upon which to base management decisions.	x					
	6. Annually survey for breeding Burrowing Owls in known prairie dog colonies.	x					
	7. Investigate the potential for stocking southern redbelly dace into other suitable waters on Fort Carson, in coordination with CDOW and the USFWS .						x
	8. Maintain a database of state-listed species locations and provide to Colorado Natural Heritage Program.	x					
	9. Continue to participate in a DoD Legacy project researching Burrowing Owls.	x					
	10. Continue mapping and cataloging state listed species occurrences on on the PCMS and Fort Carson.	x					
4.12.4.3	**Species of Special Concern Management**						
	1. Document occurrences and distribution of species of special concern on Fort Carson and the PCMS to the degree possible with available funding. ***2. Protect sensitive species and their habitats whenever possible by proposing action alternatives.***						
	1. Consider species of special concern in all Fort Carson actions.	x					
	2. Whenever possible, use actions designed for federal-listed species to protect or manage other sensitive species.	x					
	3. Maintain a list of animal and plant species of special concern list for Fort Carson and the PCMS.	x					
	4. Actively participate with other agencies in the management 5. Annually monitor area and distribution of black-tailed prairie dogs.of species of special concern.	x					

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	6. If funding becomes available, experiment with alternative control methods for black-tailed prairie dogs, including relocation and erecting barrier fences for excluding prairie dogs from Cantonment Areas.	x					
	7. Transplant prairie dogs from improved grounds into former colony sites that have been eliminated by the plague if funding and personnel become available. (Note: Colorado HR 111 prevents intra-county movement of prairie dogs.)	x					
	8. Use flea insecticides to dust colonies in areas close to recreation or high military use areas.	x					
	9. Adhere to the DECAM black-tailed prairie dog management plan (Bunn 2004) to ensure all alternative control methods are considered (such as exclusion, avoidance and dusting).	x					
	10. Annually survey for breeding Mountain Plovers at known sites.	x					
	11. Annually survey known Golden Eagle eyries and monitor nesting success.	x					
	12. Maintain a database of sensitive species locations and provide to Colorado Natural Heritage Program.	x					
	13. Conduct a survey for the roundtail horned lizard and the massasauga rattlesnake, two undocumented, but with a high possibility of occurrence, species on PCMS.						X
	14. Conduct community-level vascular plant and vertebrate inventories, documenting and mapping the presence of Species of Conservation Concern.	x					
	15. Due to the importance of the black-tailed prairie dog to eagles, Ferruginous Hawk, Mountain Plover, and the Burrowing Owl, follow goals and objectives defined in the prairie dog management plan (Bunn 2004).	x					
	16. Test the effectiveness of seeding prairie dog colonies killed by plague.	x					
	17. Prepare a management plan for the State-listed Burrowing Owl.		x				
4.12.5.3	**Land Cover and Vegetative Management**						
	1. Create land cover and vegetation maps with a minimum overall classification of 80% for the purpose of 1) updating vegetation information for Fort Carson and the PCMS, 2) creating tools for the assessment of habitat characteristics to develop wildlife management plans, 3) acquiring baseline information to develop predictive models for species and habitat distribution of species of interest, and 4) identifying areas of conservation concern in the local and regional context. ***2. Develop GIS tools to increase wildlife management effectiveness.***						

