DRAFT

ENVIRONMENTAL ASSESSMENT

of the

INTEGRATED

NATURAL RESOURCES

MANAGEMENT PLAN

2009

For

CAMP MURRAY

Pierce County, Washington

WASHINGTON ARMY NATIONAL GUARD

February 18, 2009

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act
AMEC	AMEC Earth & Environmental
ANG	Air National Guard
AR	Army Regulation
ARNG	Army National Guard
ARPA	Archaeological Resources Protection Act
BMP	Best Management Practice
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CWA	Clean Water Act
dBA	A-weighted in decibels
dBC	C-weighted in decibels
DA	Department of the Army
DoD	Department of Defense
DoDI	DoD Instruction
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FM-EN	Facilities Management – Environmental
FMP	Forest Management Plan
FNSI	Finding of No Significant Impact
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IONMP	Installation Operational Noise Management Plan
MAMC	Madigan Army Medical Center
MBTA	Migratory Bird Treaty Act
MFR	Memorandum for Record
MILCON	Military Construction
NAGPRA	Native American Graves Protection and Repatriation Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NGB	National Guard Bureau
NGB-ARE	National Guard Bureau Army Environmental Program Division
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NPS	National Park Service
NRCS	Natural Resources Conservation Service

NRHP	National Register of Historic Places
NWF	National Wildlife Federation
O_3	Ozone
PHS	Priority Habitats and Species
Pb	Lead
PEM	Palustrine Emergent Wetland
PL	Public Law
PFO	Palustrine Forested Wetland
PLS	Planning Level Surveys
PM-10	particulates 10 mm or smaller in diameter
PM-2.5	particulates 2.5 mm or smaller in diameter
PSS	Palustrine Scrub-shrub
RCRA	Resource Conservation Recovery Act
RCW	Revised Code of Washington
SAIA	Sikes Act Improvement Act
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedure
SWANCC	Solid Waste Agency of Northern Cook County
SWMM	Storm Water Management Manual for Western Washington
TNC	The Nature Conservancy
TSCA	Toxic Substance Control Act
UIC	underground injections controls
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish & Wildlife Service
WAARNG	Washington Army National Guard
WAANG	Washington Air National Guard
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOE	Washington State Department of Ecology
WQC	Water Quality Certification
WQS	Water Quality Standard
WRIA	Washington Resource Inventory Area

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1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The Washington Army National Guard (WAARNG) Camp Murray installation, encompassing approximately 240 acres, is located adjacent to Fort Lewis in Pierce County, Washington, approximately 10-miles south of Tacoma (Figure 1). Camp Murray was founded in 1903, and currently includes WAARNG, Washington Air National Guard (WAANG) (approximately 43 acres of land) and Emergency Management Division (EMD) facilities. All of Camp Murray land is state-owned. A facilities map is included as Figure 2.

An Integrated Natural Resources Management Plan (INRMP) has been developed for use by the National Guard Bureau (NGB) and the WAARNG as the primary tool for managing natural resources at Camp Murray. This is the first INRMP developed for the installation.

The purpose of this Environmental Assessment (EA) is to assess the general impacts or potential environmental consequences of 1) Implementing the INRMP [the Preferred Action Alternative], and 2) Not implementing the INRMP [the No-Action Alternative]. Per paragraph 5-3k of 32 Code of Federal Regulations (CFR) Part 651, *Environmental Effects of Army Actions,* the development of an INMRP normally requires preparation of an EA [reference "Memorandum, NGB Army Environmental Program Division (NGB-ARE), 15 June 2000, subject: All States (Log Number P00-0039) Integrated Natural Resources Management Plans].

This EA has been prepared pursuant to the National Environmental Policy Act of 1969, as amended (NEPA, 42 United States Code [USC] §4321); Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508); National Guard Bureau NEPA Handbook, June 2006; and the NGB-ARE Memorandum 9 August 2004, *Additional Guidance for National Environmental Policy Act Documentation*.

