Integrated Natural Resources Management Plan Update

Camp W.G. Williams

UTAH ARMY NATIONAL GUARD

Environmental Resources Management

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Cover photo: Morgan Mendenhall, Range & Training Land Assessment field crew member, 2004.

Camp W.G. Williams
Utah National Guard

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RESPECT: Consistently demonstrates consideration of others

COMMITMENT: Possess and exhibit constant dedication to the defined course of action

Camp W.G. Williams, Utah
Utah National Guard

APPROVAL

This Integrated Natural Resources Management Plan Update meets the requirements of the Sikes Act Improvement Act of 1997, Department of Defense Instruction 4715.3, Environmental Conservation Program, and Army Regulation 200-3, Natural Resources – Land, Forest, and Wildlife.

REVIEWED AND
APPROVED BY:

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Camp W.G. Williams, UT
UT National Guard

APPROVAL ADDENDUM

This Integrated Natural Resources Management Plan (INRMP) update meets the requirements of the Sikes Act Improvement Act of 1997, Department of Defense Instruction 4715.3, Environmental Conservation Program, and Army Regulation 200-3, Natural Resources – Land, Forest and Wildlife.

REVIEWED AND
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Table of Contents

Integrated Natural Resources Management Plan Update i
APPROVAL v
Table of Contents vii
Appendix A: Documentation viii
Appendix B: Correspondence viii
Appendix C: Monitoring viii
Appendix D: Species Lists viii
Appendix E: Mule Deer Management Plan viii
Table of Figures viii
Table of Tables ix
1 Executive Summary 1
2 General Information 5
2.1 Goals and Policies 5
2.2 Authority 7
2.3 Responsible and Interested Parties 7
2.4 Review for Operation and Effect – 2001-2006 INRMP 9
2.5 Requirements and Mechanisms for Annual and Five-Year Review 18
3 Installation Overview 19
3.1 Location 19
3.2 History, Acreage and Acquisition 19
3.3 Military Mission 20
3.4 Neighbors 23
3.5 Local Natural Areas 23
4 Physical environment 24
4.1 Climate 24
4.2 Topography 26
4.3 Geology 27
4.4 Soils 29
4.5 Groundwater 31
5 Ecosystems and the Biotic Environment 32
5.1 Ecological Classification 32
5.2 Vegetation 32
5.3 Wildlife 38
5.4 Threatened and Endangered Species 46
5.5 Wetlands 53
6 Mission Impacts on Natural Resources 59
6.1 Land Use and Management Units 59
6.2 Natural Resources Needed to Support the Military Mission 63
6.3 Effects of the Military Mission on Natural Resources 63
6.4 Effects of Natural Resources or their Management on the Mission 65
6.5 Future Military Mission Impacts on Natural Resources 65
7 Natural Resources Program Management 67
7.1 Natural Resources Program Management 67
7.2 Geographical Information System 68
7.3 Wildlife Management 69
7.4 Threatened and Endangered Species Management 73
7.5 Wetland Protection 75
7.6 Land Rehabilitation and Management 75
7.7 Wildfire Management 78
7.8 Agricultural Out-leasing 91
7.9 Integrated Pest Management 91
7.10 Outdoor Recreation 96
7.11 Mineral Extraction 96

7.12 Fugitive Emissions and Fugitive Dust 96
7.13 Cultural Resources Protection 97
7.14 Enforcement 101
7.15 Outreach 101
8 Management Goals and Objectives 103
8.1 Overview 103
8.2 Goal: Sustain Camp William's Role in Traverse Mountains 103
8.3 Goal: Equip decision makers with the best environmental information and practices for training site development and use 103
8.4 Goal: Sustain or improve the current condition of the training site environment. 104
8.5 Goal: Monitor ecosystem health. 104
8.6 Goal: Protect golden eagles and bald eagles (if found). 105
8.7 Goal: Continue pro-active compliance with Endangered Species Act 105
8.8 Goal: Improve condition of wetland and riparian areas. 105
8.9 Goal: Control noxious weeds. 106
8.10 Goal: Implement the Mule Deer Management Plan. 106
8.11 Goal: Outline and implement the methods and protocols necessary to control wildfire frequency, intensity, and size on Camp W.G. Williams. Comply with Army regulations and guidance, federal and state laws, and memorandums of understanding and meet UTNG's land stewardship responsibilities. Provide for firefighter and public safety and allow continuation of military training necessary for the UTNG and other military units to maintain a high level of combat readiness. 107
9 Implementation 109
9.1 Projects 109
9.2 National Environmental Policy Act 112
9.3 Natural Resources Management Staffing 113
9.4 Monitoring INRMP Update Implementation 115

Appendix A: Documentation
Appendix B: Correspondence
Appendix C: Monitoring
Appendix D: Species Lists
Appendix E: Mule Deer Management Plan

List of Figures

3-1. Geographic Setting of Camp Williams 19
3-2. Example Range Page: MAC-MOUT Site 21
3-3. Proposed Route of the Mountain View Corridor through Camp Williams 23
4-1. Average Precipitation and Temperature near Camp Williams 24
4-2. Utah Climate Divisions 25
4-3. PDSI Values for Utah Climate Division 3 25
4-4. Fire Danger Rating Probability for Camp Williams Vicinity 26
4-5. Location of Camp Williams with Surrounding Central Utah Mountain Ranges 27
4-6. Simplified Geologic Map and Cross-section of the Traverse Mountain 28
4-7. Erosion Risk Classification 30
5-1. Vegetation Community Types 35
5-2. Sagebrush Plain at the 100 Series Firing Points 34
5-3. Perennial Grassland in Pinyon Hill Training Area 36
5-4. Former quarry within the 200 Series Firing Points 36
5-5. Mature Gambel Oak Stand within the Impact Area 37
5-6. Mature Juniper Stand in the East Tickville Training Area 37
5-7. Tickville Gulch Riparian Area 38
5-8. Breeding Bird Transects at Camp Williams, 1993-2005 41
5-9. Breeding Status of Bird Species Found at Camp Williams, 1993-2004 42

5-10. Number of bird species detected at Camp Williams State Military Reservation, Utah, 1993-2004 each year (■) and cumulatively (□). 42
5-11. Golden Eagle Chick in Last Year's Red-Tail Hawk Nest 43
5-12. McClain, Houndsman for the Cougar Project, takes a blood sample and collars a tranquilized cougar with a Global Positioning System transmitter 44
5-13. Mule Deer Utilize Camp Williams Year-round 45
5-14. Transects Used to Assess Avian Diversity at Camp Williams 50
5-15. Wetlands of Camp Williams 55
5-16. Tickville Gulch Wetlands and Channel 53
5-17. Oak Springs Wetlands and Channel 54
5-18. Staff from ERM Inspects Vegetation Composition and Condition at a Small Wetland in Wood Hollow 54
5-19. Wetland of Hidden Valley 57
6-1. Training Areas at Camp Williams 58
6-2. Training Areas by Type and in Relation to Live Fire Ranges 59
6-3. Impact Area at Camp Williams 61
6-4. Mechanical Thinning in the South Mountain Training Area 62
6-5. Soldiers Training on a 155 Self-Propelled Howitzer Firing at the 200 Series Firing Points 63
7-1. Organizations and Positions with Responsibilities for Development and Implementation of the INRMP 66
7-2. Mule Deer Utilize Gambel Oak Stands for Thermal and Fawning Cover 70
7-3. ERM Staff Participate in a Cougar Collaring for the USU/UDWR Cougar Project 71
7-4. Kent Keller Captures a Golden Eagle Chick for Banding 72
7-5. Proposed Mechanical Thinning of Juniper to Improve Training and Ecological Condition 76
7-6. Fire Triangle 80
7-7. Camp William's 20-Year Fire History 83
7-8. Goats in Beef Hollow Experimental Pen 84
7-9. Experimental Goat Firebreak in Wood Hollow after the 2001 Wildfire 84
7-10. Hotshot Crew Performing a Manual Thinning in Wood Hollow 85
7-11. Bullhog Performing a Mechanical Thinning in Tickville Gulch 85
7-12. Chaining Prior to Greenstripping in the Impact Area in 1998 86
7-13. Helicopter applying herbicide to the twin firebreaks on the north end of the Impact Area in 2003 86
7-14. Prescribed burn being conducted on the grenade launcher range in 2000 86
7-15. Firebreak and Fuelbreak Projects to Mitigate Wildfire Hazard at Camp Williams 89
7-16. Educational Booth at a Local Festival 100
9-1. NEPA Review Process for INRMP Implementation 112

List of Tables

Table 2-1. 2001-2006 INRMP Project and Program Priorities Review. 10
Table 3-1. Types of Training Assets Available at Camp Williams. 21
Table 5-1. Proper Functioning Condition Assessment of Oakbrush Communities for Camp Williams as a Landscape. 37
Table 5-2. Survey Years, Number of Samples, and Sample Method for Fauna Surveys From 1993 to 1994 Conducted at Camp Williams. 39
Table 5-3. Summary of avian groups from the 1993-1994 surveys. 39
Table 5-4. Summary of mammalian groups from the 1993-1994 surveys. 40
Table 5-5. Summary of reptiles and amphibians from the 1993-1994 surveys. 40
Table 5-6. Avian species diversity by habitat type, Camp Williams, UT, May-September 2005. 42
Table 5-7. Bird Species with Special Protective or Managerial Designation. 43
Table 5-8. Scent Station Results. 44
Table 5-9. Listed Species Potentially Occurring in Utah or Salt Lake Counties. 46
Table 5-10. Results of Avian Point Count Surveys at Camp Williams, Utah, May-July, 2005. 51
Table 5-11. Observations of American White Pelicans on or Near Camp Williams, Utah, May-August, 2005. 51
Table 5-12. Wetlands and water habitats of Camp Williams. 53

Table 5-13. Wetlands and Water Habitats of Hidden Valley.....58
Table 7-1. Priority Bird Species for Management. 70
Table 7-2. Communities at Risk Bordering Camp Williams (Division of Forestry, Fire & State Lands, 2005). 78
Table 7-3. Components of the Integrated Wildland Fire Management Plan Components Included in this INRMP Update.....79
Table 7-4. Noxious Weeds Monitored at Camp Williams and Suggested Treatment.....94
Table 9-1. Projects for INRMP Update Implementation. 109

1

1 EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) Update carries out the overarching objectives of responsible stewardship, environmental compliance and maintenance of a quality military training environment as required by the Sikes Act (as amended in 1997). The Utah Army National Guard's primary concern is upholding military mission needs, upholding training area environmental standards, and supporting the local community. Under the Sikes Act, the UTNG developed the AGCW INRMP Update in consultation with state and federal agencies, including the Utah Division of Wildlife Resources (UTDWR) and the U.S. Fish and Wildlife Service (USFWS).

The Camp Williams INRMP Update is a comprehensive planning document incorporating inventory and monitoring data, land rehabilitation mandates, and budget needs. In addition, the plan update incorporates military training impacts and adaptive management of those impacts. In short, the Camp Williams INRMP Update includes each of the parts of Integrated Training Area Management (ITAM). When carried out, this INRMP Update with the Camp Williams ITAM program will serve as the basis for defensible natural resources management decisions.

A military training environment is a function of the area's climate, physiography and, especially, its vegetative communities. The diversity of natural vegetation types at Camp Williams is an important characteristic of the military training environment. The Camp Williams INRMP Update uses an ecosystem approach to land management intended to integrate military training with conserving ecological integrity and biodiversity. A major focus of this approach is to uphold naturally occurring structural vegetative diversity. At the site or community level, this includes providing for a diversity of native plant species. At the landscape level, it includes maintenance of various community types, successional stages, and patch sizes.

Camp Williams is found in north-central Utah, about 15 miles south of Salt Lake City. It comprises mostly of Army Corps of Engineers land, with a section and a half section of State Trust Land Administration land. It receives a great deal of military training on a small area of land; it upholds about 350,000 troop training days a year on its roughly 25,000 acres. This alone makes management of Camp Williams a challenging task, made more difficult by variable military training and land uses. Military land uses include specialized winter, desert, mountain and amphibious training, and many firing ranges. The nature of military land use on Camp Williams is high intensity training on small areas of land (designated firing ranges and training courses) with lower impact training (foot traffic) on much the Camp.

The impacts of current military training on soil, vegetation, water, and wildlife at Camp Williams are, in general, modest. Training with potential for high impact (for example, antitank ditching, demolition, firing points, ranges and bivouac areas) are restricted to dedicated sites, which are either hardened or naturally resistant to environmental damage. Beyond the high intensity, localized, military training sites, the greatest potential impacts are associated with training-ignited wildfires, off-road traffic, and noxious weed introductions.

When carried out, this INRMP Update will support the training mission objectives and the continued conservation of the natural environment. The features of ecosystem management as incorporated in this INRMP Update include: a proactive approach to environmental management; a focus on habitat and communities, rather than individual species; a reliance on the best available science and technology; the premise that training must be sustainable; and that ecosystems and training need effective monitoring and adaptive management.

Specific direction for preserving biodiversity include:

1) Use of a course-filter approach (that is, focus on habitats and communities, rather than individual species)
2) Maintenance of each of the major vegetation types in about their current proportions.
3) Using prescribed and natural disturbances, preserve age-classes or successional stages for each of the major vegetation types.
4) Minimize nonnative species establishment, especially noxious weeds.
5) When restoration or rehabilitation are necessary, use native plant species and integrated management that accounts for causal agents and processes.

The Utah Army National Guard's primary concern is upholding military mission needs, upholding training area environmental standards, and supporting the local community.

Camp Williams experiences frequent, high intensity wildfires. Historically, wildfires were of little concern and undocumented. However, with increasing environmental awareness and encroaching suburban development, understanding wildfire risk and behavior at Camp Williams has become important. When fully carried out the wildfire management part will improve predictability, reduce wildfire risk, spread, and overall impact. Outlined in this plan update are tasks necessary to develop vegetative firebreaks and prescribed burns. These management alternatives are not an attempt to remove wildfires but to limit the size and intensity of wildfires. Limiting the size and intensity of wildfires better mimics the patchy structure of wildfire-adapted ecosystems and promotes protection of training lands. This plan update is based on previous research conducted at Camp Williams, which assessed fuels, wildfire, weather, and behavior predictions, and wildfire history data.

A major challenge to preserving intact native ecosystems is the rapid expansion of invasive weeds. Unchecked, invasive plants can quickly dominate and fundamentally alter native plant communities. Potential effects of these invasions include displacing native plant species, altering natural disturbance regimes and declines in the quality of wildlife and livestock forage. There is great potential for plant species invasion. Of the 15 species on the statewide noxious weed list, 13 have been reported on Camp Williams and of these, three have serious potential of spreading. The potential for plant species invasions is further shown by nearly 25% of the vascular plant species on the installation are nonnative. Implementation of the noxious weed management plan, strongly integrated with the Camp Williams grazing and wildfire management plans, should promote the control of existing infestations and lessen the risk of new ones.

An advantage of ecosystem-based management is that with successful implementation, the need for restoration or rehabilitation is minimized. The careful matching of sites with suitable, sustainable levels of land use preserves intact, robust native plant communities dominated by perennial species. Maintenance of these sorts of ecosystems is the priority. Even with the best stewardship, the need for restoration or rehabilitation will inevitably arise, for example, because of past or current, unavoidable, impacts. Under the ecosystem management approach, restoration and rehabilitation projects will only be undertaken after careful analysis across multiple spatial and temporal scales (that is, causes are determined and considered before tries are made to treat symptoms).

Monitoring is an important factor in fulfilling ecosystem-based management at Camp Williams. The monitoring program promotes environmental stewardship and supports the training mission. This has been done through developing and refining field data collection method and on-site management, and compiling a digital database including a standardized data structure, data analysis package, and graphical user-interface.

The monitoring protocols used at Camp Williams are based on the standard developed and used by the Department of the Army, originally referred to as Land Condition Trend Analysis (LCTA). Those protocols are now part of the Range and Training Land Assessment (RTLA) unit of ITAM. The change in name from LCTA to RTLA reflects a changing emphasis by the military to focus on specific training impacts on the land and effectiveness of treatments mediating those effects. RTLA will continue to be the primary set of monitoring protocols used to track land condition and trend and training-related impacts at Camp Williams. 97 core and special use plots have been set up so far. This exceeds the original LCTA recommendation of one per 500 acres and is most efficient for one field crew. About half of the total plots are resampled every year and the balance on a two- or three-year rotation. This sampling scheduled is based on vegetation type, training use and damage resulting from sampling. More plots may be set up as fitting based on changes in training use and management needs. RTLA is an adaptive set of protocols that will be altered to meet changing needs dependent on future training needs.

As part of the RTLA part of ITAM, LCTA protocols carry out two fundamental objectives: (1) provide a baseline against which land managers and decision makers can compare future inventories as they continue to record land conditions; and (2) evaluate the effectiveness of management. So far, the first of these has been the focus of large comprehensive natural resources monitoring programs. However, it is the second objective that will take monitoring beyond simply a want of environmental compliance and make it a part of adaptive management in support of the military training mission.

There are no known populations of threatened or endangered animal or plant species on Camp Williams. The course-filter approach (that is, focus on habitats and communities, rather than individual species) is, therefore, especially suitable to preserve biodiversity without threatened or endangered species which might need a fine-filter, single-species approac.

The Sustainable Range Awareness (SRA) part of ITAM has the primary goal of educating soldiers to conduct environmentally responsible training at Camp Williams. It fosters concern, thinking, and action to protect and conserve both the natural resources and future training opportunities. SRA can be either preventive or corrective in nature, and issue-specific or more widely applicable. Education about natural resource concerns, training impacts, and environmental programs, including the INRMP Update, are specific objectives of the SRA part of ITAM. Major topics specific to Camp Williams include protection of raptors, riparian areas, juniper stands, and restoration areas, decreasing off-road traffic, digging and wildfires, and hazardous waste programs. Other environmental education involves telling the public about Army environmental programs and specific issues related to Camp Williams.

Implementation of the INRMP Update will minimize potential impacts of natural resources management and military training on cultural resources. The GIS database includes archeological and historical information and the INRMP Update has specific terms for protection of cultural resources during training outside fixed training areas.

The AGCW INRMP Update is subject to public environmental review under the National Environmental Policy Act (NEPA) and 32 CFR 651, *Environmental Analysis of Army Actions*. As part of the NEPA review, the 2001-2006 INRMP was performed through a Programmatic Environmental Assessment (PEA). The intent of the PEA is to identify any significant impact to the natural and human environment that will result from implementation of the INRMP. Any project that may have potential environmental impacts will be tiered into the PEA through a project-specific EA's or a Record of Environmental Consideration (REC).

This document is the result of the five-year review required by the Sikes Act and Sikes Act Improvement Act (SAIA). Because of review under Army supplemental and additional guidance for the SAIA, the UTNG decided to update and continue implementation of the 2001-2006 INRMP. It has been reorganized from the original format to that of the ARNG Template. New information as the result of monitoring and planning level surveys and Department of the Army (DA) policy changes has been added to the following sections:

4.3 Geology – updated to reflect new geology mapping by the Utah Geologic Survey;
5.3 Wildlife – updated to reflect need for monitoring;
5.4 Threatened and Endangered Species – updated to reflect new planning level survey in preparation for this five-year review;
6 Mission Impacts on Natural Resources – updated to reflect the current mission and results of Range and Training Land Assessment analyzes;
7.3 Wildlife Management – includes monitoring and prescription for mule deer management, if needed;
7.5 Wetland Management – reflects need for monitoring and change in DA policy;
7.7 Wildfire Management – updated to reflect DA policy change and refined management; and
7.9 Integrated Pest Management – reflects results of past management and weed issues from 2001-2006 INRMP.

The limited biophysical impacts of these revisions are not materially different from those expected in the 2001-2006 INRMP, signed in October and November of 2001, and evaluated under the Programmatic Environmental Assessment. Therefore, the UTNG will carry out the INRMP Update with a Record of Environmental Consideration.

1

2 GENERAL INFORMATION

2.1 Goals and Policies

This Integrated Natural Resources Management Plan Update (INRMP) for Army Garrison Camp W.G. Williams[1] (AGCW) addresses effective management to carry out the overarching objectives of responsible stewardship, environmental compliance, and maintenance of a quality training environment.

The plan uses an ecosystem approach to land management that strives to integrate military training with conserving ecological integrity and biodiversity. Sustainability of a quality training environment is dependent on keeping intact ecosystems.

General ecosystem management goals include:

- Maintenance of ecosystem integrity;
- Keeping biodiversity and ecosystem processes; and
- Continuing quality training opportunities.

The Camp Williams INRMP is a comprehensive planning document incorporating inventory and monitoring data, and land rehabilitation and budget needs. In addition, the plan incorporates military training impacts and adaptive management of those impacts. In short, the Camp Williams INRMP includes each of the basic parts of Integrated Training Area Management (ITAM). When carried out, this INRMP Update with the Camp Williams ITAM program will serve as the basis for defensible environmental assessments.

2.1.1 Goals

The comprehensive goal is preserving opportunities for quality military training. This plan represents an ecosystem-based approach to integrated natural resource management intended to achieve this goal. Key elements of this approach include:

- A focus on ecologically sustainable systems;
- Attention to multiple spatial and temporal scales;
- Addressing problems by encompassing, interdisciplinary means; and
- A commitment to monitoring and adaptive management.

Specific goals of the Camp Williams integrated natural resources management plan update include:

- Preserving viable populations of all native species on the installation;
- Representation of all native ecosystem types across their natural range of variation;
- Upholding ecological processes, for example, disturbance regimes, hydrological processes, nutrient cycles;
- Managing over periods of time long enough to preserve these processes;
- Accommodating human use and occupancy, for example, military training, livestock grazing, within these constraints.

2.1.2 Policies

The goals of integrated natural resource management needs, in general terms, addressing environmental opportunities and challenges and acceptance of the basic premise that continuing quality training opportunities is dependent on sustainable management of ecosystems. The basic focus of management is on habitat and ecological communities, rather than on individual species, to efficiently conserve biodiversity. This plan recognizes the changing nature of ecosystems, ecosystem processes and the military training mission, and that it is impossible to know everything about ecosystems and military and nonmilitary user's impacts on the environment. Therefore, effective monitoring and adaptive management are central to carrying out the goals. In all of its various parts, effective integrated natural resource management should use the best available science and information.

Specific policies and direction for the Camp Williams INRMP:

Monitor, evaluate impacts, and adapt management based on new information. There is no substitute for reliable monitoring to help discover the success or failure of management actions. As understanding of

[1] Hereafter shortened to Camp Williams, the Camp or AGCW.

ecosystems changes over time and as the needs (and impacts) of the training mission change, there must be flexibility, openness, and willingness to experiment, evaluate, and adapt.

Camp Williams does not exist by itself. It is important, for example, to understand how the installation contributes to regional biodiversity and how neighbors may influence and be influenced by land use decisions at Camp Williams.

Recognize unique and important characteristics of Camp Williams. Wetlands, seeps, cliffs, rock outcrops, and riparian zones carry rare and sensitive species.

Match proposed military training to the specific condition of a site. Some areas are suitable locations for intensive military training and management, while others are more sensitive.

Try to preserve native plant and animal species. Avoid introducing exotic plants and animals that have the potential to spread and displace native species, change or disrupt natural communities, or reduce ecological or training opportunities.

Focus management on ecological communities. The only practical way of addressing the habitat needs of many species at once is by managing for naturally occurring groups of species.

Protect rare or ecologically important species that may not receive enough protection under the ecosystem-based approach to management.

Minimize habitat fragmentation. Large patches of undisturbed natural habitat are important to conserving biodiversity. More fragmentation in already fragmented areas reduces availability of those habitat conditions that may be the rarest. Where possible, management should increase patch size.

Develop, preserve or improve connective corridors between patches of quality habitat in otherwise fragmented landscapes. Identification of existing landscape patterns and preserving or reestablishing natural vegetation types along riparian corridors and on selected tracts of land increases landscape connectivity.

Preserve naturally occurring structural diversity. At the site or community level, this includes providing for a diversity of plant species. At the landscape level, management should preserve various community types, successional stages, and patch sizes.

Preserve or mimic natural processes. Naturally occurring processes, such as succession, disturbance, nutrient cycles, and such, have been important forces in fixing native biodiversity. It is difficult to manage for large-scale natural disturbance processes such as wildfire. Prescribed fire and other types of vegetation management techniques mimics natural disturbances.

Protect genetic diversity. Genetic variation within plant and animal populations provide species with greater flexibility to adapt to changing environmental conditions, thus increasing the likelihood of preserving species viability. One way to protect genetic diversity is to protect isolated populations at the edges of species' ranges - populations that are often genetically distinct. Another way is to provide connective corridors to promote movement of organism and prevent isolation of small populations.

The basic steps for implementation of ecosystem-based management include:

Delineation of boundaries and scales. The size of the analysis area should not be so large that managers will not be able to focus adequately on specific local problems, nor so small that managers are unable to address the effects on the ecosystem of activities and processes originating across boundaries. It is important to distinguish between boundaries defining the area to which decisions will apply and those that are necessary for collecting and organizing information. A key principle is to consider ecosystems at the next higher and next lower scales from the management scale to assess whether these scales are affected by management and conversely.

Inclusion of all relevant and affected stakeholders. Inclusion increases the prospects of successful plan implementation.

Assessing constraints and opportunities. This includes assessing current ecological, legal, social, and land use conditions and trends. This also includes identifying conditions necessary to keep ecosystem integrity. This "reference condition" for each major ecosystem type is a fitting and defensible starting point. Effective assessment also includes "mapping" as many linkages (that is, ecological, social, economic) as possible, but eventually a "coarse-filter" approach to protect elements and links that cannot be studied in detail must be used.

The short- and long-term effects of human activities on the ecosystem are also assessed. A major element is trying to account for training impacts.

Implementation. Implementation includes involving relevant decision makers early on in the planning and recognizing mandates, laws, budgets, and staff realities. Effectively presenting the process and its recommendations will help in gaining support and impetus for carrying out actions. Stakeholders must be informed and involved.

Monitoring progress, evaluating impacts, and adapting management based on new information. This is the key to adaptive management. There is no substitute for reliable monitoring to help find out the success or failure of management actions. As understanding of ecosystems changes over time and as the needs (and impacts) of the training mission change, there must be flexibility, openness, and willingness to experiment, watch, and adapt.

Multiple, modest experiments will often yield more insight about a problem than one general design applied broadly. A prototype should focus on a specific problem and should be testable with only a few years data at most. If successful, the prototype can be copied, if unsuccessful, it can be abandoned without great cost.

2.2 Authority

This INRMP Update fulfills (in whole or part) or references the following natural resource-related laws and rules:
Sikes Act Improvement Act of 1997
National Environmental Policy Act of 1969
Endangered Species Act of 1973
National Historic Preservation Act of 1966 (as amended through 1992)
Archeological Resources Protection Act of 1979
Federal Noxious Weed Act of 1974
Clean Water Act of 1987
Clean Air Act (as amended through 1990)
Federal Insecticide, Fungicide, and Rodenticide Act
Protection of Wetlands, 1977, Executive Order 11990
Migratory Bird Treaty Act
32 CFR Part 651, Environmental Analysis of Army Actions
NGB NEPA Handbook, Guidance on Preparing Environmental Documentation for Army National Actions in Accordance with the National Environmental Policy Act of 1969

2.3 Responsible and Interested Parties

2.3.1 Utah National Guard

The Camp Williams Commander and Training Site Manager are responsible for implementation of the INRMP Update. The Director of Environmental Resources Management (ERM) and the Camp Williams ERM office provide administration and implementation of the INRMP Update, and advise the Training Site Manager and Commander of matters on integrated natural resource management. Organizations with implementation interests and responsibilities include: AGCW Operations and Range Control (RC); AGCW Facilities Management; Directorate Plans and Training; Directorate Engineering and Housing. All units and organizations training at or using Camp Williams will comply with the INRMP Update, with oversight provided by the Operations and Range Control Office.

Environmental Resources Management responsibilities include: oversight and direction; general natural resources program planning and management to include National Environmental Policy Act (NEPA) compliance; grazing management; vegetation management;; soils conservation; water resources protection and conservation; planning for and monitoring of integrated pest management, including noxious weed control; air quality and air emissions compliance; cultural resources protection and conservation; wildlife management; threatened and endangered species management surveying and protection; natural resources monitoring; land rehabilitation and maintenance (LRAM); general environmental compliance; integration of Geographic Information Systems (GIS) administration and management; environmental awareness; and Training Requirements Integration (TRI).

There are two important changes moving funding away from ERM. Responsibility for fuels management and other wildfire prevention rests in the Real Property and Range Training Land Program (RTLP) under AGCW-RC. Second, while ERM can develop plans and survey noxious weeds and other pests, responsibility for control passes to Facilities.

2.3.2 National Guard Bureau

The National Guard Bureau (NGB) provides guidance, policy and funding for natural resource management and INRMP implementation. The NGB-ARE provides MACOM (major army command) review and approval of the INRMP Update under Department of Army policy. The Chief of Environmental Programs Division is a signatory to the INRMP Update. The NGB is responsible for seeking necessary funding to carry out the INRMP Update through the Department of Army budgeting.

2.3.3 Other Federal Agencies

The US Fish and Wildlife Service (USFWS) takes part in developing and review of the INRMP as directed by the Sikes Act Improvement Act (SAIA) and described by Army Sikes Act Improvement Act Implementation Guidance. The Regional Director is a signatory.

Other federal agencies which may cooperate with implementation of the INRMP Update include the Natural Resources Conservation Service (NRCS) and the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS). Because the Bureau of Land Management (BLM) manages nearby lands, the UTNG may consult the BLM on regional management issues.

2.3.4 State Agencies

The State of Utah Department of Wildlife Resources (UDWR) is the second principal nonDoD agency that takes part in development and review of this INRMP Update. The Director of UDWR is a signatory on the plan.

State agencies which may cooperate with implementation of the INRMP Update include the Division of Forestry, Fire and State Lands (the Salt Lake and Utah County fire wardens), the State Historic Preservation Office (SHPO), and the Utah Department of Natural Resources (UDNR).

2.3.5 Indian Tribal Governments

Under DoD Annotated American Indian and Alaska Native Policy (October 27, 1999) and Executive Order 13175, the UT-ARNG recognizes there exists a unique and distinctive political relationship with federally recognized tribes. This Executive Order identifies tribal governments as consulting parties rather than “other interested parties.” Specific requirements are in chapters 3 & 4 of the UT-ARNG Integrated Cultural Resource Management Plan (ICRMP).

2.3.6 Universities

Since 1992, interdisciplinary teams of faculty, specialists, and graduate students from the College of Natural Resources, Utah State University, have conducted collaborative ecosystem-based research at Camp Williams. This collaboration integrates information from biological surveys and ecosystem studies and helps decisions on environmental management and land-based training.

Utah State University's continuing partnership with the UT-ARNG encompasses projects intended to support integrated natural resources management. GIS links information from the various databases by integrating spatial and temporal reports on biological, physical, and cultural surveys, ecosystem studies, and military training, to enable ecosystem-based decisions.

2.3.7 Local Governments

Other interested parties include the Cities of Lehi, Bluffdale, Eagle Mountain, Saratoga Springs, Herriman, and Riverton. The governments of Salt Lake and Utah Counties and their respective Soil and Water Conservation Districts may also have an interest in the natural resource management at Camp Williams.

2.3.8 Private Entities

While the input of interested parities and special interest groups is appreciated and encouraged, no private groups have expressed interest in environmental management at Camp Williams.

2.4 Review for Operation and Effect – 2001-2006 INRMP

2.4.1 Review Coordination

The UTNG set up early contact with the UTDWR and USFWS by phone, with a following letter inviting them to join in the INRMP review[2]. UTDWR directed the point of contact be in the Central Region Office. The USFWS initially directed contact from the Utah Ecological Services Office to the military coordinator at the Vernal Field Office; after the preliminary draft was completed, the USFWS redirected contact to the Utah Ecological Services Office. The UTNG and USFWS conducted a face-to-face review then.

The UTDWR responded to the first review request for participation by e-mail. The USFWS provided substantial and useful comments. The two most significant questioned our management of migratory birds and how monitoring data triggers management[3].

2.4.2 Decision to Update

2.4.2.1 DoD Supplemental and Additional Guidance

No less often than every 5 years, all three parties to the INRMP must complete a review of the INRMP. Although the Sikes Act specifies only that a formal review must be completed no less often than every 5 years, DoD policy requires installations to review INRMPs yearly in cooperation with the other parties to the INRMP. Annual reviews promote "adaptive management" by providing an opportunity for the parties to review the goals and objectives of the plan, as well as set up a practical schedule for undertaking proposed actions.

If only limited revisions to an existing INRMP are thought needed, and these revisions are not expected to result in biophysical consequences materially different from those expected in the existing INRMP and analyzed in an existing NEPA document, then neither more NEPA analysis nor an opportunity for public comment should be necessary.

The Sikes Act is silent on the need for ESA consultation on INRMPs. As a result, neither a separate biological assessment nor a separate formal consultation should be necessary on most INRMPs or INRMP revisions.

2.4.2.2 Implementation Assessment

Most projects identified in the 2001-2006 were either completed or "discontinued" – projects that were not completed for some reason (See Table 2-1). Most projects will continue through the INRMP Update.

2.4.2.3 Review for Operation and Effect

The UTNG conducted the review for operation and effect of the 2001-2006 INRMP. After review of performing this INRMP, the UTNG decided to "update" and continue implementation of the existing INRMP with new information, some minor management changes and reformatting of the document. The goals and objectives are unchanged. It has been reorganized from the original format to that of the ARNG template. Projects have been added and removed as part of adaptive management. The needed management changes are not "materially different in biophysical consequences." The changes include:

- Section 7.8, Agricultural Out-leasing - *temporarily* suspend livestock grazing
- Section 4.3, Geology – updated to reflect new geology mapping by the Utah Geologic Survey;
- Section 5.3, Wildlife – updated to reflect monitoring results;
- Section 5.4, Threatened and Endangered Species – updated to reflect new planning level surveys, which found no new species, in preparation for this five-year review;
- Section 6, Mission Impacts on Natural Resources – updated to reflect the current mission and results of Range and Training Land Assessment analyzes;
- Section 7.3, Wildlife Management – includes deer herd surveying and matching prescription for mule deer management, should it be needed, and discussion of responsibilities for migratory birds;

[2] All official correspondence is in Appendix B.
[3] The review errata and response is included in Appendix A..

Table 2-1. 2001-2006 INRMP Project and Program Priorities Review.

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
Natural Resources Manage-ment	Maintain surface water distribution for wildlife/livestock	Annual (A)	8.2,8.3,8.4,8.6	P, B	High(H)	Discontinued - System damaged by storm; livestock grazing discontinued.
	Manage grazing systems	A	8.2	P,B,PM	H	Discontinued - Livestock grazing incompatible with military training and wetlands management.
	Seasonal range conservationist for vegetation/grazing management	A	8.2	P,PM	Medium (M)	Discontinued - No need as grazing is discontinued.
	Convert "One-station TA" into bivouac area	2	8.6	E	M	Complete - Established as alternate operations area for RTI.
	Improve and disburse high use bivouac areas	1-5	8.6	P,E	H	Complete - West Landing and Area 51 bivouacs improved through ITAM (undeveloped bivouacs identified).
	Harden existing artillery firing points	5	8.6	P,E	Low(L)	Discontinued - Incompatible with Paladin training standards.
	Develop trails and hardened Paladin firing points	2-5	8.6	P,E	H	Discontinued - Incompatible with Paladin training standards.
	Rehabilitate abandoned agricultural fields	1	8.6	P,B,E	H	Complete - Fields in Tickville converted to use as designated digging areas for engineer training; West Landing

[4] Section refers to the original 2001-2006 INRMP.

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
						converted to bivouac.
	Rehabilitate riparian areas	A	8.2,8.3,8.6,8.9	C,P,B,E	H	Incomplete - Main impact, grazing, mitigated.
	Implement IPM for noxious weeds	A	8.5	C,P,B,E, PM	H	Complete - On-going
	Develop and maintain GIS layer with known and potential noxious weed populations	A	8.5,9.5	C,P,B,PM	H	Complete - On-going
	Contain and control activities for dyer's woad and musk, Canada, and purplestar thistles	A	8.5	C,P,B	H	Complete - Dyer's woad contained, Canada thistle and purple and yellow starthistles eradicated; musk and scotch thistle uncontained.
	Prescribed burning and reseeding for vegetation rehabilitation, invasive weed management, and seedbed preparation	A	8.4,8.6	C,P,B,E	H	Discontinued - Prescribed burning prohibited by order of TAG. Critical burnt areas, weed control areas, and training areas reseeded annually.
	Prescribed burning for fire hazard reduction	A	8.4	P	M	Discontinued - Prescribed burning prohibited by order of TAG.
	Develop vegetative fuelbreaks for wildfire management and rehabilitation	A	8.4,8.6	P	H	Complete - Fuel treatment projects complete in Wood Hollow, Blacks Ridge, Oak Springs, and North Tickville.
	Apply herbicide for fire hazard reduction and vegetation management	2,5	8.4	P	M	Complete - Herbicide treatment project completed along north Impact Area in 2002.

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
	Prescribed thinning for fire hazard reduction and training enhancement	A	8.4,8.6	P,B,E	H	Discontinued - Prescribed burning prohibited by order of TAG.
	Develop drinking water contingency sources	1	8.12	C,PM	H	Complete - New well drilled October 2005,
	Develop and implement management strategies for ground and surface water protection	A	8.12	C,P ,PM	H	Complete – Drinking Water Source Protection Plans developed for all sources.
	Manage potential contamination sources	A	8.12	C,P	H	Complete – Drinking Water Source Protection Plans developed for all sources.
	Delineate groundwater source	1	8.12	C	H	Complete - Delineation Reports prepared for four sources.
	Develop land use agreements pertaining to ground and surface water	1	8.12	C,P	H	Discontinued – No need identified in reports.
	Protect/fence Hidden Valley Springs	2	8.12	P	M	Complete - Fenced, unused by training.
	Define management areas by training and ecological criteria	1,2	7.2,8.11	PM	M	Complete - Training Areas re-delineated by natural boundaries (e.g., ridgetops, valley bottoms, etc.) and man-made features (e.g., roads, training area use, etc.) in 2001.
	Collect military training data	A	8.11,9.4	PM	H	Incomplete - RFMSS reflects only scheduled use.
	Define sustainable levels of training by management area	2,3	8.11,9.4	P,B,PM	M	Incomplete - Incomplete
	Integrate ERM GIS data and software into facility and	A	8.11,9.5	PM	H	Complete - Data shared and supported in

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
	operations/range control offices					Facilities and Operations offices;
	Maintain GIS database	A	9.5	PM	H	In progress - GIS database in transition to FGDC metadata standards (xx%), to SDSFIE format (xx%), and started transition to SDE. Cartographic standards implemented IAW NGB Policy.
	Provide GIS support to ERM, facilities, and operations/range control offices	A	8.11,9.5	PM	H	Complete - Support provided by ERM full-time GIS Technician to AGCW offices. ITAM has part-time GIS technician stationed to support Range Control.
	Maintain GIS community forest inventory	A	8.10,9.5	PM	M	Complete - On-going
	Develop and implement Deer-highway management plan in cooperation with UDOT and DWR	2	8.3	P	M	In progress - Deer-management plan in draft for inclusion in INRMP Update.
	Consult with DWR on special deer hunts	2	8.3	P,B,PM	M	Complete - Deer hunt incompatible with installation training mission and safety, no population or habitat need.
	Consult with DWR about sage grouse population on CW	2	8.3	B	L	Complete - Sage-grouse not listed under ESA; species of concern for INRMP Update.
	Maintain raptor	A	8.3,8.8	P,B,PM	M	Complete - Four known Golden

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
	banding program					Eagle nests monitored and chicks banded annually in cooperation with DWR.
	Evaluate and prescribe wildlife management practices in the garrison	A	8.3,8.10	P,PM	L	Complete – On-going: Project input to EPR budget system and contracted to USU.
	Evaluate and prescribe Community forest practices	A	8.10	P,B,E,PM	L	Incomplete
Inventorying and Monitoring	Implement encroachment monitoring program	A	8.14	P,E,PM	H	Complete - Assessment conducted.
	Extend biological assessments to surrounding lands	4	6.0	PM	L	Complete - New data developed to include 1-2 kms from boundary.
	Monitor land condition and training impacts	A	9.2	C,P,B,E, PM	H	Complete - LCTA program implemented annually.
	Revise dwarf bear claw poppy endangered species management plan	1	8.8,App.A	C,P,B,PM	H	In progress - St. George requires separate INRMP (submitted to DA list) that meets the substance of an Endangered Species Management Plan.
	Monitor noxious weeds in conjunction with LCTA field activities	A	8.5,9.2	C,P,B,PM	H	Complete - Separate crew employed for 2001-2006.
	Resurvey Threatened and Endangered species	5	8.8,9.0	C,P,B	M	Complete - Resurveyed in 2005: no plants found; targeted searches for probable species (sage grouse, pygmy rabbits) were negative.
	Monitor breeding bird populations	A	8.3,9.1	P,B	M	Complete - Spring populations

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
						surveyed annually.
	Monitor active and inactive raptor nests	A	8.3,8.8,9.1	P	M	Complete - Four known Golden Eagle nests monitored and chicks banded annually in cooperation with DWR. Protocols in development for 2006 for general raptor monitoring.
	Determine demographics of mule deer herd	2	8.3,9.1	P,B	M	In progress - Deer-management plan in draft for inclusion in INRMP Update.
	Monitor livestock use of CW	A	8.2,9.1	P, B	M	Complete - Livestock grazing incompatible with military training and wetlands management.
Applied Research and Special Projects	Integrate fugitive emission control strategies with natural resources management consistent with air emission Approval Order and CW Dust Control Plan (CWDCP)	A	8.7,8.13, App.B	C,P,PM	H	Complete
	Develop encroachment mitigation strategy and plan	3	8.14	P,E,PM	M	Incomplete
	Develop and implement efficient and effective LCTA sampling methods	4	9.2	C,P,B,E, PM	M	Complete - Monitoring conducted using PDAs for improved accuracy.
	Continue refinement of the NED and CW LCTA analysis package	A	9.2,9.5	PM	H	Discontinued - database converted to Access format.
	Incorporate soil erosion classification into GIS and the INRMP	2	8.7,9.0	C,P,B,E, PM	M	Complete – Bartsch, K.P. 1998. Modeling soil loss to determine water

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
						erosion risk at Camp Williams National Guard Base, Utah. M.S. Thesis, Utah State University. 111p.
	Incorporate NRCS soil survey into GIS	2	6.6,8.7,9.0	PM	M	Completed – Also, geologic survey completed by Utah Geologic Survey for Jordan Narrows and Tickville Springs USGS 7.5' quads.
	Update soil erosion classification based on NRCS soil survey	2	8.7,9.0	P,PM	L	Complete – updated IAW Bartsch, K.P. 1998. Modeling soil loss to determine water erosion risk at Camp Williams National Guard Base, Utah. M.S. Thesis, Utah State University. 111p.
	Develop a revised vegetation classification and GIS layer using remote sensing technology	2	6.8	P,B,PM	M	Complete - Implemented by contract with USU.
	Develop recommended site-specific plant species lists for restoration/rehabilitatio n projects	2	8.6	P,B,E	M	Incomplete.
	Implement and assess alternative vegetation management	A	8.2,8.4,8.5,8.6	P,B	H	Complete.
	Monitor and detect vegetation and land condition change detection using remote sensing	A	9.3	PM	M	Complete – several projects in final stages through USU.
	Establish GIS standards	1	9.5	PM	M	In progress - GIS database in transition to

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
						FGDC metadata standards, to SDSFIE format, and started transition to SDE. Cartographic standards implemented IAW NGB Policy.
	Use remote sensing and bio-physical models to detect and predict invasive weed outbreaks	3,4,5	8.5,9.3	C,P,B	L	Discontinued.
	Fill in missing data in current RFMSS database using unit lists, METL, training plans, and SIDPERS	A	8.11,9.4	PM	M	Discontinued – too extensive of project.
	Supplement military land use data for years prior to RFMSS initiation using unit lists, METL lists, copies of training plans, and SIDPERS	1	8.11,9.4	PM	M	Discontinued – too extensive of project.
	Integrate RFMSS and ecological monitoring data	4,5	8.11,9.2,9.4, 9.5	C,P,B,E, PM	H	Incomplete – actual use data missing from RFMSS.
Environmental Awareness	Prepare and maintain EA materials and training	A	11.0,12.0	PM	H	Complete - New Soldier/Leader's Guide for Training at Camp W.G. Williams card, Environmental Safety and Prevention card, and Soldier's Guide to Wildlands of Camp W.G. Williams booklet developed and distributed; Natural Resources page added to ERM website. 2005 NGB

General Manage-ment Class	Management Activities	Schedule	Section Reference[4]	Category	Priority	Status
						Conservation Training hosted by UTNG-ERM.
	Develop community outreach EA strategy and materials for wildland management and military training	2,3,4	8.14,11.3	PM	M	Complete - ERM website developed for public access; ERM attends community functions.
	Maintain National Register of Historic Places enhancement program	A	12.2,12.3	C,P,PM	M	Complete - IAW ICRMP.