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	1. Complete Fort Carson land cover map.		x	x	x	x	
	2. Complete Fort Carson vegetation map.		x	x	x	x	
	3. Upon completion of the Fort Carson land cover map, use probability analysis to predict potential winter habitat for the Mexican Spotted Owl on Fort Carson.		x	x	x	x	
	4. Upon completion of the Fort Carson land cover and vegetation maps, use Ecological Land Unit protocol to identify potential areas of conservation concern.		x	x	x	x	
	5. Upon completion of the Fort Carson land cover map, use FragStats to stratify aerial deer sampling blocks to improve population estimates.		x	x	x	x	
	6. Complete the PCMS land cover map.		x	x	x	x	
	7. Complete the PCMS vegetation map.		x	x	x	x	
	8. Upon completion of the PCMS land cover and vegetation maps, use Ecological Land Unit protocol to identify potential areas of conservation concern.		x	x	x	x	
4.13.3	**Special Interest Areas Management**						
	Protect and manage Special Interest Areas to the degree possible with available funding.						
	1. Maintain special provisions to protect and manage identified Special Interest Areas on Fort Carson and the PCMS.	x					
	2. Improve access to West Haymes Wildlife Conservation Area, particularly for school groups visiting Fort Carson.						x
	3. Improve the trail system in the Cottonwood-Prairie Conservation and Education Area, particularly for school groups visiting Fort Carson.						x
	4. Explore establishing a partnership with Ducks Unlimited to create wetlands in Cottonwod-Prairie Conservation and Education Area ponds to establish habitat condidtions beneficial to nesting and migrating waterfowl and amphibians.						x
4.14.3	**Noxious Weed Management**						
	Sustainability. Control (contain, suppress, eradicate) Colorado high risk weeds, minimizing impacts on adjacent agricultural lands and on regional natural resources, environment and human health but reaching 85% or greater efficacy in treatments. ***Compliance. Treat 100% of Colorado Class A weeds each year while working to control, contain, or eliminate 20% of Colorado Class B and C species.*** ***1. Survey, identify, and control federal-, state-, and county-listed noxious weed species occurring on Fort Carson and the PCMS at 10% of the installations each year.*** ***2. Prevent the introduction of and control invasive species, per Executive Order 13112, Invasive Species.*** ***3. Within five years, reduce the total acreage of noxious***						

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	weed species a minimum of 5% annually by selectively treating noxious weed infested land at Fort Carson and the PCMS.						
	1. Implement and update, on a 5-year schedule, the Noxious Weed Management Plan (7th ID and Fort Carson 2001b).	x	x				
	2. Implement the African rue management plan.	x					
	3. Complete the initial inventory and GIS mapping of invasive weeds on Fort Carson and PCMS, using inventory methods used by the state.	x complete by 2014					
	4. Prioritize, by species and/or location, weed infestations for control.	x					
	5. Maintain overall ecosystem health at a level where noxious weed invasions are uncommon and/or localized.	x					
	6. Treat selected noxious weed species using an integrated approach (biological, chemical, cultural and mechanical) by treating a minimum of 100 and 250 acres annually at Fort Carson and PCMS, respectively.	x					
	7. Conduct annual monitoring to assess effectiveness of noxious weed control projects.	x					
	8. Document benefits of noxious weed management relative to sustaining and promoting the military mission.						x
	9. Continue to work with Texas A&M University, Colorado State Insectary, and U.S. Department of Agriculture - APHIS to release, redistribute, and monitor biological control agents for noxious weed control. Ensure that proponents provide reports on the status of the projects.	x					
	10. Conduct additional biocontrol research and releases or redistributions of insects for noxious weed species as control agents become available.	x					
	11. Implement the noxious weed outreach program in conjunction with the Conservation Awareness Program.	x					
	12. Renew the cooperative agreement with the Upper Arkansas Regional Weed Cooperative and continue working with the Tackling Tamarisk on the Purgatoire Working Group.	x		x			
	13. Complete Tamarisk Management Plan as an appendix to the Noxious Weed Management Plan; complete surveys; and implement the plan as funding permits.	x	x	x			
	14. Evaluate the economic and biological effectiveness of aerial spraying of herbicides to control noxious weeds compared to ground spraying using PCMS for testing.				x		
	15. Implement a systematic monitoring program to identify new weed populations and to document the size and abundance of existing weed populations.						x
	16. Survey drainages in Fort Carson and PCMS for						x