1.2 Purpose and Need

The purpose of the proposed action, implementation of the INRMP, is to provide for the effective, long-term management of the site's natural resources, while allowing the training mission to proceed. The INRMP is prepared to ensure that natural resource conservation measures and military activities on mission land are integrated and consistent with Federal stewardship requirements. In accordance with the Sikes Act Improvement Act (SAIA, 16 USC §670 *et seq*., as amended), the INRMP

> "shall, to the extent appropriate and applicable, provide for:
>
> A) Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
>
> B) Fish and wildlife habitat enhancement or modifications;
>
> C) Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;
>
> D) Integration of, and consistency among, the various activities conducted under the plan;
>
> E) Establishment of specific natural resources management goals and

objectives and time frames for proposed action;

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

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

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

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

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

The need for the proposed action is to ensure natural resources are managed effectively at Camp Murray, while allowing the military mission(s) to be accomplished in order to provide a fully trained and ready force. Camp Murray functions as the headquarters for the WAARNG. Additionally, the proposed action is needed to fulfill the requirements of the 21 Mar 97 US Army policy entitled *Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys (PLS) and INRMP* ("*Army INRMP Policy*"); Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*; 32 CFR 651; AR 200-3, *Natural Resources – Land, Forest, and Wildlife Management*; AR 200-4, *Cultural Resources*; Department of Defense (DoD) Directive 4700.1, *Natural Resources Management Programs*; and Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program*.

The INRMP provides for the management and integration of the following resource issues: land use, planning, and maintenance; soil conservation and water quality; grassland, forest, and shoreline management; fish and wildlife management; wetland and aquatic habitat management; floodplain and riparian zone management; invasive species management; and threatened and endangered species management. The INRMP identifies goals and projects that, when implemented, will help accomplish the set goals.

1.3 Scope of the Document

The scope of this EA includes evaluation of potential environmental, cultural, and socio-economic impacts to resources at Camp Murray and its vicinity that could result from the implementation of the INRMP.

The analysis presented herein determines that an Environmental Impact Statement (EIS) is unnecessary for this Proposed Action and that a Finding of No Significant Impact (FONSI) is appropriate.

Analyzed resource categories include the following:

- Physical environment
- Water quality
- Groundwater
- Air quality
- Land use
- Noise
- Infrastructure
- Socio-economic environment
- Hazardous, toxic, and radioactive wastes
- Cultural resources
- Native American Considerations
- Biological resources, including vegetation, wildlife, wildlife habitat, plant communities, protected species, and wetlands
- Human health and safety, including environmental justice and children's health and safety risks.

Per 40 CFR Part 1501.7 (a)(3), the CEQ recommends that agencies identify and eliminate from detailed study any issues, which are not significant or which have been covered in another environmental review, narrowing the discussion to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere. Resource areas considered but excluded from further analysis in Sections 4.0 and 5.0 of this EA include: climate, physical setting, topography, and geology. The reader is referred to Chapter 3 of the INRMP for a discussion of the above listed resources. No impacts either positive or negative are anticipated to occur to these resources because of the Preferred Action Alternative or No-Action Alternative.

The scope of this EA includes descriptions and evaluation of two alternatives, summarized as follows:

Alternative 1: Preferred Action Alternative – Implement the Proposed Action as defined in Section 2.0**.**

Alternative 2: No-Action Alternative – Continue with operations as currently conducted and do not implement the Proposed Action.

A detailed description of the Preferred Action Alternative is provided in Section 2.0. A description of Alternative 2 (No-Action Alternative), as well as a description of alternative development criteria is provided in Section 3.0.

2. DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action consists of implementing natural resources management measures as presented in the INRMP. The INRMP includes goals and objectives for future natural resources management at Camp Murray. Goals listed below express the WAARNG's vision of the desired condition of Camp Murray's natural resources. These goals are supported by objectives and projects, which provide management strategies and specific actions to achieve these goals.