- Section 7.5, Wetland Management – reflects need for monitoring and change in DA policy;
- Section 7.7, Wildfire Management – updated to reflect DA policy change and refined management; and
- Section 7.9, Integrated Pest Management – updated to reflect the results of past management and weed issues from 2001-2006 INRMP.

As only limited revisions, that is, updates, are necessary, the UTNG will carry out this INRMP update with a Record of Environmental Consideration according to Army Supplemental Guidance. The INRMP update will be available for a 30-day public review, concurrent with NGB's second review.

The UTNG conducted this review under 2004 Department of Defense Supplemental Guidance for INRMP Reviews.

2.5 Requirements and Mechanisms for Annual and Five-Year Review

ERM will act as the lead UTNG organization for annual and five-year review.

Draft Guidance for Implementation of the Sikes Act Improvement Act (SAIA) states that installations will set up and keep regular communications with the U.S. Fish and Wildlife (USFWS) and the state wildlife agency (UDWR) that at a minimum will include annual coordination. The installation will invite both agencies to join in development or revision of an INRMP. An INRMP will reflect the "mutual agreement" of all three parties.

An annual review will consist of a briefing and field tour for the USFWS and UDWR about current issues and a request for comments. The annual review is to tell each agency about progress in implementation of the INRMP and to identify other issues not addressed into the INRMP. It will typically result in an "update" to the INRMP, complete with documentation. An example form to track annual review is in Appendix A.

Every five years, a review of the INRMP will decide if a revision is necessary. The UTNG will invite the USFWS and UDWR by letter, enclosing hard copy and digital INRMP copies, within 30 days of starting the action to engage in the five-year review. The UTNG will notify each agency of the intent to provide the initial draft for review 60 days before delivering the document. The UTNG will incorporate and document written comments to develop a document that reflects common agreement. The UTNG will advise each agency of the intent to provide the final draft 60 days before delivery. Comments will be incorporated and the document will be completed within 120 days afterward.

Public comment on either an annual review or five-year review will be sought depending on the degree of revision needed. If no or limited revision is needed, it will be an "update" and no public comment will be sought. If extensive revision is needed, procedures will follow National Environmental Policy Act public comment requirements that will at minimum include a 30-day public review period.

3 INSTALLATION OVERVIEW

3.1 Location

Camp W.G. Williams is in north central Utah, 26 miles south of Salt Lake City (Figure 3-1) in Utah and Salt Lake Counties. It sits on the eastern slopes of the Traverse Mountains, a low range that bridges the Oquirrh Mountains to the west and the Wasatch Mountains to the east. As well as its relevance to the Utah Army National Guard (UTNG) training mission, Camp Williams represents an important block of wildland and biodiversity within a rapidly developing urban landscape.

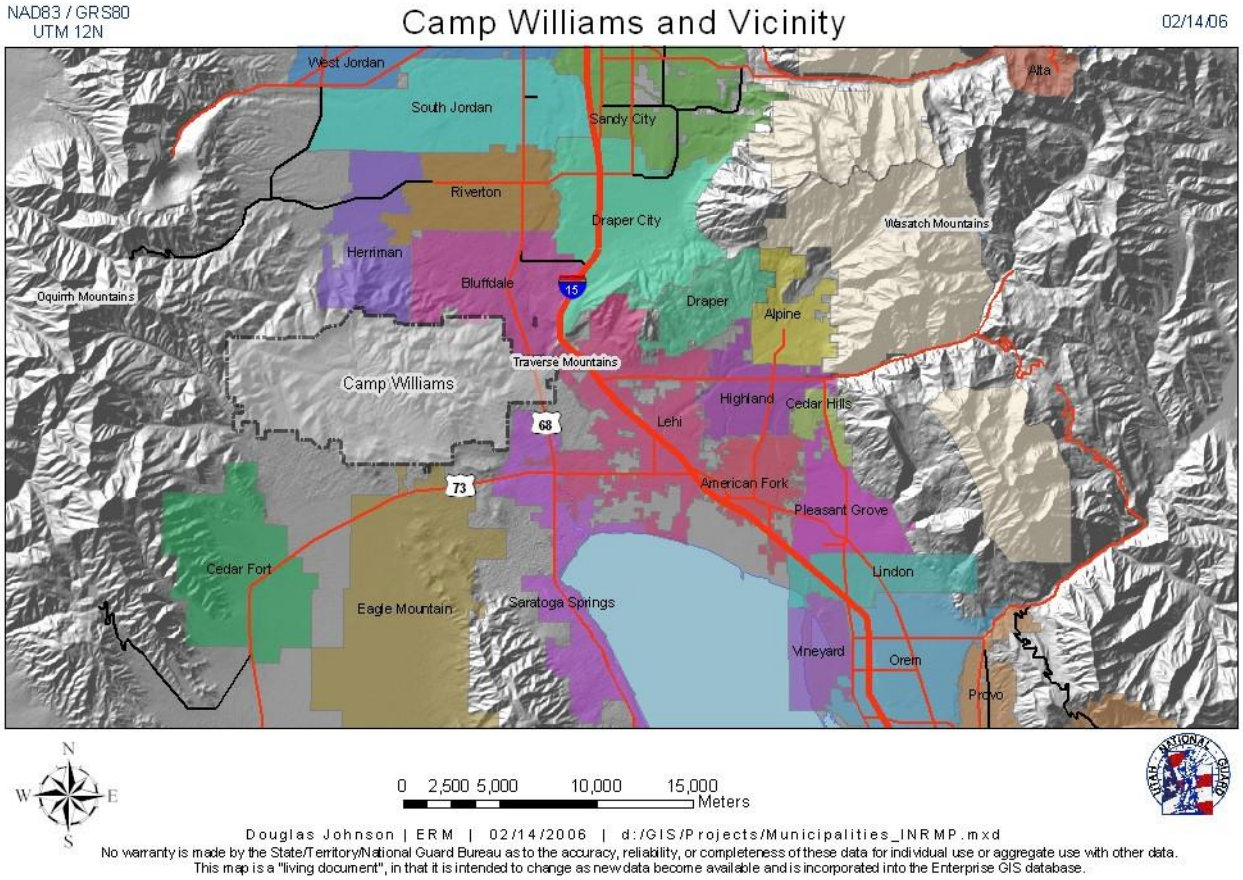


Figure 3-1. Geographic Setting of Camp Williams.

3.1.1 Satellite Installations

Hidden Valley is one mile north of camp beside the Jordan River and is about 7.5 acres in size. While the military does not training there, it has significant natural resources, including wetlands, drinking water and wildlife habitat. Camp Williams is developing a new drinking water source within its main boundary. Once this new well is functioning and reliable, Hidden Valley's source may become obsolete.

3.2 History, Acreage and Acquisition

Camp W. G. Williams is the premier training site for the Utah National Guard in Utah and consists of 25,000 acres. President Woodrow Wilson set up Camp Williams by Executive Order in 1914 and it has been used for military encampments since 1854. In 1928, the camp was named for Brigadier General W.G. Williams, who was instrumental in fixing the camp as a permanent training site. Originally Camp Williams was 18,700 acres but between 1926 and the beginning of World War II Camp Williams grew to allow the increase in the number of troops training in the Utah National Guard. To help support training, the State of Utah bought 153 acres in 1927 and another 199 acres in 1931 for development of a suitable cantonment area. In 1929, the Secretary of War granted a license to the State of Utah to use another 6,140 acres for organizing and training the Utah Army National Guard.

At the start of World War II, the War Department appointed Camp Williams as an installation instead of a military reservation. A directive was issued to acquire the privately owned in-holdings within the area originally received in 1929. About 2,280 acres were bought under this directive leaving a balance of 11,280 acres of the original reservation still in state, county, and private ownership.

By 1990, Camp Williams had grown to over 25,000 acres, but much of the interior of the camp was still disjointed and under multiple ownership. The diversity of landowners made it difficult to control or restrict public access, and hard to manage live-fire training exercises. Therefore, on July 10, 1990, the 101st Utah Congress passed the "W.G. Williams Land Exchange and Withdrawal Act of 1990", which consolidated the Department of the Army property within a specific boundary. This law, PL 101-628: 1) approved land exchanges with private individuals who owned land inside Camp Williams, 2) allowed for adjusting the boundary of Camp Williams, and 3) returned certain lands to public status. Four tracts of privately owned land, totaling about 865 acres, inside Camp Williams were exchanged for lands outside the camp boundaries. About 1,400 acres of Bureau of Land Management (BLM) land inside camp boundaries were added to Camp Williams in exchange for 1,900 acres to be returned to public domain. Administration of these lands by the BLM was completed after they were certified as clear of military ordnance, toxic, and hazardous waste. Once the land exchanges were complete, Camp William's jurisdiction was its current size of about 25,000 acres. With its increase in size, the use of Camp Williams has increased and training now approach half a million troop training days a year.

The jurisdictional landownership of Camp Williams is uncertain; the UTNG has contracted with the Army Corps of Engineers to research and document landownership. It is accepted the landowners are the U.S. Government (Department of the Army), State Trust Lands, and the State Armory Board.

3.3 Military Mission

3.3.1 Overview

The mission of Camp Williams is to create a quality training environment for military units, the individual service member, and other organizations by providing facilities, logistical support, and personnel help. Military units conducting training at Camp Williams include the Utah Army National Guard and Air National Guard, US Army and Army Reserve, US Marine Corps and Marine Corp Reserve, US Air Force and US Air Force Reserve, ROTC, and other Department of Defense organizations. Units that use Camp Williams as their main training site include: 19th Special Forces Group (Airborne), 211th Aviation Regiment, 115th Engineer Group, 300th Military Intelligence Brigade, I Corps Artillery, 97th Troop Command, Training Site Command (TSC), Joint Force Headquarters (JFHQ), and the Regional Training Institute (RTI). As well as military units, Camp W.G. Williams is a major training site for law enforcement agencies in the region. Civilian groups (for example, church groups, boy scouts) also use facilities.

3.3.2 Training Operations

Types of military training include weapons live-fire familiarization and qualification, basic airborne and jump master refresher courses, military academy courses (including field exercises), battalion-sized field training exercises, group and brigade-sized command post exercises, urban assault and defense training, mobilization processing exercises, artillery battalion live-fire exercises, individual training, and primary leadership development courses. Table 3-1 lists the types of assets available for training at Camp Williams. Figure 3-2 is an example of the information pages or "Range Pages" associated with all ranges on Camp Williams. Similar pages are being developed for all nonlive fire areas as well as all light and heavy maneuver areas (Training Areas). The pages are available through the Camp Williams website and provide information on assets, site capacities and limits, sdz's, downloadable maps, and links to scheduling through RFMSS. Descriptions of these assets can also be found in chapter 6.1 of the Range and Training Land Development Plan (Nakata Planning Group, LLC, 2001)[1].

Training occurs year-round, nearly 50 weekends a year, with 10-12 annual training periods (up to 14 days in duration). Refer to the Utah Army National Guard Range and Training Land Program Development Plan (final, Nakata Planning Group, 2001) for more information.

Table 3-1. Types of Training Assets Available at Camp Williams.

Asset	# of Asset
Basic Weapons Marksmanship Range	10
Collective Live Fire Range	3
Direct Fire Range	2
Scaled Mortar Range	1
Indirect Fire Range	5
Special Live Fire Range	3
Nonlive Fire Facilities	20
Light Manuever Areas	36
Heavy Manuever Areas	10
Total Assets:	89

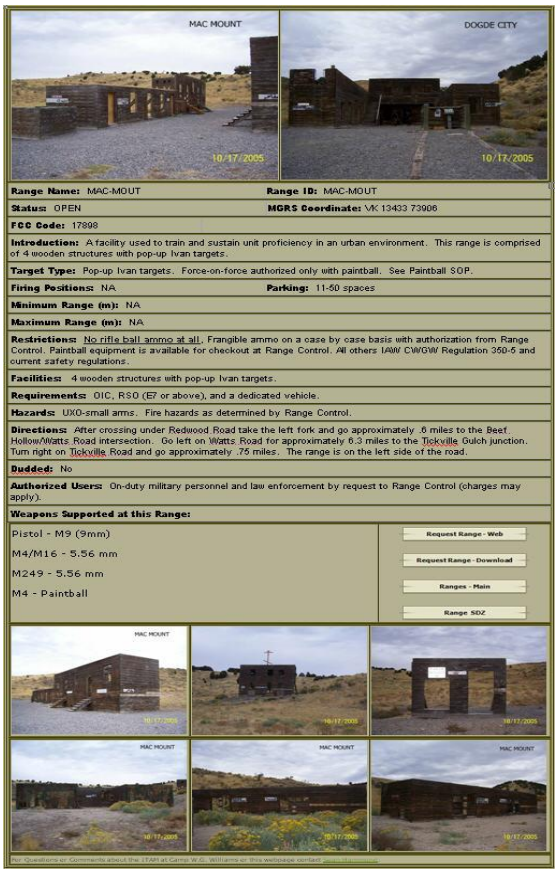


Figure 3-2. Example Range Page: MAC-MOUT Site.

The Utah Army National Guard provides training sites and facilities at Camp Williams, which support a wide variety of civilian and military agencies at the federal, state, and local levels. Besides the field sites, the camp has billeting capacity for over 2,300 and many administrative, supply and classroom amenities. The camp keeps a heliport, Basic Airborne Facility, many training ranges, and a complex of warehouses, workshops, and maintenance facilities.

3.3.2.1 2006 Training Additions

Military training doctrine changes and adapts. In line with current doctrinal changes, Camp W.G. Williams is introducing several new training facilities and ranges that will serve to improve soldier training and overall readiness. These facilities are focused around preparing soldiers for convoy combat. One live-fire convoy and one dry-fire (not real bullets) convoy range are being created. Besides the one Urban Training course currently in existence, Camp W.G. Williams is planning to build a minimum of two more urban assault courses in the 2006 fiscal year. With increasing and diverse demands on United States National Guard Units, training sites must adapt and grow to prepare soldiers for an ever-expanding and changing military mission. The immediate need for convoy and urban assault missions are just two examples of how Camp Williams is adapting to help units meet the objectives of a military mission that is becoming more complex and more advanced. We expect military training needs at Camp W.G. Williams to continue to change and advance in coming years in response to the global events.

3.3.3 Facilities

Camp Williams consists of 24,100 acres. The garrison area (cantonment) is roughly 414 acres leaving 23,282 acres for military training lands. Camp William's cantonment has a capacity to hold a brigade. The Camp can support small arms training, artillery firing and maneuvering, Basic Airborne, demolitions training, land navigation, helicopter maneuvering.

3.3.3.1 Firing Ranges

10M
25M Zero
25M Field Fire
Aerial Gunnery Range (AGR)
Alternate Pistol Range
AT4
Biathlon Roller Loop
Combat Pistol
DEMO
Engineer Qualification Area (EQA)1
EQA2
EQA3
Grenade Launcher
Hand Grenade
Infantry Squad Battle Course (ISBC)
Known Distance (KD)
M31
Military Assault Course (MAC) Military Operations on Urban Terrain (MOUT)
Mortar
MultiPurpose Machine-Gun (MPMG)
Modified Record Fire (MRF)
Police Officers Standards and Training (4 ranges)
Scaled Mortar
Shoot House
Urban Assault

3.3.3.2 Training Facilities

Basic Airborne Compound
COMM-A
COMM-B
Engineer Qualification Area Classroom (EQA)
Firearms Training Simulator/Electronic Security Tactical (FATS/EST)
Latimer Observation Point
Leadership Reaction Course
MAC/MOUT Classroom
Obstacle/Confidence Course
One Station Unit Training Course
Prisoner of War (POW) Camp

3.3.3.3 Bivouacs

Area 51
West Landing
South Mountain (Unimproved)

3.3.3.4 Drop Zones (DZ)

DZ Ashau (leased, private land)

3.3.3.5 Tenant Units

I Corp Artillery
1/19 SFBN (A)
19SFGP SPT (A)
640th RTI
A Co. 141st MI Battalion (Ling)

B Co. 1457th ECB (C) (W)
CBCHO
JLTC
Marines Reserve Unit
Recruiter

3.3.3.6 Mountain View Corridor and Facilities Changes

The Utah Department of Transportation (UDOT) is developing the Mountain View Corridor, a 6-8 lane freeway consisting of limited-access, higher speed, and a grade separated intersections (Figure 3-3[5]). The corridor will consist of a 135 meter right-of-away passing alongside Redwood Road and bend to follow roughly the Total Force Field (airstrip). The freeway will bridge over lower Beef Hollow and follow down the grade off the airstrip.

The Mountain View Corridor Environmental Impact Statement (EIS)[6] will consider impacts to AGCW. Placement of the highway forces several changes to the Camp (for example, the Ammo Supply Point and the Airfield) that will be documented in the EIS.

Because of the Mountain View Corridor and other safety considerations, the Ammunition Supply Point (ASP) will be moved in 2007 to the 100 Series Firing Points. A scoping charrette found that this is the only area that meets DoD regulation and internal needs. This will include major site preparation needs, given the slope for the location, and full utility tie-in to the maintenance building shack found two kilometers away needing three kilometers of sewer, and one kilometer of electrical lines alongside roads. Three buildings, a parking lot, a loading dock, and ten earth covered magazines will be built with 51 acres of site development. ASP move will be part of the Mountain View Corridor EIS.

The corridor also forces moving the airfield complex, which will also be covered by the EIS. A 6,600- by 100-foot runway with tower and four helipads of 120- by 120-feet each is planned to be built because of the loss of the landing strip to the Mountain View Corridor. This is expected to be built in the next five years and have about 84 acres of site development. The location is yet to be determined.

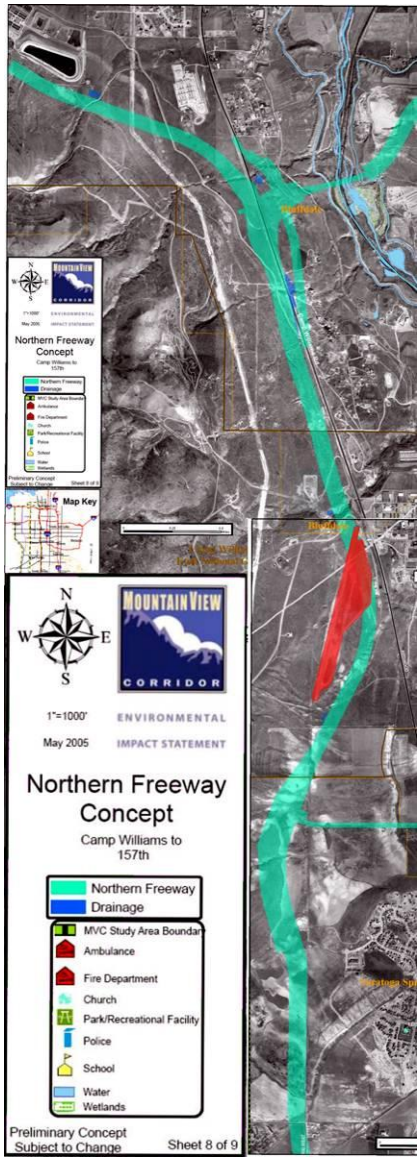


Figure 3-3. Proposed Route of the Mountain View Corridor Through Camp Williams.

3.4 Neighbors

The landownership of the area immediately around Camp Williams is mainly private and is being actively developed to the loss of military training. Suburban encroachment in the Salt Lake and Utah valleys has reduced the wildland buffer around Camp Williams and mitigation of safety concerns and negative feedback has impacted military training. New housing developments within the last 10 years have occurred near the southern and northern boundaries with more planned. This encroachment next to the boundary is expected to continue and will increase the biological isolation of Camp Williams, causing it to be both a source and sink for wildlife and plant species.

3.5 Local Natural Areas

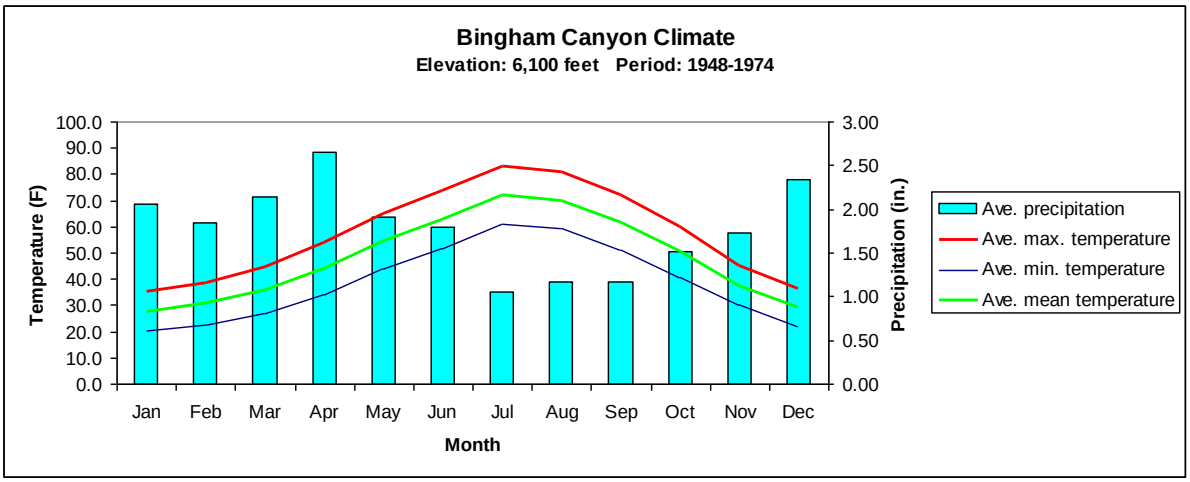
Four U.S. Forest Service wilderness areas are found in the Wasatch Mountains across the Salt Lake Valley (~8 ½ miles away). The natural environment of these higher elevation areas bears no likeness to that of Camp Williams.

[5] http://www.udot.utah.gov/mountainview/downloads/gis/NFreeways.pdf. Salt Lake County and Utah County pdf maps overlayed together with legend enlargement and highlighting of Airstrip facilities using Adobe Photoshop.
[6] Also see Section 7.3.2.3, Future Mule Deer Management Issues.

4 PHYSICAL ENVIRONMENT

4.1 Climate

Camp Williams has a characteristic continental climate of temperate deserts and semi-deserts with low precipitation and strong temperature differences between summer and winter (Bailey 1995). Most of the limited precipitation falls as snow in winter and early spring and rain during spring and fall. This is a semiarid environment with almost no precipitation in the summer (Figure 4-1).



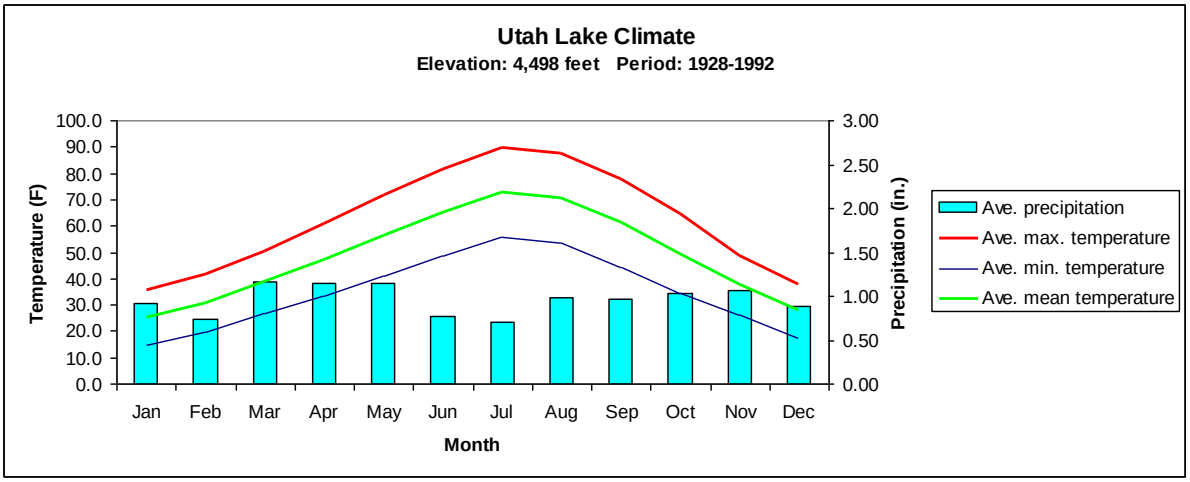


Figure 4-1. Average Precipitation and Temperature near Camp Williams.

Precipitation increases with elevation with average annual precipitation ranging from 250 mm (10 inches) at the lowest elevations to 500 mm (20 inches) at the highest. These are averaged estimates based on weather stations near Camp Williams (that is, Utah Lake at 1,370 m and Bingham Canyon at 1,860 m (4,500 and 6,100 feet, respectively). Average annual temperature at Camp Williams varies from 5-12^{0}C (40-55^{0}F) with a frost-free period ranging from 60 to 180 days.

Major climatic influences on species establishment include hot summers with extended summer droughts and cold winter temperatures down to -25^{0}C (-13^{0}F). This climate favors cool season plant species which do most of their growth in the spring when moisture is available.

4.1.1 Palmer Drought Severity Index

The Palmer Drought Severity Index (PDSI) signals prolonged and abnormal moisture shortage or excess. The index is a sum of the current moisture anomaly and a portion of the previous index to include the effect of the duration of the drought or wet spell (NOAA website 06/15/05). The index uses 0 (zero) to mark normal conditions with positive or negative numbers reflecting excess moisture or drought, respectively. The PDSI considers the soil moisture storage by dividing the soil into two layers and computing field capacity for each of the two layers. The moisture available in those two soil layers has a direct impact on moisture content and the growing capacity of vegetation. This in turn can have a direct impact on range condition, and more importantly for Camp W.G. Williams, can suggest potential intensity of wildfires (NOAA website 06/15/05). PDSI values are calculated with local climate division data. There are 350 climate divisions, divided by state, in the United States (Figure 4-2). Utah has seven separate climate divisions. Camp W.G. Williams falls into division 3.

Figure 4-2. Utah Climate Divisions.

Two large wildfires occurred in the summer of 2001and 2003 on Camp Williams. As pointed to in Figure 4-3, these wildfires occurred during two years during or immediately following severe drought conditions. Using monthly data from 1895 onward for our area, cycles may be seen which are used by Natural Resource Managers and Range and Operations Staff to prepare and plan mitigation for potential wildfire and training hazards. This mitigation may be in the form of wildfire fuels reduction projects, training checks, or project proposal for funding of mitigation a fiscal year in advance.

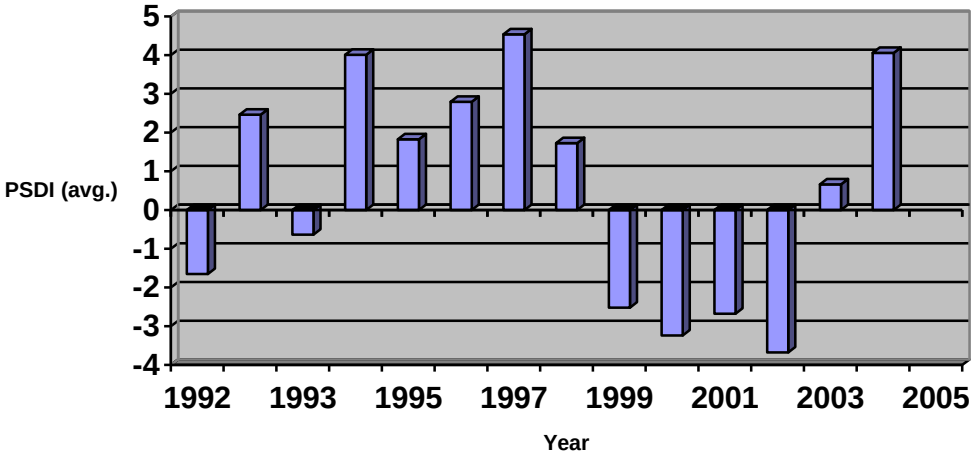


Figure 4-3. PDSI Values for Utah Climate Division 3. The numbers above were calculated by averaging the monthly PDSI values for each year using Utah climate division 3 data from NOAA. The values are:

-4.0 or less (Extreme Drought)	+4.0 or above (Extremely Moist)
-3.0 or -3.9 (Severe Drought)	+3.0 or +3.9 (Very Moist Spell)
-2.0 or -2.9 (Moderate Drought)	+2.0 or +2.9 (Unusual Moist Spell)
-1.9 to +1.9 (Near Normal)	

4.1.2 Implications for Training

The characteristic climate pattern of warm and dry summer months contributes to volatile wildfire danger weather ratings. AGCW restricts military training, mainly live-fire weapons training, based on wildfire danger. The following chart (Figure 4-4) should help military trainers expect training restrictions and safety hazards.

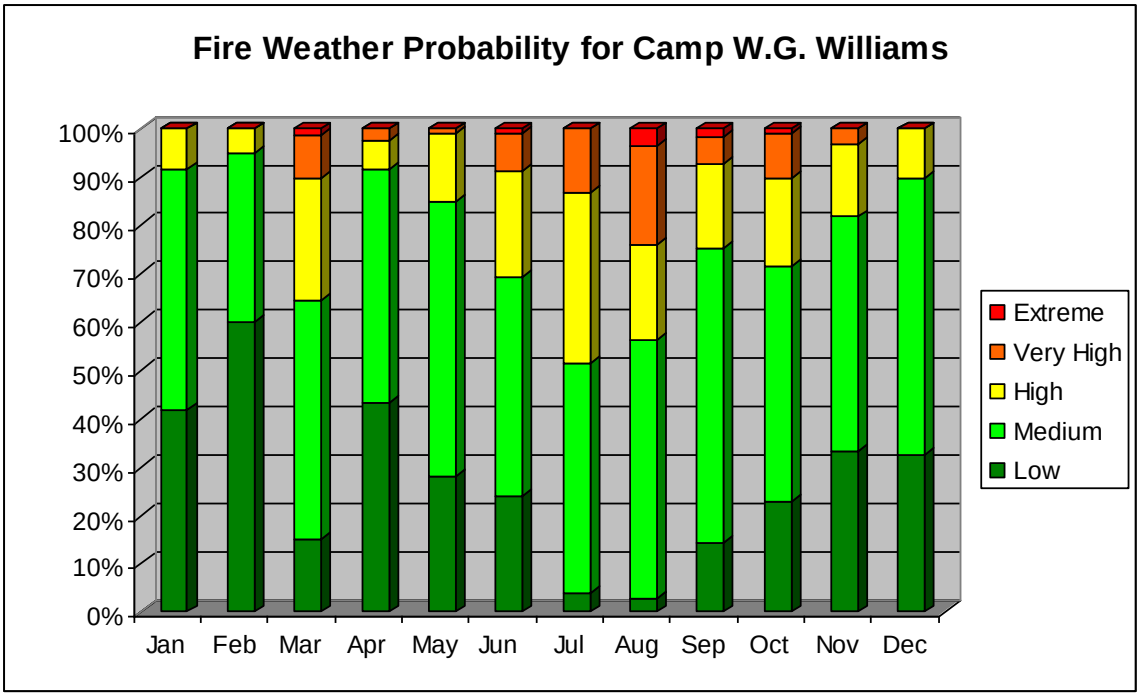


Figure 4-4. Fire Danger Rating Probability for Camp Williams Vicinity (based on 1996-1999 weather data, unknown source).

Shifting training from high wildfire danger times into the spring and fall may have affects on the impacts in the training area, as these times have higher precipitation and soil moisture that makes soils more susceptible to damage. Importantly, spring is nesting season for birds protected under the Migratory Bird Treaty Act. Should this be enacted, the effects will be evaluated and discussed with the appropriate U.S. Fish and Wildlife Service Office for appropriate procedures, for example, management alternatives and applications for permits.

4.2 Topography

Camp Williams lies in the western half of the Traverse Mountains (Figure 4-5). The Traverse Mountains, though small (17 miles maximum length and 5.5 miles maximum width), have an affect greater than their size. This mountain range splits the Great Basin province from the Western Rocky Mountains province. Although most Great Basin ranges are oriented north-south, the Traverse Mountains are oriented east to west and thus are unique to the area (Marsell 1932).

The Jordan River, on the eastern edge of Camp Williams, serves as a connection between Utah Lake, to the southeast, and the Great Salt Lake, to the northeast. The river is the drainage route for Utah Lake to the Great Salt Lake. The Jordan Narrows splits the Traverse Mountains into an eastern and western section (Marsell 1932).

Camp Williams is dominated by east-west drainages (Beef Hollow and Cedar Fort) on the eastern half and north-south drainages (Tickville, and Oak Spring) on the western half. Elevations range from 4,494 feet on the eastern boundary near the Jordan River to 7,255 feet on Sheps Ridge on the western boundary. Gentle slopes predominate on the western portion of the installation while steep (up to 58 degrees) slopes dominate the eastern portion near Beef Hollow

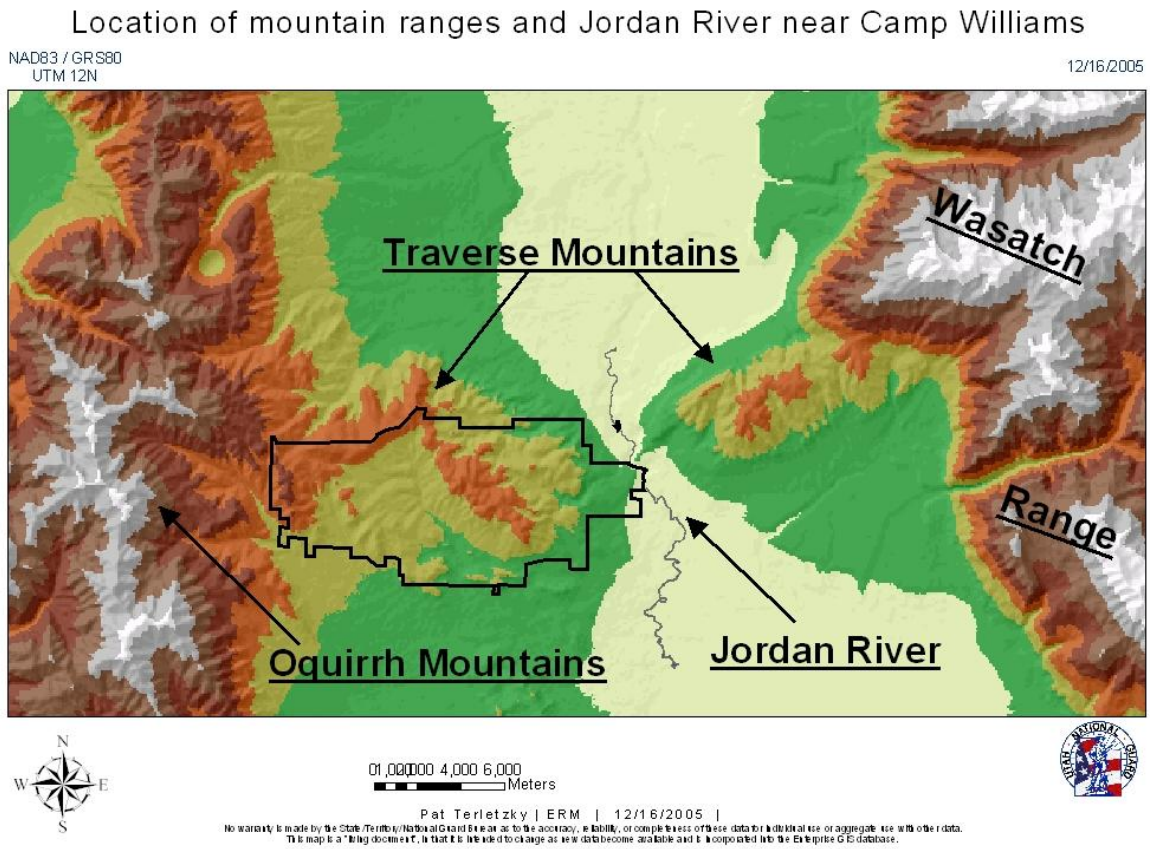


Figure 4-5. Location of Camp Williams with Surrounding Central Utah Mountain Ranges.

4.3 Geology

Camp Williams is in the central and western sections of the Traverse Mountains and the extreme eastern end of the Oquirrh Mountains. The Utah Geological Survey mapped the geology of Camp Williams at a scale of 1:24,000 during 2002 to 2004 as part of a larger effort to map the geology of the Jordan Narrows and Tickville Spring quadrangles.

Most of the mountain ranges in Utah are north-south but the Traverse Mountains are east-west because of a weakened crust along the Charleston thrust and the Deer Creek detachment faults. Even though the orientation is different, the Traverse Mountains are of the same tectonic regime that created the north-trending basins and ranges of the Great Basin. The Jordan River, found on the eastern edge of Camp Williams, runs north-south along the Salt Lake Valley. It crosses the Traverse Mountains at the Jordan Narrows and splits the range into eastern and western sections.

The geology of the Traverse Mountains has three sections: "1) Late Paleozoic shallow-marine rocks, now exposed as large northwest-trending folds…" which occurred about 140 to 50 million years ago, 2) "a variety of middle Tertiary intrusions, associated volcanic rocks, and younger basin-fill strata…" which occurred about 20 to 40 million years ago, and 3) Basin and Range extensional tectonics and the evolution of the modern Traverse Mountains." (Biek, 2005).

The Late Paleozoic period resulted in several northwest-trending anticlines (upwarps) and synclines (downwarps) on the western portion of the range that includes Camp Williams. During the middle Tertiary period, volcanism produced three groups of volcanic rocks the oldest of which is at the western end of the range (mostly northwest of

Rose Canyon) on the southeast flank of the Bingham volcanic system. A gap of about 5 million years separates these older volcanic rocks from the younger, overlying volcanic rocks from nearby volcanoes, including Step Mountain and South Mountain. A third suite of volcanic rocks is present in the east part of the Traverse Mountains, east of Jordan Narrows. Lake Bonneville, the largest Pleistocene lake in western North America, experienced cyclic highs and lows from 30 to 12 thousand years ago. The deposits from these cycles and encircle the base of the Traverse Mountains except for the topographically high northeast and western ends of the range (Figure 4-6).

The geology of the impact area is of some interest as it is the eroded remains of a previously unknown cinder cone. The partially enclosed, almost bowl-shaped topography of the impact area resulted from eroding volcanic rocks that amassed on the distal flanks of the Bingham volcanic system. The impact area is within a large north-northwest, down–faulted block associated with forming the Traverse Mountains themselves, which is why the volcanic rock is preserved in this area.

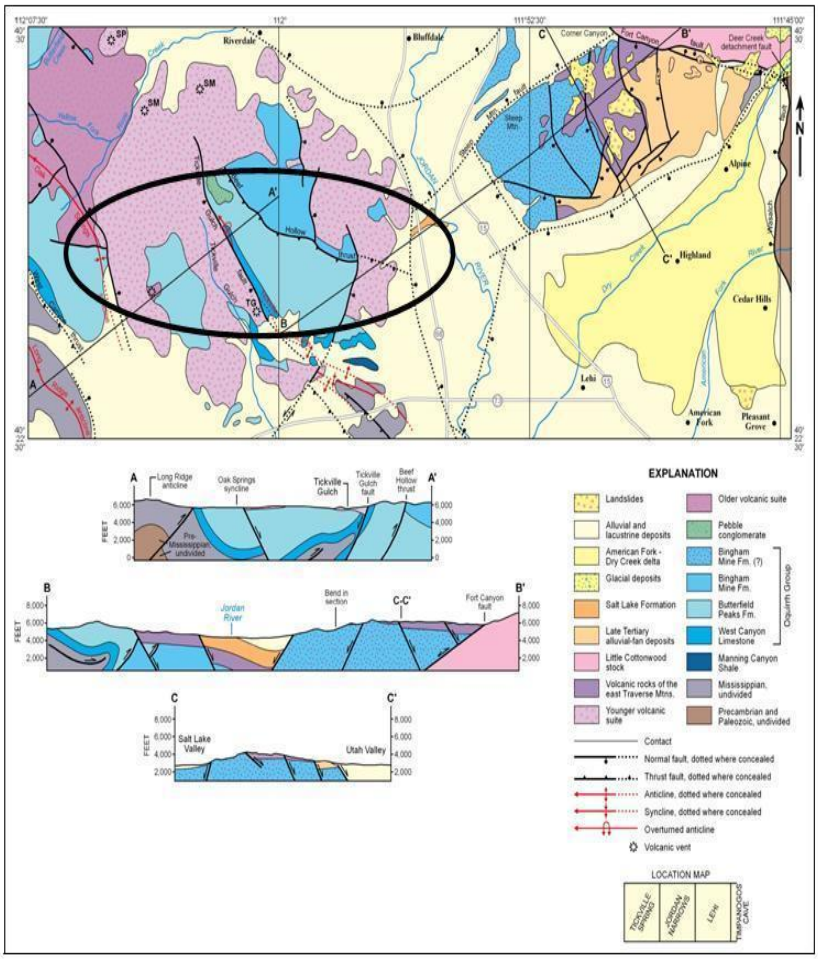


Figure 4-6. Simplified Geologic Map and Cross Section of the Traverse Mountains. The approximate boundary of Camp Williams is in black. Eruptive centers include: SP = Shaggy Peak, TG = Tickville Gulch, SM = Step Mountain (near Rose Creek), and SM = South Mountain (southwest of Riverdale). Reprinted from Survey Notes, Utah Geological Survey, Vol. 37, No. 2, May 2005

4.4 Soils

There are two principal sources of detailed soils information for Camp Williams. First, soil scientists from the College of Natural Resources, Utah State University conducted an intensive soils inventory based on the Range and Training Land Assessment (RTLA) plots (Van Miegroet and others. 1999) and mapped erosion risk. The second source is the USDA Natural Resources Conservations Service (NRCS), in cooperation with the Utah National Guard, conducted a comprehensive soils survey of Camp Williams (NRCS 2001).

4.4.1 Soil Classification

Camp Williams' soils arose from parent material consisting of quartzite, limestone, sandstone, granite, andesite, basalt, and conglomerate. The pluvial Lake Bonneville cycle strongly influenced the geomorphology. The lower elevations consist of dissected lake bottom sediments, alluvial fans, deltas, and lake terraces associated with the Bonneville shoreline. Above the shoreline and into the mountainous areas, the landscape consists of pediments and hillslopes underlain by bedrock. The soils above the Bonneville shoreline are derived from residuum and colluvium (Swenson et al. 1972; Woodward et al. 1974; Trickler and Hall 1984; NRCS 1999). These soils are well drained or somewhat excessively drained with textures ranging from silty clay to sandy loam. However, most soils are silt loam and clay loam with a large surface rock fragment content of gravel, cobble, or stone. Most of the soils are slightly to very strongly calcareous and some have calcic horizons and other calcareous features.

Camp Williams' soils are comprised of 23 soil series mapped to 24 map units. A map unit represents an area dominated by one or more major soil type. Each unit is named for the dominant soil type or types within the unit. Some map units are made up of two or more major soils. Such units are mapped when two or more soils form such an intricate pattern or are in such small areas that they cannot by shown separately on the map. The pattern and proportion of the soils within a given map unit are typically similar across the map unit. The Butterfield-Shepridge complex with 20 to 60% slopes is an example (NRSC 1999)

4.4.2 Soil Properties

The objectives of the USU soil inventory at Camp Williams were: (1) to characterize soil properties at representative locations throughout the installation; (2) provide the baseline soil information for long-term ecological monitoring; (3) assess water erosion risk with the use of soil erosion models and GIS; and (4) develop tools and technology for environmental management at Camp Williams and other military installations.

Pedon descriptions and soil properties were evaluated at 59 of the RTLA plots. The plots were chosen based on accessibility and the likelihood of the presence of live ordnance. Eventually, most RTLA plots outside the dedicated impact area were included in the study and are representative of soil conditions existing at the installation. The soil erosion risk analysis is a qualitative study that encompasses the entire installation.

The main advantage to using the RTLA plots for soil studies is the ability to compare soils information to the RTLA vegetation data. The soil material is available in a concise report (Van Miegroet et al. 1999) and has much potential for identification of correlations between soil properties and vegetation data collected for RTLA, spatial analysis through GIS, and temporal analysis against which to compare future soil observations.

The soil survey conducted by the NRCS (1999) contains information affecting land use planning and management including predictions of soil behavior for selected land uses and the likely impact of these land uses on the environment. These predictions about soil behavior are based on the soil properties and on such variables as climate and biological activity. The detail in the map units promotes land-use planning and resource management (NRCS 1999).

4.4.3 Erosion Risk Analysis

Geologic erosion occurs slowly everywhere under natural conditions and is important to the geomorphology of the landscape. When an area becomes disrupted, such as removal of vegetation, soil erosion may increase to unacceptable levels. This is a problem in semiarid rangelands where precipitation is not high enough to regenerate a timely protective vegetation cover (Weltz et al. 1987). Agriculture, wildfire, roads, livestock grazing, and military activities all contribute to increased soil erosion.

Soil erosion is often associated with severe disturbance, mass wasting, and tons of topsoil being moved by water downriver. There is little mass wasting or topsoil movement by water at Camp Williams or for most semiarid environments. Soil erosion at Camp Williams occurs in the form of physical transport of soils downhill. Often, detached soil is deposited only a few meters away from the source. This phenomenon is not a problem on most hillslopes, but may be in riparian areas at the base of hillslopes. Adding large amounts of silt and sand to riparian systems can be harmful to riparian vegetation and degrades water quality. Another problem posed by soil erosion at Camp Williams is forming gullies. One particular gully, Tickville Gulch, has steep and dangerous walls. Such gullies expand, become deeper, and branch out, creating new hazards to National Guard personnel.