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	tamarisk; target areas with tamarisk for eradication; and start eradication efforts the year of survey or the year following the survey.						
	17. Coordinate with the DECAM Wildlife Office for the protection of wildlife (particularly listed or sensitive species) during weed control operations.	x					
4.15.3	**General Pest Management**						
	Performance and Sustainability. Provide a compliant, customer-oriented pest control program that will achieve the Installation sustainability goal "Zero Waste" by eliminating 100 percent of hazardous chemicals or active ingredients used for pest control operations by 2027. In an attempt to reach the zero waste goal by 2027, the short term pesticide reduction goal is 40 percent (8 percent per year) by FY 2011, based on FY 05 pesticide usage. ***Control those plant and animal species that affect human health, quality of life, natural resources management (e.g., reduce ecosystem functionality, displace native species) or the military mission, exclusive of noxious weeds.***						
	1. Maintain and implement the Integrated Pest Management Plan (7th ID and Fort Carson 2001a) on a five-year cycle, including an update in 2007 and 2011.	x	x				x
	2. Emphasize integrated pest management techniques to minimize the use of pesticides. Pesticides used for noxious weed control will not be counted toward this objective since this is a compliance issue.						
	3. Use chemical control as a last resort to control pests; cultural, mechanical, and biological control methods are first priority. When chemical control is required, use the least environmentally toxic pesticide. Utilize new technology, educational opportunities, and the judicial/professional use of chemicals to reduce chemical pesticide use.	x					
	4. Ensure pesticide applicators are fully certified or under the necessary direction of a certified applicator.	x					
	5. Conduct preventive maintenance and surveillance inspections for pests.	x					
	6. Ensure pest management personnel receive adequate formal, as well as on-the-job, training to achieve required pest management certification and to operate at the most efficient level.	x					
	7. Procure, maintain and properly store adequate supplies of pesticides and pesticide dispersal equipment.	x					
	8. Implement a safety program that provides for the safety and well being of all pest management personnel.	x					
	9. Coordinate with the DECAM Wildlife Office for the	x					

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	protection of wildlife (particularly listed or sensitive species) during pesticide operations.						
	10. Work with other regional installations to include the entire pest management program within the Front Range Ecoregional Management Team.	x					
5.1.1.3	**Range and Training Land Assessement**						
	Develop Conceptual Models to define those thresholds in terms of suitability for training for each ecotype including all possible land uses and establish Specific Assessments to determine the status of training lands with respect to those thresholds as well as success of rehabilitation efforts.						
	1. Determine Specific Assessments (e.g., High-Use Area Assessments, Threatened and Endangered Species Habitat Monitoring, Invasive and Noxious Plant Assessment, Soil Compaction, Land Cover, Vegetation Condition) to be conducted, starting early 2006.	x					
	2. Produce individual RTLA data analyses reports for each Specific Analysis upon completion. Reports will include management recommendations based on conceptual models (i.e., Green, Amber, Red, and Black ratings).	x					
	3. Continue annual monitoring of the 44 RTLA plots in former area of Training Areas B and C at PCMS for comparison against baseline data collected prior to the re-opening of those areas for military maneuvers.	x					
	4. Continue monitoring of permanent RTLA plots and use data to analyze the distribution of military impacts on land over time (trend analysis) as well as to monitor changes in vegetation over time to assist in validating/modifying watershed management practices. The next monitoring at Fort Carson shall be completed in 2007 and the PCMS in 2008.		x	x			
	5. Update plant collections and species lists as new species are found.	x					
	6. Revise RTLA Protocol annually to incorporate new Specific Assessments and evaluate former Specific Assessments as needed.	x					
	7. Conduct baseline surveys in expansion areas as determined.	x					
5.1.2.3	**Land Rehabilitation and Maintenance**						
	1. Use LRAM efforts to restore and maintain lands to full training support capability. ***2. Coordinate with adjoining private, state, and federal land managers to protect lands from the effects of military training by reducing fugitive dust, soil erosion, and sedimentation within current land management strategies.***						