Goal 1: Improve coordination with Fort Lewis regarding shared natural resources.

Objective 1.1: Identify shared resources to be managed cooperatively, including, but not limited to, invasive species (Japanese knotweed , reed canary grass, and yellow flag iris), bald eagle nesting sites, Murray Creek, and American Lake.

Project 1.1.1: Cross-installation planning meeting.

Goal 2: Enhance rearing and spawning habitat for kokanee salmon in coordination with Washington Department of Fish and Wildlife (WDFW) efforts to restore the native kokanee population in Murray Creek.

Objective 2.1: Maintain fish support structures in Murray Creek.

Project 2.1.1: Fish support structure maintenance.

Objective 2.2: Enhance and monitor baseline creek flow in Murray Creek.

Project 2.2.1: Baseline creek flow monitoring protocol.

Goal 3: Maintain vegetated communities in a condition that minimizes the threat to human health and safety, and maintains or enhances habitat for flora and fauna.

Objective 3.1: Control invasive species that threaten natural resources on the installation.

Project 3.1.1: Updating and implementing the IPMP.

Project 3.1.2: Invasive plant species control per the IPMP.

Project 3.1.3: Spatial data development for native species conservation and weed control.

Objective 3.2: Allow large woody debris to accumulate in Murray Creek and the forest understory to increase wildlife habitat and nutrient cycling.

Project 3.2.2: Enhancement of environmental awareness through staff trainings.

Objective 3.3: Restore native vegetation and habitat functions in degraded natural areas, especially Oregon oak woodlands.

Project 3.3.1: Woodland and unvegetated areas preservation and restoration.

Project 3.3.2: Maintenance and protection of restored woodland and unvegetated areas.

Objective 3.4: Protect and enhance sensitive natural resource areas (i.e., lakefront, wetland, and riparian ecosystems) by establishing protective buffers.

Project 3.4.1: Enhancement of environmental awareness staff trainings.

Project 3.4.2: Identification and mapping of buffer locations.

Project 3.4.3: Maintenance and protection of buffer areas.

Objective 3.5: Provide forest conditions that support the military mission while maintaining healthy and sustainable forest ecosystems and complying with all applicable regulations.

Project 3.5.1: Conducting an inventory of forest plant community and wildlife habitat features, and updating of Forest Management Plan (FMP).

Project 3.5.2: Maintenance of existing forest trees and restoring degraded forest areas.

Goal 4: Improve awareness of natural resources at Camp Murray to ensure compliance with all federal and state laws and regulations.

Objective 4.1: Educate all WAARNG personnel, contractors, civilians, and any other groups using the Camp Murray facility regarding the locations of sensitive areas such as wetlands, streams, buffers, and other priority habitats on the installation, and potential activities that could result in non-compliance (for example, filling of wetlands or disturbing bald eagles during the breeding season).

Project 4.1.1: Installation of interpretive signs.

Project 4.1.2: Preparation of environmental awareness brochure.

Project 4.1.3: Enhancement of environmental awareness staff trainings.

Goal 5: Protect and enhance existing habitat for bald eagles and improve awareness of bald eagle habitat at Camp Murray to ensure compliance with all federal and state laws and regulations

Objective 5.1: Increase awareness regarding eagle habitat on Camp Murray.

Project 5.1.1: Preparation of environmental awareness brochure.

Objective 5.2: Limit disturbance to bald eagle habitat by following management guidelines provided by the WDFW and in the WAANG Bald Eagle Management Plan (BEMP).

Project 5.2.1: Preparation of environmental awareness brochure.

Project 5.2.2: Enhancement of environmental awareness staff trainings.

Objective 5.3: Maintain dead trees (snags) in the landscape for perching and nesting.

Project 5.3.1: Enhancement of environmental awareness staff trainings.

Project 5.3.2: Development and enforcement of coordinated tree/snag retention policy.