An erosion risk map for Camp Williams is based on annual soil loss estimates by applying the RUSLE (Revised Universal Soil Loss Equation; Renard et al. 1996). Grid-based, RUSLE-factor GIS coverages were multiplied them together to determine an annual soil loss estimate. The soil loss estimates were then grouped into erosion risk classes. The erosion risk classification shows the areas most sensitive to soil erosion at Camp Williams based on current landuse. Figure 4-7 incorporates the influences of roads, grazing, and military training on the potential for soil erosion.

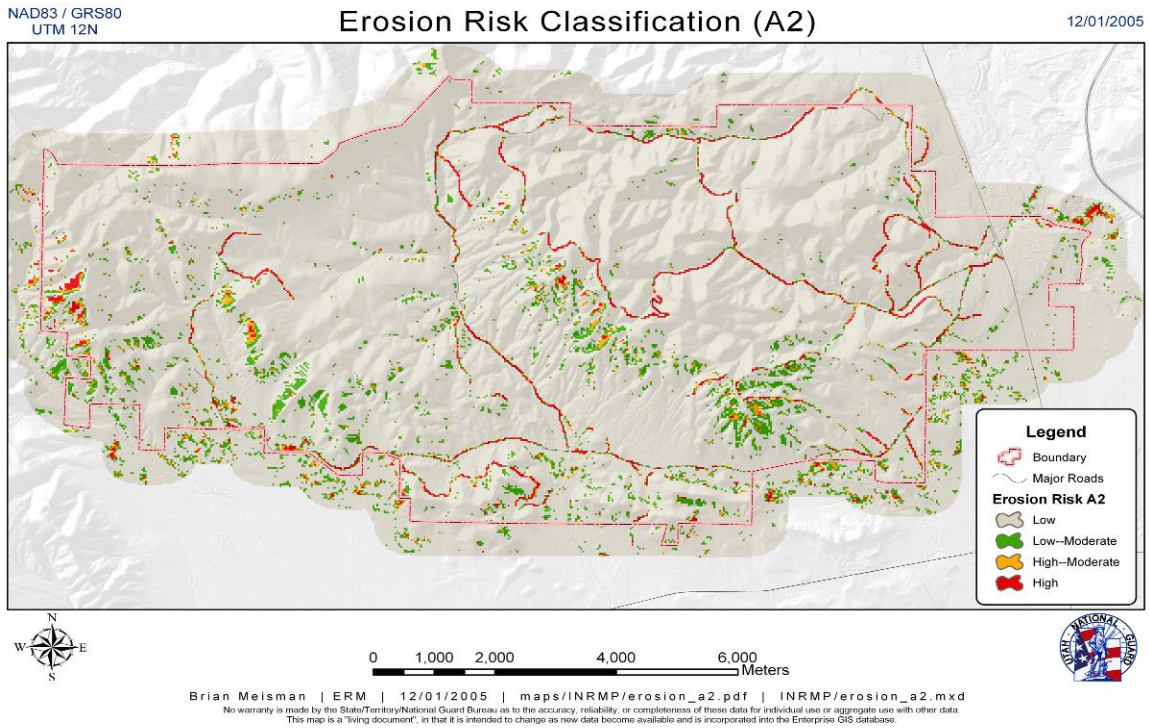


Figure 4-7. Erosion Risk Classification.

Most of Camp Williams is classified as nonsensitive to soil erosion under natural conditions. The areas labeled most sensitive were credited to roads, ridgetops and agriculture because of the lack of vegetation associated with those areas.

The RUSLE and GIS were compatible in determining potential soil loss, but there is error inherent to applying the RUSLE to a large tract of rangeland. The error is in predicting annual soil loss and it becomes less important when deciding relative erosion risk. The methods used for this analysis show how a small amount of data collection can yield some important soil erosion risk predictions for a large area such as a military installation.

Any analysis performed with a model at a coarse scale provides a poor substitute for measurements. The application of the RUSLE with GIS is no exception. Eventually, the model produces a quantitative value that represents a specific soil loss estimate for a particular area. However, because some of the GIS coverages were based on assumptions and estimates that only provide a crude appraisal of the physical character of Camp Williams, they should never be used for a quantitative analysis. The soil loss quantities in and of themselves have little meaning due to the inherent error in the modeling, but when converted to a qualitative assessment (sensitivity classes) their analysis becomes more meaningful. By grouping the soil loss estimates into sensitivity classes, the RUSLE-GIS analysis can provide a relative risk for each area. The confirmation for the risk classification is justified because the assessment is based on the fundamental parts of soil erosion -- climate, soils, relief, vegetation, and land use.

4.5 Groundwater

Groundwater sources within Camp Williams include those used as drinking water sources, identified below, and others throughout the plan area that are not currently used by Camp Williams. These other sources, for example, the groundwater found within the Tickville Springs basin, may represent significant sources for other users or may be identified as backup or future sources of water for Camp Williams. Groundwater suitable for development into a drinking water resource ought to be around 300' to 500' depth in the Tickville drainage. Agricultural and agricultural interests along the southern border of Camp Williams might be impacted by degradation of groundwater within Camp Williams' boundaries.

Other parts of this plan may have an impact on groundwater quality. Vegetation and soil management must be carried out with the realization that vegetation loss and soil disturbance or compaction may result in decreased infiltration into groundwater.

Camp Williams runs its own public drinking water supply. The sources for this system are the following: Hidden Valley Springs Numbers 1 through 7, Beef Hollow Spring, and the Camp Williams Well. Hidden Valley Springs Numbers 1 through 7, known as Alpine Spring Area #1 and #2 and Railroad Spring on the water diversion right, provides half of the water used by Camp Williams. Production of these sources is 1.23 cfs, or about 550 gallons a minute. This right is allotted among the springs and the existing well. Production from the Beef Hollow Spring is 0.0512 cfs, or 23 gallons a minute. Production from the Camp Williams Well is estimated as a maximum yield of 500 gallons a minute.

Delineation reports and source protection plans for these water resources were approved by the State Division of Drinking Water in 2002 and 2003. Updates to these reports are required intermittently. These documents should be referred to for greater detail; however, in general the recharge areas have been identified as follows.

It is likely that the recharge zone for Hidden Valley Springs Numbers 1 through 6 extends to the east towards the Traverse Mountains and may be directly impacted by sand and gravel pit operations just uphill. Hidden Valley Spring 7 (Railroad Spring) - The CH2M Hill modeling limited the recharge area to the west side of the Jordan River and extended it into the Camp Williams range area.

Beef Hollow Spring - Time-of-travel zones were not determined for this source because the recharge zone is thought to lie within Camp Williams' property. The management area for this source is that area within a two-mile radius of the spring and topographically higher than the spring discharge point.

Camp Williams Well - The well draws from two aquifers, screened at depths of 305-325 feet and 415-445 feet. The recharge area extends to the south along the west side of the Jordan River for just over 1 mile.

A new water source is being developed in the Beef Hollow drainage through installing a new well. The well will draw from the Oquirrh Quartzite formation that lies about 800 feet below the surface. This formation recharges from the west within the boundaries of Camp Williams. The recharge area will in general consist of the hydrologic boundaries of this drainage.

5 ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

5.1 Ecological Classification

Ecoregions (*sensu* Bailey 1983) are ecosystems of regional extent. This is a hierarchical classification scheme where the units are differentiated on the basis of climate and vegetation. The two broadest levels in the classification, domains and divisions, are based on climatic zones (e.g., the Dry Domain includes Temperate Steppe and Temperate Desert Divisions, differentiated on the basis of rainfall and winter temperature). Each division is subdivided into provinces based on vegetation characteristics which provide a more detailed climatic characterization than the divisions. Each province can be further divided into plant community types.

This hierarchical classification is useful for planning and implementing ecosystem management. Essentially, ecoregions are classified and mapped based on associations of biotic and environmental factors that regulate the structure and function of ecosystems. These factors include climate, physiography, soils, hydrology, and potential natural communities. Ecoregions are composed of smaller ecosystems, or sites, that recur throughout the ecoregion. Knowledge gained for a particular kind of ecosystem (or plant community) can be extrapolated to a similar, but unstudied, ecosystem. A map of ecoregions provides a geographic framework for identifying other areas from which similar responses may be expected and to which similar management practices may be applied (Bailey 1989). This has important implications for land management, environmental monitoring, and training.

Camp Williams, along with the greatest portion of Utah, is represented by the Intermountain Semi-desert and Desert Province - a part of the Temperate Desert Division (Bailey 1995). Temperate deserts of continental regions have low rainfall and strong temperature and precipitation contrasts between summer and winter (Figure 6.1). The Bonneville Basin Section of the Intermountain Semi-desert and Desert Province consists of narrow mountain ranges running north and south, separated by broad sediment-filled valleys, most of which have no external drainages (O'Brien 1996). The mountains were formed by faulting and have been highly modified by erosion. Important landscape features include Pleistocene lake benches, alluvial fans, playas, and salt flats. Annual precipitation ranges between 4 and 10 inches, with higher mountains receiving up to 20 inches. Little of this precipitation comes in summer. Annual average temperatures range from 45 to 55 ^{o}F (O'Brien 1996).

The Temperate Desert Division represents more than 1,818 million acres worldwide. Thus, for example, the same basic types of climate, physiography, hydrology, and potential natural communities exist on approximately 146 and 1,374 million acres in South America, and Central Asia, respectively (Figure 6.2). In addition, for many training purposes, Camp Williams is similar to conditions in the Temperate Steppe Division; this division represents another 1,606 million acres worldwide (Figure 6.2).

5.2 Vegetation

5.2.1 Historic Vegetative Cover

There are no known early observations of the vegetation specifically for Camp Williams, but there are several reports of regional vegetation change shortly after settlement that probably apply. Christensen and Johnson (1964) described the valleys of the Great Salt Lake along the Wasatch, as having rich grasses abundantly able to support livestock in the mid-1800s. The foothills and valley bottoms were described as being covered in grasses (bluebunch wheatgrass[7], Sandberg bluegrass and western wheatgrass), some sagebrush and scattered junipers. Sagebrush stands had significant components of grasses. Juniper stands also had abundant grass understory, particularly bluebunch wheatgrass, but were largely restricted to hills and rocky outcrops. The conversion of valleys from grass- to sagebrush-dominated occurred before 1900. After 1900, these valleys were converted to agriculture, such as dry-land wheat fields (limited to a few flat areas at Camp Williams). Historically riparian areas were noted for being well wooded, especially in foothills (like Camp Williams).

The foothills of Utah have been grazed since about 1850, usually in spring and fall (Pickford 1932). Stocking rates on the Wasatch Front foothills from 1883 to 1931 varied between 100,000 to 384,000 cattle and 450,000 to 3,537,000 sheep. Spring use was principally on foothills and fall use on the upper slopes. Common

[7] Christensen & Johnson (1964) and Stoddart (1941) only provided common names, which may or may not match today's common names.

foothill plant communities included sagebrush, pinyon-juniper, oakbrush and cheatgrass[8], much as now. Perennial grasses were present in all areas, but apparently not dense enough to be considered a unique cover type. The only areas unaffected by grazing were found in cemeteries. All unprotected plots were "unquestionably overgrazed"; moderately grazed areas were either scarce or had unreliable grazing histories. In addition, wildfires have modified the landscape around Camp Williams. It is thought that these wildfires were purposely set to facilitate grass land development and maintenance (Pickford 1932).

Similar changes have been noted throughout the region. Numerous early observers (1832-1898) in Cache Valley, about 80 miles north, noted extensive grasslands with little sagebrush (Hull and Hull 1974). It was originally thought to be one of the premier grazing areas in the state. It is also thought that livestock, particularly sheep, so overgrazed the valley that grass decreased, sagebrush increased and dust clouds were common within 40 years of the start of grazing (Stoddart 1941). Agricultural use also reduced the grasslands. From examination of areas considered to be remnants, the original vegetation communities were thought to be composed of species seen currently at Camp Williams: bluebunch wheatgrass, Sandberg bluegrass, western wheatgrass, Indian ricegrass, needle-and-thread, sand dropseed and other bluegrasses. Streambank wheatgrass, basin wildrye, and junegrass (probably cheatgrass (*Bromus tectorum*) were also common. Cache Valley, like Camp Williams, now has dense stands of big sagebrush and cheatgrass, with minor stands of perennial bunchgrasses. Five exotic grasses occur or are widespread at both Cache Valley and Camp Williams: cheatgrass, crested and intermediate wheatgrasses, and bulbous and Kentucky bluegrasses.

In a comparison of vegetation noted in original (1871 and 1913) and recent (1988) township surveys near Tooele (about 30 miles east), low-lying areas had changed significantly, probably due to livestock grazing (Sparks et al. 1990). Annuals had replaced shrubs as the dominant vegetation in almost all bench and foothill sites examined in both low- and high-grazing intensity sites. At higher-elevation sites, cheatgrass invasion was also widespread but bunchgrasses had survived. Juniper had also increased at the cost of bunchgrasses, (probably because of wildfire control and) despite extensive control efforts. Mountainous sites, where grazing would have been more limited, have had less vegetation change. Besides livestock grazing, wildfire appears to have had and continues to have a large role in vegetation change.

It is reasonable to assume that similar changes with similar causes have occurred at Camp Williams. Sheep corrals were noted at three locations by land surveyors in 1890[9]. The camp's proximity to Salt Lake City and Provo, major population centers even at the time, probably meant high levels of grazing animals much like in Emigration and Red Butte Canyons (Cottam and Evans 1945). The Tickville Gulch riparian area probably had trees, grasses, and wildlife (e.g., beaver) not presently found (Dr. N.E. West, pers. comm.[10]). Historic non-military influences have probably been the primary determination of the present ecological condition. A return to these historical conditions may not be possible or desirable due to regional environmental change and current military land use.

Besides livestock grazing, wildfire appears to have had and continues to have a large role in vegetation change. Fire affects plant succession, wildlife habitats and generally returns ecosystems to an earlier successional state (Heinselman 1978 in UTNG 2000). Fire severity and plant species characteristics determine the plant community succession after wildfire (Bradley *et al.* 1992). Oakbrush recovers fast through prolific sprouting, but juniper and sagebrush recovery is longer[11]. Rabbitbrush, a native but undesirable species, sprouts and can quickly gain dominance after wildfires. Fire opens juniper stands, increasing biodiversity and productivity (Bradley *et al.* 1992). Fire frequencies at Camp Williams are frequent and of high intensity (UTNG 2000). The larger wildfires are mainly found in oakbrush.

5.2.2 Current Vegetative Cover

Camp Williams is comprised of four major plant community types: sagebrush (*Artemisia* spp.), grasslands, oakbrush (*Quercus* spp.), and juniper (*Juniperus* spp.) woodlands. Sagebrush, grasslands (both perennial and annual), and juniper are inter-related and may replace each other depending upon various factors. A number of specialized plant community types provide habitat or other ecological services outweighing their relatively small acreages. These include rock outcrops, which may harbor protected plant species, and riparian areas. These community types were

[8] Composition of natural vegetation is found on pages 164 and 165 of Pickford (1932); average density of vegetation under four conditions is found in Table 1, page 164.

[9] One presently exists still near the Watts and Tickville Roads intersection; another was at the upper vehicle lot in Tickville; and the third near Rose Canyon. Notes on vegetation were sketchy.

[10] Professor Emeritus of Rangeland Resources, Utah State University, 1994.

[11] Reviewed in greater detail in the draft INRMP, Section 7.7, Wildfire Management.

mapped and described by Van Niel (1995; Figure 5-1). A major need is for a new classification that reflects recent changes.

The major plant communities are not static on the landscape and shift in response to a variety of influences, including wildfire, grazing, climate, and natural succession. Sagebrush and grassland communities have been widely affected by natural and human actions. Wildfire probably historically sustained perennial, native grasslands until western man implemented wildfire suppression, which appears to have shifted grasslands in Utah to shrub or juniper communities. This is supported by the RTLA program. Several areas, monitored by RTLA plots and isolated from any disturbance, have seen a shift from sagebrush to perennial grasses.

Other mechanical disturbances, including military training and livestock grazing, probably act to shift vegetation from shrub to annual grass. Annual grasses are light, flashy fuels that increase (decreased interval OR increase frequency) wildfire frequency and carry a wildfire between more widely spaced shrubs and bunchgrasses. It is likely that suppression of naturally occurring wildfires and the lack of deliberately set wildfires has allowed juniper to expand considerably (Bunting 1994) into other vegetation communities. Gambel's oak (*Quercus gambelii*) can sprout quickly and vigorously after a wildfire and results in extremely dense clumps in early seral stages. Changes in the cover of the dominant species (perennial grasses, sagebrush, oakbrush and juniper) may indicate potential shifts between communities.

5.2.2.1 Sagebrush Communities

Sagebrush communities cover about 35% of Camp Williams and are dominated by big sagebrush (*Artemisia tridentate*; Figure 5-2). Morphological adaptations of big sagebrush (*A. tridentata*) along environmental gradients (elevation, slope, and soil type) result in distinct subspecies (Shultz 1986). Mountain big sagebrush (*A. tridentata ssp. vaseyana*) is the most common big sagebrush at Camp Williams. Basin big sagebrush (*A. tridentata ssp. tridentata)* occurs in deep well-drained sandy or gravelly soils, most notably in the bottom of Tickville Gulch. Wyoming big sagebrush (*A. tridentata ssp. wyomingensis*) colonizes drier sites in lower elevations than other big sagebrushes. Three other species of sagebrush are also present: low sagebrush (*Artemisia arbuscula*), wormwood (*Artemisia ludoviciana*), and wild tarragon (*Artemisia dracunculus*).

Figure 5-2. Sagebrush Plain at the 100 Series Firing Points.

Topography and patterns of disturbance (e.g., grazing and wildfire) are the main factors influencing sagebrush ecosystems. Both topography and disturbance patterns are highly variable at Camp Williams. Consequently, composition and character of sagebrush communities are varied and range from dense, pure stands of big sagebrush (rare) to diverse mixtures of sagebrush and associated species. Common sagebrush associates are bitterbrush (*Purshia tridentata*), rabbitbrush (*Chrysothamnus sp*.), bunchgrasses (*Elymus sp*.), and cheatgrass (*Bromus tectorum*). Bitterbrush provides a significant food source as well as cover for small animals. In certain areas, most notably the north-eastern Impact Area, it is co-dominant with big sagebrush. There is a high degree of variation in the growth forms of bitterbrush at Camp Williams; a tall growth form found at Camp Williams may be a hybrid of bitterbrush and cliff rose (*Cowania mexicana*), although cliff rose was not found on the training area.

Two species of rabbitbrush occur as components of the sagebrush community: rubber rabbitbrush (*C. nauseosus*) and mountain rabbitbrush (*C. viscidiflorus*). Rubber rabbitbrush is generally sub-dominant in sagebrush communities, but can be either dominant or co-dominant in highly disturbed areas. Two subspecies of rubber rabbitbrush (spp. Hololeucus and spp. Consimilis) and two subspecies of mountain rabbitbrush (spp. Viscidiflorus and spp. Lanceolatus) were collected on Camp Williams.

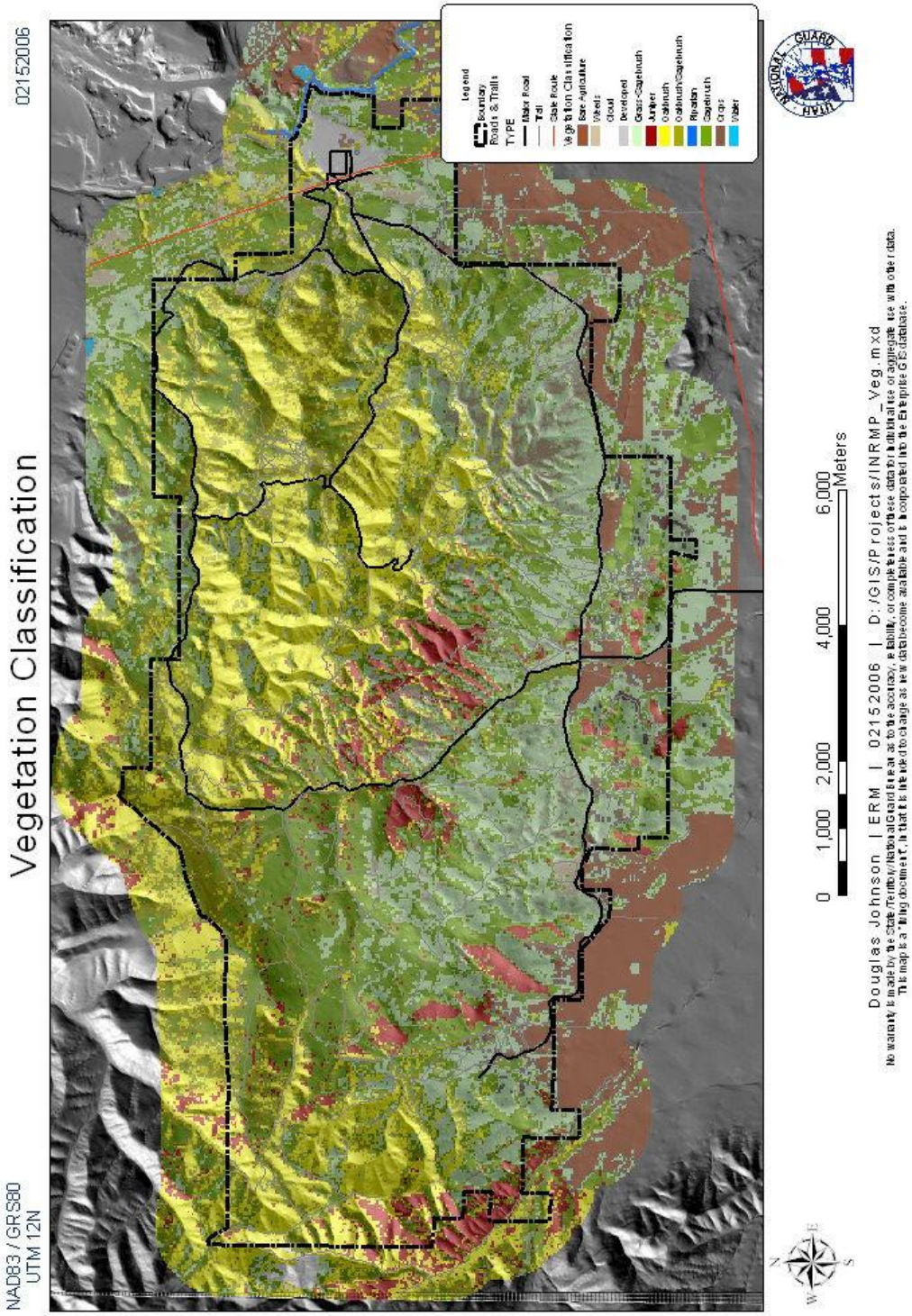


Figure 5-1. Vegetation Community Types. (From Van Niel 1995)

Sagebrush communities have a gradient of shrubs to grass depending upon site moisture, soil condition, wildfire history and land use, particularly grazing (West 1983). Perennial bunchgrasses and annual grasses occur with sagebrush throughout the installation. Some pure patches of bluebunch wheatgrass (*E. Spicatus)* and western wheatgrass (*E.* smithii) exist. Replacement of longer lived perennial grasses and herbs by shorter lived annual species is a current trend of western rangelands (West, 1988). Several undisturbed RTLA[12] plots show a distinct trend from sagebrush to perennial grass, as mentioned above.

5.2.2.2 Grasses and Herbs

This section considers lands supporting grass and herbs, where neither shrub nor tree communities dominate (Figure 5-3). Perennial bunchgrass vegetation (especially bluebunch wheatgrass and Sandberg bluegrass) is the characteristic climax vegetation of the lower elevations (valleys and foothills of central Utah (Christensen 1963). Bunchgrass communities are resilient to disturbance compared to other types and valuable for soil protection and other natural values. Various annual grasses compete with native grasses and may form the dominant vegetation on heavily disturbed sites. Cheatgrass (*Bromus tectorum*), in particular, is ubiquitous but only rarely dominant across the installation and is found on most RTLA plots. Grasslands account for nearly a third of the training area.

Figure 5-3. Perennial Grasslands in Pinyon Hill Training Area.

Grasslands can be created through natural progression from sagebrush/shrublands, by disturbance that removes shrubs and trees, or where physical conditions do not support or are disadvantageous to shrubs and trees. Historically, wildfires in Camp Williams created mosaics of grassland patches within sagebrush communities. Grasses and herbs grew in these open spaces where moisture was adequate. As for sagebrush communities, the replacement of longer-lived perennial grasses and herbs by shorter-lived annual species is a current trend for grasslands as well (West 1988).

5.2.2.3 Disturbed Land

This type describes the relatively small areas (~8% of the Camp) dominated by bare ground, agriculture or annual weeds that have been heavily disturbed by human activity (Figure 5-4). Cheatgrass tends to be the dominant species in all of these areas and has continued to expand its range on Camp Williams. Scotch and musk thistles (*Onopordum acanthium* and *Carduus nutans*) have expanded in recent years along the disturbed edges of roads (see Section 7.9, Integrated Pest Management). Observation suggests the majority of plants colonizing disturbed areas of the training area are non-native (introduced) plants. The largest areas of this category are former dryland wheat fields (which have been designated as maneuver and digging areas for military training in order to limit damage on wildlands).

Figure 5-4. Former quarry within the 200 Series Firing Points.

5.2.2.4 Oakbrush/Sagebrush/Grass Mixed Communities

Oakbrush, juniper, sagebrush and grassland communities intermix on sites with abrupt, variable moisture, aspect and soil depth. Oakbrush dominates on east and north-facing slopes. Big sagebrush grows in areas of well-drained, relatively deep soils, but also occupies dry ridges and exposed slopes. Oakbrush can form savanna-type mosaics with grasses on ridgetops as well

[12] Formerly Land Condition Trend Analysis (LCTA), a component of the Integrated Training Area Management (ITAM) program.

5.2.2.5 Oakbrush Communities

Oakbrush, Gambel oak (*Quercus gambellii*), dominates east and north-facing slopes that are more protected than the drier, sagebrush-dominated slopes (Figure 5-5). Since Camp Williams is near the northern extent of Gambel Oak, stand structure is highly variable. Thickets of oakbrush and mountain brush, distinct in some places, a matrix in others, cover nearly a third of the training area. On the slopes, oakbrush is interspersed with patches of mountain brush species and in hollow bottoms with patches of bigtooth maple (*Acer grandidentatum*) and chokecherry (*Prunus virginiana*). These inclusions are important wildlife habitat and may play other ecological roles as well. The most prevalent understory herbaceous associates of oakbrush are: *Paxistima myrsinities*, *Carex geyeri*, *Hydrophyllum occidentale*, *Galium aparine*. Early spring bloomers beneath oakbrush are *Claytonia lanceolata* and *Erythronium grandiflora*.

Figure 5-5. Mature Gambel Oak Stand within the Impact Area.

While oaks may reproduce both clonally and sexually, clonal reproduction dominates at the boundaries of distribution and Gambel oak is near its northern distributional limit at Camp Williams (Albee *et al*. 1988). Gambel oak sprouts vigorously after wildfires, recovering quickly even after the aboveground portion is destroyed (Bradley *et al*. 1992); sprouts have been observed within three weeks following wildfire during mid-summer weather.

Table 5-1. Proper Functioning Condition Assessment of Oakbrush Communities for Camp Williams as a Landscape.

Criteria	Desired	Actual
Grass/Forb	~10-20%	10%
Early Seral (bushy)	~20-40%	66%
Mid-Seral (young pole)	~20-40%	21%
Late Seral (trees)	~20-40%	3%

Oakbrush carries wildfires well – all the largest wildfires have been on the eastern half of the camp in oakbrush communities in steep terrain. Wildfires are probably the primary agent acting to keep the oak in an early seral stage. A Landscape Level Assessment, utilizing RTLA plots, found that most stands were in an early to mid-seral stage Table 5-1; Johnson 2000); probably a consequence of several large wildfires within the last 10-15 years. The two known, relatively small stands of tree-size Gambel oak have been protected from fire. Shrub-size oak has only limited usefulness for military training and poses a high wildfire hazard and hazard to wildland firefighters. In addition, a more even distribution of oak stages has the greatest desirability for wildlife habitat.

5.2.2.6 Juniper Woodlands

Utah juniper (*Juniperus osteosperma*) woodlands cover only about 6 percent of the Camp Williams Installation (Figure 5-6). Juniper provides year-round shelter and cover for wildlife and sporadically provide abundant seed crops that are a significant source of food. Utah Juniper is represented on Camp Williams as distinct stands, small groves, and the occasional individual tree. The stands are found on the west and south aspects in the Tickville Gulch and Oak Springs watershed, but small groves and individuals are scattered throughout the camp. Single needle pinyon pine (*Pinus monophylla*) is found as isolated trees within the Camp Williams Installation. Although one Colorado pinyon pine (*P. edulis*) was identified in the adjacent area, no Rocky Mountain

Figure 5-6. Mature Juniper Stand in the East Tickville Training Area.

juniper (*J. scopulorum*) has been identified on Camp Williams.

Although juniper woodlands represent only 6% of the area of Camp Williams, it is used for military activities out of proportion to its area (Figure 4). Monitoring at the Pinyon Canyon Maneuver Site revealed a similar preferential use of juniper by military units, primarily for bivouacs and concealment (Shaw and Diersing 1989).

Juniper occurs on drier sites (Shultz and Hysell 1996) and shallow, well-drained, coarse soils, which contribute to low vegetation cover (Baker *et al.* 1994; Tausch and West 1994) and consequently greater erosion compared to other vegetation types (Evans 1988). Total plant cover in juniper woodlands ranges from 9 to 80%, averaging 35% (West *et al.* 1998). Understory vegetation is particularly sensitive to variation in precipitation in July and August (Pieper 1990). In general, as juniper cover and dominance increases, the understory cover decreases and erosion then increases (Tausch and West 1994). Shrubs and forbs tend to decrease first, then perennial grasses (West *et al.* 1998). Soil loss by erosion is a natural part of juniper ecosystems, but it is accelerated by any land use that further reduces the protective understory vegetation cover.

Juniper woodlands have a long history of manipulation by humans. Native Americans set fire to stands for various purposes. Juniper has been historically harvested for firewood, fence posts and other uses. Camp Williams was originally heated by wood stoves and bivouacking army units had camp fires (Alexander and Anderson 1964), suggesting that firewood harvesting might have occurred in the past. Although juniper expands when protected from wildfire, these other activities probably acted to contain juniper. West *et al.* (1998) speculate that present woodlands are structurally and functionally different from those that occurred prior to European settlement. It is highly probable that juniper woodlands at Camp Williams have changed considerably in character and area in recent history with changing use and management.

West *et al.* (1998) classified juniper stands in the West for management purposes. The juniper stands of AGCW are adjacent to the Oquirrh Mountains (unit 57) and as such appear to be classified as 341A: Pinyon-Juniper Woodlands of the Bonneville Basin. Most stands are probably in the JUOS and JuOs series. This classification might be used to group juniper-dominated plots for comparison purposes.

5.2.2.7 Riparian Areas

Riparian areas are rare on Camp Williams but provide a significant portion of the species diversity. Riparian or delineated wetland areas are restricted to a short section along the Jordan River, Tickville Gulch, Oak Springs and various small impoundments. These areas are currently degraded and support an abundance of introduced species (Figure 5-7). Most extensive information on the riparian areas can be found in Section 5.5, Wetlands.

Figure 5-7. Tickville Gulch Riparian Area.

5.2.2.8 Rock Outcrops

Rock outcrops are too small to be identified in the 1995 vegetation classification but they are highly significant as potential habitat for rare species and careful searches were made of these habitats. Substrates of rock outcrops include andesite, quartzite, and limestone. Topography varies from exposed rock faces on ridgetops and slopes to outcrops of large boulders in mountain hollow draws. The species listed found in these areas represent species that are usually restricted to rock habitats. Rock outcrops are also critically important for Golden Eagle and other raptor nesting sites and, as such, an effort is underway to map and regularly look at the potential nesting outcrops.

5.3 Wildlife

5.3.1 Baseline Survey

A vertebrate faunal survey of Camp Williams was conducted from June 1993 to July 1994 by personnel of the Department of Fisheries and Wildlife (now the Department of Fisheries, Wildlife, and Range Sciences) at Utah State

University (Wolfe and Reynolds, 1996). Bats, birds, small mammals, predators, mule deer (*Odocoileus hemionus*), reptiles, and amphibians were sampled primarily in the spring, summer, and fall months. Sampling methods were specific to each faunal group; see Table 5-2 for specific details.

Table 5-2. Survey Years, Number of Samples, and Sample Method for Fauna Surveys From 1993 to 1994 Conducted at Camp Williams.

Fauna Sampled	Year(s) Sampled	Number of Plots	Sample Method
Avian	1993 1994 1995	291	Auditory and Visual locations on circular plots (Reynolds et al., 1980)
Small Mammals	1993	1,680 trap nights	Web Design (Anderson et al, 1983; Wilson and Anderson, 1985)
Bats	?	3 nights	Mist nets
Mammals	1993 1994	144 survey nights	Scent post surveys (Linhart and Knowlton, 1975; Conner et al., 1983)
Mule Deer	1993 1994	Seasonally	Spot light counts; scent post surveys; pellet counts
Reptiles and amphibians	1993 1994	Incidental	Road surveys; walking survey of likely habitats; variation of visual encounter surveys (Crump and Scott, 1994; Morrison et al., 1995)

Ninety-five avian species were identified with over 60% of them identified as songbirds (Table 5-3, see Appendix D for a species list) followed by 13% identified as hawks and owls. Of the 62 passerine (songbird) species documented, 67.8% were observed in both years of the study. The results of the bird transect surveys are summarized in Table 6.2. Increasing the number of plots by approximately 40% in 1994 resulted in a 100-125% increase in the total number of species encountered. However, the number of species observed on transects accounted for a maximum of 68% of the total number of species documented on the facility. Of the three principal vegetation types, oakbrush harbored a slightly higher species richness (30), but the Shannon-Wiener species diversity index (H') was comparable to values calculated for either sagebrush or juniper. This is because a single species, the rufous-sided towhee, comprised >35% of the total number of individuals encountered in oakbrush. Riparian areas showed the highest avian diversity index in 1994.

Table 5-3. Summary of avian groups from the 1993-1994 surveys.

Avian Group	Number of Species Identified
Songbirds	62
Hawks and Owls	12
Other (Gulls, Terns, Shorebirds, Miscellaneous)	7
Waterfowl	6
Wadding Species (herons, egrets, ibis)	5
Upland Species (grouse, pheasant)	3

Twenty-five mammalian species were identified with 48% of the species identified as small mammals. The remaining percentages of species were equally distributed amongst bats, predators and medium-sized mammals (Table 5-4, see Appendix D for a species list). No shrews were identified during the survey but this was likely due to the survey method. Live traps were used rather than pitfall traps which are more efficient at capturing shrews. In a parallel study that examined the effect of wildfire on small mammals in the oakbrush type, deer mice (*Peromyscus maniculatus*) comprised 94.1% of the animals captured in snap traps (Godfrey 1995). Montane voles (*Microtus montanus*), pocket mice (*Perognathus parvus*), and least chipmunks (*Eutamias* minimus) accounted for 3.8%, 1.6%, and 0.5% of the captures, respectively.

Table 5-4. Summary of mammalian groups from the 1993-1994 surveys.

Mammalian Group	Number of Species Identified
Small Mammals (chipmunks, gophers, marmot, mice, squirrels, voles)	12
Bats	4
Predators (coyote, bobcat, mt. lion, weasel)	4
Medium size mammals (rabbits, raccoon, skunk)	4
Ungulate (mule deer)	1

In April 1994, approximately 2,000 mule deer were counted in an informal (non-scientific) survey in a single day. Herd composition counts conducted during the preceding fall indicated a ratio of 6:55:39 (bucks:does:fawns). Most mule deer mortality has been and continues to be due to poaching, predation, vehicle collisions, and natural losses (winter die off).

Although Camp Williams only encompasses a small section of the shoreline of the Jordan River, this and other riparian areas had the highest herptofauna diversity for all habitat types. Three amphibians and 7 reptiles were identified in the study (Table 5-5, see Appendix D for a species list).

Table 5-5. Summary of reptiles and amphibians from the 1993-1994 surveys.

Reptile and Amphibian Groups	Number of Species
Snakes	4
Lizards	3
Toads	2
Frogs	1

Fish were not surveyed directly as the Jordan River is not managed by the UTNG, but there are potentially 8 species in the Jordan River.

5.3.2 More Recent Studies: 1994 to present

Wildlife work has been largely driven by issues and to augment the baseline surveys. Songbirds have been monitored annually in May-June, which has resulted in publications about the effects of wildfire and vegetation community (Leidolf 1999, Leidolf *et. al.* 2000). Issues with the mule deer herd have driven development of a deer management plan for inclusion in this INRMP Update. The Camp has also been a study site for the USU/UDWR Cougar Study (Wolfe *et al.* 2004, Stoner 2004; see Section 5.3.2.5 below).

5.3.2.1 Reptiles

No new surveys for reptiles have been conducted since the original 1994 survey.

5.3.2.2 Avian Diversity and Habitat Study

5.3.2.2.1 Introduction.

North American bird populations have declined in recent years, prompting research in bird communities and habitat associations. In the western United States, three dominant vegetation types - sagebrush shrubland, pinyon-juniper woodland, and oak woodland - are increasingly threatened with habitat loss, fragmentation, and degradation (West and Young 2000). As a result, bird species associated with numerous forest and shrubland ecosystems have experienced declines (Dobkin and Sauder 2004). The majority of Utah-State listed Sensitive species are native to grassland and shrubland habitats found in the Intermountain valleys and foothills. Camp Williams is an ideal monitoring site for avian communities because of its array of threatened habitat types and location on the urban-wildland interface.

The investigation of the Camp Williams bird communities began in 1993, and had three principal objectives: (1) to provide an inventory of the installation's avifauna, (2) identify species of special concern, including those listed as

Sensitive, Threatened, or Endangered, and (3) monitor bird species population trends over time. This project has proven to be an exemplary means of monitoring the ecological health of UTNG lands.

5.3.2.2.2 Methods

For all diurnal species we used a community-wide survey technique similar to the one used by the North American Breeding Bird Survey (Sauer et al 2005). Surveys points were spaced at 200 m intervals along a 1-2 km transect. One observer would note each bird species seen or heard over a 5-minute period. The distance from the point was noted as < 50 m, > 50 m, or flying overhead. When possible, the number of individuals and their sex and age were also noted. Transects were established in the six major habitat types found on the installation (grassland, oakbrush, pinyon-juniper forest, riparian, sagebrush, and urban), and with the exception of the urban transect, did not follow roads or contour the landscape. One additional transect was established in the Hidden Springs area of the Jordan River during 2005. In order to maximize the probability of detecting all birds present, point-count surveys were conducted between 0600-1200 hrs during peak nesting season (mid-May to mid-July). These surveys were

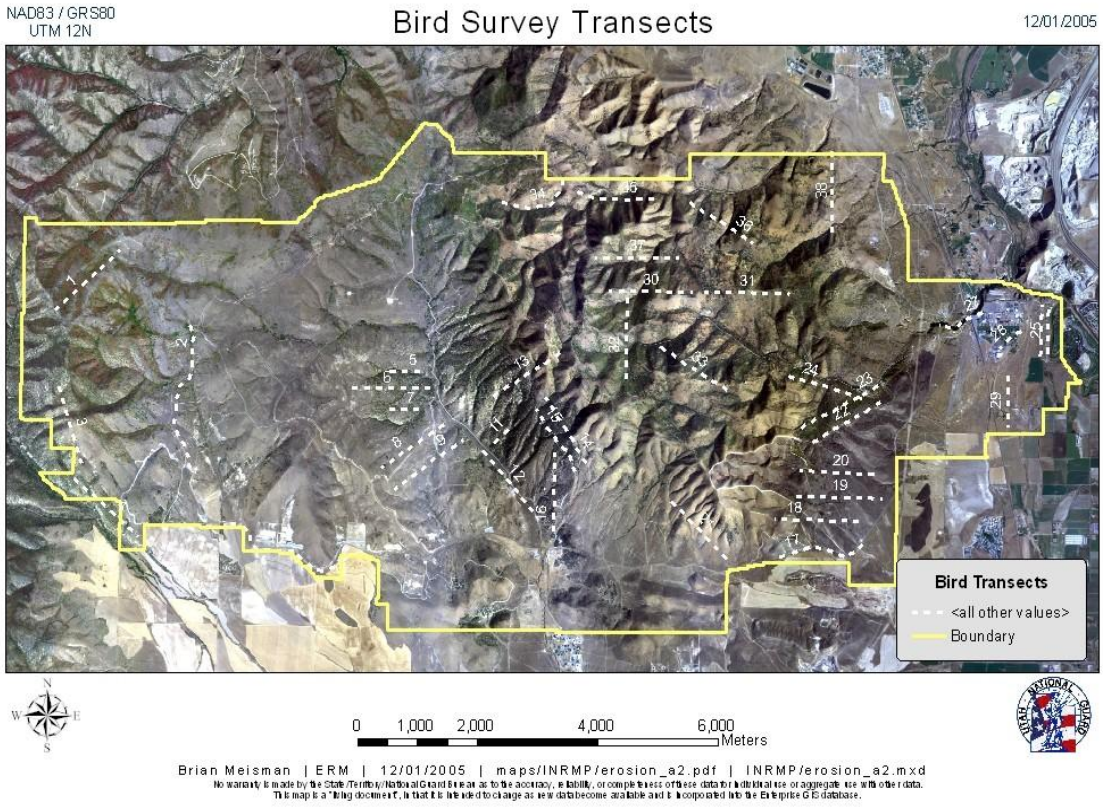


Figure 5-8. Breeding Bird Transects at Camp Williams, 1993-2005.

conducted using transects and protocols developed by Wolfe and Reynolds (1996) and Leidolf (1999). Incidental observations of bird species were also employed to complement the total avian species list. A map of bird transects appears in Figure 5-8.

5.3.2.2.3 Results

As of September 2005, the bird species checklist for Camp Williams contains 121 species belonging to 14 orders, or approximately 29% of the species reported from Utah (Utah Ornithological Society Bird Records Committee 2005). Of these, 116 (~ 96%) are native species. Breeding has been documented for 51 species (44.3%), and is suspected for an additional 30 species (26.1%, Figure 5-9) twenty-six species do not breed at Camp Williams, and breeding status is unknown for only 15 species (13.0%). Sagebrush habitats harbored the greatest species diversity, whereas urban habitats were the most homogeneous (Table 5-6).

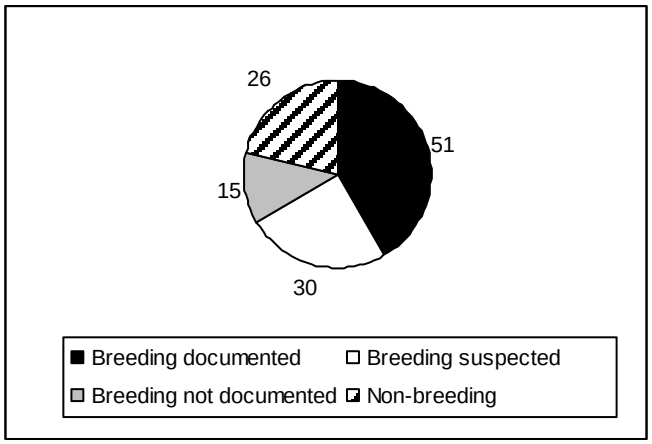


Figure 5-9 Breeding Status of Bird Species Found at Camp Williams, 1993-2004.

Table 5-6. Avian species diversity by habitat type, Camp Williams, UT, May-September 2005.

Habitat Type	# Points	# Minutes	# Hours	No. Species	Birds Detected
grassland	46	230	3.83	46	232
oakbrush	93	465	7.75	53	512
PJ	53	265	4.42	53	318
riparian	12	60	1.00	37	92
sagebrush	60	300	5.00	57	286
urban	4	20	0.33	11	12
Means:	44.7	223.3	3.7	42.8	242.0
SD:	32.8	163.8	2.7	17.1	176.7

5.3.2.2.4 Conclusions

The continuing spring bird surveys provide an excellent record and baseline with 137 species of birds noted from 1994 to present. Of these, 128 are found on the Migratory Bird List and protected under the Migratory Bird Treaty Act. The Birds of Conservation Concern (USFWS 2002) or the Utah Partners In Flight (UTPIF) Avian Conservation Strategy (2002) classifies 23 of these bird species as priorities for management (Table 5-7)[13].