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	1. Continue to repair and revegetate areas that impact or are impacted by military activities as they become apparent.	x					
	2. Reseed lands damaged by military training using drill, broadcast, or hydroseeding methods.	x					
	3. Continue erosion control dam enhancement program to improve military maneuver.	x					
	4. Implement best techniques for dust control, if needed.	x					
	5. Maintain prioritized list of restoration projects (e.g., reseeding, erosion control, bank sloping, unnecessary road/trail restoration, hardened sites).	x					
	6. Monitor previously restored areas to determine the effectiveness of reseeding, erosion control, bank sloping, hardening, and other techniques and use results to ensure maintenance of previous project sites and make appropriate adjustments to future LRAM projects.	x					
	7. Continue to develop locally adapted, native seed mixes (capable of withstanding higher/heavier traffic and more fire resistant) by vegetation type for Fort Carson and the PCMS.	x					
	8. Implement limited use and off-limits signage using tactically suitable signs (*e.g*., Siebert stakes, NATO mine field passage signs).	x					
	9. Use military and DECAM assets to assist with the design and implementation of LRAM projects.	x					
	10. Use external agency support (*e.g*., NRCS, USGS) to assist and design LRAM projects, as needed.	x					
	11. Coordinate with the DECAM in the use of the programmatic 404 Permit established with the U.S. Army Corps of Engineers to implement routine LRAM projects as much as possible.	x					
	12. Use private contracts for erosion control projects that exceed the internal completion capacity of Fort Carson.	x					
	13. Coordinate with the DECAM to ensure LRAM projects meet environmental requirements (*e.g*., NEPA, permits, listed species, cultural resources protection).	x					
5.1.3.3	**Training Requirements Integration**						
	Improve communication between training and land management staff to facilitate the integration of Fort Carson's training requirements for land use on both Fort Carson and the PCMS with the sustained capability of the land to support such use.						
	1. Use the RFMSS, Training Resource Management Meetings, and other military training data to find the "best fit" between military missions and facilities usage in terms of identifying Training Areas that can best support specific training scenarios in a sustained fashion while minimizing or mitigating environmental impacts.	x					

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	2. Use training restrictions, when required, to protect sensitive natural and cultural resources and minimize damage to Training Areas.	x					
	3. Whenever possible, incorporate training restrictions into training scenarios and tactical signature/maneuver damage reduction philosophies into unit tactical Standard Operating Procedures.	x					
	4. Evaluate the need for rest-rotation of training lands in terms of mission and environmental cost/benefits annually.	x					
	5. Continue to collect Maneuver Impact Miles data for use in the RFMSS to develop and implement a training scheduling system based on military use carrying capacity (ATTACC), considering the timeliness of necessary software fixes.	x					
	6. Coordinate with DECAM Natural Resources personnel to evaluate the use of Sibert stakes and other tactical signage to enhance military training and attempt to divert such traffic from environmentally sensitive sites.	x					
5.1.4.3	**Sustainable Range Awareness**						
	1. Develop an awareness of values of, and requirements for, natural and cultural resources protection on Fort Carson and the PCMS to support sustained military training. ***2. Educate military users to minimize impacts to the land and natural resources to sustain and enhance training.*** ***3. Increase awareness of tactical signature, increasing combat effectiveness while decreasing the need to recover military impacts.***						
	1. Provide decision makers with the information needed to make judgments that affect the Range and Training Land Program.	x					
	2. Revise Military Personnel Awareness materials (e.g., field card, posters, supplemental maps) as needed to maintain the accuracy and mission-relevancy of these materials.	x					
	3. Present briefings at the New Commanders Course, Training Resource Management meetings, Maneuver Damage Control Officer's training, and others that relate to environmental awareness, conservation, protection, and tactical signature reduction.	x					
	4. Develop or update environmental awareness materials and briefings as needed to ensure support of the military mission, compliance with environmental laws (*e.g.*, NEPA, Endangered Species Act, Clean Air Act, Clean Water Act), and stewardship of public lands, while continuing, and where possible enhancing, military	x					