Goal 6: Ensure that all biological resources at Camp Murray are appropriately inventoried and managed.

Objective 6.1: Conduct protocol-level surveys for target species.

Project 6.1.1: Western gray squirrel survey.

Project 6.1.2: Herpetological survey.

Goal 7: Foster community involvement within Camp Murray and the surrounding area (i.e., the Boy Scouts, elementary schools, installation personnel).

Objective 7.1: Help sustain natural communities on Camp Murray through environmental stewardship.

Project 7.1.1: Promotion of community outreach.

Goal 8: Ensure the quality of water on Camp Murray for use by people and wildlife.

Objective 8.1: Monitor ground and surface water to ensure water quality.

Project 8.1.1: Preparation of water quality monitoring plan.

3. ALTERNATIVES CONSIDERED

The WAARNG proposes to implement the natural resources projects as described in Section 2.0. This section of the EA describes the process of developing and screening alternatives (Section 3.1), alternatives evaluated in this EA (Section 3.2), and alternatives evaluated and eliminated from further consideration (Section 3.3). Alternative methods of meeting the WAARNG's training mission and natural resources goals and objectives were explored during INRMP development.

3.1 Screening Criteria

The NEPA, CEQ regulations, and 32 CFR Part 651 require all reasonable alternatives to be rigorously explored and objectively evaluated. Alternatives that are eliminated from detailed study must be identified along with a brief discussion of the reasons for eliminating them.

For purposes of discussion, an alternative was considered "reasonable" only if it would allow Camp Murray to provide a variety of environmental conditions and ecosystems in which to provide military training. This objective must be met in a way that provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation.

- The management goals, objectives, and projects included in the INRMP have been developed in consultation with the USFWS, WDFW, WDNR, and other resource agencies, the NGB, WAARNG, and Camp Murray staff. The process used information on existing natural resources, current conditions, and management issues at Camp Murray.
- Proposed activities were reviewed and were identified as suitable when they met the following criteria:
    - Provide a comprehensive plan for the WAARNG to carry out its mission while promoting ecosystem health and biodiversity at Camp Murray and in the surrounding region;
    - No net loss in the capacity of the installation to support the military mission;
    - Comply with existing laws, regulations, Executive Orders (EO), and Army policy;
    - Ensure goals, objectives, and projects are compatible with the requirements of the military mission, ecologically sound, and economically feasible.

After a thorough examination of potential natural resources goals, objectives and projects, it was determined that no other suitable alternatives were available. Implementation of the Proposed Action (INRMP), identified in Section 2.0, has been determined by the WAARNG to be the Preferred Action Alternative. Alternative 2 (No Action) is also evaluated, as required by the law. The No Action Alternative is used as a baseline against which the action alternative may be compared. Adoption of Alternative 2 will mean that the INRMP will not be implemented at Camp Murray and current natural resources practices will continue.

3.2 Evaluated Alternatives

3.2.1 Alternative 1: Preferred Action Alternative

Alternative 1, or the Preferred Action Alternative, consists of implementing natural resources management measures as presented in the revised INRMP and summarized in Section 2.0 of this EA.

The Preferred Action Alternative also incorporates annual INRMP review as required by DoD policy. This annual review in cooperation with the other parties to the INRMP—the U.S. Fish and Wildlife Service (USFWS), WDFW, and WDNR—provides an opportunity for the parties to review the goals and objectives of the plan, and establish a realistic schedule for undertaking proposed actions.

3.2.2 Alternative 2: No-Action Alternative

The No Action Alternative is used as a baseline against which the action alternative may be compared. Adoption of Alternative 2 will mean that the INRMP will not be implemented at Camp Murray and current natural resources practices will continue.

The No Action Alternative includes no change from current management direction or level of management intensity. Under the No Action Alternative, the WAARNG will not conduct an annual review of the INRMP and natural resource management goals and objectives.