The addition of new species to the checklist during the breeding season has slowed over the past 5 years. Considerable gains were made with each additional year of monitoring for the first 5 years (Figure 5-10). Although

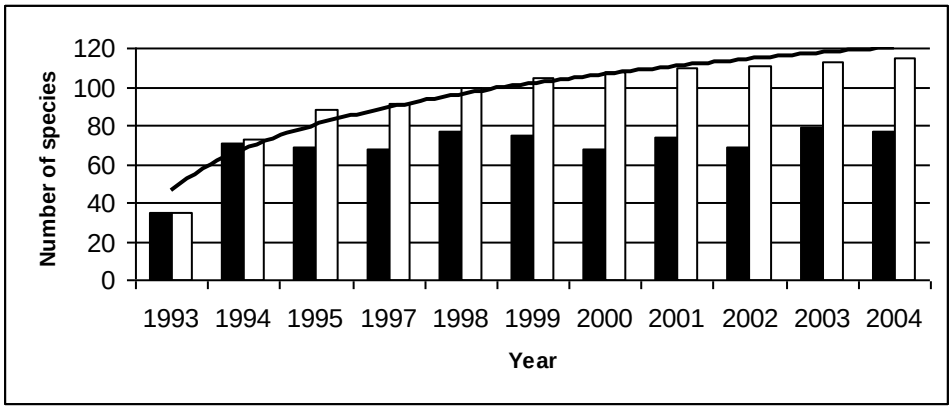


Figure 5-10. Number of bird species detected at Camp Williams State Military Reservation, Utah, 1993-2004 each year (■) and cumulatively (□).

[13] More information on these designations and their management implications is found in Section xxx.

new species are added each year, the number of species detected on an annual basis has remained fairly constant over time (Figure 5-10). The increase in new species during 2005 is partially due to the addition of a new transect along the Jordan River. Thus, during 1995-2005 (excluding the 1993 and 1994 field seasons, when significantly fewer points were censused), the mean number of species detected during the breeding season was 75 ± 7.6 (SD).

Table 5-7. Bird Species with Special Protective or Managerial Designation.

Common Name (*Scientific Name*)	Label
Northern Harrier (*Circus cyaneus*)	BCC national list
Olive-sided Flycatcher (*Contopus cooperi*)	
Brewer's Sparrow (*Spizella breweri*) [a]	BCC, for Bird Conservation Region 9, Great Basin
Golden Eagle (*Aquila chrysaetos*) [b]	
Loggerhead Shrike (*Lanius ludovicianus*)	
Prairie Falcon (*Falco mexicanus*)	
Sage Sparrow (*Amphispiza belli nevadensis*) [a]	
Swainson's Hawk (*Buteo swainsoni*)	
Virginia's Warbler (*Vernovora virginae*) [a]	
American Coot (*Fulica americana*)	BCC, game bird at desired condition
Cinnamon Teal (*Anas cyanoptera*)	
Northern Shoveler (*Anas clypeata*)	
Mallard (*Anas platyrhynchos*)	BCC, game bird below desired condition
Mourning Dove (*Zenaida macroura*)	
Northern Pintail (*Anas acuta*)	
American White Pelican (*Pelecanus erythrorhynchos*)	UTPIF Priority Species
Black-throated Gray Warbler (*Dendroica*	

nigrescens)	
Broad-tailed Hummingbird (*Selasphorus platycercus*)	
Bald Eagle (*Haliaeetus leucocephalus*) [b]	Endar
Brown-headed Cowbird (*Molothrus ater*)	Probl
a – these three are also on the UTPIF Priority List b – also protected by the Bald and Golden Eagle Protection A	

Figure 5-12. McClain, Houndsman for the Cougar Project, takes a blood sample and collars a tranquilized cougar with a Global Positioning System transmitter.

5.3.2.3 Golden Eagle

Four golden eagle (*Aquila chrysaetos*) nests are known on Camp Williams[14]. Two have been monitored since 1995; one of these has been inactive for the last 6-7 years, while the other has been successful most years. A leg snare was found on the rocks above the inactive nest, which is on the boundary, suggesting someone might have been vandalizing the nest or harassing the birds. The third has been known and monitored for the last four years, while the last was only noted as of 2005(Figure 5-11). The last was the only successful nest this past year; the female was found dead, apparently of old age, on the previously productive Beef Hollow nest (Kent Keller, personal communication). Golden eagles nest in early March, eggs hatch in mid-April and chicks fledge in mid-June.

Figure 5-11. Golden Eagle Chick in Last Year's Red-Tail Hawk Nest.

The Camp has been part of a UDWR Golden Eagle Nesting Survey since 1995 (Keller 2005). Of 235 nests in the central Great Basin in 2005, 43% (100) were active and 29% (67) were successful. Although an extremely small sub-sample, the nests of Camp Williams parallel these statistics for 2005 (two of four active, one fledged). This study showed that eagle populations are tied to their largest prey base, jackrabbits (59% of diet) and cottontails (9%). A key threat to the prey base is the loss of sagebrush habitat, replaced by houses or vegetation that do not support the rabbit populations.

5.3.2.4 Mammalian Surveys

Scent stations were re-established in 2003 and have been resurveyed in the Fall of 2003 and summer of 2004 and 2005 (Table 5-8). These are not the 24 original, but are 30 new ones placed and monitored according to the original parameters (Wolfe & Reynolds 1996). More years of monitoring are needed to establish clear trends.

Table 5-8. Scent Station Results.

	Survey Dates		
Statistic	Oct. 2003	June 2004	July 2005
Station 'nights'	79	90	90
Total Number of Visits	68	74	62
Visitation rate (visits/24-hr period)	0.86	0.82	0.69
% visitation by species or taxon			
Mule Deer	24	7	15
Bobcat	16	12	19
Coyote	22	15	5
Cougar	1	5	6
Gray Fox	3	1	0
Housecat	3	7	8

[14] The locations are confidential..

Rodents	19	27	39
Other/unidentifiable	11	25	9

5.3.2.5 Cougar Study

In January 1997 a radiotelemetry study was initiated on the Camp Williams cougar (*Felis concolor*) population. The objectives of this initial survey were to: 1) estimate the number of resident cougars on the installation, 2) describe the age structure, sex ratio, reproduction, and home range size of these animals, and 3) evaluate the efficacy of using indirect enumeration techniques to estimate cougar abundance (Figure 5-12). As of December 2005, 28 adult and juvenile cougars have been captured and marked on Camp Williams. This effort has resulted in eight annual reports, a Final Report, and two peer-reviewed publications.

5.3.2.6 Deer Collars

A mule deer radiotelemetry study was initiated in concert with the cougar project. The objectives of this initial survey were to: 1) to examine predation impacts on the resident deer herd, and 2) describe the annual movements of mule deer using Camp Williams during winter. Capture operations were conducted during February – April in 1997-1998. During this period 22 adult mule deer were captured and marked. As of December 2005 one animal is still being monitored.

5.3.2.7 Mule Deer

Little statistics have been documented for the AGCW deer herd[15]. Historically, AGCW was part of UDWR Herd Unit 20 and, later, 18. Deer hunting was terminated in 1988 following litigation ensuing from the death of a hunter due to unexploded ordnance (UXO). The Camp is currently a No Hunting unit in the annual proclamation. Subsequent poaching is a significant safety and natural resources management problem. AGCW probably serves as year-round habitat (Figure 5-13), with a subjective overall good habitat quality[16]. Year-round water is available from Oak Springs, Tickville Gulch Springs, lower Beef Hollow and the Jordan River.

Figure 5-13. Mule Deer Utilize Camp Williams Year-round.

Approximately 2000 animals were counted in a single, ground-based tally in 1993 (Dunton, pers com); the population may have exceeded 3,400 animals due to the difficulty of ground-based surveys. Deer crossing SR 68, probably to reach the Jordan River, is a major cause of mortality: estimates for this section range from 102 to 170 annually. Total annual population mortality is estimated from 250-300 animals due to road kill, predation, winter kill, poaching and other more minor factors. The AGCW deer herd will probably face greater insularization as the surrounding lands get developed.

The impact of military training is probably highly variable. Activities probably displace deer temporally from certain areas and may have a localized, negative impact on habitat. Weapons and artillery training probably has little direct impact on the herd.

[15] This section is a summary of the Deer Management Plan component of this INRMP, see Appendix G for the full text. A summary of management is contained in Section 7.3.2.2, Mule Deer (Odocoilus hemionus) Management Plan Summary.

[16] Dr. Michael Wolfe, Professor (Wildlife), Forest, Range and Wildlife Resources, Utah State University.

5.4 Threatened and Endangered Species

5.4.1 Introduction

Compliance with the Sikes Act requires all installations under the Department of Defense, including the Utah National Guard (UTNG), to cooperate with state and federal wildlife agencies in the planning, development, and maintenance of fish and wildlife resources on military reservations. Accordingly, this INRMP section summarizes efforts to identify and inventory any and all federally or state-listed wildlife species occurring on UTNG property. Further, this document serves as the initial stage in developing management strategies for monitoring and conservation of these species.

The 2001 INRMP identified five animal species that were listed as Species of Concern (heretofore "Sensitive") by the State of Utah at that time. Of those five, four (Swainson's hawk (Buteo swainsoni), loggerhead shrike (Lanius ludovicianus), Botta's pocket gopher (Thomomys bottae), and the northern pocket gopher (Thomomys talpoides)) do not occur on the updated list (UDWR 2005). The fifth species, the American white pelican (Pelecanus erythrorhynchos) is still classified as a Species of Concern

A search by the Utah Natural Heritage Program did not reveal any recent records for threatened, endangered or sensitive species within the vicinity of Camp Williams. There were historic records off Camp Williams for greater sage-grouse (*Centrocercus urophasianus*), burrowing owl (*Athene cunicularia*), American white pelican (*Pelecanus erythrorhynchos*), and Columbia spotted frog (*Rana luteiventris*). While the camp has habitat for sage-grouse and burrowing owls, neither has been observed or historically reported on the camp. Pelicans are occasionally observed flying above the Jordan River, at the east end of camp, probably commuting between the Great Salt Lake and Utah Lake.

The presence or absence of federally or state-listed species was assessed based on the Utah Sensitive Species List, updated February 2005 (UDWR 2003, 2005). This list includes all species either listed or candidates for listing under the Endangered Species Act (ESA). In addition, species "for which there is credible scientific evidence to substantiate a threat to continued population viability" (UDWR 2005) are listed as well. Camp Williams straddles the Utah-Salt Lake County lines. We examined the habitat requirements of each listed species and compared them to plant communities available on Camp Williams and historic records (Bosworth 2003). From these indices we created a subset of listed species that could potentially occur on the Camp (Table 5-9). The following is a succinct account of these potentially occurring species, habitat requirements, reasons for listing, and activities to which they are sensitive. Species are segregated by the jurisdictional level of protection (i.e. federal and state), and are further parsed into birds and mammals. The results section discusses these species and their relationship to Camp Williams.

Table 5-9. Listed Species Potentially Occurring in Utah or Salt Lake Counties.

Common Name	Scientific Name	Habitat	Status
bald eagle*	Haliaeetus leucocephalus	Lakes, rivers	Threatened
yellow-billed cuckoo*	Coccyzus americanus	riparian, woodlands	Candidate
American white pelican*	Pelecanus erythrorhynchos	Lakes, rivers	UT Sensitive
western burrowing owl*	Athene cunicularia	open country	UT Sensitive
short-eared owl*	Asio flammeus	open country	UT Sensitive
ferruginous hawk*	Buteo regalis	dry, open country	UT Sensitive
greater sage-grouse*	Centrocercus urophasianus	sagebrush	UT Sensitive
grasshopper sparrow*	Ammodramus savannarum	pastures, grasslands	UT Sensitive
long-billed curlew*	Numenius mericanus	wet and dry uplands	UT Sensitive
black swift	Cypseloides niger	cliffs, waterfalls	UT Sensitive
bobolink	Dolichonix oryzivorus	wetlands	UT Sensitive
Lewis's woodpecker	Melanerpes lewis	open woodlands	UT Sensitive
pygmy rabbit*	Sylvilagus idahoensis	sandy soils, sagebrush	UT Sensitive
kit fox*	Vulpes macrotis	sandy soils, sagebrush	UT Sensitive

Table 5-9. Listed Species Potentially Occurring in Utah or Salt Lake Counties.

* Implies suitable habitat or historic records of this species on or near Camp Williams.

5.4.2 Natural History and Conservation Status of Listed Species

5.4.2.1 Federally Protected

5.4.2.1.1 Bald Eagle, Haliaeetus leucocephalus (Threatened)

Bald eagles are predators of fish and waterfowl, and as such are generally found near large bodies of water. They require relatively tall trees for nesting, situated within 2 km of open water. This species has been covered by some form of federal protection for over 80 years (Buehler 2000), initially under the Migratory Bird Treaty Act (1918) and later under the Bald Eagle Protection Act (1940; revised to include golden eagles [Aquila chrysaetos], in 1962). The bald eagle has been protected by the Endangered Species Act since its inception (1973). In 1995 the status of this species was reduced from Endangered to Threatened. These protections were implemented because of population declines resulting from reproductive problems. Egg-shell thinning was identified as the major proximate factor responsible for reduced chick survival. This is a common problem for many fish-eating birds (e.g. brown pelican (Pelecanus occidentalis), osprey (Pandion haliaetus)), and is linked to bioaccumulation of environmental pollutants, especially DDT, in the tissues of aquatic organisms. As of 2006, only eight active bald eagle nests had been identified throughout Utah, however one of these nests was located on the Jordan River (Messmer et al. 1998). Bald eagles are known to winter in Salt Lake County along tributaries to the Great Salt Lake and Farmington Bay (Bosworth 2003).

5.4.2.1.2 Yellow-billed cuckoo, Coccyzus americanus (Candidate)

Yellow-billed cuckoos prefer to nest and forage in extensive riparian areas lined with cottonwood forests (Johnson 2002). It is the loss and degradation of these ecosystems that has led to the Candidate status of this species. The occurrence of this bird has been documented in both Salt Lake and Utah counties. Locally however, cuckoos do not have strong fidelity to nest sites, and their presence and productivity appears to be strongly tied to insect outbreaks (Hughes 1999), making their presence from year to year highly variable. Historically (< 1983), yellow-billed cuckoos were found along the Jordan River (Bosworth 2003).

5.4.2.2 Utah Sensitive Species

5.4.2.2.1 American white pelican, Pelecanus erythrorhynchos

The white pelican is a large fish-eating bird primarily associated with freshwater. It was listed because the Gunnison Island population on the Great Salt Lake represents one of only four breeding colonies remaining in North America, and the only one to demonstrate positive population trends over the past 40 years (UDWR 2005). This species has declined as a result of habitat degradation (e.g. water diversions, loss of wetlands), and is sensitive to human disturbance. Low reproductive rates make it vulnerable to local extinctions. Its distribution within Utah has been focused around the Great Salt Lake (present), and historically in Utah Lake as well (Bosworth 2003).

5.4.2.2.2 Western burrowing owl, Athene cunicularia hypugaea

Burrowing owls are small, crepuscular birds historically common in grasslands and shrublands across much of North America. These birds are fossorial, but do not dig their own burrows and are thus reliant upon the presence and activities of mammals such as prairie dogs and ground squirrels. This species is declining across most of its range due to habitat loss, primarily as a result of the conversion of grasslands to agricultural and urban uses. The eradication of commensal burrowing mammals has also played a significant role in their decline (Klute et al. 2003). The western burrowing owl is also federally-protected under the Migratory Bird Treaty Act. Nesting burrowing owls have been detected since 1983 just south and east of Camp Williams (Bosworth 2003).

5.4.2.2.3 Short-eared owl, Asio flammeus

The short-eared owl is a medium sized raptor exhibiting one of the widest distributions of any owl in the world (Holt and Leasure 1993). It feeds primarily on meadow voles (Microtus spp.) and other small mammals (Holt and Leasure 1993) and is associated with open country. Typical habitats are grasslands, shrub-steppe, marshes, and

irrigated agricultural lands (Johnsgard 1988). During the non-breeding season they are more amenable to using dry, sagebrush dominated habitats. The species is listed as Sensitive in Utah, where population declines have been related to habitat loss, most notably along the Wasatch Front (Bosworth 2003). Because this species is a ground nester, it is also susceptible to predation by mesocarnivores such as skunks, raccoons, and foxes. Short-eared owls are most prominent in the intermountain valleys of the West Desert, but may be found over the northern 2/3 of the state during breeding season and over most of the state during winter, when resident populations are subsidized by migrants from Canada and the northern tier of the United States. Within the past 20 years breeding pairs of owls have been detected near Camp Williams in the Salt Lake, Cedar, Rush, and Tooele Valleys (Bosworth 2003). However, similar to the yellow-billed cuckoo, this species tends to have a temporally spotty occurrence, being sensitive to irruptive population cycles in their principle prey, and therefore densities vary greatly from year to year.

5.4.2.2.4 Ferruginous hawk, Buteo regalis

The ferruginous hawk is the largest of the local buteos. These hawks hunt lagomorphs, ground squirrels, and prairie dogs in open grassland, desert, and shrubsteppe habitats. Ferruginous hawks are found across the West and the Great Plains and south into the Mexican highlands. They use rangeland habitats interspersed with lone trees or elevated sites for nesting (Bechard and Schmutz 1995). Steep walled canyons are generally avoided. In the Great Basin they are often found on the interface between pinyon-juniper woodlands and open rangelands. Current declines are attributed primarily to habitat loss (urbanization) and degradation (cultivation), and prey declines as a result of pest eradication campaigns (Bechard and Schmutz 1995). In Utah, ferruginous hawks are widely distributed. Within the last two decades breeding pairs have been documented in Cedar, Tooele, Rush, and Salt Lake Valleys (Bosworth 2003, Wolfe, unpublished data).

5.4.2.2.5 Greater sage-grouse, Centrocerus urophasianus

The greater sage-grouse is a large, gallinaceous bird considered a sagebrush-obligate. As of 2004, this species was a candidate for federal listing as Threatened under the ESA, but this petition has recently been rejected. Nevertheless, it remains a state-listed Sensitive species. The reasons for sage-grouse declines are varied, but stem principally from habitat loss, degradation, and fragmentation, as sagebrush rangelands have been converted to agricultural and urban uses (Schroeder et al. 1999). There is some evidence that the direct (nest trampling) and indirect (plant community changes) effects of cattle grazing have impacted sage-grouse populations as well (Schroeder et al. 1999). This species is widely distributed in Utah and is still considered a game species with annual harvests ranging from 500 to 1,500 birds / year (years: 2000-2003; Hill et al. 2003). The greater sage-grouse is a year-round resident with a spotty distribution in both Salt Lake and Utah Counties, and historically occurred on or adjacent to Camp Williams (Bosworth 2003).

5.4.2.2.6 Grasshopper sparrow, Ammodramus savannarum

The grasshopper sparrow is a small, ground-nesting omnivorous passerine adapted to grassland habitats. Although it does prey on grasshoppers, its common name refers to its insect-like song. In the US, the distribution of this species is contiguous east of the Rocky Mountains, with localized populations occurring in the West. Birds breeding in the United States typically winter in Mexico, Central America, and parts of the Caribbean. In the western portion of its range, the grasshopper sparrow tends to be found in shortgrass prairies with a shrub component (Vickery 1996). Reasons for range-wide declines stem from the loss, fragmentation, and degradation of grassland habitats. Agriculture, urbanization, and grazing related changes to plant communities are the primary factors affecting this species. Locally, it can be negatively affected by competition with brown-headed cowbirds. Grasshopper sparrows are sensitive to fragmentation and tend to be absent from patches < 30 ha in size (Vickery 1996). Within Utah, this species is found primarily on Conservation Reserve Program lands in the northern tier of the state (Goodell and Howe 1999). The nearest confirmed breeding site to Camp Williams was on Antelope Island in Salt Lake County (Bosworth 2003).

5.4.2.2.7 Long-billed curlew, Numenius mericanus

The long-billed curlew is a relatively large, ground-nesting shorebird adapted to grassland and tidal flat habitats. Its most notable physical characteristic is its long, curved bill, which is used to probe for invertebrates in soft soils. The breeding distribution of this species is limited to grasslands from the Great Plains west. Birds breeding in the United States typically winter along the coasts of Texas, California, and Mexico. The preferred habitat of the long-billed curlew is described as “flat to gently rolling terrain with a low density of trees and shrubs” (Dugger and Dugger 2002). The primary factor affecting long-billed curlew populations has been the extensive loss of wetland habitats.

Historically, the species has also suffered considerable mortality from shooting, which remains a problem in some areas. Curlews suffer both directly (poisoning) and indirectly (prey declines) from pesticides. Interestingly, the long-billed curlew is one of few species that appears to benefit from cheatgrass invasions (Dugger and Dugger 2002), in which the short grasses facilitate greater hunting success. Consequently, portions of the Great Basin, and especially the Great Salt Lake ecosystem, represent one of the species strongholds. Within Utah, curlews are found primarily in extensive grasslands and mudflats in the northwestern valleys (Parrish et al. 1999), and has been detected breeding in the Cedar Valley and along the Jordan River (Bosworth 2003).

5.4.2.2.8 Pygmy rabbit, Brachylagus idahoensis

The pygmy rabbit is the smallest North American leporid, and like the greater sage-grouse, is considered a sagebrush-obligate (Katzner and Parker 1997), occurring primarily in the valleys of western Utah. Pygmy rabbits are typically found in areas of unusually dense sagebrush on fine, deep soils. Sagebrush comprises from 60-99% of the pygmy rabbits diet, depending on season (Dobler and Dixon 1990). Its entire distribution is contained within the Intermountain West. In Utah, pygmy rabbits are listed as Sensitive, as they are in nearly every other state with extant populations, except Washington, where due to isolation, it is federally listed as Endangered. Many of the same ecological changes affecting sage-grouse hold for the pygmy rabbit. Suburban sprawl, agriculture, overgrazing, and increased wildfire frequency have all contributed to the loss and degradation of sagebrush habitats across the Great Basin. The limited amount of scientific information available on this species suggests that its distribution has been fragmented into one large metapopulation (Dobler and Dixon 1990). The closest modern record (> 1983) of pygmy rabbits to Camp Williams occurred in southern Box Elder county on the western shore of the Great Salt Lake (UDWR, unpublished data). Scant records of their occurrence near the Lake Mountains are presented by Bosworth (2003).

5.4.2.2.9 Kit fox, Vulpes macrotis

The kit fox is a small desert-adapted canid, able to forsake surface water, feeding primarily on rodents and lagomorphs (UDWR 2005). In Utah it is found exclusively in desert regions with fine-grained soils dominated by sagebrush (Artemisia tridentata), shadscale (Atriplex confertifolia), and greasewood (Sarcobatus vermiculatus; Alston and Seglund, unpublished). The San Joaquin Valley fox, native to the San Joaquin Valley of California (Vulpes macrotis mutica) is federally listed as Endangered, and its close relative, the swift fox (Vulpes velox) is listed as Threatened (UDWR 2005). Like the greater sage-grouse, the kit fox has a rather peculiar legal status in Utah. It is a Sensitive species, and yet simultaneously it is considered a furbearer (i.e. a game animal) and subject to annual harvests (Alston and Seglund, unpublished). The reasons for kit fox declines stem from both anthropogenic factors such as overexploitation and habitat loss (e.g. urban sprawl), and ecological factors, including predation and competition from expanding coyote (Canis latrans; Kozlowski 2005) and red fox (Vulpes vulpes; Cypher et al. 2001) populations, and habitat degradation resulting from the proliferation of exotic weeds (UDWR 2005). The kit fox is a year-round resident reportedly occurring in both the Tooele and Skull Valleys, and historically in the Cedar Valley and Lake Mountains (Bosworth 2003).

5.4.3 Methods

5.4.3.1 Diurnal Bird Surveys

Most Species of Concern that could occur at Camp Williams are birds. For all diurnal species we used a community-wide survey technique similar to the one used by the North American Breeding Bird Survey (Sauer et al 2005). For the lone nocturnal bird (burrowing owl) we used a species-specific survey. Survey points were spaced at 200 m intervals along a 1-2 km transect. One observer would note each bird species seen or heard over a 5-minute period. The distance from the point was noted as < 50 m, > 50 m, or flying overhead. When possible, the number of individuals and their sex and age were also noted. Transects were established in the five major habitat types found on the installation (oakbrush, pinyon-juniper forest, riparian, urban, and grassland), and with the exception of the urban transect, did not follow roads or contour the landscape (Wolfe and Reynolds 1996, Leidolf 1999). One additional transect was established in the Hidden Springs area of the Jordan River. In order to maximize the probability of detecting all birds present, point-count surveys were conducted between 0600-1200 hrs during peak nesting season (mid-May to mid-July). These surveys used transects and protocols developed by Wolfe and Reynolds (1996) and Leidolf (1999). This survey technique is described in greater detail in Ralph et al. (1993, 1995). A map of bird transects appears in Figure 5-14.

5.4.3.2 Nocturnal Bird Surveys

We employed the protocols developed by Conway and Simon (2003) to determine presence and abundance of burrowing owls on Camp Williams using nocturnal point-count surveys. Suitable habitat was subjectively identified and then surveyed during spring nesting season using pre-recorded playback calls. These surveys involved driving dirt roads (transects) through suitable habitat and playing territorial calls from a battery operated megaphone at 0.5 mile intervals. Calls were played at 90 dB and covered a radius of approximately 500 m surrounding each call point. Calls were played at each station for a total of three minutes, interspersed with three minutes of silence, during which we watched for birds and listened for responses. All surveys were conducted between sunset and midnight. Additionally, we scanned for these birds during early morning bird surveys.

5.4.3.3 Greater sage-grouse

For the greater sage-grouse a map of potential habitat (sagebrush habitat) was created and the area surveyed by M. Wolfe during Spring 2004, which involved walking narrow transects through suitable habitat searching for birds and sign. We also scanned for these birds during summer bird surveys. In addition, we attended a short-course on the identification of sage-grouse sign and were able to distinguish it from other upland gamebirds. Incidental observations were recorded during vegetation surveys in sagebrush habitats.

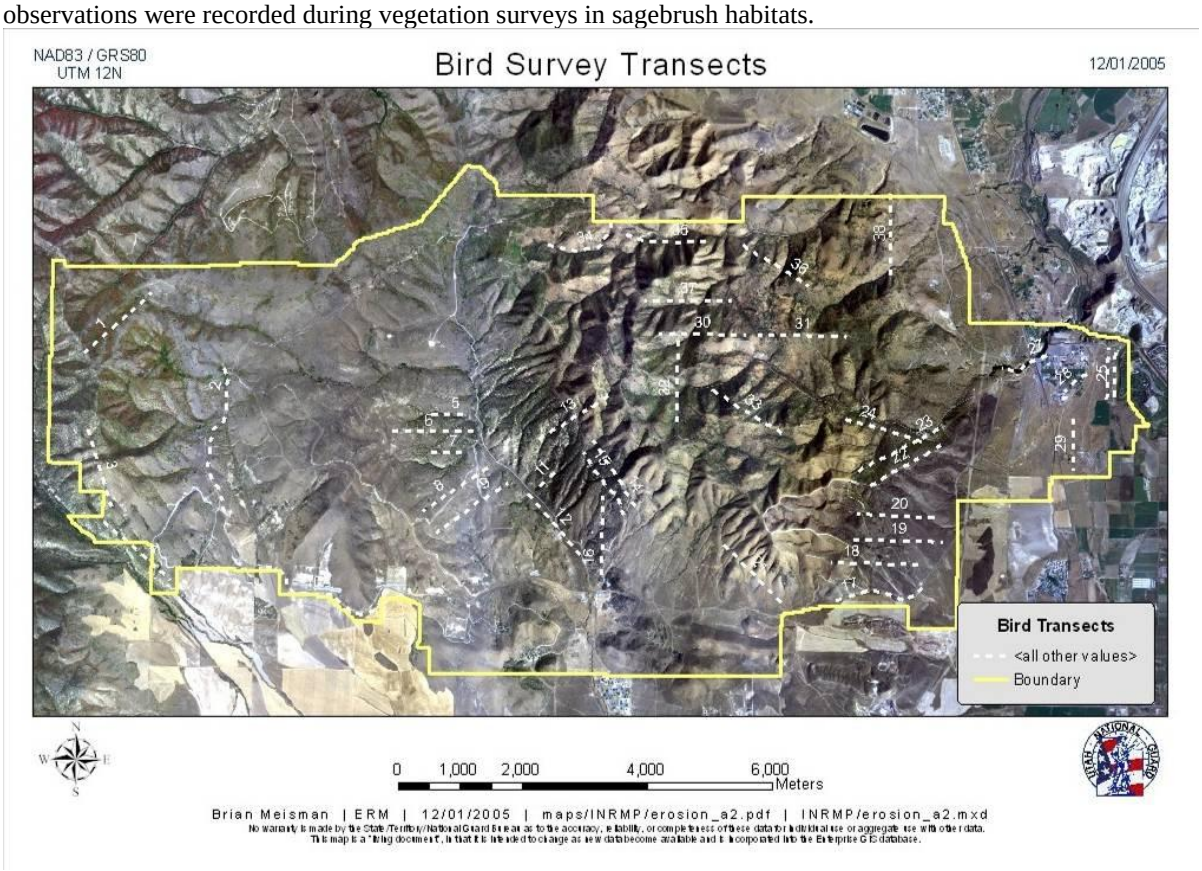


Figure 5-14. Transects Used To Assess Avian Diversity at Camp Williams.

5.4.3.4 Pygmy rabbit

A map of potential habitat was developed by P. Terletzky and the area surveyed by M. Wolfe during Spring 2004. . In addition, we watched for the presence of these rabbits and their sign during early morning bird surveys in sagebrush habitat and during cougar cache site recoveries. RTLA vegetation crews were trained in the identification of pygmy rabbit sign and were instructed to report any sightings of rabbits or their sign during fieldwork in sagebrush habitats.

5.4.3.5 Kit fox

No formal field surveys were conducted for this species. We did examine trapping records for Salt Lake and Utah counties to determine if the presence and extent of trapping pressure in the vicinity of Camp Williams.

5.4.4 Results

Diurnal bird surveys were conducted between 22 May and 29 July, 2005. One additional survey was conducted on the Hidden Springs portion of the installation on 4 September. Survey efforts were divided among six habitat types occurring on the installation. Results are compiled by points within certain habitat types and not by transects. Results of survey efforts are listed in Table 5-10.

5.4.4.1 Bald eagle

No bald eagles, nor any sufficiently large stick nests, were detected along the Jordan River or anywhere else on Camp during summer 2005. This species has been observed feeding on road-killed deer on or near the Camp during winter (Wolfe and Reynolds 1996). Whether these are migratory birds or seasonal residents is unknown. One bald eagle was sighted on Camp during summer 1998 (Leidolf unpublished data), but there have been no observations since that time. Parts of the Jordan River bordering Camp Williams may be suitable habitat for bald eagles, but their spatial needs and foraging range far exceed the area managed by the UTNG. The remaining portion of Camp Williams does not provide suitable habitat.

Table 5-10. Results of Avian Point Count Surveys at Camp Williams, Utah, May-July, 2005.

Habitat Type	# Points	# Minutes	# Hours	Species Detected	Birds Detected
Grassland	46	230	3.83	46	232
Oakbrush	93	465	7.75	53	512
Juniper-Pinyon	53	265	4.42	53	318
Riparian	12	60	1.00	37	92
Sagebrush	60	300	5.00	57	286
Urban	4	20	0.33	11	12
Mean	44.7	223.3	3.7	42.8	242.0
SD:	32.8	163.8	2.7	17.1	176.7

5.4.4.2 Yellow-billed cuckoo

No cuckoos were detected during summer bird surveys or during a one-day survey of the Hidden Springs area.

5.4.4.3 American white pelican

White pelicans were observed both during summer bird surveys and incidentally flying over Camp Williams, but not at Hidden Springs. Pelican observations are listed in Table 5-11.

Table 5-11. Observations of American White Pelicans on or Near Camp Williams, Utah, May-August, 2005.

T-point	Date	Time	Weather	Location	# Birds	Notes
8-3	6/4/2005	10:15	CLR	Sheps Ridge / Oak Springs	13	fly over
22-5	6/5/2005	11:10	CLR	Lower Beef Hollow	6	fly over
22-6	6/5/2005	11:25	CLR	Lower Beef Hollow	13	fly over
18-3	6/11/2005	11:20	OVR	Southeast corner	2	fly over
16-1	7/4/2005	11:20	CLR	Cedar Point	30	fly over
30-5	7/4/2005	10:10	CLR	Latimer Point	15	fly over
n/a	8/31/2005	12:00	CLR	South Mountain	20	fly over

In Utah, the only nesting site for this species is Gunnison Island in the northwestern arm of the Great Salt Lake. This site currently ranks as one of the largest breeding colonies in North America (Parrish et al. 1999). White pelicans prefer nesting on islands, and will travel > 50 km from their nest sites to preferred foraging areas, such as

shallow lakes, marshes, and rivers. This species is a summer resident only, wintering in southern California and Mexico. Thus, pelicans sighted in the vicinity of Camp Williams may be in migration or traveling to Utah Lake, which represents the nearest available foraging site for local birds. It is possible that pelicans use parts of the Jordan River for foraging as well.

5.4.4.4 Western burrowing owl

Between 15 April and 12 June 2005, we surveyed 16 km of the habitat most likely to harbor burrowing owls. Over the course of 2 nocturnal surveys during April and June 2005 no burrowing owls were detected. We did receive responses from other nocturnal birds, including two owl species, the great-horned (Bubo virginianus), and the barn owl (Tyto alba), and two nightjars, the greater nighthawk (Chordeiles minor), and common poorwill (Phalaenoptilus nuttalii). These are all considered secondary species that are common and widespread.

5.4.4.5 Short-eared owl

No owls were detected during early morning grassland bird surveys, nor were any detected during evening owl surveys in the vicinity. Short-eared owls generally exhibit crepuscular and diurnal activity peaks. Suitable habitat occurs on the eastern and southern perimeters of the installation, however grasslands were scanned opportunistically during late afternoons while conducting fieldwork for the cougar study. One short-eared owl was recorded during summer 1999 (Leidolf, unpublished data), but despite annual surveys none have been detected since. One owl of undetermined taxonomic status was sighted opportunistically in the mouth of Beef Hollow. Unfortunately, the sighting was brief and obscured by vegetation and a positive identification was not obtained, however it most closely resembled either a western screech owl (Otus kennecottii) or a short-eared owl.

5.4.4.6 Ferruginous hawk

No ferruginous hawks were detected on Camp Williams during spring surveys. Competition with red-tailed (*Buteo jamaicensis*) and golden eagles may preclude their presence.

5.4.4.7 Greater sage-grouse

No sage-grouse have been detected on site at any time since the implementation of annual breeding bird surveys in 1994. There are historic records of sage-grouse occurring on Camp Williams and a sighting was reported on the Kennecott property approximately 12 km northwest of Camp Williams (C. Hendrix, USU cougar project, pers. comm.). There is no record of a lek in Salt Lake County, and only spotty records in southeastern Utah County (D. Mitchell, UDWR Upland Game Coordinator, pers. Comm..). The nearest known leks to Camp Williams are located near Vernon in Tooele County. Notably, most of the high quality sage-grouse habitat occurs in the impact zone, and thus the negative results may have been affected by low survey effort in this sector. We did detect several other gallinaceous birds, including three native species: California quail (Callipepla californica), ruffed grouse (*Bonasa umbellus*), and wild turkey (Meleagris gallopavo; reintroduced), and two exotics: ring-necked pheasant (*Phasianus colchicus*) and chukar (*Alectoris chukar*). All of these are considered common gamebirds. No evidence was found during the focused search on Camp; a report, prepared by Dr. Wolfe[17] detailing search methods and results is found in Appendix C, Monitoring Summaries (Wolfe 2004).

5.4.4.8 Grasshopper sparrow

One possible grasshopper sparrow was detected on Camp Williams during the spring surveys on the southeast quadrant of the installation[18]. The bird most closely resembled a grasshopper sparrow, but the sighting was not confirmed. No other sparrows fitting the description were sighted on other transects at any point during the summer.

5.4.4.9 Long-billed curlew

No long-billed curlews were detected on Camp Williams during spring surveys.

[17] Professor, Forest, Range & Wildlife Sciences, Utah State University.
[18] On May 28, 2005 at 11:15 AM at point 5, transect 32, a small sparrow was sighted perched on a sagebrush.

5.4.4.10 Pygmy rabbit

No pygmy rabbits were detected on Camp Williams during spring surveys (Wolfe 2004) or by the RTLA crew during annual monitoring. The lack of extensive sandy soils may preclude their presence. A report, prepared by Dr. Wolfe[19] detailing search methods and results is found in Appendix C, Monitoring Summaries.

5.4.4.11 Kit fox

No formal surveys were conducted for this species. A small canid bearing a strong resemblance to a kit fox was sighted during daylight hours by a UTNG employee from Environmental Resource Management during late winter 2005. This sighting suggests the potential occurrence of kit foxes on Camp. Between 1983 and 2005, an average of 355 kit foxes was annually taken in Utah by trappers. Notably, none of these came from Salt Lake or Utah counties. It is not clear whether this reflects a lack of trapping pressure in those areas, or a low density of kit foxes.

5.4.4.12 Other Species of Interest

The Swainson's Hawk (*Buteo swainsoni*) and the Loggerhead Shrike (*Lanius ludovicianus excubitorides*) are two migratory birds that have been documented breeding on Camp Williams during spring and summer bird surveys in 2005. Both of these species were removed from the 2003 Utah Sensitive Species list. The willow flycatcher (*Empidonax traillii*) has been detected on site in previous years (Leidolf, unpublished data). It is important to note that the recognized subspecies of willow flycatcher indigenous to the Great Basin (E. t. adastus) is not the same subspecies as the Threatened southwestern willow flycatcher (E. t. extimus), which is found in the Mojave Desert of southwestern Utah.

5.5 Wetlands

The National Wetlands Inventory (NWI) describes wetlands as having one or more of the following attributes:

> "(1) At least periodically, the land supports predominantly hydrophytes, (2) The substrate is predominantly undrained hydric soil and (3) The substrate is non-soil and is saturated with water or is covered by shallow water at sometime during the growing season of each year (Cowardin et al., 1979)."

5.5.1 Camp Williams

Camp Williams has 7.8 acres (approximately .03 % of the installation area) of water bodies, including wetlands, as delineated by the U.S. Army Engineer Research and Development Center (Martel *et al*. 1999; Figure 5-15; Table 5-12). Delineated waters include streams, ponds, lakes, and wetlands and man-made stock ponds. The majority of these are in the Tickville Gulch and lower Beef Hollow drainages and along the Jordan River, but there are a number of small impoundments in Wood Hollow and a spring just south of the cantonment. All 7.8 acres are regulated as Waters of the United States under Section 404 of the Clean Water Act.

Table 5-12. Wetlands and water habitats of Camp Williams.

NWI Class	Frequency	Area/Length
R2UB (Riverine, intermittent)	2	7.4 miles
R4UB (Riverine, perennial)	160	117.4 miles
POW (Palustrine, open water)	6	1.1 acres
PEM (Palustrine, emergent)	6	6.7 acres

The largest contiguous wetland is in the Tickville Gulch channel, but these wetlands are in poor condition, probably due to historic, year-round cattle grazing (Figure 5-16). Much of the channel, especially in the southern half (on the Camp), has downcut below the surrounding terrain. The wetlands toward the northern half are trampled, without a clear water channel, and water quality is poor: mid-summer average water temperatures range from 64°F (in the shade) to 83°F in open stretches, pH ranged from 7.0 to 8.0,turbidity ranged from 5 to 25 Juu, and dissolved oxygen from 8 to 61 ppm (Johnson, unpublished data). These factors likely contribute to the lack of amphibians found on the installation. Cattle grazing as a management practice was eliminated in 2001, although some trespassing cows are found at various times year-round. The resulting reduction in consumption of riparian forage and trampling

[19] Professor, Forest, Range & Wildlife Sciences, Utah State University.

impacts should allow the channel to become narrower and deeper with the subsequent temperatures more conducive to wildlife habitat (EPA 1993).

Figure 5-16. Tickville Gulch Wetlands and Channel. Left picture shows a sample stretch of the trampled channel wetlands midway between Watts Road and the springs in late summer; right picture shows the extensive downcutting south of Watts Road.

The wetlands of Oak Springs were not delineated in the original survey since they were within the Impact Area buffer safety zone. A follow-up survey is scheduled for spring of 2006. The Oak Springs wetland area was excluded from cattle use by a 20 foot diameter enclosure. A diversion channel built by past cattle operators redirected some of the water from the spring enclosure into troughs, which when it overflowed went back into the channel. Downstream from this enclosure the channel is in extremely poor shape due to decades of cattle grazing. The channel is either un-vegetated or trampled, with high water temperatures, high turbidity and without a defined channel (Figure 5-17), the result of which is that it is highly susceptible to erosion. Conditions appear to be slowly improving since official grazing has ended, but cattle continue to trespass and use the area in the spring and fall when the problems outlined above can be exacerbated.

Figure 5-17. Oak Springs Wetlands and Channel.

Lower Beef Hollow contains a short stretch of wetlands in a narrow valley and adjacent to a dirt road. The channel is well-defined and vegetated although there is an adjacent, large area of erosion caused by prior practices at an in-use water facility that threatens wetland quality. The erosion is worsening despite stopping the original practices and will be addressed by Camp Williams.

In addition to the above channels, a number of small impoundments (both natural and man-made) were also delineated as wetlands in the Camp Williams survey (; Martel *et al*. 1999), principally in Beef Hollow and Wood Hollow (Figure 5-18). These include perennially wet and seasonally wet sites which appear to be in good condition and are generally isolated from cattle and military impacts. They are only distantly connected to perennial streams or rivers.

Figure 5-18. Staff From ERM Inspects Vegetation Composition and Condition at a Small Wetland In Wood Hollow.

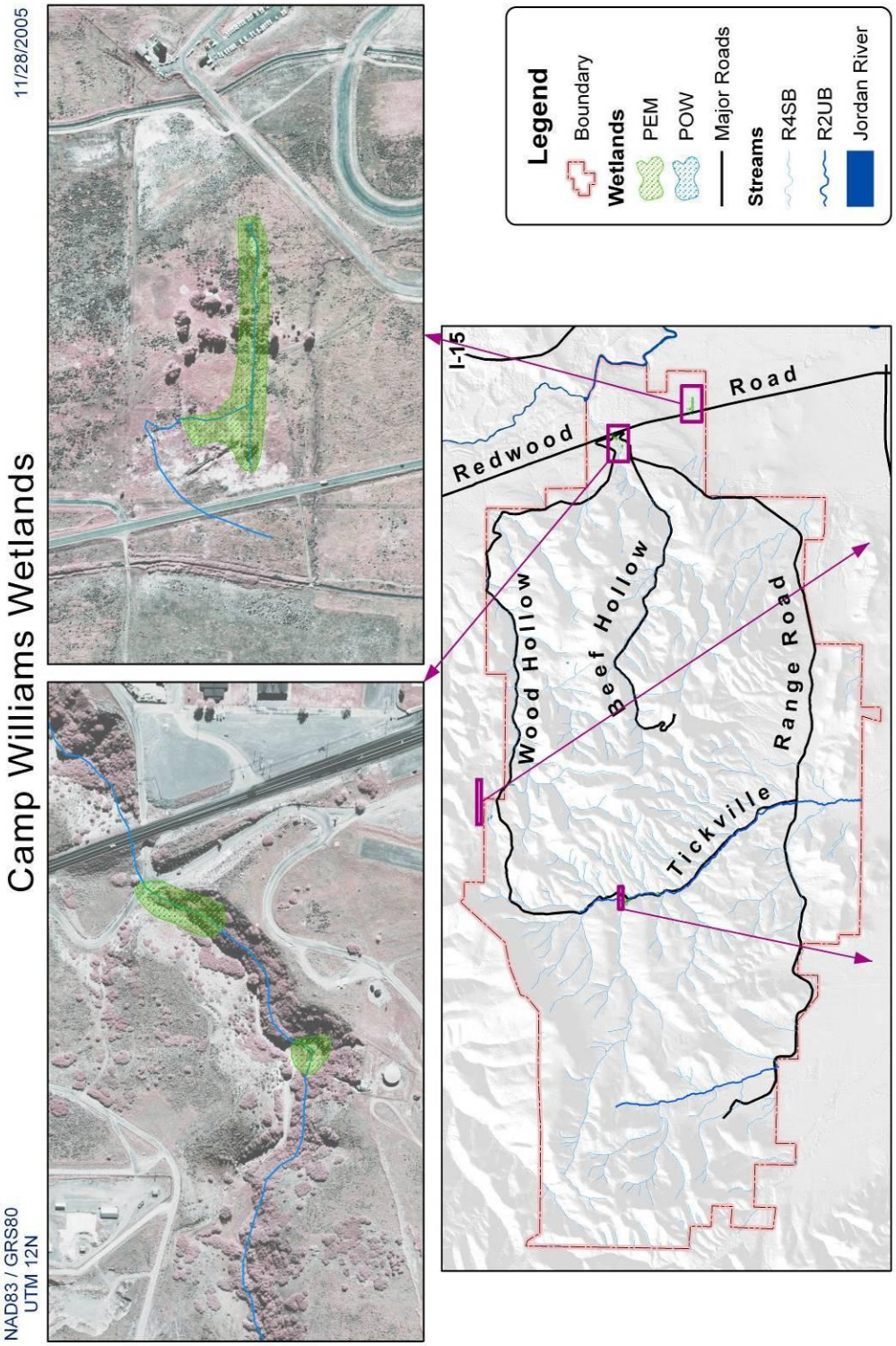
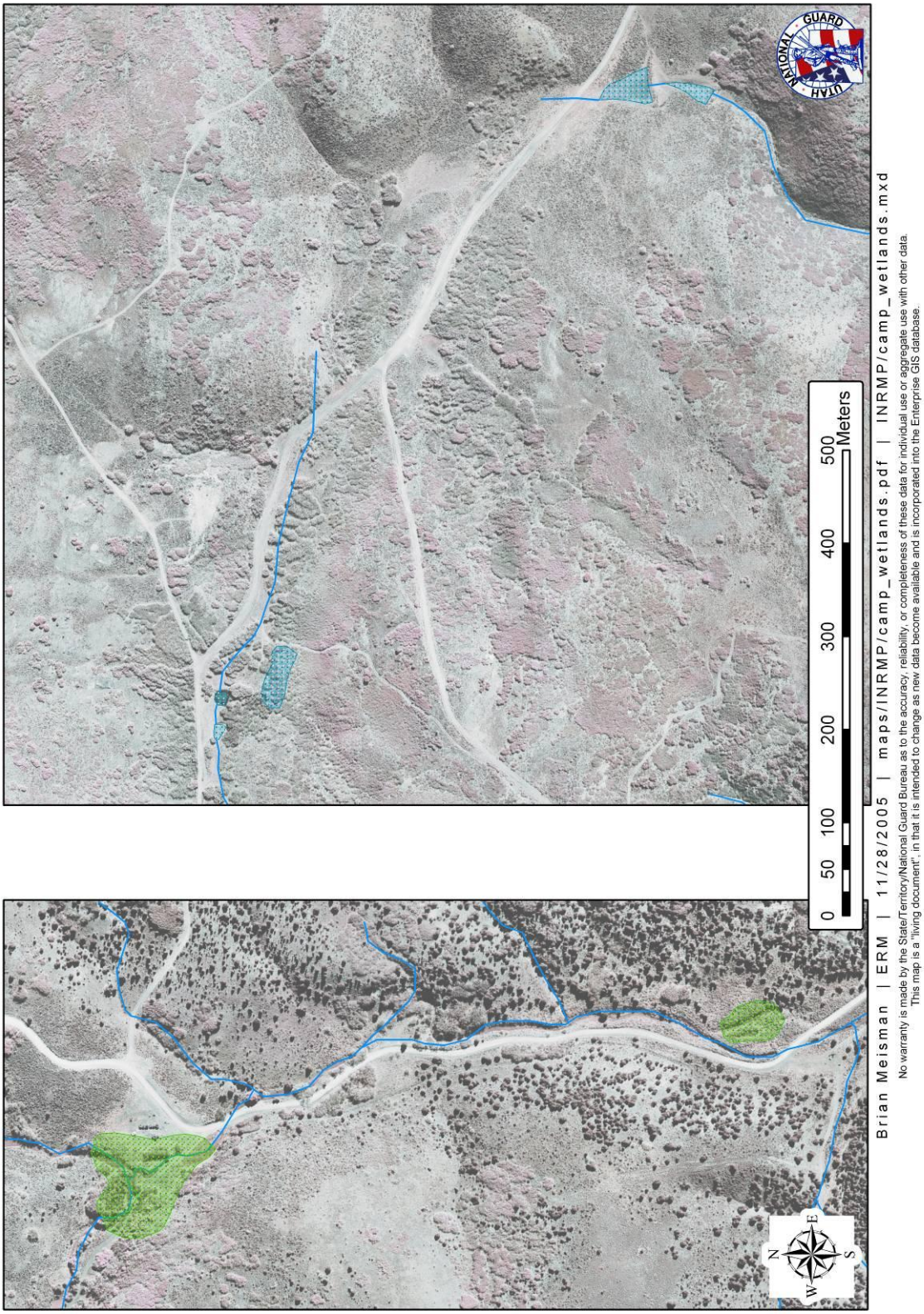


Figure 5-15. Wetlands of Camp Williams. (Two pages)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No warranty is made by the State/Territory/National Guard Bureau as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
This map is a "living document", in that it is intended to change as new data become available and is incorporated into the Enterprise GIS database.