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	training to readiness standards.						
5.1.5.3	**Geographic Information System**						
	Provide spatial products and analyses to support ITAM program implementation, military mission planning and training, and land use decision-making.						
	1. In cooperation with the DECAM and DPW, establish a network among GIS stations; determine database ownership and database standards.				x		
	2. Use GIS to maintain an historical record of RTLA plots and LRAM projects and to provide updated input to SRA briefings.	x					
	3. Update hardware/software for data collection/analysis, particularly ERDAS Imagine® software.	x					
	4. Obtain digital aerial and satellite imagery (multispectral and hyperspectral) for Fort Carson and the PCMS on a regular basis that can be used to provide analyses of changes in land condition.	x					
	5. Determine requirements for additional remote imagery, including PCMS expansion area imagery and hyperspectral imagery for both Fort Carson and the PCMS and obtain such imagery, using sources such as the Space Command or the Commercial Satellite Imagery Library, whenever feasible.					x	
	6. Utilize remote imagery to assist in determining changes in land condition.				x	x	x
	7. Use a global positioning system to digitize features (*e.g.*, target lifters, firing positions, signs, structures) for each range and Training Area on Fort Carson and the PCMS.		x	x	x	x	
	8. Enhance the self-help program for assisting with the planning of military activities on Fort Carson and the PCMS, including the use of the Internet to access GIS databases from remote locations.	x					
	9. Use Modified Combined Obstacle Overlays (*e.g.*, avenues of approach, natural and man-made obstacles, key terrain [bridges, high points], fields of fire, line-of-sight) to analyze potential maneuver damage impacts for planned military activities.	x					
	10. Continue to assist with database development for simulated training for troops using Fort Carson and the PCMS.	x					
5.2.3	**Wildlife Law Enforcement and Human Health and Safety**						
	Sustainability. Protect natural resources and Soldiers training downrange by maintaining the number of violations at or less than 5 percent of the annual number of permittees. Data collection will begin in FY 07. Performance. Maintain appropriate level of training and						

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	weapons qualification to retain state and federal commissions and maintain a visible presence downrange; achieve 1,000 hours of downrange law enforcement and force protection patrol. ***Ensure military and civilian personnel and activities are in compliance with all natural, cultural and environmental laws and regulations on Fort Carson and the PCMS; identify and cite violators.***						
	1. Maintain a proactive conservation law enforcement program on Fort Carson and the PCMS.	x					
	2. Strategize, develop, implement, and articulate means of addressing law enforcement priorities.	x					
	3. Coordinate enforcement activities with other agencies, particularly the CDOW and the USFWS.	x					
	4. Place added emphasis on expanding enforcement efforts at the PCMS.	x					
	5. Procure technologies that will enhance the effectiveness of limited enforcement resources.	x					
	6. Ensure Conservation Law Enforcement Officers receive basic and annual refresher training to meet and maintain standards required for enforcement commissions.	x					
	7. Explore other educational opportunities to broaden the expertise of Conservation Law Enforcement Officers.	x					
	8. Obtain appropriate permits and use protocols established by DECAM in conjunction with the CDOW to handle nuisance wildlife complaints on Fort Carson and the PCMS and provide for public safety in the event that dangerous wildlife is present in the Cantonment Area or areas where Soldiers are training.	x					
	9. Protect roads, archeological sites, and listed species habitat from beaver damage.	x					
	10. Construct additional office space at Building 9301 to house a USFWS Agent.		x				
	11. Respond to all complaints and issues dealing with species protected by the Migratory Bird Treaty Act.	x					
5.3.3	**Conservation Awareness**						
	Provide input into education/awareness programs that will instruct Fort Carson personnel, as well as the surrounding community, on the significance of natural resources on Fort Carson and the PCMS.						
	1. Improve the general program knowledge of all persons associated with the Natural and Cultural Resources Division, particularly those who come into regular contact with interested persons.	x					
	2. Provide prepared talks, dependent upon personnel and time availability; whenever possible, use these opportunities to explain contemporary natural resources	x					