3.2.3 Alternatives Eliminated from Further Consideration

During INRMP development, some practices (alternatives) were considered and eliminated because they were not compatible with the requirements of the military mission, ecologically sound, or economically feasible. For example, some areas of Camp Murray must be maintained as manicured landscapes rather than natural systems in order to function as effective training sites (i.e., drill grounds). This means that these areas, although grassy, cannot be maintained to optimize habitat for wildlife or to enhance native plant diversity. Proposed activities also must balance competing objectives, such as controlling pests while minimizing the use of herbicides.

4. AFFECTED ENVIRONMENT

This section discusses the physical, natural, cultural, and human environment at Camp Murray, Pierce County, Washington. Resource areas considered but excluded from further analysis include: climate, physical setting, topography, and geology. The reader is referred to Chapter 4 of the INRMP for a discussion of the above listed resources. No impacts either positive or negative are anticipated to occur to these resources because of the Preferred Action Alternative or No Action Alternative.

4.1 The Physical Environment

4.1.1 Air Quality

The U.S. Environmental Protection Agency (USEPA) is the overall regulatory agency for air quality throughout the U.S. However, in most cases, control is delegated to individual states. In some cases, the individual states may subsequently delegate control to local air quality management agencies. The primary regulatory authority for air quality in Washington is the Washington State Department of Ecology (WDOE).

The USEPA characterizes ambient air quality by whether it attains, or meets, the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act Amendments of 1990 (CAAA) requires USEPA to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS are provided for seven criteria pollutants: carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO_2); ozone (O_3); particulate matter with an aerodynamic size less than or equal to 10 micrometers (PM-10); particulate matter with an aerodynamic size less than or equal to 2.5 micrometers (PM-2.5); and sulfur dioxide (SO_2).

The General Conformity Rule (40 CFR Part 51, Subpart W) requires federal agencies to prepare written Conformity Determinations for federal actions in or affecting NAAQS non-attainment areas, except when the action is covered under the Transportation Conformity Rule or when the action is exempted because the total increase in emissions is *de minimis*.

Areas are designated as “attainment”, “non-attainment”, “maintenance”, or “unclassified” with respect to the NAAQS. General air quality monitoring is conducted in areas of high population density and near major sources of air pollutant emissions. Rural areas are typically not considered in such monitoring. Regions that are in compliance with the standards are designated as attainment areas. Areas for which no monitoring data is available are designated as unclassified, and are by default considered to be in attainment of the NAAQS. In areas where the applicable NAAQS are not being met, a non-attainment status is designated.

Air quality within the vicinity of Camp Murray, is “in attainment” for all NAAQS criteria pollutants (USEPA 2007).

4.1.2 Hydrology

Camp Murray is located within the Chambers/Clover Watershed within Washington Resource Inventory Area (WRIA) 12. The Chambers/Clover Watershed drains approximately 180-square miles in Pierce County, Washington (WDOE 2007). The watershed is bounded by the

Puget Sound to the northwest, the Puyallup River Basin to the northeast, and the Nisqually River Basin to the south. Unconsolidated glacial and interglacial deposits underlie the watershed. Water within the Chambers/Clover Watershed drains into Puget Sound.

A wetland PLS was conducted in 2007 to determine the extent of wetlands and other waters on Camp Murray (Turnstone 2007). Camp Murray is comprised of approximately 5.2 acres of wetlands (total of 11 wetlands) and approximately 0.54 miles of water bodies, which include the American Lake shoreline and Murray Creek (a perennial stream that transverses the north-central portion of the property).

The location of each waterbody on Camp Murray is shown in Figure 4.

4.1.3 Surface Water

4.1.3.1 *Murray Creek*

The Murray-Sequalitchew Watershed is located in Pierce County Washington, south of Tacoma and north of Olympia. The watershed covers approximately 7,839 acres of land area (Shapiro and Associates, Inc. 1996) and drains portions of the Fort Lewis and Camp Murray military installations.