5.5.2 Hidden Valley

Hidden Valley Springs contains approximately 1.6 acres of regulated water bodies with four National Wetlands Inventory classes identified (Martel *et al*. 2001; Table 5-13; Figure 5-19). This property is on the floodplain of the Jordan River. This site has not been and is not now used for military training, livestock, or other uses and both the spring and the wetlands are in excellent condition.

Table 5-13. Wetlands and Water Habitats of Hidden Valley.

NWI Class	Frequency	Area/length
R4SB (Riverine, intermittent)	2	0.12 miles
PSS (Palustrine, scrub/shrub)	4	0.80 acres
PEM (Palustrine, emergent)	7	1.52 acres
POW (Palustrine, open water)	1	0.077 acres

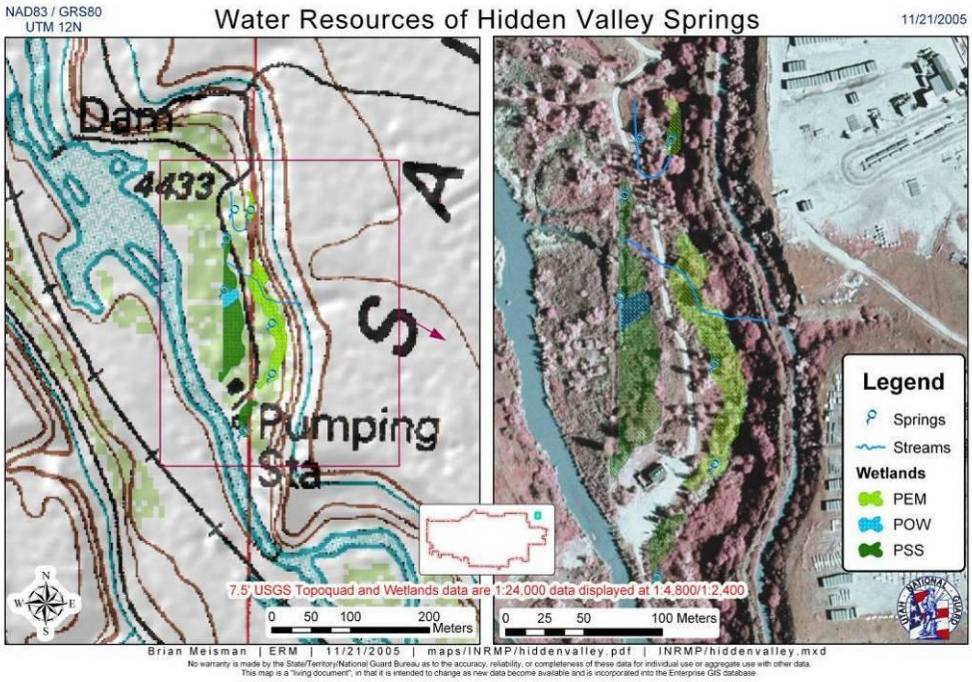


Figure 5-19. Wetlands of Hidden Valley

6 MISSION IMPACTS ON NATURAL RESOURCES

6.1 Land Use and Management Units

6.1.1 Overview

Camp Williams upholds roughly 350,000 troop training days a year on its 24,000 acres. The number of troops, the high diversity of training types, and the fairly small land area result in intensive use of the land. This needs conscientious land management to maintain the training mission and training environment. Some of the specialized military training includes winter, desert, mountain, and amphibious training, and many ammunition ranges. These different training objectives can have a high impact on the land (that is firing ranges, training courses, and live ammunition impact area) or a low impact on the land (i.e. foot traffic) and have a corresponding land use management. Camp Williams also provides support for numerous natural resource experiments and management activities.

The principle management units on Camp Williams are Training Areas. Previously, training areas were based on a one kilometer square grid. This grid delineation was changed in 2001 to named areas delineated by natural and man made features such as ridges, valleys, and roads in addition to military land use (Figures 6-1 & 6-2). Delineation of training areas by name and category allows for easier integration with the training database, Range Facilities Management Scheduling System (RFMSS), and the Range and Training Land Assessment database (RTLA). Generation of the names and categories for the training areas was completed by Range Control with the advice of the environmental staff. Most of Camp Williams is designated as training areas, which support bivouacs, dismounted maneuvers, and other non-live fire activities; other designations include Live Fire Ranges, Live Fire Area (Impact Area), Live Fire Training Area (firing points for heavy artillery), Army Garrison (or Cantonment), Airborne Facility, Leased to State, Digging Areas, and Restricted Training Areas.

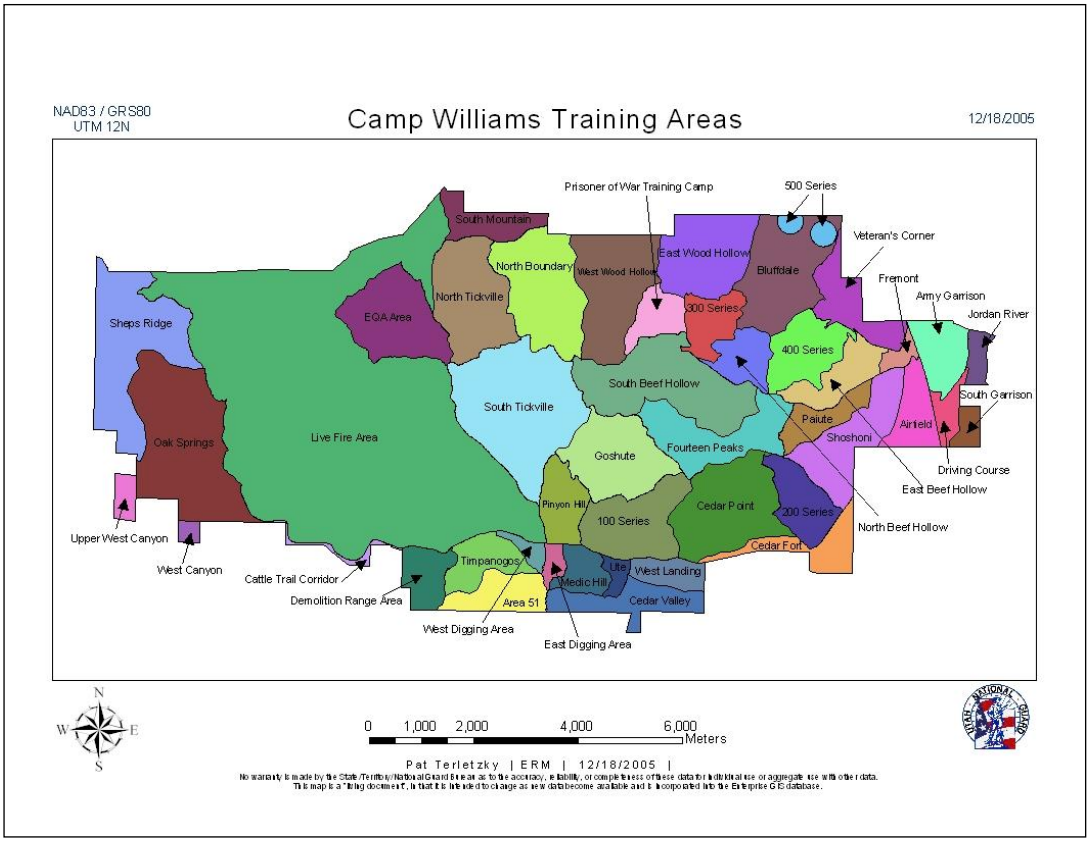


Figure 6-1. Training Areas at Camp Williams.

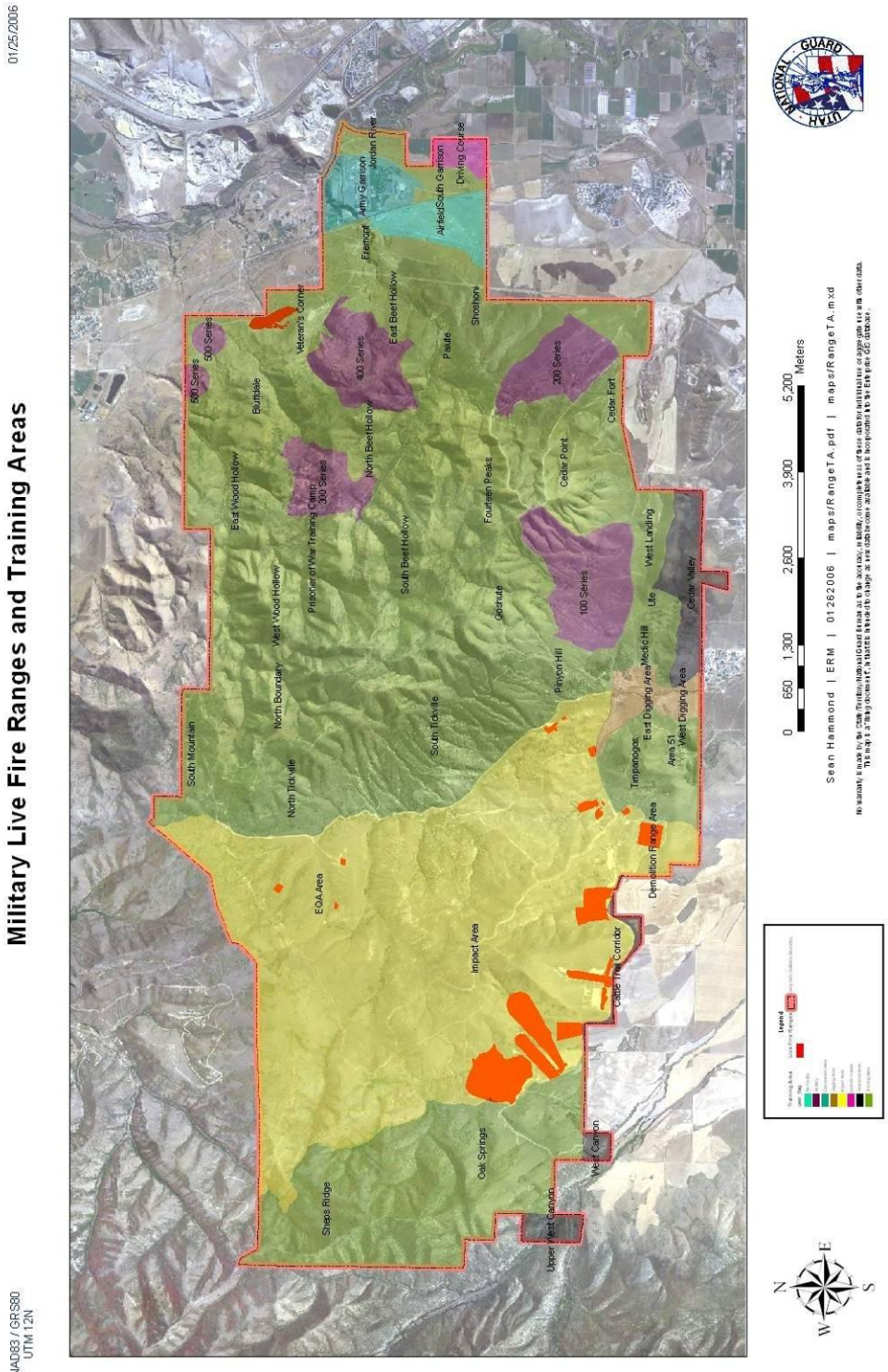


Figure 6-2. Training Areas by Type and in Relation to Live Fire Ranges.

6.1.2 Training Areas

There are 44 training areas (excluding the Cantonment and Impact Areas) comprising 17,603 acres. The largest land designation is that of training areas that support unit non-live-fire (36 training areas encompassing 14,694 acres) training requirements: dismounted maneuvers and tactics, engineering heavy equipment maneuvers, command centers, etc. The remaining eight training areas that are live-fire are comprised of 5 provided for artillery maneuvers, 2 provided for an engineer qualification area and a demolition training area, and 1 set aside for small arms ranges.

6.1.3 Heavy/Light Maneuver Areas

Training areas designated as 'heavy' are done so to indicate the type of vehicle traffic those training areas are designated to accommodate. 'Heavy' usually refers to large wheeled vehicles such as the Heavy Military Mobile Tactical Transport (HMMTT) and tracked vehicles such as self-propelled Howitzer (M109A5) and Paladin (M109A6) artillery pieces and Tracked Ammunition Carriers (M548). It is also used to describe those areas designated for training on engineering equipment such as bulldozers, earthmovers, graders and dump trucks.

Light maneuver training areas include those areas designed to accommodate all dismounted maneuvers as well as maneuvering of vehicles such as High Mobility Multi-purpose Wheeled Vehicle (HMMWV) up to Light Maneuverable Tactical Vehicle (LMTV), commonly referred to as 5-ton personnel carriers. Tracked and construction vehicles do not normally fall into this classification.

6.1.4 Bivouacs

Only one training area, Area 51, has an improved bivouac (i.e., tent pads, graveled parking, etc.). The South Mountain and West Landing training areas have designated unimproved bivouac sites within them. The Pinyon Hill and Oak Springs training areas have the PLDC and OST training facilities respectively. Both have barracks and latrines for overnight use and are regularly used by the RTI. Roads were installed in the West Landing training area to facilitate bivouac and operations use, but the juniper plantings for concealment failed. Otherwise training units are allowed to bivouac wherever suits them.

6.1.5 Vehicle and Non-Vehicle Maneuvers

Off-trail maneuvers are restricted to the Firing Points (heavy maneuver areas) and the Digging Areas without prior clearance. Even though off-road driving is discouraged on Camp Williams, the largest military disturbance to the land (excluding wildfires caused by training) is from unauthorized off-road driving by training units. This potentially causes destruction of vegetation, particularly shrubs, and can result in the invasion and establishment of weeds, soil erosion, and damage to cultural resources. A large proportion of Camp Williams is officially limited to foot traffic and non-vehicular operations, which causes much lower impacts to the land. Damage to natural and cultural resources are reduced or eliminated in these low impact areas while maintaining the training mission. The boundary of Camp Williams is increasingly becoming urbanized, and with that comes a concomitant increase in illegal trespass by non-military vehicles and foot traffic. This unfortunate increase has its own negative implications for the land and serves to compound the effects of the military impact.

6.1.6 Digging Areas

There are two digging areas that are set aside specifically for engineer maneuvers. They are the East and West Digging Areas located at the base of Tickville between Range road and the Camp's southern boundary. The digging areas are the only places on Camp where vegetation and soil removal is approved as part of training activities.

6.1.7 Artillery Firing Points

Five training areas, the 100 through 500 Series, have a dual role as training areas and as the sites where artillery positions itself to fire into the Impact Area. These five training areas are designated for 'heavy' maneuvers, and as such are potentially the most susceptible to training-related damage due to cross-country maneuvers. They also generate the most noise during live-fire events. The 100-500 Series training areas are designated to accommodate the DA's 'shoot and scoot' doctrine. The purpose of the 'shoot and scoot' doctrine is to train soldiers to engage a target from one point then quickly move to another firing point and engage either the same or a different target from that point. The theory behind this methodology being that if our force is light and maneuverable, always on the move, that it will be much more difficult for an enemy force to locate our soldiers and return fire.

6.1.8 Impact Area

The "Live Fire Area" contains a permanently designated impact area approximately 6,183 acres in size on the western end of the Camp Williams training area (Figure 6-3). There are 19 assorted Firing Ranges established along the southern boundary of this area and 3 demolition areas located in the northeastern quadrant. This land use designation limits impacts to small arms, demolitions, and artillery fire. The impact on natural resources within this area includes highly localized disturbance to the soil where shells impact, wildfires from incendiary devices, and weapon noise. Soil erosion and vegetation degradation is minor. The limitation on human access results in the impact area functioning as a quasi-wildlife refuge. Wildfires started within the impact area are of great concern due to the potential spread to the rest of the camp as well as northward with the dominant wildfire season weather to residential areas adjacent to the Camp Williams boundary.

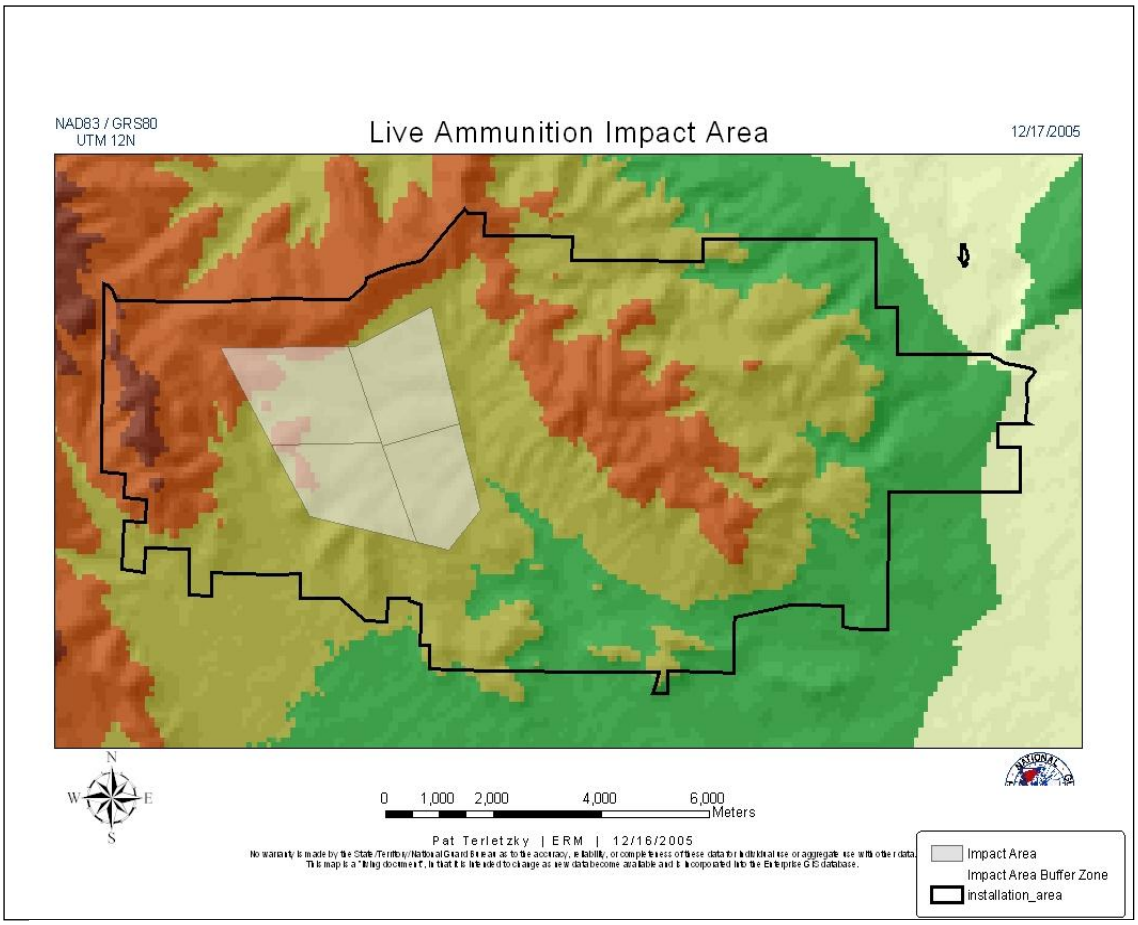


Figure 6-3. Impact Area at Camp Williams.

6.1.9 Firing Ranges and Weapons Training

Weapons training occur primarily on eighteen permanent small arms ranges surrounding the southern and eastern ends of the impact area, but there are five small arms ranges in the Veteran's Corner training area. The small arms ranges receive a great deal of use, but the impact on natural resources is minimal

6.1.10 Drop Zones

Camp Williams has a single Drop Zone (Ashua) that is leased and located approximately one mile south of the installation. The drop zone is located on agricultural land and the UTNG does not have management authority over the land.

6.1.11 Air Facility

The Air Facility has a combat-assault landing strip capable of support C-130 aircraft, but most commonly used by helicopters from the 211th Aviation BN. Impacts to natural resources are minimal.

6.1.12 Restricted Training Areas

Camp Williams has four training areas, Upper West Canyon, West Canyon, Cattle Trail Corridor and Cedar Valley, in which training has been restricted for either environmental or military reasons.

6.2 Natural Resources Needed to Support the Military Mission

A training environment is a function of the area's climate, topography, and its vegetative communities. The diversity of natural vegetation types at Camp Williams is a particularly important element of the training environment. The Camp Williams INRMP uses an ecosystem approach to land management intended to integrate military training activities with the conservation of ecological integrity and biodiversity. A major focus of this approach is the maintenance of naturally occurring structural diversity. At the site or community level, this includes providing for a diversity of native plant species. At the landscape level, it includes maintenance of a variety of community types, successional stages, and patch sizes. The biodiversity at Camp Williams provides soldiers with a variety of training opportunities in different habitats.

6.2.1 Vegetation Manipulation to Accommodate the Training Mission

As part of Camp William's goal to integrate training requirements with the conservation of the training resources ecological integrity and facilitate use of the training area by trainers, site-specific vegetation manipulation will be conducted in critical training areas. The only identified need is to improve maneuverability in thick juniper or Gambel oak stands. In a landscape of relatively low growing vegetation, juniper provide concealment not found elsewhere. Treatment will entail either thinning (mechanical thinning) of dense juniper stands to facilitate movement and ecological stability or thinning of Gambel oak to facilitate infantry exercises (Figure 6-4). More information on these objectives are found in Section 7.6, Land Rehabilitation and Management. Thinning has the duel advantage of reducing wildfire hazard as well.

Figure 6-4. Mechanical Thinning in the South Mountain Training Area. The oak on the left are post thinning, the oak on the right are representative of the oak on the left pre-thinning.

6.2.2 Vegetation Mapping for Military Objectives

Maps of the vegetation present on Camp Williams are available for use by units in planning for training. When a unit has specific requirements for concealment or vegetation structure, they can request a map of those areas meeting their requirements. ITAM is currently in the process of developing maps of each training area that will be available online, internal to the UTNG (see also Section 3.3.2, Training Operations).

6.3 Effects of the Military Mission on Natural Resources

The historic impacts of training activities on soil, vegetation, water, and wildlife at Camp Williams appear, in general, to be fairly modest. Training activities with potential for high impact (e.g., antitank ditching, demolition, artillery firing points, ranges and bivouac areas) are restricted to dedicated sites, which are either hardened or otherwise resistant to environmental damage.

The effect of military training on the training resource is monitored through the RTLA (Range and Training Land Assessment) component of the ITAM (Integrated Training Area Management) program. RTLA protocols were first developed by the military under the Land Condition Trend Analysis (LCTA) program in 1992 (USACERL 1992). The LCTA program attempted to provide an Army-wide methodology for data collection and analysis. It soon became apparent that uniform methodologies applied to every training center may not be the most effective way to answer questions about environmental impacts by training due to the inherent variation in training resources across the nation. In response, the Center for Ecological Management of Military Lands (CEMML) developed a technical reference manual in 1999 (CEMML 1999) that could be used by installations to develop what was then referred to as LCTA II protocols. LCTA II protocols gave installations more independence in designing custom monitoring to answer the questions most important to training on individual installations. Douglas Johnson developed the protocols currently used on Camp Williams with the exception of some minor additions made by Sean Hammond in 2005 (See Appendix C or Johnson 2000). Current methodology will be included in the Camp Williams RTLA Protocol report when it is completed.

Analysis of the LCTA data collected starting in 1993 through 1998 was analyzed in three component areas: training areas (focusing on firing points), range areas, and the Impact Area. A report summarizing this analysis was published in May of 2000 (Johnson 2000).

Firing points are used for heavy artillery fire into the impact area (Figure 6-4). Equipment used varies from towed 105mm artillery pieces to self-propelled 155mm Howitzer to self-propelled 155mm Paladin's. The self-propelled artillery has the greatest potential to damage the training resource when compared to other training activities. The 2000 analysis suggested that RTLA plots located at or near firing points were in a state of declining health, indicated by a decreasing number of native plants and an increasing number of invasive species. Of the three component areas, the firing points show the worst trends. It can be inferred that the firing points that are experiencing this trend are doing so due to overuse. Reason for overuse stems from the fact that the two most heavily used firing points are also the most accessible. To mitigate for this overuse, ITAM staff is working to repair and improve maneuver trails to provide access to alternative firing points in the 200 and 400 Series and the Bluffdale TA through the LRAM component of ITAM. The result will be to spread use, easing impacts.

Figure 6-5. Soldiers Training on a 155 Self-Propelled Howitzer Firing at the 200 Series Firing Points.

The range areas and the Impact Area have similar increases in both native and invasive species. Invasive species had a slightly higher rate of increase. Preliminary results of RTLA data spanning from 1993 to 2005 suggests that increases in species presence could be more stongly related to climate and wildfire return interval than to impacts from military training. Since the 2000 report we have been able to gather both climate data dating back to 1992 as well as historic wildfire information in order to have more precise wildfire return interval data for each plot. Using this data we hope to acertain more directly, the relationship of trends in vegetation with climate and wildfire. Preliminary data agrees with the 2000 assessment that the climatic cycle may have much more to do with landscape vegetation composition trends than either wildfire or military training which are both more localized effects in nature. This being said, the duration of negative effects is following intense disturbance by military training or fire and an areas ability to recover from that disturbance is directly linked to climatic conditions. The worse the climatic condition, the more probable that introduced species will have a larger increase than its native neighbors for the simple reason that most introduced and invasive species begin their growing season early when there is no competition with native plants. In drought years, the early phenology species use up most of the available resources by the time the native species start their growing season. Because the invasive increase is slight and restoration is difficult due to safety risks, these areas will not be managed directly but will continue to be observed.

Beyond the localized, high use areas, the greatest potential impacts are associated with training-ignited wildfires and off-road traffic. Analysis of RTLA data does not show that these concerns have materialized. Shrubs and species

that do not tolerate repeated fires thrive. Sagebrush and Gambel oak plots recover quickly. Wildfires will continue to be assessed and reseeded or otherwise treated as described in Sections 7.6, Land Rehabilitation and Management, 7.7.3.6,Pre-Suppression, and 7.7.3.9, Post-Wildfire Rehabilitation. Impacts from off-road driving are fairly modest and requests from Range Control to restrict off-road driving to mission-critical training appears to marginalize this concern. The ITAM program plans to develop hardened helipads to facilitate training to mitigate the localized damaged from aviation training.

In addition, the movement of equipment, particularly tracked vehicles, onto Camp Williams represents a minor risk of noxious weed introductions. This risk is substantially increased during years exhibiting a wetter than normal climatic cycle. Thistle appears to be especially affected during these cycles. Off-road travel through patches of weeds during the time that they are going to seed contributes significantly to their spread. Wash racks are provided north of the entrance to the UTES on Camp Williams for incoming equipment. Use of these wash racks by units prior to conducting maneuvers at Camp Williams will greatly reduce the potential introduction of noxious weeds that may eventually degrade the training resource and force the UTARNG to expend monetary resources in weed control efforts that could be used elsewhere.

6.4 Effects of Natural Resources or their Management on the Mission

The ecosystem management approach incorporated in the Camp Williams INRMP is compatible with the military training mission. Sustaining quality training opportunities is ultimately dependent on the sustainable management of ecosystems. Ecosystems and the military training mission are all dynamic; integrated natural resource management allows environmental challenges to be addressed proactively.

The basic focus of ecosystem management is on habitat and ecological communities rather than on individual species and resource outputs. Potential problems are minimized by matching proposed activities to the specific characteristics and conditions of a site, e.g., some areas are appropriate locations for intensive activity and management, while others are less resistant or resilient to environmental damage. The objective of the Training Area Pages that will be provided by ITAM on the ERM and Camp Williams websites is to provide trainers with this type of information, allowing them to more easily find the right area to meet their training objectives while at the same time making them aware of environmental considerations for the area.

Natural resources conditions that currently affect the accomplishment of the military mission, or that could potentially impact the mission if not adequately addressed, include gullying in the lower Tickville drainage, populations of noxious weeds, and possible temporary loss of suitable wildlife habitat for some species of interest to either the USFWS or the UDWR (mainly raptors such as golden eagles or Swainsons hawk) due to wildfire.

Protection of cultural resources necessitates localized restrictions on training activities involving major soil disturbances (e.g., antitank ditching).

Camp Williams has a long-standing and on-going environmental monitoring program (the Range and Training Land Assessment component of the Integrated Training Area Management Program). The various monitoring activities are intended to facilitate the maintenance of ecosystem integrity and, thus the sustainability of a quality training environment. In order to more effectively use monitoring results, UT-ERM will develop a set of evaluation criteria and thresholds for important indicators of environmental processes and functions. Thresholds associated with the evaluation criteria will be incorporated into management action plans for rehabilitation and restoration of affected ecosystems and training areas.

6.5 Future Military Mission Impacts on Natural Resources

The current plans for training by the Utah National Guard and other outside agencies is for the increased use of Camp Williams and less out of state training due to budget constraints. While no structural changes are concrete for the UTNG, any future structural change within the Army will require a greater diversity in soldiers training requirements. This will require an increase in training opportunities and flexibility in management in order to accommodate emerging training requirements being placed on units.

This increased military use of Camp Williams directly affects the scope of this integrated natural management plan. It creates a greater challenge for environmental managers to minimize impacts to natural resources across the Camp. Cooperation between environmental staff and military personnel will be essential to accomplish this goal.

Anticipation of the effects of increased training, and looking ahead to lessen the impacts by planning attainable goals will also be important. Restoration or rehabilitation of damaged areas and protection of sensitive places must be outlined.

7 NATURAL RESOURCES PROGRAM MANAGEMENT

7.1 Natural Resources Program Management

Responsibility for implementation of the INRMP Update lies with the UTNG (Figure 7-1). Environmental Resources Management (ERM) is the lead office for development and oversight. Greater detail is found in Section 9, Implementation. The INRMP Update should reflect the participation and agreement of the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources.

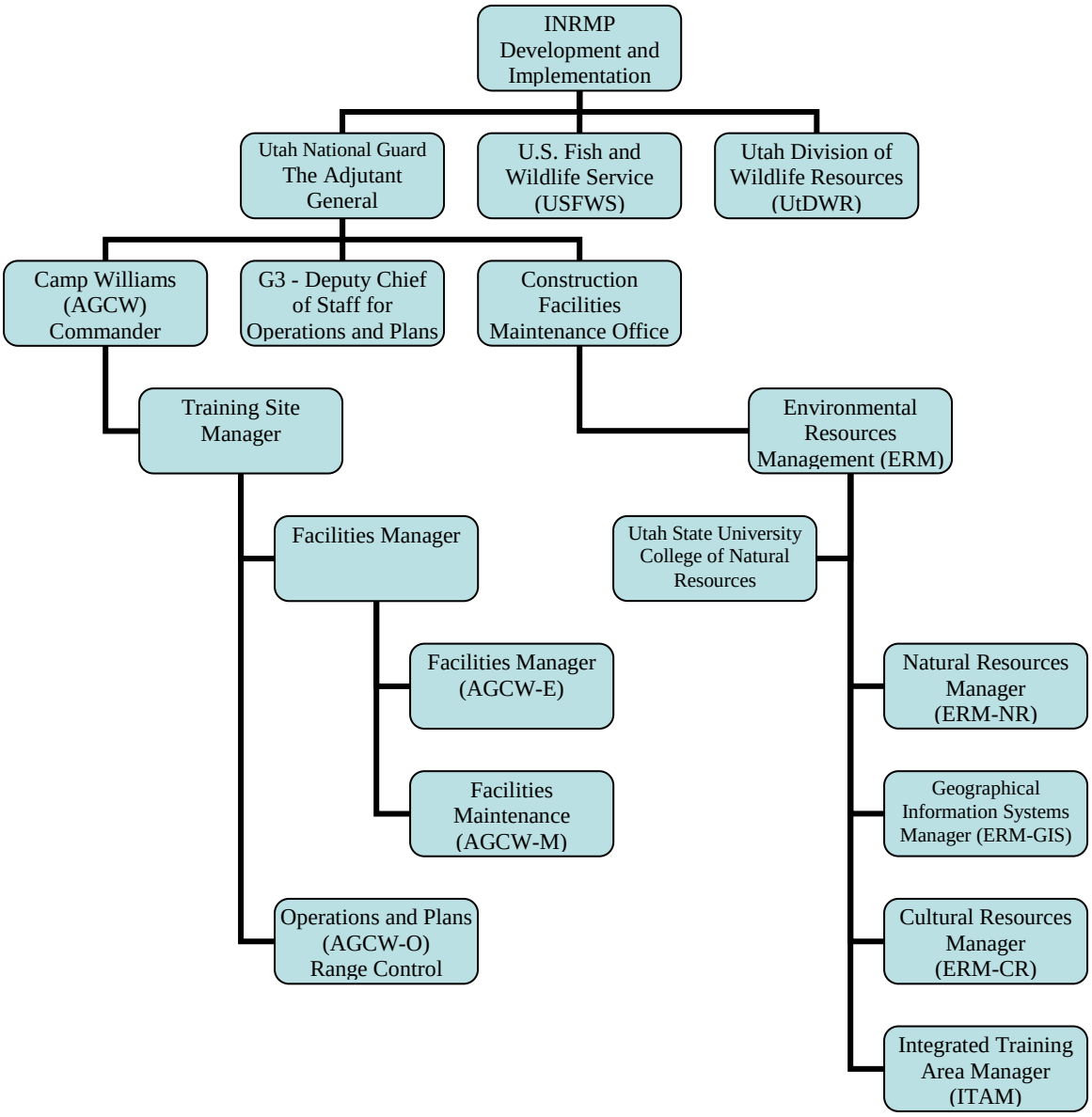


Figure 7-1. Organizations and Positions with Responsibilities for Development and Implementation of the INRMP.

ERM contracts with and relies heavily on the College of Natural Resources, Utah State University, for technical assistance and implementing specific projects. The Natural Resources Manager, Integrated Training Area Manager, and Geographical Information Systems Manager have official positions within the UTNG, but are technically USU employees.

7.2 Geographical Information System

7.2.1 General Introduction

A common definition of Geographical Information System is that it is a computerized tool for storing, managing, analyzing, and presenting geographical data. At the simplest level, a GIS is a computer or a number of computers. To "use" a GIS a person has to be sitting in front of some type of computer, a desktop, a laptop, a palm pilot, or even a global positioning system (GPS) unit. Second, a GIS requires data. Often this is the most time consuming and expensive part of a GIS. GIS data can be thought of as layers in a sandwich. The bottom layer might represent elevation values for each $30m^2$ area across the state of Utah, the next layer might represent vegetation across the state of Utah, the next layer might be roads across the state of Utah and the final layer might be the locations of UTARNG facilities across the state of Utah. The third part of a GIS is people. A GIS cannot run without people interacting with it and instructing it what to do. So, the three parts of a GIS are the computer, the data, and the people. In the end, all three components are intertwined and a GIS cannot function with any of the pieces missing.

The purpose of a GIS in the Utah Army National Guard is to support natural resources in the fulfillment of the military mission. This support comes in the form of access to GIS data layers for analysis and the creation of maps. GIS was first used in the UTARNG, in late 1980's to develop and facilitate management of natural resources. One of the first uses of GIS was in the implementation of the 2001 to 2006 INRMP. Currently GIS data and GIS software are used every day and are integral parts of natural resources management at Camp Williams.

7.2.2 Standards

Although GIS is primarily a function of the Environment Resources Management, many other departments use GIS for their specific purposes. GIS data users must understand and correctly interpret the GIS data they receive. To address this, data standards have been implemented. These standards ensure that data fields and information is the same for all users (i.e. that an attribute "units" means the distance units and not the units that might train in an area). The GIS data for Camp Williams is incorporated into a spatial database that encompasses all facilities for the Utah National Guard. This database is Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) compliant and can be seamlessly incorporated into the Army National Guard database for the entire United States. All GIS data has associated with it Federal Geographic Data Committee (FGDC) compliant metadata. Metadata is important information regarding a specific GIS data layer (projection, attribute descriptions, etc.).

The standard projection for the GIS data is a map projection Universal Transverse Mercator (UTM), with a datum of WGS1984, spheroid of WGS1984, and units of meters.

7.2.3 Procedures

Once a GIS data layer is developed, the GIS technician must have a Subject Matter Expert (SME) review the GIS spatial and attribute data for quality and correctness and then obtain their signature. Concurrently with the data creation, metadata should be created. Once the SME has signed the data review, thus indicating the spatial and attribute information is correct, the GIS manager will review the metadata to ensure FGDC compliance. Assuming all standards are met, the GIS data will be incorporated into the official database. The complete standard operating procedure (SOP) for incorporating GIS data into the official GIS database is available in Appendix C.

7.2.4 Data Layers

A complete SDSFIE GIS database contains over 100 specific data layers but not all are appropriate for Camp Williams (i.e. Camp Williams does not have a harbor or dolphin points). There are currently (2006) over 90 data layers for Camp Williams but this number will change as new data is added. Some of the more important data layers available are the updated boundary for Camp Williams; the updated roads layer for both Camp Williams and the surrounding areas; locations of firebreaks; outlines of past wildfires; hazardous waste location sites; soils; locations of permanent and intermittent water sources; and non-point sources of pollution.

7.2.5 Projects

The RTLA program was one of the initial projects to have a significant GIS component. The RTLA program samples and monitors vegetation on installations. Using GIS with the RTLA program allows for spatial tracking and monitoring of exotic weed species, native plant species distributions, soil disturbance areas and amounts, the

diversity of the plant community, and changes in density and cover of the plant community. GIS played a significant role in refining the Universal Soil Loss Equation in conjunction with a Masters project at Utah State University. GIS has and continues to be used to track initial location and dispersal of noxious weeds on Camp Williams. The spatial component of GIS allows for monitoring of weed movement and dispersal and can be used to create predictive models of weed movements. With the addition of noxious weed management (cutting, spraying, etc.), analysis can be conducted to examine the effectiveness of a different weed management methods. Any issue with a spatial component can use GIS, including but not limited to identification of areas with a high potential for noise problems. Surface Danger Zones (SDZs) can be created and draped over a general landscape to identify areas of danger from ammunition. Fires are an important component in the landscape community at Camp Williams. With a GIS, we can determine if the spatial pattern of man-made fires is different than the spatial pattern of natural wildfires. We can track the location and ignition points of wild fires to determine if there is a correlation with elevation, tree cover, etc.

GIS is used for more than natural resources in the Environmental Resources Management department. Hazardous waste storage locations and hazardous materials locations can be located, monitored, and tracked. Although not directly an environmental concern, locations of sewers, electrical systems, potable water, and other utilities can be incorporated into a GIS and used to determine accessibility and location (i.e. if a sewer system is leaking, the GIS could be used to locate the specific line).

7.3 Wildlife Management

7.3.1 Introduction

Camp Williams has maintained a relatively complete set of vertebrate and avian fauna especially considering the intensity of military training and the recent urban encroachment to the north and south. The primary goal is to maintain habitat to sustain native species. Management of wildlife species must 1) be in accordance with state and Federal laws on threatened or sensitive species, 2) be conducted with the goal of maintaining the training mission, 3) maintain healthy population levels, and 4) be adaptive and flexible.

7.3.2 Management

The primary focus of wildlife management is on ecosystem management, the execution of which will sustain habitat for all wildlife species (Figure 7-2). Although the main focus of natural resources management at Camp Williams is the ecosystem rather than the individual species, some species (e.g., mule deer) require individual attention due to their impact on the natural resources or their perceived impact. These individual plans are developed for a single species but they are not implemented without consideration of their impact on the whole.

7.3.2.1 Management of Migratory Birds

The Migratory Bird Treaty Act protects migratory birds from take – to chase, hunt, take, capture or kill. Federal agencies are responsible to coordinate with the USFWS before an action likely to take, to minimize the take, and to control harmful invasive species. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, specifically directs federal agencies that are likely to have a measurable negative effect to develop and carry out a protective Memorandum of Understanding. The DoD and the USFWS have just completed the conservation MOU. Incidental take during military readiness exercises is addressed in a rulemaking in accordance with section 315 of the National Defense Authorization Act for FY2003 (Pub. L. 107-314, 116 Stat. 2458). Federal regulations (50 CFR) and Executive Order 13186 provide the framework for regulation of migratory bird take and possession. For any take that does not occur as a direct result of military readiness activities, as defined in the Director's Order detailing specifics of the exemption, federal permits are required to take, possess, transport, and dispose of migratory birds, bird parts, feathers, nests, or eggs. When necessary, application for permits will be made to the U.S. Fish and Wildlife Services Migratory Bird Permit Office in Denver, Colorado.

The USFWS identified a subset of the 800-900 species of migratory birds as priority species under Birds of Conservation Concern (BCC; USFWS 2002). The purpose was to identify birds of conservation value, to stimulate coordinated and early management, to manage treats that may lead to listing under the Endangered Species Act, and to make management cost-effective. The BCC named priority species at various scales, but the base layer were Bird Conservation Regions (BCR). BCRs are regions that encompass landscapes having similar bird communities, habitats, and resource issues.

The Utah Partners in Flight (UTPIF) Avian Conservation Strategy (2002) focuses on effective and efficient ecological management of priority bird species and their habitats within Utah. A key goal is to incorporate recommendations into land management plans.

The BCC and the UTPIF strategy form the basis for prioritizing bird species for management. The 11 years of bird transect count data provide an excellent baseline that reveals many sensitive migratory bird species (Appendix C). Table 7-1 lists the birds, identified as priority species in the BCC and the UTPIF, which will be the focus at AGCW. The game birds identified in the BCC are mainly waterfowl. The primary water habitat is the Jordan River, over which the UTNG does not have management authority; therefore, these birds are not considered. American white pelicans and bald eagles are dealt with under Section 7.4, Threatened and Endangered Species Management.