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	issues and management.						
	3. Use newspapers, television, and radio to inform the Fort Carson and surrounding community of matters important to the natural resources program at Fort Carson and the PCMS.	x					
	4. Participate in natural resources events, such as Earth Day, Free Fishing Day, and Arbor Day, to promote the Natural and Cultural Resources Division and/or its programs.	x					
	5. Interact with surrounding communities and professional organizations to exchange information and knowledge on environmental subjects.	x					
	6. Maintain education and awareness programs that meet requirements for certification by the Wildlife Habitat Council as a Corporate Lands for Learning Site and recertify Fort Carson and the PCMS as required.	x					
	7. Support scouting and other youth activities.	x					
	8. Continue to develop the Wildlife Complex to provide effective conservation awareness activities.	x					
	9. Install interpretive signs around selected schools, parks, the Wildlife Complex, and selected reservoirs that provide information relative to natural and cultural resource conservation.	x					
	10. Obtain funding (including potentially private funding) and construct the Environmental Education and Interpretative Center at Fort Carson, to include the Museum near the Front Gate.	x					
5.4.3	**Wildlife-based Recreation Management**						
	Sustainability. Increase Soldier participation in hunting and fishing programs; data collection will begin in FY 07. ***Performance. Increase awareness of DECAM's hunting and fishing programs.*** ***1. Provide a quality wildlife related recreational experience on Fort Carson and the PCMS for military personnel and the public.*** ***2. Consolidate installation wildlife-recreational administration at the DECAM Wildlife Office (i.e., recreational permit sales, downrange recreational passes, collection of weapon registration forms for the PMO).***						
	1. Investigate alternative means to allow active duty military personnel to participate in big game hunts.	x					
	2. Operate the wildlife check station five days per week throughout the year; during big game and turkey seasons, operate the station 15 hours per day; for the remainder of the year, operate the station eight hours per day.	x					
	3. Explore the creation of a sportsman's club to evaluate	x					

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	program effectiveness and solicit community involvement in the Outdoor Recreation Program.						
	4. Repair guzzlers and solar powered pumps at a rate of 20 percent a year.	x					
	5. Further develop educational and recreational uses of the Cottonwood-Prairie Conservation and Education Area.	x					
	6. Repair Small Bird, Large Bird and Northside reservoirs.						x
	7. Identify new sources of procurement for catchable fish.	x					
	8. Conduct regular creel censuses and monitor fishing pressures.	x					
	9. Test warm water species for heavy metal contaminates.	x					
	10. Encourage partnerships with wildlife and game-oriented nongovernmental organizations.	x					
	11. Publicly disseminate information about hunting programs on Fort Carson and the PCMS through public meetings, newspaper articles, and mass mailings to license holders.	x					
	12. Conduct a hunting workshop annually for the military community to explain procedures for obtaining a state license and to highlight hunting opportunities available on Fort Carson and the PCMS.	x					
	13. Manage the Fort Carson fisheries program for approximately 1,000 annual permitted anglers.	x					
	14. Continue to operate the check station at the PCMS in accordance with personnel and funding availability to collect data to validate management goals established by Andersen and Rosenlund (1991).	x					
5.5.3	**Cultural Resources Protection**						
	Implement this INRMP in a manner consistent with the protection of cultural resources at Fort Carson and the PCMS.						
	1. Maintain and implement the ICRMP during the every-day practice of natural resources management on Fort Carson and the PCMS.	x					
	2. Conduct review of proposed natural resources projects for cultural resources concerns via NEPA Team Leaders and the CRM.	x					
	3. Observe protective fencing and/or signs around archeological sites, rock art, or other cultural resources during natural resources management activities.	x					
	4. Implement SOPs for Inadvertent Discovery of Archaeological Resources or Human Remains (Section 6.3 of the ICRMP) and NAGPRA (Section 6.4 of the ICRMP) upon discovery of cultural deposits or features, paleontological deposits, burials, or other potential artifacts or funerary.	x					
	5. Continue to use natural resources management	x					