Table 7-1. Priority Bird Species for Management.

Common Name *Scientific Name*	Designation	Survey Count [a]	Breeding Habitat
Brewer's Sparrow *Spizella breweri*	UTPIF: 34[b] BCR 9	11	Obligate of sagebrush >1.5m tall [b]
Northern Harrier *Circus cyaneus*	BCC [c]	11	Wetlands, prairies, or shrub-steppe [d]
Black-throated Gray Warbler *Dendroica nigrescens*	UTPIF: 32	10	Juniper and lowland riparian [b]
Broad-tailed Hummingbird *Selasphorus platycercus*	UTPIF:33	10	Riparian [b]
Virginia's Warbler *Vernovora virginae*	UTPIF: 36 BCR 9	10	Juniper and streamside shrub [b]
Swainson's Hawk *Buteo swainsoni*	BCR 9	6	Nests in trees, forages in open areas [d]
Loggerhead Shrike *Lanius ludovicianus*	BCR 9	5	Open areas with short vegetation [d]
Olive-sided Flycatcher *Contopus cooperi*	BCC	1	Coniferous forest, or riparian areas [d]
Prairie Falcon *Falco mexicanus*	BCR 9	1	Open areas with cliffs or bluffs [d]
Sage Sparrow *Amphispiza belli nevadensis*	UTPIF: 32 BCR 9	1	Sagebrush obligate, 1-2m tall [b]

a – Number of years noted out of 11 survey years
b – UTPIF ranking for Priority Species and habitat from Utah Partners in Flight Avian Conservation Strategy (Parish *et al.* 2002).
c – BCC is Birds of Conservation Concern; BCR 9 is specific to Bird Conservation Region 9, Great Basin (USFWS 2002).
d – From The Birds of North America Online (bna.birds.cornell.edu)

The DOD PIF Strategic Plan promotes a landscape perspective in migratory bird conservation: the biggest threat is from habitat loss, fragmentation and changing natural processes, such as changing fire regimes or hydrologic cycles (DOD 2002). A key aim of the UTPIF strategy and the DOD PIF plan is habitat conservation that preserves fully functioning natural ecosystems that support bird needs. This INRMP promotes an ecosystem focus, on habitats and communities, to keep the major native vegetation communities in roughly their current proportion (though diversity of age structures may be promoted).

General management guidelines are to:
1. Survey for these species before altering, such as by training, construction, controlled burns and such, their respective habitats.
2. Avoid the use of pesticides within their breeding habitats.
3. Prevent and control exotic plants (See Section 7.9, Integrated Pest Management).

4. Uphold a "no net loss" of habitat, particularly of sagebrush. The sagebrush-steppe is rapidly being developed along the Wasatch Front and elsewhere in the Great Basin. Its conservation is a recommendation of the Western Working Group of the DOD PIF.
5. Manage for large blocks of sagebrush habitat; avoid fragmentation. Avoid disturbing high-quality sagebrush habitat.
6. Reestablish native grasses and shrubs and reduce cheatgrass dominance.

Figure 7-2. Mule Deer Utilize Gambel Oak Stands for Thermal and Fawning Cover.

7.3.2.2 Mule Deer (Odocoilus hemionus) Management Plan Summary

The overarching goal for management of the AGCW deer herd is the maintenance of a population level that is in balance with its habitat and minimizes negative interactions on areas adjacent to Camp Williams[20]. The essential requirement to management is informational: population size, juvenile recruitment, and deer survival. ERM personnel will collect herd composition statistics, essential to management, based upon UDWR standardized procedures.

Herd reduction is not now needed. Due to safety concerns and potential litigation, depredation will only be a tool if the population exceeds habitat capacity. If needed in the future, a depredation hunt would have to have the approval of the Wildlife Board through UDWR.

Camp Williams probably has mule deer within its boundaries all year due to moderately good habitat and forage and a sufficient supply of free water, but deer also travel to the surrounding areas. The annual mortality of mule deer associated with Camp Williams is estimated to be approximately 250-300 individuals. One of the highest causes of mortality to mule deer is from vehicular collisions along Route 68 (Kassar and Bissonette, 2005; West 2005), which is on the eastern edge of Camp Williams near the Jordan River Narrows. Although UDOT placed signs and flashers in the area, there was no change in the situation. Mitigation of deer-road kills should be a major issue with development of the proposed Mountain View Corridor (Section 3.3.3.6, Mountain View Corridor and Facilities Changes).

Although cougars (Felis concolor) kill mule deer, the estimated numbers (111 to 152) per year do not seem to negatively effect the population. Rather, cougar kills seem to be an additive mortality in maintaining the mule deer population at or just below carrying capacity.

Although no specific numbers or statistics have been recorded, poaching likely occurs on Camp Williams due to the porosity of the boundary. Since legal mule deer hunting was discontinued on Camp Williams in 1986, older and larger antlered deer may have increased, thus creating a greater temptation for poachers. Range Control personnel estimate they handle 3-4 mule deer poaching incidents annually.

7.3.2.3 Future Mule Deer Management Issues

The increase in suburban development around the borders of Camp Williams has the potential to elevate the mule deer population within Camp Williams. As suitable habitat is decreased outside Camp Williams, the suitable habitat within Camp Williams may become a limited resource and might cause an over-utilization of the forage (Figure 7-2). Over-utilization of forage could cause an increase in winter mortality and a host of natural resource problems (i.e. increased weed invasion, soil degradation and increased erosion).

A proposed highway development would increase vehicle traffic on the eastern sections of Camp Williams (See Section 3.3.3.6, Mountain View Corridor and Facilities Changes). An increase in vehicle traffic would likely cause a concomitant increase in mule deer–vehicle collisions. Although the UTNG is not directly responsible for wildlife-

[20] The full management plan is found in Appendix xxx.

vehicle accidents, placement of fences or other mitigation techniques has the potential to reduce mule deer mortality in this area.

Although some parts of Camp Williams are fenced, it is not recommended that the entire Camp boundary be fenced. This is due to 1) the high cost of fencing the remaining boundary and 2) elimination of a travel corridor for mule deer from Camp Williams to the Oquirrh Mountains.

Currently, predation and vehicle mortality seem to be maintaining the mule deer population below carrying capacity. Unless predator numbers increase and drive the mule deer population down, predator management is not recommended.

Until the mule deer population demonstrates signs of reaching the carrying capacity of Camp Williams (i.e. over browsing, vegetation degradation), herd reduction should not take place. If herd reduction becomes warranted, measures should be directed at the female segment of the population. This most likely method of reduction in this case would be either 1) general hunt with approval of the Utah Department of Wildlife Resources or 2) hunt conducted by military personnel with the carcasses donated to locale charities.

7.3.3 Monitoring

7.3.3.1 Mule Deer

Herd compositions surveys will be conducted every other year to maintain and monitor information on the mule deer population. The level of winter forage utilization will be monitored as a gage of population impact on the environment. Utilization must, at minimum, exceed 75% of current annual growth before a change in management is triggered.

7.3.3.2 Predators and Omnivores

Scent post surveys (Sargeant *et al.* 1997) will be conducted every year to maintain and monitor the predator and omnivore (skunks, raccoons, etc.) populations. While this may only result in an index of population levels, this wildlife guild has the potential to impact avian, small mammal and mule deer populations.

7.3.3.3 Small Mammals

Small mammals form the base of the prey population for both mammalian and some avian predators, thus monitoring their relative population levels is important. Snap traps, pitfall traps, and small live traps set every third year will effectively monitor these populations.

7.3.3.4 Bats

Bats are a good indicator of the health of a system and as such will be monitored every third year, as funding allows. Although these surveys will result in an index, the population can be monitored and accessed in this manner.

7.3.3.5 Herptofauna

Although not likely a large portion of the wildlife at Camp Williams, the herptofauna (reptiles and amphibians) have a significant role in assessing the quality of an ecosystem. Herptofauna surveys will consist of pitfall traps conducted every third year to assess and monitor these populations, as funding allows.

Figure 7-3. ERM Staff Participate in a Cougar Collaring for the USU/UDWR Cougar Project.

7.3.3.6 Bird Surveys

There is a long history of bird surveys being conducted at Camp Williams (+10 years). Conducting these surveys will be maintained. Oral and visual recordings of birds along predefined transects will be conducted every spring to record migrates and incidental species, as funding allows.

7.3.3.7 Cougar Project

ERM will continue to be a study site and to support the USU/UDWR Cougar Project (Figure 7-3), as funding allows. This project is important to understanding the role of the Camp for management of large predators.

7.3.3.8 Golden Eagle Nesting

ERM will continue to monitor nesting success in cooperation with the UDWR Golden Eagle Nesting Survey conducted by Kent Keller and submitted to UDWR (Figure 7-4).

Figure 7-4. Kent Keller Captures a Golden Eagle Chick for Banding.

7.4 Threatened and Endangered Species Management

7.4.1 Bald Eagle

This species is a known scavenger (Buehler 2000) - removal of deer carcasses from Redwood Road will minimize the potential for accidental killing of these birds in the vicinity of Camp Williams. Bald eagles show a wide range of responses to human disturbance. Bald eagles nest ≥100 and typically > 500 m from human developments (Buehler 2000). They are known to abandon nests if frequently disturbed (e.g. noise impacts). The only traditional nesting habitat for bald eagles within the installation occurs along the Jordan River, though they have never been reported here. Thus, if they are present and nesting at some point in the future, any military activity resulting in modifications to this area, including the removal of large trees, sustained motorized vehicle activity, or training exercises could have a negative impact on bald eagles. If better information is needed, a water-based survey of the Jordan River Narrows during late spring or early summer to determine if any eagles are present may suffice. It should also be noted that bald eagles often roost > 30 km from their winter foraging areas. Windmills have also been implicated as a significant source of raptor mortality in some areas (Hunt 1995). A semi-annual post migration survey within a ~ 80 m radius of the windmills (Smallwood and Thelander 2004) may be warranted to determine if these structures pose a threat to migrating raptors. The U.S. Fish and Wildlife Service is preparing new management guidance to be released in June 2007 in conjunction with the delisting of Bald Eagles under the Endangered Species Act. If bald eagles are found on the camp at some point, the UTNG intends to follow the new guidance for management.

7.4.2 Yellow-billed cuckoo

This species has not been found on Camp Williams. Due to their transitory nature and obligatory association with riparian areas, it is unlikely that Camp Williams would host a resident population of these birds. Nevertheless, some suitable habitat does exist along portions of the Jordan River, and if resources are available, there may be some merit in surveying this area prior to any major impact to riparian vegetation. Given the habitat value of this portion of the property, a survey for yellow-billed cuckoos might be wrapped into a larger survey of riparian avifauna. Should surveys be conducted, it is important to consider that yellow-billed cuckoos are migratory and do not arrive in northern latitudes until early to mid-summer. Thus, surveys should be conducted at that time to maximize the probability of detecting them.

7.4.3 American white pelican

Because of their dependence on large, open bodies of water and the lack of evidence for their presence, it is unlikely that white pelicans would be affected by activities on Camp Williams.

7.4.4 Western burrowing owl

This species has not been found on Camp Williams. No individuals were observed during the 2005 survey. If further surveys are to be conducted, we suggest that grasslands and / or areas with known high ground squirrel activity be targeted. This species is also migratory and if present, should begin calling during April or May. Two to three surveys should be conducted between mid-April to mid-June, at annual intervals. Burrowing owls are sensitive to ground disturbance, e.g. heavy equipment and artillery.

7.4.5 Short-eared owl

This species has not been found on Camp Williams. Because of their association with wetlands and wet grasslands, there is little suitable habitat for short-eared owls on Camp Williams. They are equally or more likely to be present during winter, when local populations are subsidized by migrants from northern latitudes that use drier sites. This species is also somewhat transient (i.e. not particularly faithful to breeding sites), being attracted to areas that are experiencing a high rodent irruption. Given the substantially reduced amount of training during winter, there is little opportunity for conflict between UTNG activities and short-eared owls. More important would be the impact of suburban encroachment surrounding the site. Loss of agricultural lands is more likely to have a pronounced effect on the nesting density of this species than military activities. Further surveys may be warranted focusing on the agricultural and shrublands along the eastern and southern perimeters.

7.4.6 Ferruginous hawk

This species has not been found on Camp Williams. Declines of ferruginous hawk populations appear to be linked to a variety of factors, the most important of which is the degradation and loss of grassland habitats (Olendorff 1993). Cultivation, overgrazing, and the eradication of small mammals are the most important factors affecting the survival of this species. Further surveys for nesting (~ mid-March to early July; Bechard and Schmutz 1995) hawks may be warranted.

7.4.7 Greater sage-grouse

This species has not been found on Camp Williams. Further surveys, especially in the sagebrush dominated areas of the impact zone, may be warranted. This species has been detected within 12 km of Camp Williams. The removal of cattle from the property may have beneficial effects on sage-grouse habitat.

7.4.8 Grasshopper sparrow

The preliminary, unconfirmed finding of a grasshopper sparrow indicates that further surveys are warranted. Breeding densities of grasshopper sparrows may decline when frequent wildfire reduces shrub cover. Grasshopper sparrows can be negatively impacted by extensive grazing.

7.4.9 Long-billed curlew

This species has not been found on Camp Williams. This species is fairly tolerant of wildfires and exotic grasses, but is sensitive to human disturbance, particularly vehicle traffic and off-road vehicle recreation during nesting season (Dugger and Dugger 2002).

7.4.10 Pygmy rabbit

This species has not been found on Camp Williams. The best pygmy rabbit habitat on site occurs in the bottom of Tickville Gulch where large sagebrush grows on fine-grained soils. Given the small size of this area, it is unlikely to support many, if any, pygmy rabbits. Conversely, because this piece of suitable habitat is so small, it would take very little effort to conduct a thorough survey of the area.

7.4.11 Kit fox

This species has not been found on Camp Williams. The presence of coyotes and potentially red foxes, as well as the lack of fine soils, indicates that Camp Williams may be only marginal habitat for the kit fox. One incidental sighting suggests that kit foxes may be present on the property. Although a variety of survey techniques (including scent stations, scat deposition transects, trapping indices, and radio-telemetry mark-recapture studies) have been developed and field-tested for a closely related species, the swift fox (Vulpes velox) (Schauster et al. 2002), the difficulty in distinguishing kit foxes from red foxes based on field sign makes indirect methods unreliable. We

suggest camera trapping over baits in select locales. This species is found on other military installations within the State (e.g. Dugway Proving Grounds, Tooele Army Depot), and is fairly adaptable to human presence and activities (Van Horn Job and Cypher 2002). Interestingly, there is some evidence that swift fox conservation is compatible with military training, especially heavy equipment maneuvers (C. Thompson, unpublished data). As yet, it is unclear what types of military activities might be incompatible with kit fox conservation. Additional surveying and monitoring efforts are warranted.

7.4.12 Conclusions

Most of the species mentioned here are associated with grassland habitats. The primary threat to this habitat type in the vicinity of Camp Williams is urban sprawl. Therefore, the conservation of this habitat type through ecosystem management inherent to this INRMP might prove to be of great benefit to the suite of species discussed here.

7.5 Wetland Protection

Camp Williams, including Hidden Valley, has 9.4 acres of wetlands. Wetlands on Camp Williams are in poor condition due to livestock grazing. The wetlands should and appear to be recovering since removal of grazing in 2002 (see Section 7.8.1, Grazing Management), similar to case studies conducted on the Big Creek in northern Utah by the Bureau of Land Management (Cheney *et al.* 1990). Further, they are isolated from military training use due to being on the Impact Area border or in other remote sites. There are no pending Section 401/404 permits under the Clean Water Act. Obligation for wetland management funding has shifted from ERM to Facilities (see Section 7.1, Natural Resources Program Management).

ERM is responsible for monitoring and a program was established in 2004, with methodology based upon Winward (2000) and Platts *et al*. (1987). The protocol is found in Appendix C.

7.6 Land Rehabilitation and Management

An advantage of ecosystem-based management is that with successful implementation, the need for restoration or rehabilitation is minimized. The careful matching of sites with appropriate, sustainable, levels of land use results in the maintenance of intact, robust native plant communities dominated by perennial species. Maintenance of these sorts of ecosystems is the first priority. Even with the best stewardship, the need for restoration or rehabilitation will inevitably arise, e.g., because of past or current, unavoidable, impacts. Under the ecosystem management approach, restoration and rehabilitation projects will only be undertaken after a careful analysis of the situation across multiple spatial and temporal scales (i.e., causes will be determined and considered before attempts are made to treat symptoms).

Restoration and rehabilitation differ somewhat in their focus; in their implementation, both include, but may not be limited to, revegetation. Rehabilitation implies reestablishment of a productive, functioning, ecosystem, but not necessarily one with the same structure, processes, and species composition as the pre-disturbance ecosystem. Restoration implies higher standards in the reestablishment and conservation of indigenous biodiversity, ecosystem structure, and function (Berger 1993). This suggests not only halting degradation and re-establishing productivity, but also redirecting the disturbed ecosystem in a pre-disturbance trajectory of community development (MacMahon and Jordan 1994).

Revegetation is the establishment of plants on highly disturbed sites. Revegetation may be natural, artificial or a combination of both. Artificial revegetation may involve direct seeding or planting of bareroot or containerized nursery stock. Revegetation of semiarid sites is challenging. Individual sites should be carefully inventoried to determine if natural recovery of native species will likely occur within an acceptable period or if artificial revegetation measures are needed (Monsen and MacArthur 1995). With careful planning and implementation, successful revegetation is possible on even the most degraded sites.

In general, the long-term goal at Camp Williams is restoration. Mixtures of native grasses, forbs and shrubs stabilize soils, minimize invasion by exotic weeds, provide good grazing and forage, increase diversity of wildlife habitat, and are self-sustaining (McKell et al. 1979; Monsen 1984). Shrubs increase wildlife habitat, increase plant community diversity, and provide winter forage (MacArthur 1994). Grasses quickly form a stable ground cover and can extend the grazing season. Forbs increase diversity of plant communities, are potential nurse crops for shrubs

on highly disturbed sites, provide late season forage, and are considered aesthetically pleasing (Shaw and Monsen 1983; MacArthur 1988; Asay et al. 1991).

The first year of establishment is the most critical for survival (McDonald and Fiddler 1989). Exotic annuals thrive in disturbed areas when competition for nutrients and water is fairly low. Cheatgrass (*Bromus tectorum*) is an exotic annual and a major potential competitor on highly disturbed sites at Camp Williams because of its ability to start growing in early spring and extract available soil moisture early in the growing season (Young 1991; Pyke and Novak 1994; Vallentine and Stevens 1994). Once established and untreated, cheatgrass can hinder native species establishment and succession for decades (Allen 1988). Cheatgrass can be particularly competitive where topsoil has been removed. Cheatgrass can also decrease the wildfire return interval. More frequent wildfires will prevent shrubs and perennial forbs from re-establishing, eventually aiding in the development of a cheatgrass monoculture.

Planting of bareroot or containerized stock minimizes some of the establishment risk associated with seeding on semiarid sites. This is particularly true for revegetation involving shrubs, which are often especially difficult to establish from seed. At Camp Williams, the most successful plantings of grass, which are dormant over winter, are in the fall, but shrub seedlings are more successful as spring plantings (Assay, pers.com.). Planting is done using high quality planting stock, produced from certified seed. Planting of bareroot juniper and shrub stock needs special attention in the form of a drip irrigation system the first year and possibly the second year of planting.

A critical step in the development of site-specific revegetation plans is the identification of long term objectives with respect to desired species composition and structure (Box 1996). A key step in achieving these objectives will be the identification of native species able to provide site stability while withstanding extremes in climatic conditions, adapted to biological aspects of the site (e.g., competition and grazing), and resilient to periodic disturbances. Camp Williams has the additional challenge of maintaining structures that are more compatible with military training objectives. The Camp Williams plant species database (Shultz and Hysell 1996) is used to conduct initial screenings (e.g., screening potential species for matching characteristics of the revegetation site). The database also provides addition information useful in making tentative species choices (e.g., expected heights at maturity, annual vs. perennial, woody vs. herbaceous, etc.). Following this sort of screening, planting and seeding trials have been established at Camp Williams. These trials have resulted in the development of a list of species recommended for use in revegetation projects (Weiss 1997).

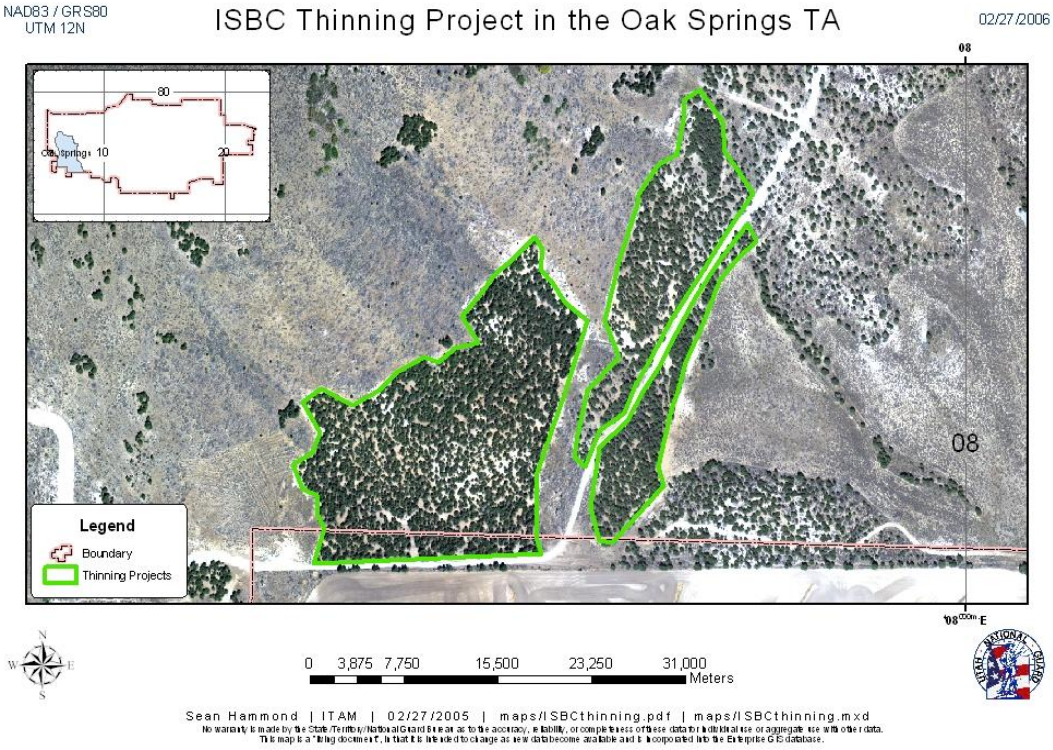
The development of species recommendations is an example of adaptive management within an ecosystem-based framework, i.e., implement, monitor, evaluate, and adapt responses based on the new information. Results from the initial, ecosystem-based screenings, are field tested in small-scale planting projects (Weiss 1997). Results from these trials are used to refine the list of recommended species and each additional revegetation project allows the cycle of implementation, monitoring, evaluation, and adaptation to continue.

Because of its size and semiarid climate, riparian environments are fairly limited on Camp Williams. Nevertheless, protection, restoration, and rehabilitation of riparian areas are a high priority of resource management at Camp Williams. Indeed, management of riparian areas is a critical issue throughout the Southwest and Intermountain West. Riparian communities are recognized as unique and valuable habitats whose welfare is strongly interrelated with the surrounding watershed. Large-scale misuse of watersheds and associated riparian communities in the last century has led to degradation of many naturally occurring riparian communities throughout the region. Land managers now recognize the ecosystem value of riparian areas and current management philosophy is based on maintaining viable links across the watershed (Debano and Schmidt 1990). Camp Williams' riparian monitoring protocol is described in the wetlands section of the INRMP.

At Camp Williams, a general goal of land management is the reduction of the long-term cumulative impacts of military training and testing. Land Rehabilitation and Maintenance (LRAM), an Integrated Training Area Management (ITAM) component, is a military training-sponsored preventive and corrective land rehabilitation and maintenance program. It mitigates training and testing effects by combining preventive and corrective land rehabilitation, repair, and/or maintenance practices. It includes training area redesign and/or reconfiguration to meet training requirements. It also involves design and maintenance of maneuver trails to minimize erosion potential, minimize training impacts, and provide reliable access to training areas throughout the year. Thoughtful design has a direct impact on damage done to maneuver trails during the wet season and subsequent maintenance required after

the trails dry. Proper drainage design and construction can help mitigate any costs or down time associated with spring damage due to training.

The key to ecosystem management is adaptation. Adaptive management is illustrated by a juniper thinning project. Juniper communities are valuable for military training concealment, but monitoring reveals a problem. As juniper crown cover increases, shrub cover decreases and cheatgrass increases (Johnson 2001). This effect was documented in juniper stands whether used for training or not. Thinning was proposed and target juniper cover levels were estimated in cooperation with trainers. The purpose of the project is to decrease juniper stem density, preserving juniper concealment while making it easier to conduct dismounted maneuvers. As a side benefit, canopy cover will be decreased, opening the area up for re-establishment of native shrubs and grasses, which will in turn aid in conserving the soil in that area and prevent erosion. The only currently planned project is in the Oak Springs TA (Figure 7-4). This site is adjacent to the one-station-training site used by the Regional Training Institute (RTI). The Special Forces (SF) has also expressed interest in using this area for exercises. Other thinning projects will occur on Camp Williams as training and ecological needs dictate. For example, in juniper communities, canopy cover greater than 20 % is needed for dismounted maneuvers. At the same time, percent canopy cover of more than 43 %, contribute to site degradation and erosion. Thinning projects will also be planned and executed if a site is determined overused, and new sites are in need of development to meet training needs. These areas will be monitored using existing RTLA plots. Feedback on the cover of juniper, shrubs and cheatgrass will be used to guide future



projects.

Figure 7-5. Proposed Mechanical Thinning of Juniper to Improve Training and Ecological Condition.

Another general goal at Camp Williams is to implement projects and practices which will improve hydrologic and hydraulic conditions in streams and enhance riparian communities. Riparian enhancement (after Platts and Rinne 1985) is returning the riparian system to a more productive condition. In semi-arid environments, like Camp Williams, this sort of management will result in more nearly perennial stream flow and improved conditions on

upland slopes, which, in turn, will reduce the intensity of surface runoff. Attaining the benefits of riparian enhancement is expensive and achieved over a long period (Clary et al. 1996). From an ecosystem perspective, however, the benefits are considerable.

At Camp Williams, the principle watershed practices benefiting riparian communities are upstream treatments aimed at improving watershed condition, increasing duration of stream flow, and stabilizing badly eroded channels. Improving watershed condition involves implementing better range and watershed management practices, which sometimes may require supplemental mechanical treatments to obtain adequate cover to protect the soil (e.g., reseeding of appropriate native plant species during rehabilitation of burned areas, installing sediment traps, water bars or diversion ditches, etc.).

7.7 Wildfire Management

7.7.1 Overview of Wildland Fire Management and its Drivers at Camp W.G. Williams

The United States military has significant involvement in land management across the nation, both through management of its own land and through managerial partnerships with other state and federal land management agencies. The military is concerned with managing its natural resources not only to sustain training, but also for environmental purposes such as wildlife habitat and noxious and invasive plant control. Frequent wildland fire occurrence is a natural part of most ecosystems found in the United States and has a significant impact on the way these resources are managed. The Final Report of the Department of Defense Wildland Fire Management Policy Working Group[21] states 'the occurrence of wildfires is a real threat to military installations'. For this reason, wildland fires on military installations require suppression.

The challenge of managing wildfire is increasing in its complexity. The encroachment of suburban development into what have historically been classified as wildlands and are often adjacent to federal lands only increases the magnitude of this challenge. Five communities around the Camp's boundaries are classified as "Communities at Risk (CAR)" by the Northern Utah Fuels Committee[22] (Table 7-2). Wildfires do not respect human boundaries. The most important problem for wildfire management at the Camp is protecting the communities and residences that neighbor the installation. This problem determines why, where, what and how we deal with this problem. This section of the INRMP discusses the scope of the wildfire issue at the Camp, methods for dealing with it and projects.

Table 7-2. Communities at Risk Bordering Camp Williams (Division of Forestry, Fire & State Lands, 2005).

Community	County	Location Relative to Camp
Bluffdale	Salt Lake	North-east
Herriman	Salt Lake	North-west
High-Country Estates	Salt Lake	North-west
Eagle Mountain*	Utah	South
Saratoga Springs*	Utah	South-east

Historically, ignition sources of wildfire on Camp Williams could be placed in one of two categories: training or natural (i.e. lightning). With the increase of suburban encroachment on Camp William's northern and southern boundaries, there has been an increase in the occurrence of human caused fire. In recent history there has only been one human caused fire that has started off-installation and has spread onto Camp Williams (the Father's Day fire in 2001). In 2004 and 2005 there were five wildfires both natural and human-caused that burned within several hundred meters of Camp Williams boundary before being contained and suppressed. With an increase in encroachment, there comes an increase in the potential for human caused fires on land surrounding the installation, as well as wildfires being started on the Installation by trespassers. There is significant potential for those wildfires to spread both onto and off of Camp Williams. There is little more AGCW can do to prevent wildfires from occurring off Camp and spreading onto Camp than what it has already done by establishing joint training and MOU's with firefighting units from surrounding communities. AGCW has also partnered with several communities

[21] https://www.denix.osd.mil/denix/Public/Library/OSH-Fire/fire.html
[22] www.ffsl.utah.gov/firemgt/WUI/ComAtRisk/2005CommunitiesAtRisk.pdf

in educating the public about wildfire danger in their communities and the presence of Camp Williams as a member of their community that is faced with many of the same wildfire challenges that they are. Though there is little we can do about wildfire occurring off-post, there is a significant amount that we can do to about wildfire hazard and wildfire occurrence on-post. Wildfire efforts on Camp Williams will be detailed in the Integrated Wildfire Management Plan. Efforts that have a direct impact on the management of natural resources on Camp will be discussed in this section of the INRMP.

7.7.2 Integrated Wildland Fire Management Plan (IWFMP)

The Department of the Army (DA) recognizes wildland fire as having a significant impact on training activity as well potentially putting public and private values at high risk. In response, the DA released a memorandum outlining DA Wildland Fire Policy and Guidance [DAIM-ZA (200-3)]. DAIM-ZA (200-3) directs that 'Installations with unimproved grounds that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool will develop and implement an Integrated Wildland Fire Management Plan (IWFMP) that is compliant and integral with the Integrated Natural Resource Management Plan (INRMP), the installations' existing fire and emergency services program plans(s), and the Integrated Cultural Resources Management Plan (ICRMP)'. This requirement is placed on installations by the Assistant Chief of Staff for Installation Management (ACSIM). Table 7-3 shows the IWFMP requirements organized by section. Those sections that are highlighted are described in part here.

The Camp W.G. Williams IWFMP is in development. The IWFMP sections referred to in this document have either been completed or are in the process of being completed. Only those sections of the IWFMP seen as directly effecting natural resource management will be reviewed in further detail in this document.

Table 7-3. Components of the Integrated Wildland Fire Management Plan Components Included in this INRMP Update.

IWFMP Section	Corresponding DAIM-ZA (200-3) Section	Developer
1. Introduction	Sections 1-5, 7.0	RTLP/ERM
2. Goals and Objectives	Section 7.1	RTLP/ERM
3. Organizational Structure and Responsibilities	Section 7.2	RTLP
4. Interagency Cooperation and Mutual Aid Agreements	Section 7.3	RTLP
5. Smoke Management and Air Quality	Section 7.4	ERM
6. Safety and Emergency Operations	Section 7.5	RTLP
7. Risk Assessment/Decision Analysis Process	Section 7.6	RTLP/ERM/Utah County
8. Wildland Fire History	Section 7.7	ERM
9. Natural and Cultural Resource Considerations	Section 7.8	ERM
10. Mission Considerations	Section 7.9	RTLP/ERM
11. Wildland Fuel Factors	Section 7.10	ERM
12. Monitoring Requirements	Section 7.11	ERM
13. Public Relations	Section 7.12	RTLP
14. Mutual Aid	Section 10.0	RTLP
15. Labor Relations	Section 11.0	RTLP
16. Personnel Training	Section 7.14	RTLP

and Certification Standards and Records		
17. Prescribed Fire	Section 9.0-9.3	RTLP/ERM/Utah County
18. Programmatic Environmental Assessment	Section 7.15	RTLP/ERM/Utah County Fire
19. Funding Requirements and Sources	Section 7.13, 8.0-8.5	RTLP, ERM, Facilities

7.7.3 Historic and Current Management of Wildlands with Fire

7.7.3.1 Historic Role of Wildfire

As stated above, wildfire is a natural part of most ecosystems. Natural wildfires were a catalyst for diversity and provided stability in those ecosystems. "Without fires forested communities become monocultures and are plagued with overstocking, excessive fuel accumulation, stagnation, and inadequate reproduction, which encourage disease and insects. Similarly, grasslands stagnant and are invaded by shrubs and trees, whereas shrublands become decadent or impenetrable thickets" (Wright and Bailey 1982).

Fire was used by indigenous peoples for management of their environment. It helped them de-thicket large tracts of land making travel and hunting easier. Low intensity burns at the right time of year also stimulate regrowth that attracts game, as well as stimulate plant regrowth of species used for food (Whelan 1995).

Fire suppression on the American continent started in earnest during Theodore Roosevelt's administration. At that time, the production of forest products was one of the most important industries in the nation. During that period, most of our foresters were European-trained, in forests that had been managed as plantations. In that environment, wildfire was viewed as bad simply because it killed trees. "European fire protection philosophy in North American forests spilled over into every plant community in North America.

Not until the Leopold Report of 1963 was the general public in the United States informed that protecting all plant communities from fire could be bad" (Wright and Bailey 1982). The value of wildfire as an integrated part of the ecosystem began to be recognized in the 1960's, but only recently has wildfire been recognized as a critical natural part of the ecosystem to the extent that it is being re-integrated into land management philosophy and practice (USDA Forest Service 2004). It is due to the attitude and culture of wildfire suppression that dead fuel loading in chaparral, a vegetation community very similar to our own Gambel oak communities, as well as in forests has accumulated to a point that it is able to fuel wildfires that man cannot control. It is common that the leading front of a wildfire stops due to climate and natural barriers rather than wildfire suppression efforts of crews on the ground (Wright and Bailey 1982). The shift in philosophy regarding management of wildlands with wildfire in a way similar to how native Americans implemented wildfire is to keep fuel loads from accumulating to levels that eventually contribute to catastrophic wildfire. By managing fuel levels, wildfire that occurs naturally will be somewhat more controllable, and crews trying to suppress wildfire have a much higher probability of being able to do so.

7.7.3.2 Camp W.G. Williams

Camp Williams follows a wildland fire management policy of suppression. This policy is based on Department of the Army (DA) policy dictating that *wild*fires are to be suppressed, meaning any un-planned fire or any prescribed burn that has grown out of its prescription parameters (i.e. grown beyond its prescribed size and intensity), will be suppressed. The DA recognizes that suppression is what has led to many catastrophic wildfires by allowing fuel load build-up. Therefore, it is useful at this point to make a distinction between wildfire and prescribed burning. Wildfire is the occurrence of un-planned and un-prepared for fire. Prescribed burning is an event designed specifically to manage fuel loads, and prevent fuel load build-up. The purpose of prescribed burning is to prevent the occurrence of catastrophic wildfire.

Prescribed burns are deemed an important tool for wildfire fuel load management in support of military mission requirements and subsequent readiness (Memorandums: NGB-ARE 28MAR04; DAIM-ED 10AUG04). In the recent past (2001, prior to the moratorium being placed), prescribed burning has been utilized as a tool to reduce/remove fuels from ranges. Currently, there is a moratorium on prescribed fire at Camp Williams. This is due in part to an escaped prescribed fire on the Fish Lake National Forest in 2001, and partly due to the increase in construction along the installations northern boundary. The prospect of a prescribed burn going out of prescription and escaping the installation boundary is what prevents it's use as a tool. Ironically, the longer that fuel loads are allowed to build, the greater the chance of a wildfire becoming catastrophic in nature and consequently escaping the installations boundaries.

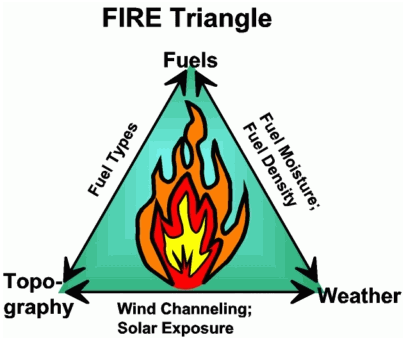


Figure 7-6. Fire Triangle. Used with Permission From Southwest Environmental Research and Education (www.SERE.org)

In order to understand wildland fire and wildfire management on Camp Williams, it is first important to understand the factors contributing to fire behavior and the factors limiting firefighter response, namely, fuel types and topography.

7.7.3.3 Topography as it Relates to Fire Behavior and Firefighting Capability

Of the three main components of the fire triangle, topography may be the factor most limiting to initial response to a wildfire (Figure 7-6). There are four major components of topography as it relates to fire: slope, aspect, elevation, and terrain features.

7.7.3.3.1 Slope

Fire behavior on steep slopes is usually much more dangerous that more gentle slopes for several reasons. First, all other factors being equal (i.e. climate, fuel loading), wildfire will spread more quickly when burning uphill. This is due to convective heat being produced by the wildfire pre-heating fuels upslope from them. Upslope fuels are also more apt to be ignited by firebrands spotting upslope, thus igniting small wildfires ahead of the main wildfire front aiding in more rapid spread of the wildfire.

Slope adversely effects firefighter safety in three main ways: rapid fire spread and increased flame length heading upslope, increased chance of ignitions of unburned fuel downslope by firebrands rolling downhill, and increased difficulty in escaping a fire as the slope increases. All three of these situations have been the cause of firefighter fatalities. When firefighters are building fireline along a ridgeline (usually the most effective placement), steep slopes below firefighters can aid in bringing the fire to them before they are ready, forcing evacuation to safety zones. Conversely, firebrands rolling past firefighters down steep slopes can ignite wildfires behind them, thereby cutting off escape routes and trapping firefighters. Any time steep slopes are involved the prospect of physical injury increases, forcing firefighters to take longer to escape a dangerous situation.

7.7.3.3.2 Aspect

Aspect affects the condition of the fire fuel and can often be an indicator of what fuel type and loading to expect. The condition of fire fuel is usually defined in relation to fuel temperature and moisture.

At Camp Williams, aspects facing east and south are exposed to solar radiation earlier in the day and so are normally hotter and dryer as well as are typically covered by light flashy fuels. This fuel type coupled with earlier and longer solar radiation exposure contributes to the fuels on these aspects being more easily ignited. Due to the pre-conditioning of the fuel by increasing temperature and decreasing relative humidity and consequently fuel moisture, wildfires on these aspects tend to travel much faster than those on north and west facing aspects.

North and west facing aspects experience the least amount of solar radiation exposure and consequently retain moisture for much longer. This trait not only affects the type of fuel present but also the moisture content of that fuel. Lighter, drier fuels will burn quickly, but will not produce as much heat as more moist fuels that potentially do more damage to vegetation. Western aspects tend to be somewhat drier than north aspects. North aspect wildfires

have a tendency to burn slower than other aspects. However, they also have a tendency to burn hotter, have longer flame lengths, and do more damage.

Each aspect receives its peak amount of solar influence at a different time of the day. Eastern aspects receive their peak at 0900 hours, southern aspects at 1200 hours, western aspects at 1500 hours, and northern aspects at 1200 hours. Solar radiation has a dramatic effect on wildfire behavior. Common wisdom says that wildfire activity will increase between 0800 and 1000 hours. Air temperature and relative humidity (RH) are in large part a function of the effect of solar radiation on ground surface and fuel temperature. As the ground surface and fuels warm, they warm the air around them, thus decreasing the RH. Behavior will begin to decrease for the night at between 1800 and 2000 hours when the ground surface and fuels begin to cool down, decreasing the air temperature and increasing the RH (Lowe 2001).

7.7.3.3.3 Elevation

Typically, vegetation changes with elevation. Lower elevations in valleys can be described by grass models. As elevation increases shrub models develop, eventually changing into vegetation best described by timber models.

Camp Williams is typified by grass and shrub models in the lower elevations, quickly developing into more complex models as elevation increases. Vegetation communities seem to be more strongly tied to aspect and soil type than to elevation. Wind speed is probably the wildfire behavior variable most directly affected by elevation.

7.7.3.3.4 Terrain Features

The terrain of Camp Williams is probably the most important factor of topography affecting wildfire behavior and spread on the installation. The steep, rugged terrain of the entire eastern half of Camp Williams is defined by the high number of both small and large chimneys, narrow canyons, box canyons, and saddles. These features can have dramatic effects on wildfire behavior and rate of spread. Consequently, and perhaps most importantly, the terrain features have an adverse affect on firefighters' ability to successfully suppress wildfires.

7.7.3.4 Fuel Types and Models

The four major vegetation communities present at Camp Williams, grassland, sagebrush, Gambel oak, and juniper, can be categorized into one or more of Scott and Burgans 2005 fire fuel models. Until recently a standard set of 13 fire behavior fuel models (Anderson 1982) has been one of the main component inputs for predicting wildfire behavior under specific conditions in modeling programs such as Behave. In June of 2005, the USDAFS published a new, more comprehensive set of standard wildfire behavior fuel models to be used with such programs as BehavePLUS, Farsite, and FlamMap (Scott & Burgan, 2005). Fuels were previously classified by Anderson into four groups, which are grass, brush, timber, and slash. The new dynamic fuel models are made up sixty fire behavior fuel models that are classified into seven different groupings. Categorization is dependent on the structure of the fuels and the type of fuel that is predominantly carrying the wildfire. Most of the fuels on Camp Williams can be placed in one of eight categories: GR1, GR2, GS1, GS2, SH5, SH7, TL9, and TL3 (Scott and Burgan 2005).

In the following discussion of the four main types, flame length and spread descriptions are based on a five mi/h mid-flame wind speed and zero slope. Some of Camp William's larger wildfires have occurred with wind speeds ranging between 15 and 35 mph, and in steep terrain. Flame lengths and rate of spread are very important to firefighters both for purposes of suppression activities and safety zone location. Flame length specifically is used to determine feasibility of approach for suppression activities. For instance the Fireline Handbook (PMS 410-1) states that wildfires with flame lengths of 4 feet or less can generally be attacked at the head or flanks by firefighters using hand tools. In contrast, flame lengths of over 11 feet have the potential to crown, spot, and spur major wildfire runs, as well as make control efforts at the head of the wildfire ineffective.

7.7.3.4.1 Grass

The grass group on Camp Williams can be adequately described by models GS1 and GS2. These models apply when grass is the primary carrier of wildfire. GR1 describes those areas where grass is somewhat patchy, short, with a low flame length and moderate rate of spread. Grass on southern aspects and somewhat rocky soils fall into this category. Grasses along southern exposed ridges also fall into this category. The GR2 model describes those areas where grass is more continuous with an average depth of about one foot. Flame lengths in this model are

moderate with a high rate of spread. A 15-mph wind speed will allow grass wildfires to have a tremendous rate of spread ranging from 50-150 ch/h[23]. Flame lengths are also high to very high: 4-12 feet or more.

7.7.3.4.2 Shrub/Grass Mixture

The GS1 and GS2 models best describe the sagebrush fuel component type at Camp Williams. Ridgelines and rocky soils on south-facing slopes are typically home to shrub and grass mixtures described in GS1. Shrubs are an average height of one foot with a low grass component making for low flame lengths and a moderate spread. GS2 adequately describes most of the sage-steppe environment on Camp Williams as well as open stands of juniper where grass and shrubs are the predominant carrier of wildfire with juniper only occasionally torching. Shrubs are 1-3 feet high with a moderate grass load component. Spread rate is high with moderate flame lengths in this model, even with a zero slope and a five mi/h mid-flame wind speed. During the 2001 wildfire with mid-flame wind speeds of 35 mph or more, flame lengths were calculated using BehavePlus 3.0 to be at least 14 feet with an average rate of spread of 200 ch/h (2.5 mi/h) using an average slope of 35 percent.

7.7.3.4.3 Shrub

Shrub models can accurately describe most of the fuels associated with Gambel oak and the remainder of the sage-steppe environment at Camp Williams. The SH5 model represents the sagebrush stands that have reached their climax. These are stands that have very little grass or forb understory. It also describes Gambel oak that is between 4-6 feet high due to poor site conditions and/or a recent wildfire (2-4 years previous). In these stands, the shrubs are the main carrier of wildfire. In high to extreme wildfire danger conditions, flame lengths and rate of spread can be substantial. Under the conditions present during the 2001 wildfire (35 mph winds), BehavePlus 3.0 calculates flame length to be at least 40 feet and the rate of spread to be 575 ch/h (7.2 mi/h). These predicted conditions represent what firefighters experienced (LTC Dunton, pers. comm.).

Gambel oak that has not recently burned, is typically on more shaded and productive sites, and has a higher litter component is better described by the SH7 model. The SH7 model has similar flame lengths to that of SH5 but has a substantially slower rate of spread (362 ch/h or 4.5 mi/h). The SH2 model works well in describing open juniper stands where there is very little grass component and a moderate shrub load, and where shrubs are the predominant carrier of wildfire. SH2 has lower flame lengths and a more moderate rate of spread than either SH5 or SH7.

7.7.3.4.4 Timber

While Camp Williams has no commercial timber, fuel conditions and wildfire behavior in climax juniper stands and mature oak stands fall into this group of models. The TL3 model best describes juniper in its climax state, and on Camp Williams, there is a significant portion of the juniper community that falls into the TL3 model. This model has very little grass or litter to carry a wildfire, normally having flame lengths of less than 2 feet and spreading very slow if at all. Juniper trees can torch in this model when enough fuel is built up around the base and potentially spreading to neighboring trees and possibly neighboring stands through spotting. However, it is very rare for a crown wildfire to occur, let alone be sustained in juniper (Wright and Bailey 1982, Barbara Gardner pers. comm.).

Mature Gambel oak stands, described by TL9, are rare on the Camp. They occur mostly in moist places near streams and in the bottom of gullies and ravines where they have been somewhat protected by wildfire over the years. These stands have relatively few ladder fuels but have a more substantial duff and litter layer than any other community on Camp Williams. Fires in these stands tend to be fairly light, staying on the ground, with only the edges of the stands where they share an edge with a SH5 or SH7 model sustaining any long-term damage. In extreme conditions these stands can crown and produce spotting. They are best described by a TL9 model.

7.7.3.5 Fire History at Camp W.G. Williams

Using satellite imagery (McGinty, unpublished data) combined with on-the-ground GPS mapping, we have compiled a 20-year history of wildfires that have occurred on Camp W.G. Williams, building on the work of Godfrey (1998; Figure 7-7). There are three wildfires boundaries that have been included that are pre-1985. One has a date associated to it (1978), the other two wildfires were mapped using wildfire scar data derived from Landsat TM imagery. The wildfire history outside our boundaries is incomplete, as are the cause of ignition data. Utilizing

[23] Chains per hour is denoted as ch/hr. A chain is defined as 66 feet.

wildfire history data, we can better plan, mitigate, and prioritize wildland fire pre-suppression and firefighting efforts, as well as aid meeting the goals and objectives as dictated in the IWFMP.

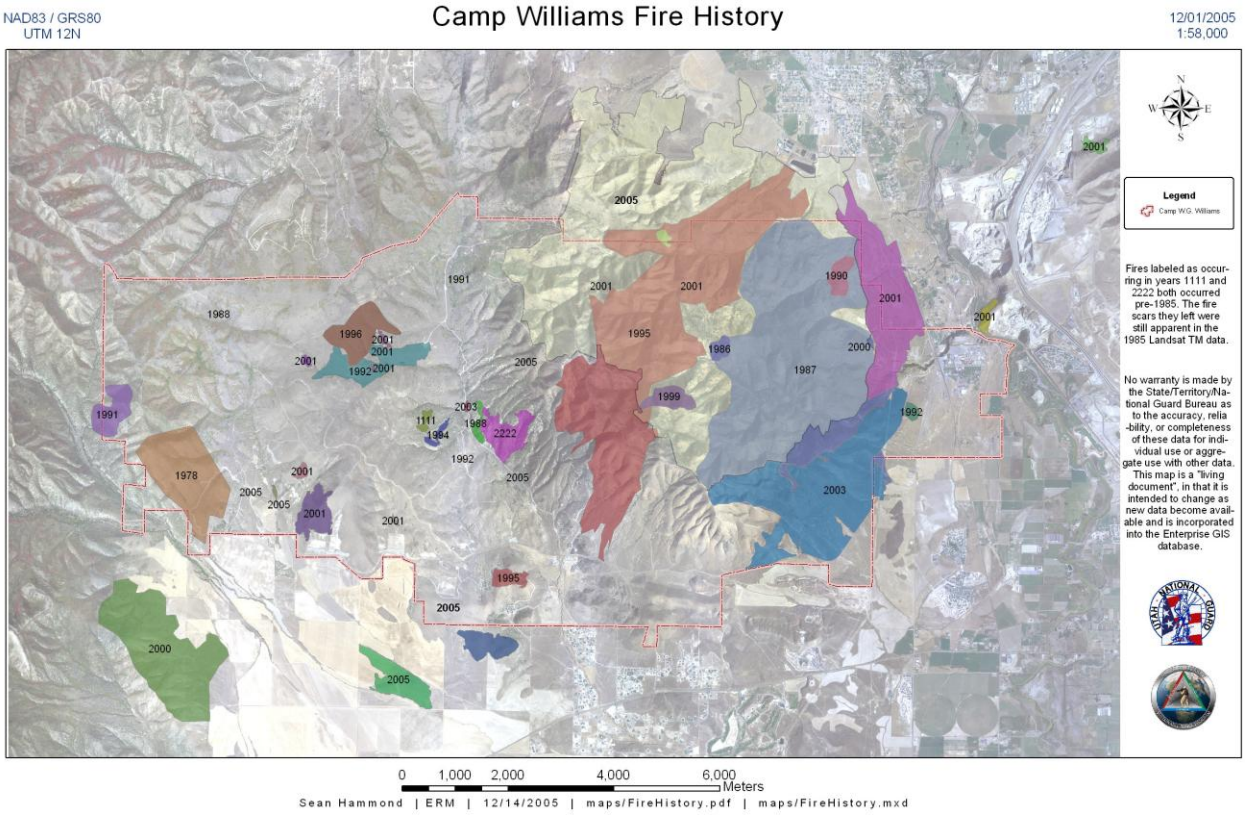


Figure 7-7. Camp Williams 20-Year Fire History

Fires occurring in and west of the Tickville Gulch occur mostly in sagebrush-steppe and juniper/mixed-shrub communities (GS2, SH2, and TL3). Due in part to the fuel types, they are relatively small and either burned themselves out (e.g., the 1994 wildfire in TL3 fuel type) or were contained with manmade structures such as roads or bulldozed firebreaks (e.g., the 1996 wildfire in a GS2 fuel type).

Fires occurring east of the Tickville Gulch are mostly in fuel types falling into the more volatile fuel models: GR2, SH5, and SH7. As illustrated in the wildfire history map (Figure 7-7), these wildfires have a much higher probability of becoming very large wildfires and escaping the Camp Williams boundary. This is due largely in part to fuel type present, but also to the steep topography. There are few access roads, steep terrain, and only a handful of safety zones. These factors make fighting a wildfire in this area very difficult and very dangerous.

7.7.3.6 Pre-Suppression

Pre-suppression activities on Camp Williams fall into one of two categories: mechanical and non-mechanical. By looking at the structure of fuels present, wildfire history, and location of resources such as access roads and water points, we are able to develop goals and a strategy for firebreak placement The following is a list of the techniques that have been and will continue to be utilized on Camp Williams.

7.7.3.6.1 Mechanical: Firebreak and Fuelbreak Techniques

Firebreaks are defined as those structures that have had fuel removed down to mineral soil. Bulldozers are most commonly used to create firebreaks. Goats are used at Camp Williams as another effective method of firebreak construction. Sheep could be effectively utilized in a similar manner to create firebreaks in a grass/forb environment.

In comparison, fuelbreaks are defined as those structures that manipulate fire fuel structure and loading but do not remove fuel down to mineral soil. Fuelbreaks are constructed with the intent of changing wildfire behavior by decreasing flame length and intensity. Fuelbreaks can be constructed by thinning stem density, removing entirely the overstory component, or by initiating a complete vegetation shift (greenstripping).

7.7.3.6.1.1 Bulldozer

Scarification using bulldozers is the least expensive method of firebreak construction and maintenance. Bulldozed firebreaks, however, are limited both by topography and fuel type. Removing all vegetation creates the potential for serious erosion problems. Bulldozer-constructed firebreaks should only be implemented on gentle terrain with a 13% or less slope. Bulldozed firebreaks, at least two blades wide, are effective in both grass and sagebrush fuel types for low intensity wildfires. Construction of firebreaks more than three blades wide for other fuel types will substantially increase erosion potential and introduce invasive and noxious weeds. Bulldozed firebreaks are effective in containing small, low-intensity wildfires in the Camp Williams Impact Area and within ranges. They are also effective in stopping the lateral progression of wildfire on the sides of the flame front. Bulldozed firebreaks are typically not effective in stopping a flame front that has flame lengths over 8 feet (PMS 410-1, 2004).

7.7.3.6.1.2 Goat Grazing/Browsing

Experimental use of goats to reduce wildfire fuels was conducted from 1999 to 2003 ((Figure 7-8). In 2004 goat fuel reduction was implemented operationally. During the 2001 wildfire, a goat firebreak was being constructed for research purposes along a small stretch of Wood Hollow. LTC Robert Dunton's (the Initial Attack Incident Commander) professional opinion, is that the wildfire would have been stopped by a goat-constructed firebreak the full length of Wood Hollow before escaping off-Camp, based on the effect of the goat experimental pens on the progress of the wildfire (Figure 7-9).

Figure 7-8. Goats in a Beef Hollow Experimental Pen. Note the striping of ladder fuels as they reach for food.

Goats are the only viable method for terrain dominated by Gambel oak. Goats are predominantly browsers as opposed to grazers, meaning that they prefer to browse shrubs over grazing grass. This trait makes them ideal for fuel reduction in Gambel oak and sagebrush fuel types. Goats are focused within a portable fencing system that controls exactly where they are allowed to graze. By focusing the goats at a high density within a specific area, they trample ground fuels and remove ladder fuels producing a 150 ft mineral soil firebreak, as opposed to bulldozed firebreaks of 10-20 ft wide. The width is important, because actual flame lengths (much less the heat effects, which are many times greater) in Gambel oak exceed bulldozed-firebreaks total widths. They have several other advantages over bulldozed firebreaks: the root mass is in place allowing re-growth of vegetation in the fall to prevent soil erosion. Goats are also used in areas where the steepness of slopes or other environmental conditions prevent use of bulldozing equipment. They are focused along Wood Hollow as an effort to prevent wildfire from escaping Camp. These firebreaks are placed in the direct path of every historical wildfire that has escaped Camp's boundary. Timing of the treatment to match vegetation phenology is imperative.

Figure 7-9. Experimental Goat Firebreak in Wood Hollow after the 2001 Wildfire

Additionally, using goats for firebreak construction has been accepted by the public and has generated some very positive publicity for Camp W.G. Williams (e.g., The Daily Herald, June 28, 2004). Goats are also very effective at maintaining manual thinning (that done by hand, generally to improve an area for training reasons) that have been done in the past, thereby keeping fuel loads from building and keeping the stands along Wood Hollow open for dismounted training maneuvers.

Figure 7-10. Hotshot Crew Performing a Manual Thinning in Wood Hollow.

7.7.3.6.1.3 Sheep

Sheep can be used in a very controlled manner to create firebreaks in grass fuel types or to maintain firebreaks where goats have previously been used to remove the shrubby fuel component, and are currently dominated by grass and forbs. Sheep can be very effective at controlling fine fuels, due to fact that they are grazers and not browsers, through which wildfires typically start and travel, but this requires a very controlled management environment similar to the control efforts used with the goats.

7.7.3.6.1.4 Manual Thinning

The purpose of manual thinning is to change wildfire behavior by a fuelbreak. By managing fuel loads and structure, the probability of successful wildfire suppression increases. Mechanical thinning often has the beneficial side effect of improving soldier movement during tactical maneuvers. The drawback is that it is a fuel reduction technique and does not remove potential fuels completely. During non-severe wildfire conditions, conditions with low flame lengths and low flame front intensity, mechanically-thinned areas can reduce flame-lengths sufficiently to make wildfire suppression efforts more effective. Under severe wildfire conditions, a wildfire will sweep through mechanically thinned areas.

Figure 7-11. Bullhog Performing a Mechanical Thinning in Tickville

There are two main methods of manual thinning that have been used at Camp Williams: sawyer crews and mowing. Sawyer crews are very effective in Gambel oak (Figure 7-10) and have been used in thinning stem-density in mid-seral oak that is usually a little taller (8 + feet) from up to greater than 20 stems/m2 to one stem/m2. Thinning oak in this manner makes wildfire spread dependent on ground fuels and no longer affords a continuous fuel source above the ground for wildfire to travel through. This also decreases flame length, changes the flame front to something that is more manageable and safer for those fighting wildfire. The drawback of this method is it is expensive and has a need for periodic (annual/biannual) maintenance for wildfire purposes. This method is most effective when combined with other methods such as goat grazing.

Mowing has been used on live-fire ranges as and along roadsides for mitigation of fine fuels as well as weed control. In 2004, we experimented with a new kind of fuelbreak methodology: a bullhog (Figure 7-11). A bullhog is little more than a large mower but its capability is substantially greater than that of a conventional mower. It is designed to quickly mulch large trees and shrubs. The bullhog is fairly cost efficient and does a very effective job of changing the fuel profile to something that produces low flame lengths and low intensity flame fronts. This method has the same slope limitations as a bulldozer as well as limitations on rocky terrain.

7.7.3.6.1.5 Greenstripping

Greenstripping is a form of vegetative fuel break. Greenstrips are constructed by removing the vegetation that is present, often by chaining, then planting more wildfire resistant vegetation in a wide strip, making it difficult for wildfire to travel through the strip (Figure 7-12). There are two drawbacks to using this method. First, it is often very difficult in this area to establish suitable greenstripping plants. Second, greenstrips should be maintained annually by grazing. The BLM has obtained some success in cheatgrass monocultures using greenstrips to limit wildfire spread. Development of a greenstrip on Camp W.G. Williams, however, has proved to be a less desirable method both due to the difficulty of establishing suitable vegetation and safety concerns with using livestock in a controlled manner in the Impact Area, such as would be required on Camp due to current grazing policy.

Figure 7-12. Chaining Prior to Greenstripping in the Impact Area in 1998.

7.7.3.6.2 Non-Mechanical: Herbicide and Prescribed Burning

7.7.3.6.2.1 Herbicide

Herbicide can be used as an alternative treatment for vegetative management when other options are not available. It has only been used at the north end of the Impact Area where unexploded ordnance can preclude mechanical treatments. In these areas, herbicide can be used to reduce wildfire fuels by thinning shrubs or as a soil-sterilent. The advantage of herbicide is that it can be applied without mechanical soil disturbance eliminating the risk to both personnel and equipment.

Residual herbicides are used to kill existing vegetation and prevent regrowth between the twin bulldozed firebreaks on the north end of the impact area (Figure 7-13). This substantially increases the effectiveness of these firebreaks. References that cover general herbicide uses are maintained in the Camp Williams ERM Lab. These references should be reviewed when considering herbicide treatments. The use of aerially applied chemicals on larger scales requires environmental permitting and is not looked on favorably by the public. There is also a prescription development process that must be followed when using this method.

Figure 7-13. Helicopter applying herbicide to the twin firebreaks on the north end of the Impact Area in 2003.

7.7.3.6.2.2 Prescribed Burning

Prescribed burning is recognized by DA as a valuable and cost-efficient tool for fuel load management (DAIM-ED, 2004). There are many benefits of prescribed fire as a management tool, including the removal of fuel from ranges, thereby keeping them open for training with little risk of starting a wildfire in the summer wildfire season (Figure 7-14). There is some risk of a wildfire escaping. However, with careful planning to mitigate the risks, prescribed fire provides fiscal and ecological benefits that are hard to ignore.

There is currently a moratorium on prescribed fire on Camp Williams enacted by The Adjutant General in 2003 (after the U.S. Forest Service lost control of the Cascade II fire). Prior to the moratorium, prescribed burning was not a widespread or integral part of our wildlife management. As before, the objectives will be achieved through other means. A comprehensive cost-benefit analysis will be completed as part of the IWFMP.

If it were to be reinstated, here are some of the factors that would need to be taken into consideration:

Figure 7-14. Prescribed burn being conducted on the grenade launcher range in 2000.

- Military training needs/scheduling
- Environmental impacts, including potential impacts to nesting birds and other wildlife
- Smoke (EPA restrictions and guidelines)
- Containment strategy
- Prescription/plan designed and approved
- Cost
- Resources required
- Utah county permitting
- Coordination with state and local government

The IWFMP will contain specific direction regarding the conducting of prescribed burns on Camp Williams as well as priority sites and projects for its use in the event that the moratorium were to be lifted.

Utah and Salt Lake counties are classified by the Environmental Protection Agency (EPA) as being non-attainment areas for particulate matter (PM10), the component of air quality that would probably be affected the most by smoke produced during a prescribed burn. There is currently a Utah Smoke Management Plan (Utah Division of Air Quality 2000) that can be used for developing a burn prescription for Camp Williams. A copy of this plan can be obtained from the Division of Forestry, Fire and State Lands or the Division of Air Quality website and will be on file in the Camp Williams ERM Lab. Following is a set of general guidelines to be used for smoke management. These guidelines are taken from Mallory (1978), with some modification specific to Camp Williams. Forms to request permits for prescribed burning are available on the Utah Division of Air Quality website.

- Have clear objectives: Be sure to have clear resource objectives and to have considered the impact on the total environment, both on and off site.
- Obtain and use weather forecasts: Knowing atmospheric conditions is important for smoke dispersal. Burning should be done when the atmosphere is slightly unstable so smoke will rise and dissipate. If too unstable, however, there could be control problems. This information is part of the decision process used by the Interagency Fire Center in determining whether burning is allowed on a given day.
- Determine the direction and volume of smoke: This is especially important near highways, such as Redwood Rd., and populated areas.
- Use caution when near or upwind of smoke sensitive areas: Burning should be done when wind will carry smoke away from areas such as Redwood Rd., Bluffdale, and the cantonment area. Notify appropriate agencies, nearby residents, and adjacent landowners: Notifying agencies are on file in the Camp Williams ERM Lab. Depending on the size and location of the prescribed fire, it may be appropriate to notify local City Offices such as Bluffdale, Riverton, Herriman, Saratoga Springs, Eagle Mountain, and Lehi.
- Use test fires to confirm smoke behavior: Set these in the area proposed for burning, away from road or other "edge" effects.
- Use backfires when possible: Backfires result in more complete consumption of fuel and produce less smoke. Even though slower and more expensive, fewer pollutants are put into the air and visibility is less restricted.
- Burn in small blocks: The larger the area being burned, the more visibility is reduced downwind and the higher the concentration of particulates put into the air. However, it may be better to burn all the area needed when weather conditions are ideal for rapid dispersion of smoke.
- Be cautious of nighttime burning: Predicting smoke drift and visibility is more difficult at night. The wind may lessen or die out completely and smoke will tend to stay near the ground. Burn at night only when there is a definite forecast of optimum conditions.
- Have an emergency plan: Be prepared to control traffic on nearby roads if wind changes direction. Be prepared to stop a prescribed burn if it is not burning according to plan or if weather conditions change.

7.7.3.7 Suppression

Wildfire suppression on Camp Williams is overseen by Range Control. Camp Williams has a 100% suppression policy for wildfire due to the dangers of a “let it burn” policy associated with the surrounding wildland-urban interface. More information on wildfire suppression protocol and resources will be found in the Installation’s Integrated Wildland Fire Management Plan (IWFMP). Regulations and procedures for fighting wildfires at Camp Williams are currently provided in UT-CWGW Regulation 350-5, Chapter 8: Fire Fighting Procedures.

Memorandums of Understanding with the Utah Department of Natural Resources Division of Forestry, Fire, and State Lands and other local government organizations are maintained by Range Control and will be included in the IWFMP as appendices.

7.7.3.8 Fire Weather and Fire Danger Ratings

The best source of wildfire weather is the National Fire Danger Rating System (NFDRS) wildfire weather station located at Camp Williams. This station can be used in assessing wildfire risk throughout the wildfire season. If the wildfire weather station at Camp Williams is inoperable, wildfire weather can be obtained from the Interagency Fire Center located in Salt Lake City at (801) 908-1900.

Fire Danger is computed hourly using the ignition component (IC) and burning index (BI) values collected remotely from the wildfire weather station. Downrange activities are restricted by AGCW Range Control based upon the Fire Danger Rating taken at 1300 hrs each day. An explanation of range restrictions relative to wildfire danger rating is located in Range Control. They can also be found in Appendix D of the UT-ARNG Regulation 350-5. Range users are briefed of restrictions placed on range use when they check in at Range Control. Fire Danger Rating is posted on large signs in front of Range Control and at the intersection of Watts road and Beef Hollow road. A chart of monthly probable wildfire danger is included in Section 4.1.2, Implications for Training, to aid military trainers in planning training.

When used for prescribed burns it is important that the station be monitored in order to determine when conditions fall into acceptable ranges for burning. Acceptable ranges for various fuel types are on file in the Camp Williams ERM Lab. On the day when the burn is being conducted on-site weather measurements should be taken hourly using a belt weather kit.

7.7.3.9 Post-Wildfire Rehabilitation

Fire affects plant succession and wildlife habitat and generally returns ecosystems to an earlier successional state (Heinselman 1978). Affects on plant succession are dependent on a number of factors, including how well plant species have adapted to wildfire by mechanisms such as thick bark and sprouting (Wright and Bailey 1982). Rehabilitation of a burned area is dependent on the extent and severity of the burn. The need for rehabilitation is determined as it relates to military training, soil stability, invasive weeds, and wildlife habitat by the Natural Resource Manager and the ITAM Coordinator. After a light wildfire, natural regeneration aided by resting the area is the most successful and efficient manner of rehabilitation. There are some circumstances when a wildfire has been particularly severe, that rehabilitation techniques in the form of reseeding, replanting, or mechanical methods of soil stabilization are needed in order to prevent soil erosion or invasion by noxious weeds (information on LRAM methods can be found in Section 7.6, Land Rehabilitation and Management, information on weeds can be found in Section 7.9, Integrated Pest Management).

Generally seeding is done in the fall, though spring and sometimes winter are effective times depending on the species to be seeded and that species seed availability. A rangeland drill is an effective and recommended means of seeding. Other alternatives include broadcast seeding, aerial seeding and/or chaining. References for seeding techniques are maintained in the Camp Williams ERM Lab. ITAM will continue to fund this need but probably not completely. Noxious and invasive weed control under the new guidance, however, is the responsibility of facilities and maintenance. Reseeding after a wildfire, therefore, may be funded in part by facilities maintenance to prevent noxious weed invasion.

7.7.3.10 Operational Plan

Wildfire management on Camp Williams will be planned annually and included in Real Property, RTLP, ITAM, and ERM budget strategies. Funding responsibility is outlined in Sustainable Range Program Environmental Activity Responsibilities Matrix (DAIM-ZA, 2005). Wildfire management in the foreseeable future are comprised entirely of pre-suppression projects. The primary goal is to prevent wildfires from leaving the installation; the secondary goals is to cause the inevitable wildfire to be smaller and less intense and therefore, more easily and safely suppressed. Within the next five years, Camp Williams plans to implement all of the mechanical techniques mentioned above with the exception of greenstripping (Figure 7-15). The next date proposed for use of herbicide for maintenance of the twin firebreaks at the north end of the impact area is FY07. All firebreaks will be evaluated and, if needed, maintained annually.

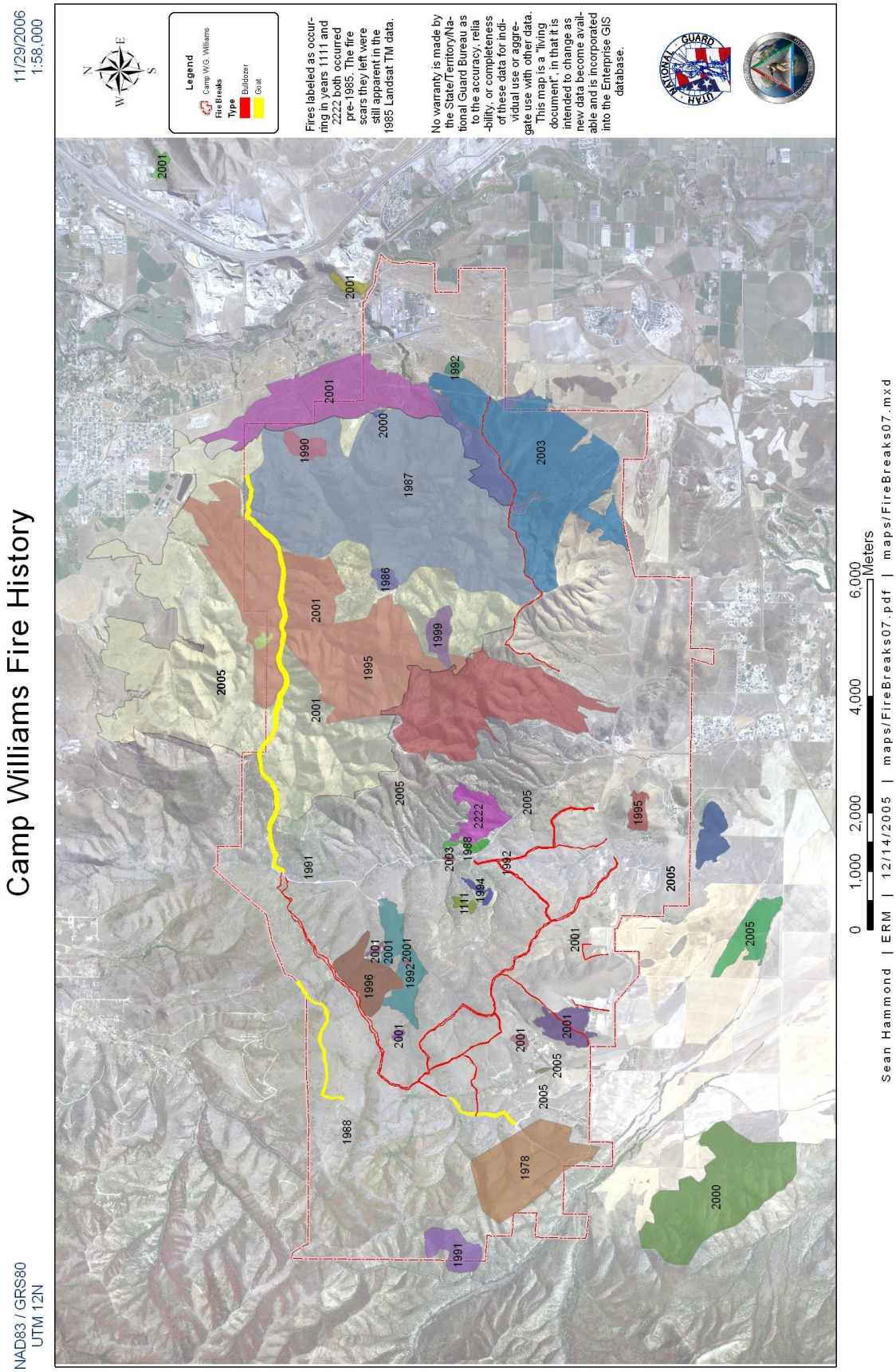


Figure 7-15. Firebreak and Fuelbreak Projects to Mitigate Wildfire Hazard at Camp Williams.

7.8 Agricultural Out-leasing

7.8.1 Grazing Management

Camp Williams has been historically grazed by both sheep and cattle. Land Surveyors in the late 1800's noted sheep pens within the present Camp boundaries in upper and lower Tickville Gulch. Cottam and Evans (1945) documented that regional grazing pressure was fairly heavy, especially in the early 1900's.

In the 1980s and 90s, two sheep ranchers grazed the eastern half of Camp and a cattle cooperative grazed the western half. This arrangement was arbitrated according to land trade agreements. Grazing started in the spring, ended in the fall and used less than the allowable 25% of Animal Units Months.

However, several problems lead the Training Site Manager to end grazing in 2002. The cattle, which were not herded or otherwise restricted, tended to congregate in the wetlands and stream channels causing substantial impacts and deterioration. Cattle also caused considerable damage to facilities and ranges on the western half of the Camp which interfered with training and range operations. Manure, insects, and other problems from livestock also contributed to an undesirable state of some training sites. In addition, there were safety concerns among the ranchers about military activities and unexploded ordinances. Livestock overgrazing may have contributed to the introduction and expansion of weeds and fire-prone plants, like cheatgrass

Alternatively, livestock grazing can be conducted an environmentally acceptable manner, minimizing overgrazing and erosion. Livestock can be managed to reduce wildfire fuels across broad areas or specific areas according to a management recommendation. Impacts to water quality and wetlands can be minimized through fencing and other means.

In order for grazing to be reinstated at Camp Williams, grazing management would have to address the ecological goals of this INRMP, especially the restoration and maintenance of wetlands, stream channels, and the mitigation of damage to training facilities. Livestock grazing requires an agricultural lease in accordance with AR200-3, Natural Resources – Land, Forest and Wildlife Management, and AR 405-80, Management of Title and Grazing Use of Real Property. The Installation Commander must prepare a Report of Availability. Contamination by explosives or ammunition or conflicts with environmental policy or goals may preclude availability. Grazing leases are administered by the Army Corps of Engineers and meet the following criteria: must support the military mission and must not impair training; must comply with applicable laws and the INRMP; must be fiscally sound and compatible with ecosystem sustainability; must be consistent with installation safety procedures; and revenues used to support lease administration and environmental goals.

The same conditions must be met to allow trailing of cattle though the Camp. A few cows have been observed at any time from Summer to early Fall trespassing on the Camp in the Impact Area and riparian areas of Tickville Gulch.

7.8.2 Other Agricultural Leasing

Some of the Camp is classified as prime agricultural land with irrigation. However, irrigation is not available and because this land is relatively flat it is prime training land in support of the mission. Therefore, it is not available for outleasing.

7.9 Integrated Pest Management

Because effective land-based training depends on the continued availability of suitable training areas, the National Guard has a basic commitment to the maintenance of healthy ecosystems. A major challenge to maintaining intact native ecosystems is the rapid expansion of invasive weeds. Unchecked, invasive plants can quickly dominate and fundamentally alter native plant communities. Potential consequences of these invasions include the displacement of native plant species, the alteration of natural disturbance regimes and declines in the quality of wildlife and livestock forage. It is estimated that on western public lands noxious weeds are spreading at more than 1.5 million acres per year and that the rate of spread is increasing (BLM 1996).

There are many widely cited generalizations concerning the attributes of successful plant species invasions; however, there have been few tests of, and many exceptions to, these generalizations. Nevertheless, generalizations which appear to be fairly robust include: communities with low species richness appear to be more prone to invasion

than communities with high species richness; and disturbance appears to increase the potential for invasion (Lodge 1993). Many communities of semi-arid environments, including those of Camp Williams, share both of these characteristics, i.e., low species richness and high frequency of disturbance. While xeric habitats are unfavorable for the germination and establishment of aliens and wet habitats tend to have strong resident competitors, seasonally dry habitats, with the "...alternation of episodes of gap-creation by drought and wildfire with wet periods more suitable for seedling establishment..." seem to be particularly prone to invasion (Thompson et al. 1995). Put another way, Camp Williams is susceptible to invasion by noxious weeds.

Noxious weeds "have characteristics that make them a threat to agronomic agriculture, grazing lands, and the environment in general if they are allowed to be introduced or spread without control" (Antognini et al. 1995). Such species are designated as noxious weeds by federal, state, and sometimes county, governments. Managers of state and federal lands, including National Guard installations, are mandated to prevent the spread of these listed species (Federal Noxious Weed Act [7 U.S.C. 2801-2814]).

While, there are no major infestations of noxious weeds at Camp Williams, there is considerable potential for plant species invasion. Of the 15 species on the statewide noxious weed list, 9 have been reported on Camp Williams. Of these 9 reported species, infestations of three different thistles (*Carduus sp.*, *Cirsium sp.*, and *Onopordum sp.*) may have serious potential of spreading. The potential for plant species invasions is further illustrated by the fact that approximately 25% of the vascular plant species on the installation are non-native. Implementation of this noxious weed management plan, which is strongly integrated with the Camp Williams grazing and wildfire management plans, should facilitate the control of existing infestations and greatly minimize the risk of new ones.

Weed invasions have been compared to slow-moving wildfires. This is an extremely useful perspective when developing and implementing a weed management plan (Dewey et al. 1995). Following a "fire suppression" model, the Camp Williams noxious weed management plan emphasizes strategy as well as tactics. The plan features focused monitoring to ensure early detection and effective control of noxious weeds while populations are still small.

The Camp Williams noxious weed management plan has the following management objectives (after Dewey *et* al. 1995): Prevention, Detection, Rapid Response, Containment and Control, and Site Rehabilitation. These program areas are intended to comply with the requirements for federal agencies of Executive Order 13112 – Invasive Species. Noxious and invasive weed control will be pursued in consultation with National Guard Bureau and the Invasive Species Council, as appropriate.

7.9.1 Prevention

Preventing infestations of noxious weeds is an extremely effective, yet often overlooked, tool in weed control (Antognini et al. 1995). Effective prevention includes ecosystem management, monitoring, and minimize new introductions.

At Camp Williams integrated training area management is the first line of defense against the introduction and spread of noxious weeds. Weeds are colonizing species that typically depend on some form of disturbance for initial establishment and the maintenance of diverse communities dominated by perennial species is an important element of weed prevention (Antognini et al. 1995).

Monitoring of training and other management is integral to the Camp Williams INRMP. A benefit of this comprehensive monitoring activity is anticipation (and therefore, avoidance) of levels of disturbance conducive to invasive plants. Given this sort of early warning, training and resource managers can respond by reallocating, when practical, training activities to alternative training sites within the installation.

In addition to maintaining healthy, intact plant communities, another element of the prevention strategy is to minimize the risk of noxious weeds being inadvertently introduced onto the installation. For example, restoration and rehabilitation activities will only use certified seed from reliable sources.

Tracked vehicles in particular may transport soil and weeds from one site to another. The Camp Williams Environmental Awareness program will develop and disseminate to training units educational materials describing

the benefits of weed prevention, the negative impacts of weed infestations to the environment, and specific recommendations for the cleaning of equipment.

7.9.2 Detection

The earliest possible detection of new occurrences of noxious weeds is a critical strategic element of the Camp Williams noxious weed management plan. Successful implementation of the early detection strategy depends primarily on aggressive "focused" monitoring based on species-specific ecosystem-based analysis.

In addition to the monitoring of the actual RTLA plots, the RTLA crewmembers are trained to be on the lookout for noxious weeds while they travel about the installation. For recognition training, the Camp Williams ERM Lab maintains a laminated specimen for each Utah's noxious weeds. In addition to this opportunistic monitoring, much of the monitoring effort will include explicitly planned searches by the crew responsible for mapping weeds, dependent on the phenology of a specific species. For example, the crew responsible for mapping weeds may spend 2-3 days during the flowering period of a targeted noxious weed searching for that species in predetermined areas on the installation. These search areas will be delineated on the basis of a GIS analysis of known or suspected environmental and land use affinities of that species, e.g., *Convolvulus arvensis* (bindweed) is often associated with old agricultural fields. Remote sensing and GIS can be used to map and possibly even detect large infestations of weeds (e.g., Everitt et al. 1987; Everitt and Deloach 1990); and, GIS will be used to predict potential noxious weed infestation locations based on an analysis of habitat relations for each targeted species (Dewey at al. 1991).

The Camp Williams Environmental Awareness program offers an additional opportunity for the early detection of noxious weeds. Units will be provided with a brochure describing in general terms the benefits of weed prevention and the negative impacts of weed infestations to the environment. The brochure would also describe and illustrate particular noxious weeds. As part of this EA project, recognition and/or rewards may be awarded to units or individuals reporting the location of new occurrences of the targeted species.

7.9.3 Rapid response

Rapid response, following early detection, is the key to effective (and cost effective) noxious weed management. Approval and implementation of this noxious weed plan will allow rapid and therefore highly effective response to small populations of noxious weeds. An annual control effort of modest scale can be anticipated and budgeted for, thus eliminating both budgetary and administrative barriers to rapid response.

7.9.4 Containment and control

There is strong theoretical and empirical support for an emphasis on detection and control of "satellite foci" as opposed to large, conspicuous, main infestations (Moody and Mack 1988). The most effective weed management strategy is to eradicate isolated populations while they are still small (i.e., the "spot fire" analogy of Dewey et al. 1995). Starthistle, *Centaurea calcitrapa*, a potentially serious problem weed, was found on Camp Williams in 1997. It was controlled by removing flowering plants and rosettes with handtools. Follow-up efforts will include both removal with handtools and herbicide. Starthistle is not new to either Salt Lake or Utah Counties according to the Atlas of the Vascular Plants of Utah. Control of spot infestations is more economical and less biologically disruptive than attempts to control landscape infestations. Fortunately, Camp Williams currently has no landscape infestations and the focus of this noxious weed management plan is to maintain that condition.

The overarching goal of the Camp Williams noxious weed management plan is the detection and eradication of new introductions. Eradication involves total removal of the weed including seeds and roots. This is only possible on small-scale infestations and requires annual monitoring and evaluation of treated areas to ensure success. In the case of very small infestations, control may be accomplished by mechanical means (e.g., pulling individual plants). Where hand weeding is not practical, appropriate herbicide treatments will be carried out by a trained applicator. Specific herbicidal control recommendations for each of the Utah noxious weeds are included in the Montana-Utah-Wyoming Weed Management Handbook (Fay et al. 1995). These recommendations include associated grazing restrictions, where appropriate.

The Camp Williams noxious weed management plan is consistent with the intent of the DOD/EPA MOU concerning the Pesticide Environmental Stewardship Program (PESP). A goal of PESP is to reduce pesticide use through the development and implementation of integrated pest management programs. Under the Camp Williams

noxious weed management plan, herbicides are applied only in small amounts and when they are most effective (i.e., rapid response to small, satellite populations following early detection).

For several of the state-listed noxious weeds there is some potential for biological control (Fay et al. 1995). In developing species-specific control prescriptions, biological control agents will be considered along with cultural, mechanical, and chemical methods.

7.9.5 Site rehabilitation after weed control

Natural or assisted revegetation of treated sites is important to minimize reinvasion by weeds. Each site-specific treatment prescription will include an assessment of natural revegetation potential and a recommendation for seeding or planting when required. Consistent with overall direction from the Camp Williams INRMP, native species adapted to local environmental conditions will be selected for revegetation and only certified seed will be used in direct seeding projects.

7.9.6 Application

7.9.6.1 Prevention

A goal of Camp William's ITAM program is maintenance of a quality training environment (See Section 7.6, Land Rehabilitation and Management). Disturbed areas are evaluated and rehabilitated aggressively, which aids in the prevention of weed establishment.

7.9.6.2 Detection

ERM hires a natural resource technician crew, whose main duty was detection and treatment of noxious weeds. ERM continues to be the lead UTNG department responsible for monitoring and mapping noxious weed outbreaks. In addition, the RTLA vegetation monitoring crew is trained to recognize noxious weeds as they travel the backcountry of the Camp. Sets of noxious weed field identification mounts are carried with each crew, as well.

7.9.6.3 Rapid Response

Treatment is only effective when it is timely and takes into account the plant's physiology. Treatment of new populations is the most effective method. Purple starthistle (*Centaurea calcitrapa*), about 150 plants near the 25m Range, was found in 1999. Aggressive treatment by hand pulling and herbicide eradicated it; no plants have been found during the last three years of continued monitoring.

7.9.6.4 Containment and Control

Weeds are best control (eradicated) when small, like spot wildfires. Treatment has been transferred to Real Property through Camp Williams. ERM will continue to play a key role with advice and consultation. Table 7-4 contains information about known weeds mapped at the Camp and treatment.

Table 7-4. Noxious Weeds Monitored at Camp Williams and Suggested Treatment.

Common Name	Distribution[24]	Threat to Training[25] / Spread[26]	Objective	Treatment Standard	Manage-ment Options	Best Time for Control
Bull Thistle, *Cirsium vulgare*	Intermixed with Scotch & Musk Thistles; <.01 acres.	Moderate / Low	Eradicate		Mow	Before flowering
					Hand pull	Anytime before seed-set.
					Herbicide	Best prior to flowering.

[24] Acreage is only a general indicator of size, as a large area may have only a sparse distribution within it.
[25] Subjective assessment of how much is might hinder mainly dismounted military training, such as due to plant characteristics (e.g., spines) or to management difficulties (e.g., increased fire hazard).
[26] Subjective assessment of how fast the weed is spreading and is likely to spread.

Table 7-4. Noxious Weeds Monitored at Camp Williams and Suggested Treatment.

Common Name	Distribution[24]	Threat to Training[25] / Spread[26]	Objective	Treatment Standard	Manage-ment Options	Best Time for Control
Canada Thistle, *Cirsium arvense*	Small stand in Beef Hollow, near Tickville/Range Rd Intersections; riparian areas in Oak Springs and the Homestead Spring; ~0.5 acres.	Low / Low	Eradicate	Treat stand on Range Road; Ignore riparian areas.	Herbicide	Early growth, before flowering.
Dalmation Toadflax	Widespread in northern half of Camp; small patches or individual plants over ~0.2 acres.	Low/ High	Contain		Hand pull	Anytime before seed-set, but not highly effective due to resprouting.
					Herbicide	When actively growing in Spring or Fall.
Diffuse Knapweed, *Centaurea diffusa*	~ 0.5 acres.	Low / Moderate	Eradicate	Spray known stand annually until eradicated.	Herbicide	From rosette to bolting stage.
Dyers Woad, *Isatis tinctoria*	Centered on water tanks and repeater site; ~1.4 acres.	Low / Moderate	Contain	Treat known sites.	Hand pull	Anytime before seed-set.
					Herbicide	In rosette stage in Fall or to young plants in late Spring.
Leafy Spurge, *Euphorbia esula*	Mouth of Beef Hollow; several small patches over ~0.3 acres.	Low / Moderate	Eradicate	Spray known stand annually until eradicated.	Herbicide	When flowers or seeds developing, June, or mid-September.
Medusahead, *Taeniatherum caput-medusae*[27]	Beef Hollow; small patches over ~2.7 acres.	High / High	Eradicate	Spray all known patches.	Herbicide	Before seed-set (early May at latest).
Musk Thistle, *Carduus nutans*	Widespread along roadsides; totals 124.4 acres.	High / High	Contain		Mow	Before seed-set (but may resprout).
					Hand pull	Anytime before seed-set.
					Herbicide	Before flowering, early summer.
Russian Knapweed, *Acroptilon repens*	One patch; 0.1 acres.	Low / Moderate	Eradicate	Spray known stand annually until eradicated.	Herbicide	Depends upon choice of herbicide; anytime for several.
Scotch Thistle, *Onopordum acanthium*	Widespread along roadsides; totals 75.6 acres.	High / High	Contain		Mow	Before seed-set (early May at latest).
					Hand pull	Anytime before seed-set.
					Herbicide	Best before flowering, early summer
Spotted Knapweed, *Centaurea maculosa*	One patch; 0.02 acres.	Low / Moderate	Eradicate	Spray known stand annually until eradicated.	Hand pull	Before seed-set; must get taproot.
					Herbicide	Before seed-set.

[27] Medusahead is not on the Utah Noxious Weed List, primarily because it is relatively new to the area, but is extremely concerning to the County Extension Agents and to the County Weed Managers. It is concerning to AGCW because of the potential for adversely affecting fire hazard and for altering the ecology of training sites.

Table 7-4. Noxious Weeds Monitored at Camp Williams and Suggested Treatment.

Common Name	Distribution[24]	Threat to Training[25] / Spread[26]	Objective	Treatment Standard	Manage-ment Options	Best Time for Control
Squarrose Knapweed, *Centaurea squarrosa*	One patch; <0.01 acres.	Low / Moderate	Eradicate	Spray known stand annually until eradicated.	Herbicide	
Hoary Cress (aka Whitetop), *Cardaria draba*	Widespread around easternmost 1/4 of Camp; totals 19.7 acres.	Low / High	Contain	Spray known stands annually.	Herbicide	Herbicide is only effective before flowering (bud stage), Spring.
Yellow Starthistle, *Centaurea solstitialis*	One area on ISBC Range & one along Tickville Road; ~0.2 acres total area	High / Moderate	Eradicate	Treat known stands annually.	Hand pull	Before seed-set
					Herbicide	
Purple Starthistle, *Centaurea calcitrapa*[28]	Eradicated		Monitor		Monitor for re-appearance.	

7.10 Outdoor Recreation

The only outdoor recreation permitted is fishing along the Jordan River. Fisherman must check in with Security at the main gate to the Camp. Safety concerns due to un-exploded ordinance drive prohibitions on the remainder of the Camp, similarly to prohibitions on hunting and efforts to curtail poaching and other trespassing.

7.11 Mineral Extraction

There are no petroleum developments, existing or planned, on Camp Williams. Mineral resources, such as gravel and sand, have been extracted in the past and will likely continue to be extracted in the future. A small deposit of manganese of hot spring origin is known to exist in the Jordan Narrows region, but it is neither rich enough nor sufficiently extensive to possess commercial value (Marsell 1932). Kennicott, Utah Copper's Bingham Canyon Mine is located at the north end of the Oquirrh Mountains, approximately 5.5 miles north of Camp Williams. This is one of the largest open pit mines in the world. Igneous intrusions into sedimentary sandstone, quartzite, and limestone result in low grade ore which contains copper, gold, silver, and molybdenum.

Any mineral extraction and/or processing will be done in accordance with state and local regulations and zoning ordinances, where applicable[29]. Then local ordinances are not applied, a site development plan will be developed and staffed internally. The plan will address site selections, operational constraints, and the rehabilitation of the site after its use is concluded.