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	techniques and projects to support cultural resources conservation.						
5.6.3	**Meteorological Data Collection**						
	Monitor and assess the effects of climatic conditions on natural resources management programs and military activities.						
	1. Use the USGS to collect meteorological data at meteorological stations and rain gauges on Fort Carson and the PCMS.	x					
	2. Assess the impact of precipitation during the growing season on revegetation projects and coordinate the effect of precipitation on vegetation growth with other elements such as land use.	x					
	3. Use climatic data to help model ecological processes, such as sedimentation rates.	x					
	4. Use weather data to help evaluate impacts of military activities under various weather conditions and use that data to minimize unnecessary military impacts.	x					
	5. Assess feasibility of using climate data in the development of a wet weather deferment program to assist in determining when training restrictions would best mitigate soil/vegetation damage.	x					
5.7.3	**Data Collection, Storage, and Analysis**						
	Provide automated data processing and analysis to fully support and implement all associated natural resource management programs on Fort Carson and the PCMS.						
	1. Upgrade computer hardware and software as needed during the next five years.	x					
	2. Provide GIS support for natural resource personnel, to include installation and upgrade of software.	x					
	3. Continue to assist natural resource management personnel in developing their abilities to utilize the GIS as an analytical tool.	x					
	4. Provide periodic updates to GIS data essential to support natural resource management.	x					
	5. Work with the Directorate of Information Management to facilitate consistent, open data sharing useful for natural resource via connectivity between all Fort Carson and the PCMS entities utilizing GIS.	x					
	6. Work in conjunction with other directorates on Post for future aerial/imagery data acquisition, including funding, hopefully to be acquired on a regular basis.	x					
5.8.3	**Use of NEPA**						
	1. Use NEPA to identify projects and activities on Fort Carson and the PCMS that might impact natural resources and work with project planners to resolve issues early in the planning process. ***2. Use NEPA to ensure this INRMP is documented***						

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	according to the spirit and letter of NEPA. ***3. Help Fort Carson comply with NEPA.***						
	1. Document effects of implementation of this INRMP, as required.		x				
	2. Reference this INRMP in descriptions of affected environment to reduce verbiage in other NEPA documents.	x					
	3. Classify mitigation as a "must fund" for budgetary purposes.	x					
7.2.1.2	**INRMP Implementation Staffing**						
	Provide staffing of natural resource management professionals required to effectively manage natural resources on Fort Carson and the PCMS (Department of Army 1995a).						
	Provide staffing for the Fort Carson natural resources program to effectively implement this INRMP.	x					
7.2.2.2	**Personnel Training**						
	Provide training to natural resources personnel implementing this INRMP.						
	1. Encourage Natural and Cultural Resources Division and ITAM program personnel to join professional societies and their state/regional chapters as well as be active in them.	x					
	2. Send at least one person to each of the annual workshops or professional conferences discussed above.	x					
	3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to Fort Carson and the PCMS activities.	x					
	4. Ensure that natural resources personnel obtain the one-time or occasional refresher training needed to fulfill job requirements (e.g., enforcement, GIS, NEPA, endangered species documentation/ consultation, firefighter, pesticide application).	x					
	5. Actively participate in training sessions to disseminate knowledge learned at Fort Carson and the PCMS.	x					
	6. Whenever appropriate, author/co-author papers for scientific journals presenting research/ project results.	x					
7.2.3.2	**External Assistance**						
	Provide external specialized skills, personnel, and resources to support the Fort Carson natural resources program.						
	1. Implement external support projects, which are described in more detail in appropriate sections of this INRMP.	x					
	2. Consider using InterService Support Agreements, Oak Ridge Institute of Science and Education, and/or	x					

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	volunteers for personnel assistance.						
	3. Use state and federal agencies, particularly INRMP signatory partners, the USFWS and CDOW to assist with implementation of this INRMP.	x					
	4. Use universities to assist with implementation of this INRMP.	x					
	5. Use contractors to assist with implementation of this INRMP.	x					

* Project title (in **bold**) follows section number; goal(s) appear in ***bold/italics***; objectives are numbered consecutively following goals. Both goals and objectives are condensed from chapters 4, 5, and 7.