7.12 Fugitive Emissions and Fugitive Dust

Fugitive emissions are air emissions from an installation or facility which are neither passed through an air cleaning device nor vented through a stack, or could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening for control purposes. An example fugitive emission at Camp Williams is smoke from controlled burns or artillery firing.

[28] Caltraps were mid-evil spikes designed to cripple warhorses and like its namesake, it produces large, unpleasant spines. It is not officially on the Utah Noxious Weed List yet, but is of great concern to the County Extension Agents and County Weed Managers.

[29] Applicable zoning ordinances for Salt Lake County are found at: http://ordlink.com/saltlkco/_DATA/Title19/Chapter_19_12_FR_0_5_FR_1__FR.html, Section 19.12.030 Conditional Use, Section J Mineral Extraction and Processing.

Fugitive dust is particulate, composed of soil and/or industrial particulates such as ash, coal, minerals, etc., which becomes airborne because of wind or mechanical disturbance of surfaces. Fugitive dust sources at Camp Williams include administrative and unit training activities on unpaved roads, pit operations, excavations, demolitions, and yard and landscaping activities.

Camp Williams has implemented a Fugitive Dust Control Plan (available at ERM lab) addressing fugitive dust, as required by State statute. INRMP plan elements may cause either fugitive emissions or dust, and such plan elements must be integrated with the requirements of the Air Approval Order and the Fugitive Dust Control Plan. In some cases, the Fugitive Dust Control Plan calls for vegetative controls either as cover materials or as wind breaks. Actual locations of wind breaks are yet to be determined. Controlled burns must be carried out in a manner consistent with specified emissions limitations.

7.13 Cultural Resources Protection

7.13.1 Objectives

The objectives of this chapter are to identify cultural and historic resources on Camp Williams, outline pertinent references and definitions, Native American consultation responsibilities, closely follow cultural and historic legislation, and integrate this information with military and natural resources management on Camp Williams. Key elements of this plan are the protection of historic landmarks, structures and sites as mandated by federal legislation, primarily the National Historic Preservation Act (NHPA) of 1966, Native American Graves Protection and Repatriation Act (NAGPRA), American Indians Religious Freedom Act (AIRFA), DoD Annotated American Indian and Alaska Native Policy (October 27, 1999) and Executive Order 13175. Also, Executive Order 11593 directs federal agencies to provide leadership in preservation of historic and cultural resources, and to nominate to the National Register those properties which meet the criteria. All States Log Number I92-0088 mandates ARNG compliance with the NHPA.

7.13.2 Cultural and Historic Resources

7.13.2.1 Archaeological Sites:

A large number of archaeological sites have been identified on UT-ARNG properties at Camp Williams. A total of 32 archaeological inventories have been completed on over 14,000 acres at Camp Williams. The inventories resulted in the recordation of 110 archaeological sites, of which 36 are considered eligible for the National Register of Historic Places (NRHP). Those archaeological sites considered eligible consist primarily of prehistoric lithic scatters, though a small number of historic sites, including two historic canals, are also eligible.

7.13.2.2 Historic Preservation

An assessment of the historic buildings and structures at Camp Williams was conducted and reported by Brigham Young University Museum of Peoples and Cultures in 1988. The survey identified 20 buildings from the original post built from 1927-1929. A number of 1940's era buildings were also identified as significant but no specific recommendations were made regarding these buildings. Reassessments of the structures in the Camp Williams cantonment area were conducted in 2001 by Archaeological Investigations Northwest, Inc., and in 2005 by Sagebrush Consultants, L.L.C. Currently, a total of 19 structures are considered eligible for listing in the NRHP. One of these structures, the ca. 1934 Camp Williams Officer’s Club, was listed in the National Register in 1984.

7.13.3 Natural Resources Management Implications

The relationship between any natural resources management decision and the implications of those decisions on cultural resources should be considered. Natural resource management on Camp Williams will be coordinated with the Utah Army National Guard Integrated Cultural Resources Management Plan (UT-ARNG ICRMP). Both natural resources managers and the cultural resources program manager will have access to the same dataset.

The UT-ARNG does not anticipate that adverse effects to historic properties will result from INRMP recommendations. Chapter 5 of the UT-ARNG ICRMP specifically addresses Standard Operating Procedures (SOPs) regarding scenarios which may have the potential to effect cultural resources as a result of INRMP

recommendations. They are designed to provide detailed guidance for UT-ARNG personnel in addressing the most common cultural resource compliance situations.

The Camp Williams cultural clearance procedure for training activities outside established training areas and ranges including new construction, road building, earth moving, and digging, will use the following guidelines:

1) The requesting unit must notify the Camp Williams ERM office AGCW-NR thirty (90) days prior to the training or construction;
2) The requesting unit must detail the planned activity, include a legal description and map of the site, and identify the type of equipment that will be used in the process.

The Utah National Guard ERM office will arrange for an archaeological inventory of the site within 30 working days. The AGCW-NR will then notify the requesting unit in writing to proceed as planned or to choose an alternate course of action. All non-standard training requests will be presented to the Training Site Manager during the Camp Williams weekly staff meeting. The Training Site Manager and the Director of Environmental Management will also be informed of all archaeological survey requests.

7.13.3.1 National Historic Preservation Act of 1966 (amended 1970 and 1980):

This federal law provides for a National Register of Historic Places to include districts, sites, buildings, structures and objects significant in American history, architecture, archaeology and culture. Section 106 of the Act requires that federal agencies having direct or indirect jurisdiction over a proposed federal, federally assisted, or federally licensed undertaking, prior to approval of the expenditure of funds or the issuance of a license, take into account the effect of the undertaking on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to the undertaking.

Section 110 of the Act directs the heads of all federal agencies to assume responsibility for the preservation of National Register listed or eligible historic properties owned or controlled by their agency. Federal agencies are directed to locate, inventory and nominate properties to the National Register, to exercise caution to protect such properties and to use such properties to the maximum extent feasible. Other major provisions of Section 110 include documentation of properties adversely affected by federal undertakings, the establishment of trained federal preservation officers in each agency, and the inclusion of the costs of preservation activities as eligible agency project costs.

The State of Utah has implemented regulations that essentially apply the major provisions of the NHPA to state agencies. Utah Code Annotated 9-8-404 directs all state agencies to take into account the effects of any undertaking on districts, sites, buildings, structures, or specimens that are included in or eligible for inclusion in the NRHP or the State Register prior to approval of the undertaking or expenditure of state funds.

The NHPA and U.C.A. 9-8-404 require that the UT-ARNG plan and act to minimize harm to structures, sites and objects that are included in, or eligible for, the National Register of Historical Places. The UT-ARNG must allow the State Historic Preservation Officer 30 days to comment on any of the following actions:

- Ground Disturbing Activity (road construction/maintenance, facility construction, etc.);
- Major renovation or demolition of a structure eligible for listing in the NRHP;
- Transfer of ownership; and
- Any other action that may directly or indirectly affect historic properties.

The NHPA does not necessarily require that historic properties be preserved. However, consultation with the State Historic Preservation Officer is required prior to initiating any activity which may affect an historic property. The ERM Cultural Resources Program Manager is responsible for coordinating SHPO consultation.

Buildings eligible for the NRHP must be maintained in original condition whenever possible. These buildings are documented in the GIS database as restricted. Prior to any remodeling or replacement, engineers must seek the approval of the Cultural Resources Program Manager.

7.13.3.2 Archaeological Resources Protection Act of 1979 (amended 1988):

The Archaeological Resources Protection Act (ARPA) serves to protect archaeological resources on federal and Indian lands. Major provisions of the law define archaeological resources, require a permit to conduct archaeological investigations, and specify that the nature and location of any archaeological resource on federal or Indian lands may not be made available to the public unless it is determined that such disclosure would further the purposes of the act and not create a risk of harm to the resources or to the site at which such resources are located. Training buffers will be established around eligible archaeological sites at Camp Williams. Buffers will be included in the GIS database as a restricted management area as shown in section 7.2 of this document. Since archaeological site data, particularly site location data, is considered sensitive, buffers will be established in such a way that specific site locations will not be divulged. With respect to the possible sensitivity of the archeological information, the reason for the restriction may be kept secret. Personnel may be informed about this management area at the discretion of the Cultural Resources Program Manager. A map of restricted management areas will be provided to range control officers that clearly describes training restrictions. Any training activity that is questionable must be approved by the Cultural Resources Program Manager.

7.13.3.3 Native American Graves Protection and Repatriation Act of 1990:

The Native American Graves Protection and Repatriation Act (NAGPRA) contains two main provisions which apply to federal agencies. The first requires federal agencies and museums receiving federal funds to inventory collections of human remains and associated funerary objects, and develop written summaries for unassociated funerary objects, sacred objects, and objects of cultural patrimony that are in the collections they own or control. Requests for repatriation of those remains or objects may be made, based on those inventories, by federally-recognized Indian Tribes or Native Hawaiian organizations which are culturally affiliated or for which they are lineal descendants.

The second provision provides for the protection of Native American graves and associated cultural items. Avoidance of archaeological sites containing graves is encouraged, as are intensive surveys to identify such sites. Archaeological investigations for planning or research purposes on federal and tribal lands, or other land modifying activities that inadvertently discover such items, require the federal agency or tribe to consult with affiliated Native Americans. Federal ARPA permits are required for archaeological investigations of grave sites on federal or tribal lands, in addition to consultation with affected groups.

The State has implemented regulations that essentially apply the major provisions of NAGPRA to state agencies and state lands. U.C.A. 9-9-403 and Utah Administrative Code Rule R230-1direct state agencies to protect Native American burial locations when possible and cease ground disturbing activities and consult with the Utah Division of Indian Affairs and Utah State Historic Preservation Office should Native American remains be discovered. State agencies are required to make a good faith effort to determine the cultural affiliation of discovered remains.

7.13.3.4 American Indians Religious Freedom Act of 1978:

The American Indians Religious Freedom Act (AIRFA) requires that federal agencies consult with Native American groups regarding actions that might affect sites of traditional religious or cultural importance to them, impede their access to such sites for religious purposes, or otherwise impede the practice of traditional religions.

7.13.3.5 Government-to-Government Relations with Native American Governments:

In accordance with DoD Annotated American Indian and Alaska Native Policy (October 27, 1999) and Executive Order 13175, ERM office will consult, to the greatest extent practicable, with tribal governments prior to taking actions that affect federally recognized tribal governments. All such consultations are to be open and candid so that all interested parties may evaluate for themselves the potential impact of relevant proposals. Appropriate steps will be taken to assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs and activities.

7.13.4 Definitions

ARCHAEOLOGICAL RESOURCE - Any material remains of past life or activities which are of archaeological interest. Such resources include, but are not limited to, pottery, basketry, stone tools, structures or portions of structures, pit houses, rock art, graves, human skeletal materials, or any portion or piece of any kind of the foregoing items.

ASSOCIATED FUNERARY OBJECTS - Objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, and which are in the possession of a Federal agency or museum.

ASSOCIATED RECORDS - Original records (or copies thereof) that are prepared, assembled and documented efforts to locate, evaluate, record, study, preserve, or recover a prehistoric or historic resource.

BURIAL SITE - Any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which as a part of the death rite or ceremony of a culture, individual human remains are deposited.

COLLECTION - Material remains that are excavated or removed during a survey, excavation or other study of a prehistoric or historic resource, and associated records that are prepared or assembled in connection with the survey, excavation or other study.

CULTURAL AFFILIATION - There exists a relationship of shared beliefs which can be reasonably traced historically or prehistorically between a present day Indian tribe and an identifiable earlier group.

CULTURAL ITEMS - Associated and unassociated funerary objects, sacred objects, and cultural patrimony.

CULTURAL PATRIMONY - An object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native American, and which, therefore cannot be alienated, appropriated, or conveyed by any individual regardless of whether or not the individual is a member of the Indian tribe.

FEDERAL AGENCY OFFICIAL - Any officer, employee, or agent officially representing the secretary of the department or the head of any other agency of the United States having primary management authority over a collection of material remains subject to 36 CFR 79.

FEDERAL PRESERVATION OFFICER - The person who is responsible for coordinating the agency's activities under the NHPA and EO 11593, including nominating properties under the agency's ownership to the National Register. Also referred to as Historic Preservation Officer.

HISTORIC PROPERTY - Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places.

MATERIAL REMAINS - Artifacts, objects, specimens, and other physical evidence that are excavated or removed in connection with efforts to locate, evaluate, document, study, preserve, or recover a prehistoric or historic resource.

NATIONAL REGISTER OF HISTORIC PLACES - The listing of districts, sites, buildings, structures, and objects of national, state or local significance in American history, architecture, archaeology, or culture that is maintained by the Secretary of the Interior (Keeper of the Register).

NATIVE AMERICAN - Of, or relating to, a tribe, people, or culture that is indigenous to the United States.

RELIGIOUS REMAINS - Material remains that the Federal Agency Official has determined are of traditional, religious, or sacred importance to an Indian tribe, in consultation with appropriate Indian groups.

SACRED OBJECT - Specific ceremonial objects which are needed by traditional Native American religious leaders for the practice of their traditional Native American religions by their present adherents.

SECTION 106 CONSULTATION - A compliance procedure in which an agency requests the comments of the SHPO and/or the Advisory Council on Historic Preservation when an undertaking may affect a property on, or eligible for, the National Register.

STATE HISTORIC PRESERVATION OFFICER - The appointed official who is responsible for administering the NHPA within a State or jurisdiction.

UNASSOCIATED FUNERARY OBJECTS - Objects that, as a part of the death rites or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, where the remains are not in control of the Federal agency or museum and the objects can be identified as having been removed from a specific burial site.\

UNDERTAKING – Project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of the agency, those carried out with Federal financial assistance, those requiring a Federal permit, license, or approval, and those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency.

7.14 Enforcement

Camp Williams has no formal natural resource "law enforcement." Security enforces all law enforcement, but is primarily concerned with installation security. They do, however, respond to trespass incidents and coordinate enforcement with local law enforcement. Poaching incidents are coordinated with State of Utah

7.15 Outreach

The Environmental Awareness (EA) Program has the primary goal of educating soldiers to conduct environmentally responsible training at Camp Williams. It is intended to foster concern, thinking, and action to protect and conserve both the natural resources and future training opportunities. Environmental Awareness can be either preventative or corrective in nature, and issue-specific or more widely applicable.

EA provides a means to educate land users on their environmental stewardship responsibilities. It provides for the development and distribution of educational materials to land users. These materials relate the principles of land stewardship and the practices of reducing training and/or testing impacts. EA also includes information provided to environmental professionals concerning operational requirements.

The primary target audience is military and non-military personnel working and training at Camp Williams. Education about natural resource concerns, training and operation impacts, and environmental programs, including the INRMP, are specific objectives of the Environmental Awareness program. Major topics specific to Camp Williams include protection of raptors, riparian areas, juniper stands, and restoration areas, decreasing off-road traffic, digging, wildfires, and hazardous waste programs. A secondary audience and objective involves informing the public about Army environmental programs and specific issues related to Camp Williams.

7.15.1 Military Personnel Awareness

Education of soldiers and training units is primarily the responsibility of the Sustainable Range Awareness (SRA) component of ITAM and is accomplished at Camp Williams by a Training Area Environmental Issue board, staff and in-coming unit briefings, posters, the ERM website, written material (e.g., pamphlets, handouts, etc.), and articles in the Utah Guard magazine. The Training Area Environmental Officer and the ITAM Manager have primary responsibility for the Environmental Awareness effort. The ITAM web pages on the ERM website present information on training resources, Ranges and Training Areas, their status, use and any environmental concerns for soldiers and trainers. The Camp Williams website is maintained by Range Control is also linked to this information.

7.15.2 Public Awareness

Awareness efforts aimed at the public include articles in the Utah Guard magazine, newspaper articles, TV news spots, public website, and public informational briefings (Figure 7-16). The UT-ARNG provides public outreach by welcoming local elementary and secondary school groups to Camp Williams. Town meetings are held to inform the public regarding natural resources management issues at Camp Williams.

Figure 7-16. Educational Booth at a Local Festival.

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8 MANAGEMENT GOALS AND OBJECTIVES

8.1 Overview

The emphasis of the INRMP Update is the achievement of goals for maintenance and improvement of the natural environment of the installation. Previous chapters presented the background information from which the goals and objectives are formed. Goals are the focal points for implementation of the INRMP Update over the five-year period; they should reflect the installation values and the desired future condition of the natural resources. Objectives are the management strategy that will be used to achieve the stated goal. Projects are the individual actions required to achieve an objective and become line items in the proposed budgets.

8.2 Goal: Sustain Camp William's Role in Traverse Mountains

8.2.1 Objective: Enable multiple land uses to the extent practicable with the military mission.

8.2.1.1 Project: Participate in the development of the Bonneville Shoreline Trail along the north edge of Camp Williams; plan to have maximum impact for wildfire management and least trespassing.

8.2.1.2 Project: Consider the use of livestock grazing to meet the environmental standards and goals (e.g., wildfire fuel management) of this INRMP and IAW AR 200-3 and DODI 4715.3.

8.2.2 Objective: Mitigate hindrance to military training due to suburban encroachment.

8.2.2.1 Project: Develop plan for mitigating negative impacts to the military mission due to suburban development.

8.2.2.2 Project: Coordinate with UDOT on mitigating deer-vehicle accidents on Camp Williams Road (SR 68).

8.2.2.3 Project: Incorporate fencing and underpass into planning for the Mountain View Corridor to mitigate deer-vehicle accidents.

8.2.3 Objective: Promote environmental and mission awareness of Camp Williams to the public.

8.2.3.1 Project: Enable public access to the INRMP through the web.

8.2.3.2 Project: Investigate INRMP-related compliance needs in regards to ISO standards and the Environmental Management System.

8.3 Goal: Equip decision makers with the best environmental information and practices for training site development and use.

8.3.1 Objective: Develop planning resources for non-environmental personnel.

8.3.1.1 Project: Develop Best Management Practices for soil sustainment.

8.3.1.2 Project: Develop protocols of soil and geologic properties related to development analysis.

8.3.1.3 Project: Integrated ERM GIS data into facility and operations/range control offices.

8.3.2 Objective: Develop resources for trainers planning training activities at Camp Williams.

8.3.2.1 Project: Complete Range, Facilities and Training Area Information Pages (ITAM), which incorporate environmental information. Incorporate the webpages into a web-based relational database with information pertaining to METL tasks, weaponry and ammunition, and site-compatibility with tactical maneuver.

8.3.2.2 Project: Maintain ITAM website (ITAM).

8.3.2.3 Project: Develop and maintain natural resources web pages.

8.3.2.4 Project: Install Training Area Signs at each TA outlining wise practices for use of the TA (ITAM).

8.3.2.5 Project: Maintain current information for Training Area Signs (ITAM).

8.3.3 Objective: Provide trainers with resources for planning training for operations around the world.

8.3.3.1 Project: Wartrace. Develop a wartrace that relates the Camp Williams environment to related ecosystems around the world (ITAM).

8.4 Goal: Sustain or improve the current condition of the training site environment.

8.4.1 Objective: Detect and monitor military impacts on the training resource.

8.4.1.1 Project: Assess range and training lands using the RTLA program (ITAM).

8.4.1.2 Project: Monitor military impacts on Local Training Area's (ITAM).

8.4.2 Objective: Mitigate military training-caused impacts.

8.4.2.1 Project: Develop vegetation community-specific prescriptions for rehabilitation (ITAM).

8.4.2.2 Project: Evaluate and treat sites damaged by military training within same year (ITAM).

8.4.2.3 Project: Identify potential erosion problems and develop mitigation plans for those areas (ITAM).

8.4.3 Objective: Enhance the training site environment to accommodate training objectives (e.g., METL tasks, current mission, etc.).

8.4.3.1 Project: Develop hardened helipads to facilitate training and to mitigate wildland damage (ITAM).

8.4.3.2 Project: Develop access corridors for artillery firing points for RTI and I Corps use to facilitate training and to mitigate damage caused by overuse of other artillery firing points (ITAM).

8.4.3.3 Project: Manipulate vegetation structure to accommodate training objectives (e.g. mechanical thinning, plantings, reseedings – ITAM).

8.4.4 Objective: Improve existing maneuver trails.

8.4.4.1 Project: Identify locations on maneuver trails that exhibit drainage problems. Make a list of these locations, prioritizing them for treatment (ITAM).

8.4.4.2 Project: Identify current erosion problems affecting utilization of maneuver trails and prioritize for treatment. Treat the identified problem areas as funding permits.

8.5 Goal: Monitor ecosystem health.

8.5.1 Objective: Utilize RTLA data.

8.5.1.1 Project: Utilize RTLA data for detecting and mitigating training-related impacts.

8.5.1.2 Project: Develop evaluation criteria and thresholds relating monitoring to management.

8.5.1.3 Project: Develop plant-community associations.

8.5.1.4 Project: Utilize RTLA data to develop plant community types using clustering methods (NR-ITAM).

8.5.1.5 Project: Investigate use of RTLA data to ordinate land condition and trends (NR-ITAM).

8.5.2 Objective: Maintain currency of Planning Level Surveys.

8.5.2.1 Project: Develop new land cover classification.

8.5.2.2 Project: Conduct surveys for herpavores at AGCW and Hidden Valley every third year. Test captured reptiles for the Rikettzia rikettzia virus, the causative agent for Rocky Mountain Spotted Fever.

8.5.2.3 Project: Conduct annual scent station surveys for predators.

8.5.3 Objective: Monitor impacts of natural resource management.

8.5.3.1 Project: Monitor ecological effects of fuel treatments (e.g. goats in Wood Hollow).

8.5.3.2 Project: Support use of Camp Williams as study site for UDWR/USU Cougar Project.

8.6 Goal: Protect golden eagles and bald eagles (if found).

8.6.1 Objective: Maintain nesting and foraging habitat for golden eagles.

8.6.1.1 Project: Cooperate with UDWR Golden Eagle Project.

8.6.2 Objective: Identify use by bald eagles.

8.6.2.1 Project: Though extremely infrequent, document bald eagle sightings, eagle behavior and human activities.

8.6.3 Objective: Identify opportunities for research and management related to eagles and other raptors in cooperation with UDWR.

8.6.3.1 Project: Establish contact with appropriate person, identify opportunities, incorporate into INRMP and appropriate budgeting vehicle, and document.

8.7 Goal: Continue pro-active compliance with Endangered Species Act

8.7.1 Objective: Monitor for endangered, migratory birds, or otherwise protected species.

8.7.1.1 Project: Conduct focused search for likely TES (e.g., pygmy rabbit, greater sage-grouse, kit fox, and bald eagle).

8.7.1.2 Project: Conduct annual breeding and migratory bird surveys.

8.7.1.3 Project: Resurvey for all potential TES in 2010.

8.8 Goal: Improve condition of wetland and riparian areas.

8.8.1 Objective: Identify current condition and track changes.

8.8.1.1 Project: Monitor riparian area vegetation recovery and system health.

8.8.1.2 Project: Delineate potential wetlands to supplement original survey.

8.8.2 Objective: Protect wetlands IAW Clean Water Act.

8.8.2.1 Project: Monitor water quality in the riparian corridors both prior to and subsequent to development of live-fire ranges or other construction and training. Establish water quality baseline prior to training taking place and monitor water quality for potential impacts due to training (ITAM).

8.9 Goal: Control noxious weeds.

8.9.1 Objective: Track noxious weeds.

8.9.1.1 Project: Map noxious weeds to DA GIS standards.

8.9.1.2 Project: Tasks the RTLA crew to watch for noxious weeds.

8.9.1.3 Project: Utilize mapping to effectively treat noxious weeds.

8.9.2 Objective: Contain large outbreaks of noxious weeds.

8.9.2.1 Project: Bull thistle, musk thistle & scotch thistle - Treat high-value areas (e.g., ranges, facilities, etc.) first, then other areas.

8.9.2.2 Project: Dalmatian toadflax – Evaluate and implement treatment options.

8.9.2.3 Project: Medusahead – Evaluate and implement treatment options.

8.9.2.4 Project: Hoary cress – Treat stands on edge of infestation area.

8.9.3 Objective: Eradicate small noxious weed populations.

8.9.3.1 Project: Canada thistle - Treat stand on Range Road.

8.9.3.2 Project: Diffuse knapweed – Spray known stand annually until eradicated.

8.9.3.3 Project: Dyers woad – Integrate manual and herbicide treatments.

8.9.3.4 Project: Leafy spurge – Spray known stand annually until eradicated.

8.9.3.5 Project: Russian knapweed – Spray known stand annually until eradicated.

8.9.3.6 Project: Squarrose knapweed – Spray known stand annually until eradicated.

8.9.3.7 Project: Yellow starthistle – Handpull and spray known stand annually until eradicated.

8.10 Goal: Implement the Mule Deer Management Plan.

8.10.1 Objective: Obtain reliable impacts of deer to determine management (e.g., hunting).

8.10.1.1 Project: Conduct deer herd composition counts annually.

8.10.1.2 Project: Conduct utilization studies annually for deer browse.

8.10.2 Objective: Decrease environmental impacts if deer herd reaches overpopulation level.

8.10.2.1 Project: If required due to damage to the environment, coordinate herd reduction with UDWR. Reduction is not now (2006) needed.

8.10.3 Objective: Curtail poaching on Camp Williams.

8.10.3.1 Project: Charge trespass fee.

8.10.3.2 Project: Coordinate enforcement of poaching and hunting laws with UDWR..

8.11 Goal: Outline and implement the methods and protocols necessary to control wildfire frequency, intensity, and size on Camp W.G. Williams. Comply with Army regulations and guidance, federal and state laws, and memorandums of understanding and meet UTNG's land stewardship responsibilities. Provide for firefighter and public safety and allow continuation of military training necessary for the UTNG and other military units to maintain a high level of combat readiness.

8.11.1 Objective: Provide, first and foremost, for firefighter and public safety[30].

8.11.2 Objective (primary): Use fuels management to mitigate wildfire danger to prevent a wildfire from escaping the camp boundaries.

8.11.2.1 Project: Develop firebreak/fuel break prescription for Black Ridge (ITAM).

8.11.2.2 Project: Reapply herbicide to augment firebreaks in the northern Impact Area (Facilities Maintenance).

8.11.2.3 Project: Utilize goats to develop firebreak the length of Wood Hollow (NR-ITAM-Facilities Maintenance).

8.11.3 Objective (secondary): Prevent catastrophic wildfires on the Camp by breaking the internal landscape into smaller units through fuels management.

8.11.3.1 Project: Maintain existing firebreaks.

8.11.3.2 Project: Build new bulldozed firebreaks where needed to anchor existing firebreaks or where needed to reroute due to terrain, fire fuel type or other hazard.

8.11.3.3 Project: Utilize goats around high-risk training areas and adjacent to ranges to create firebreaks.

8.11.3.4 Project: Begin systematic management of fuel loading.

8.11.3.5 Project: Reseed priority areas (i.e., high value training locations, high erosion potential areas, special habitat, etc.) with native, fire-resistant plants following wildfire.

8.11.4 Objective (secondary): Prevent wildfires from coming onto the Camp.

8.11.4.1 Project: Assist state agencies and municipal entities in educating people living adjacent to Camp Williams about wildfire and how it affects their communities.

8.11.4.2 Project: Analyze high risk areas along our boundaries for fuel reduction treatment and/or firebreak creation (ITAM-TRI/GIS)

[30] Projects for Objectives 8.11.1 and 7-11 will be developed as part of the Integrated Wildland Fire Management Plan; see section 7.7.2, Integrated Wildland Fire Management Plan (IWFMP), for more information.

8.11.5 Objective: Complete the Integrated Wildland Fire Management Plan.

8.11.5.1 Project: Evaluate and develop Prescribed Burn Plan.

8.11.5.2 Project: Develop Farsite simulations for wildland firefighter training (ITAM).

8.11.5.3 Project: Analyze effectiveness of various treatment options (ITAM).

8.11.6 Objective: Maintain current tools and develop new tools for reporting fire danger and supporting firefighting assets.

8.11.6.1 Project: Perform annual maintenance on the Tickville Fire Weather Station (ITAM).

8.11.6.2 Project: Fully implement the Wildfire Asset Tracking System (ITAM).

8.11.6.3 Project: Develop handbook for safety zones.

8.11.7 Objective: Work closely and integrate with outside agencies for training, suppression and fuels management.

8.11.8 Objective: Comply with all regulations and laws for smoke management and air quality.

8.11.9 Objective: Employ, train and equip an initial-attack wildland firefighter force.

8.11.10 Objective: Upon detection, deploy firefighters to contain wildfires to within camp boundaries and suppress all wildfires.

8.11.11 Objective: Incorporate wildfire protection and ecology into installation and public awareness programs. Notify the media and affected public for wildfire incidents and prescribed burning.

9 IMPLEMENTATION

9.1 Projects

The following table summarizes the projects addressed through in this INRMP Update (Table 9-1). All actions comteplated in this INRMP are subject to the availability of funds properly authorized and approapriated under federal law. Nothing in this iNRMP is intended to be nor shall be construed to be a violation of the Anti-Defiency Act, 31 USC § 1341.

Table 9-1. Projects for INRMP Update Implementation.

Project Number	Project Name	Estimated Funding Requirements ($1,000s)	Funding Source[31]	Priority	Timeframe (years or annual)
8.2.1.1	Bonneville Shoreline Trail	Na	Na	High	2006-07
8.2.1.2	Evaluation of Grazing Use	Na	Na	High	Annual
8.2.2.1	Encroachment Plan	$50,000	VENN	High	Medium
8.2.2.2	Deer-vehicle Accident Mitigation	$10,000	VENN/QDPW	Medium	2007
8.2.2.3	Mountain View Corridor	Na	Na	Medium	2006-08
8.2.3.1	INRMP Webpage	$1000	VENN	High	2007
8.2.3.2	INRMP ISO/EMS Integration	$1000	VENN	High	2007
8.3.1.1	Soil BMPs	$10,000	VENN	Medium	2007
8.3.1.2	Soil & Geologic Protocols	$5,000	VENN	Medium	2008
8.3.1.3	GIS integration	Na	Na	High	Annual
8.3.2.1	Training Area Webpages	Na	TATM	High	2006-07
8.3.2.2	ITAM Web	Na	TATM	Medium	Annual
8.3.2.3	Natural Resource Web	$1,000	VENN	Medium	2007
8.3.2.4	Training Area Signs	$6,000	TATM	Medium	2007-2011
8.3.2.4	Training Area Sign Information	$1,000	TATM	Medium	2007-2011
8.3.3.1	Wartrace	$12,000	TATM	Low	2007
8.4.1.1	RTLA	$25,000	TATM	High	Annual
8.4.1.2	LTA Monitoring	$3,000	TATM	High	Annual (through LTA lease)

[31] Army Funding Code (MDEP), per "Sustainable Range Program Environmental Activities Matrix"

Table 9-1. Projects for INRMP Update Implementation.

Project Number	Project Name	Estimated Funding Requirements ($1,000s)	Funding Source[31]	Priority	Timeframe (years or annual)
8.4.2.1	Community-specific Rehabilitation Prescriptions	$10,000	VENN	Medium	
8.4.2.2	Post-training Rehabilitation	$5,000-$50,000	TATM	High	As Needed
8.4.2.3	Erosion Mitigation Plan	$50,000	VENN	High	2008
8.4.3.1	Hardened Helipads	$15,000	TATM	Medium	2007
8.4.3.2	Hardened Artillery Firing Pads	$20,000	TATM	Medium	2007
8.4.3.3	Vegetation Structure Manipulation	$20,000	TATM	Medium	Annual (as needed)
8.4.4.1	Maneuver Trail Improvement and Maintenance	$50,000	TATM	Medium	Annual
8.5.1.1	Plant-community Association	$10,000	VENN	Low	2007
8.5.1.2	Plant Community Typing	Na	TATM	Medium	2007
8.5.1.3	RTLA Data Ordination	Na	TATM	Low	2007
8.5.2.1	Land Cover Classification	$10,000	VENN	High	2007
8.5.2.2	Herptovore Survey	$5,000	VENN	High	2008
8.5.2.3	Scent Stations	$1,000	VENN	Medium	Annual
8.5.3.1	Fuel Treatment Evaluation	$10,000	VENN	Medium	2009
8.5.3.2	Support UDWR Cougar Project	$3,000	VENN	Medium	Until UDWR Project Expires
8.6.1.1	UDWR Golden Eagle Nesting Survey	$1,000	VENN	High	Annual
8.6.2.1	Bald Eagle Review	$0	VENN	High	Annual
8.6.3.1	Raptor Potential Assessment	$0	VENN	High	2006-07
8.7.1.1	Focused TES Planning Level Survey Maintenance	$1,000	VENN	High	Annual
8.7.1.2	Migratory Bird Survey	$10,000	VENN	High	Annual
8.7.1.3	TES Planning Level Survey	$15,000	VENN	High	2010
8.8.1.1	Wetland Monitoring	$2,000	VENN	High	Annual

Table 9-1. Projects for INRMP Update Implementation.

Project Number	Project Name	Estimated Funding Requirements ($1,000s)	Funding Source[31]	Priority	Timeframe (years or annual)
8.8.1.2	Wetland Delineation	$10,000	VENN	Medium	2006
8.8.2.1	Water Quality Monitoring	$1,000	VENN	Medium	Annual
8.9.1.1	Noxious Weed Monitoring	$20,000	VENN	Medium	Annual
8.9.1.2	RTLA Weed Monitoring	Na	TATM	Medium	Annual
8.9.1.3	Integrated Mapping with Treatment	Na	VENN	Medium	Annual
8.9.2.1	Thistle Treatment	$20,000	QDPW	Medium	Annual
8.9.2.2	Dalmation Toadflax Treatment	$5,000	QDPW	Low	Annual
8.9.2.3	Medusahead Treatment	$5,000	QDPW	High	Annual (until eradicated)
8.9.2.4	Hoary Cress Treatment	$5,000	QDPW	Medium	Annual
8.9.3.1	Canada Thistle Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.9.3.2	Diffuse Knapweed Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.9.3.3	Dyer's Woad Treatment	$2,000	QDPW	High	Annual (until eradicated)
8.9.3.4	Leafy Spurge Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.9.3.5	Russian Knapweed Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.9.3.6	Squarrose Knapweed Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.9.3.7	Yellow Starthistle Treatment	$1,000	QDPW	High	Annual (until eradicated)
8.10.1.1	Deer Herd Composition Count	$1,000	VENN	Medium	Annual
8.10.1.2	Deer Utilization Study	$1,000	VENN	Medium	Annual
8.10.2.1	Deer Herd Reduction Coordination	$1,000	VENN	Medium	If Required
8.10.3.1	Trespass Fee	Na		Medium	Annual
8.10.3.2	Poaching Enforcement	Na		Medium	Annual
8.11.1.1	Black Ridge Firebreak	$20,000	QDPW	High	2006
8.11.1.2	Impact Area Firebreak	$30,000	QDPW	High	2008
8.11.1.3	Wood Hollow Firebreak	$58,000	QDPW	High	Annual

Table 9-1. Projects for INRMP Update Implementation.

Project Number	Project Name	Estimated Funding Requirements ($1,000s)	Funding Source[31]	Priority	Timeframe (years or annual)
8.11.2.1	Firebreak Maintenance	$30,000	QDPW	High	Annual
8.11.2.2	New Firebreaks	$10,000	QDPW	High	2007+
8.11.2.3	High-risk Firebreaks	$10,000	QDPW	High	2007-08
8.11.2.4	Fuel Load Management	$10,000	QDPW	Medium	2007-08
8.11.2.5	Post-fire Reseeding	$5,000-50,000	VENN/TATM/QDPW	Medium	As Required
8.11.3.1	Public Wildfire Awareness	$1,000	VENN	Medium	Annual
8.11.3.2	Firebreak Need Analysis	$5,000	QDPW	Medium	2008
8.11.4.1	Prescribed Burn Plan Evaluation	$5,000	QDPW	Medium	2006
8.11.4.2	Farsite Simulation	$5,000	QDPW	Medium	2007
8.11.4.3	Fuel Treatment Analysis	$5,000	QDPW	High	2009
8.11.5.1	Fire Weather Station	$1,000	TATM	High	Annual
8.11.5.2	Wildfire Asset Tracking System Implementation	$0	TATM	High	2006-07
8.11.5.3	Safety Zone Handbook	$1,000	TATM	High	2006-2007
9.4	Natural Resource Technician	$60,000	VENN	High	Until Filled

9.2 National Environmental Policy Act

9.2.1 Objectives

The Camp Williams INRMP Update will be subject to public environmental review in accordance with the National Environmental Policy Act (NEPA) and 32 CFR 651, Environmental Analysis of Army Actions. As part of the NEPA review process, a Programmatic Environmental Assessment (PEA) for AGCW was completed for the initial 2001-2006 INRMP. DoD and NGB guidance for INRMP five-year review is that revisions that have major on-the-ground impacts require a new PEA, minor revisions may be implemented through a Record of Environmental Concern tiered to the original PEA (NGB 2006).

9.2.2 NEPA Responsibilities and Implementation

All projects, construction, or training are evaluated for impacts IAW 32 CFR 651, Environmental Analysis of Army Actions. The following flow chart (Figure 9-1) will be used to determine which course of action will be followed.

9.2.3 NEPA and Integrated Natural Resource Management Planning

The Sikes Act (as amended in 1997) requires the implementation of an Integrated Natural Resources Management Plan for each military installation. In accordance with the Sikes Act, the AGCW INRMP Update was developed in consultation with appropriate state and federal agencies, including the Utah Department of Natural Resources (and its Division of Wildlife Resources) and the USDI Fish and Wildlife Service.

The INRMP Update represents an ecosystem-based approach to natural resources management in accordance with DoD Instruction 4715.3, Environmental Conservation Program, 3 May 1996. The INRMP Update also represents, in context of NEPA, the proposed action. The programmatic goals of the INRMP Update are to enhance the capabilities of Camp Williams as the primary training site for the Utah Army National Guard, ensure the sustainable use of Camp Williams through an ecosystem-based approach to management, and continue Camp Williams' healthy relationship with local communities. Three alternatives to the proposal were considered in the PEA. One alternative represents the status-quo, i.e., natural resources management as it has been done in the past. Another alternative represents a management scheme based exclusively on meeting Camp Williams' military training objectives, i.e., essentially no natural resources management. The last alternative allowed for no human manipulations, i.e., neither training nor natural resources management.

The PEA concluded that no significant impact to the air quality, water resources, cultural resources, and no significant change in the generation or disposal of waste or noise will result from the implementation of the INRMP. The PEA also concluded changes to the biological, physical and social-economic environment will largely be beneficial because of the implementation of the INRMP. Any project that may have potential environmental impacts will be tiered from the programmatic PEA through a project specific environmental assessment or a Record of Environmental Consideration (R and six personnel with state-wide environmental responsibilities. Full implementation of the AGCW INRMP Update requires additional personnel including collaboration and support from USU.EC).

9.3 Natural Resources Management Staffing

Existing ERM staff with responsibilities within this INRMP Update includes four personnel assigned full-time to AGCW,

ERM stationed at AGCW:

- Natural Resources Manager - ERM
- AGCW Environmental Protection Specialist - ERM
- Integrated Training Area Management Coordinator – ERM
- GIS Technician –ERM

State wide environmental and partial INRMP Update responsibilities:

- Director - ERM
- State Environmental Specialist - ERM
- Environmental Compliance Manager - ERM
- Hazardous Materials/Waste Manager - ERM
- Environmental Technical Support Specialist - ERM
- Geographical Information System Manager - ERM/USU
- Cultural Resource Manager – ERM

Non-ERM Responsibilities:

- Operations Officer- AGCW-O
- Facilities Maintenance Manager – AGCW-M

Full AGCW INRMP Update implementation requires:

- Special Projects Principle Investigator (PI) - USU/ERM
- Natural Resource Assistant Manager-USU/ERM
- Land Rehabilitation and Maintenance Manager - USU/AGCW ERM
- Training Requirements Data Acquisition and Monitoring - Part Time - AGCW ERM/AGCW RC
- Natural Resources Monitoring - Seasonal - USU/AGCW ERM
- Environmental Operations - Part Time - USU/AGCW ERM/AGCW RC

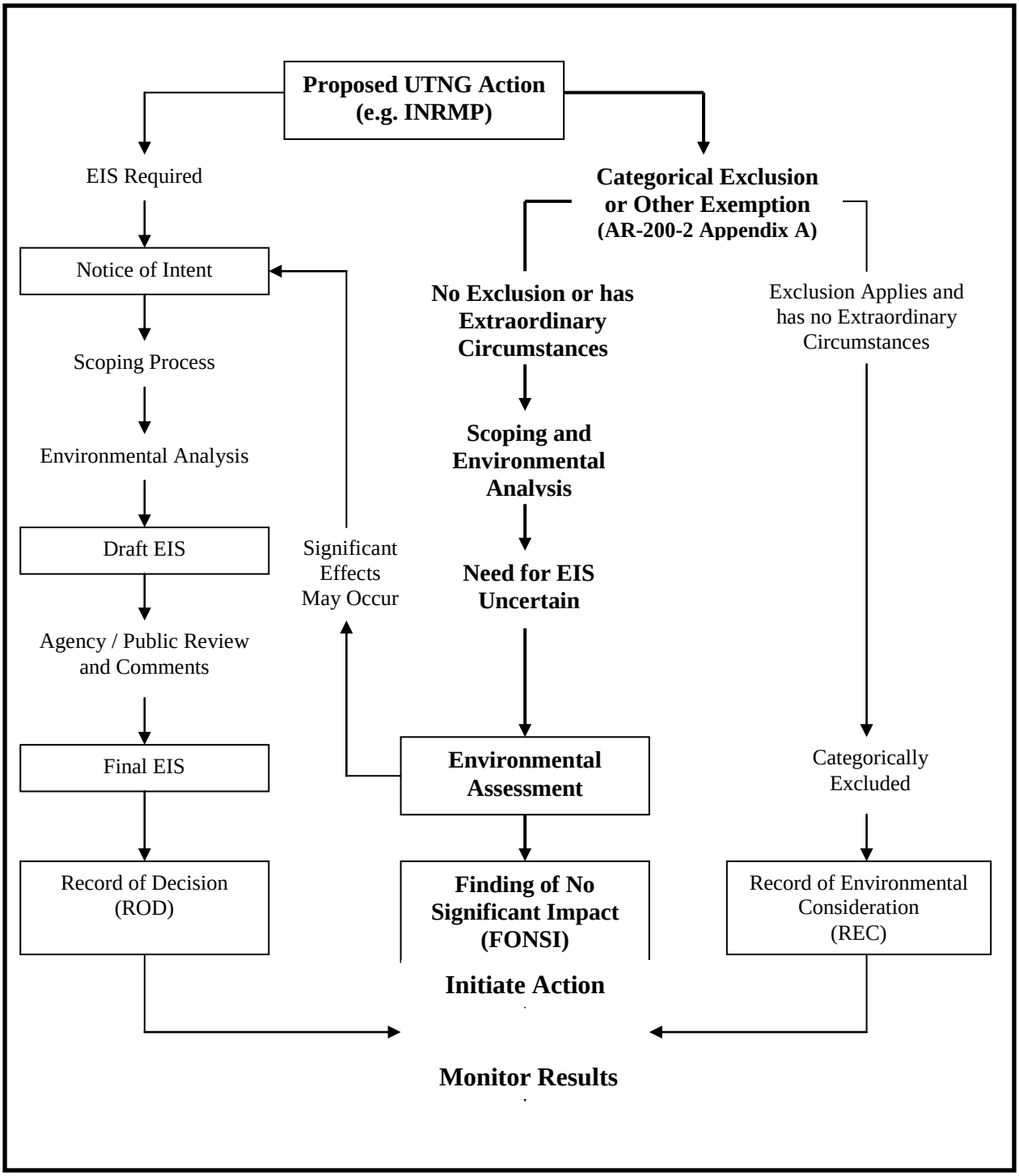

Figure 9-1. NEPA Review Process for INRMP Implementation.

9.4 Monitoring INRMP Update Implementation

9.4.1 Process

The NR Manager will update Table 14.1 to track implementation in October and provide it to UTNG parties, USFWS and UDWR in the request to participate in annual review. The NR Manager will develop the following metrics for the Environmental Quality Report to Congress:

- Coordination sought with military trainers and operators?
- Projects added as a result of comments from military trainers and operators?
- Annual feedback requested from military trainers and operators?
- Annual feedback given by military trainers and operators?
- Coordination sought from regional USFWS?
- Projects added as a result of comments from USFWS?
- Annual feedback requested from USFWS?
- Annual feedback given by USFWS?
- Coordination sought from UDWR?
- Projects added as a result of comments from UDWR?
- Annual feedback requested from UDWR?
- Annual feedback given by UDWR?
- Does the INRMP contain a list of projects necessary to implement the plan?
- Annual funding requirements in reporting FY:
    - $ required for Class 0 and 1 projects
    - $ funded for Class 0 and 1 projects
    - $ unfunded for Class 0 and 1 projects
    - $ funded for Class 2 and 3 projects
    - $ unfunded for Class 2 and 3 projects
    - List of unfunded Class 0 and 1 projects > $50k
    - Public comment sought on draft INRMP?
    - Projects added as a result of public comment?