Murray Creek flows from east to west through a shallow valley from Kinsey Marsh to American Lake. The stream is fed by surface water from Kinsey Marsh and several springs and seeps upstream of the Special Forces compound located on Fort Lewis. The creek is approximately 3 miles in length and is primarily low gradient in most stretches. From the headwaters in Kinsey Marsh to the mouth at American Lake, the creek has a drop of approximately 45 feet, with 30 feet of this drop associated with the 0.55-mile reach west of Interstate 5 (I-5). The creek has a low gradient between 0.5 and 3 percent (Shapiro and Associates, Inc. 1996).

Historically, the stream was perennial with continuous water flow throughout the year. Starting in the early 1990s, the lower portion of Murray Creek began to go intermittently dry due to a combination of low annual precipitation and groundwater pumping from the shallow aquifer by the Madigan Army Medical Center (MAMC; ENSR 1998).

A number of strategies for the Murray Creek sub basin were developed to protect creek flow in Murray Creek (Shapiro and Associates, Inc. 1997). Recommended conservation strategies include: 1) limiting the extent of impervious surfaces; 2) increasing stormwater infiltration; 3) limiting activities that result in soil erosion and compaction; 4) maintaining forested open space and steam buffers; 5) water conservation; and 6) establishing recharge and groundwater protection areas. Groundwater withdrawals from the shallow aquifer are scheduled to cease in fall 2008, after which time the creek flow in Murray Creek is expected to increase (Tom Skjervold, pers. comm.).

Efforts are also underway to restore wildlife habitat functions of Murray Creek. Murray Creek historically supported a resident population of cutthroat trout and provided spawning habitat for kokanee salmon. Several structures for fish rearing and holding are located along the creek, and are being maintained by Camp Murray personnel. The creek and adjacent riparian vegetation communities also provide habitat for a variety of wildlife species. Restoration activities for Murray Creek have included the rearing and introduction of kokanee fingerlings

as broodstock, the enhancement of vegetation within the riparian zone, control of invasive weeds, and public outreach.

4.1.3.2 *American Lake*

American Lake, located along the western boundary of Camp Murray, is the largest natural body of freshwater in Pierce County (Mueller and Downen 1999). The approximately 1100-acre lake consists of two basins separated by a distinct, narrow channel. American Lake is primarily fed by groundwater; however, some inflow occurs through Murray Creek located in the southeast portion of the lake, precipitation, and stormwater runoff. The lake has no natural outlet. During times of high water (elevation greater than 230 feet), water flows through a box culvert overflow channel at the south end of the lake.

Land use around American Lake is mostly urban. Together, the Fort Lewis Military Reservation and Camp Murray comprise over 42 percent of the shoreline, with the remainder devoted to residential and recreational uses, including the Tacoma Country and Golf Club along the northwestern shore (Mueller and Downen 1999). American Lake receives high recreational use because of its proximity to the City of Tacoma, Fort Lewis, McChord Air Force Base, and Camp Murray. In addition to several county parks and private marinas, WDFW stocks the lake annually with game fish and maintains a public boat launch near the mouth of Murray Creek.

The aquifer supplying American Lake is known to contain excessive concentrations of nutrients such as phosphorus and nitrate due to surrounding land use in the American Lake watershed (Mueller and Downen 1999). As reported by KCM (1993), American Lake is characterized by intermittent algal blooms, oxygen-depleted bottom waters, hypolimnetic buildup of phosphorus, an impoverished benthic invertebrate community, and phosphorus-rich surface sediments. The occurrence of toxic blue-green algal blooms has been of particular concern.

The shoreline of American Lake is considered to be a Shoreline of Statewide Significance because it is greater than 1,000 acres in size. Therefore, the shoreline is regulated by the Washington State Department of Ecology (WDOE) under the Shoreline Management Act.

4.1.4 Wetlands

The U.S. Army Corps of Engineers (USACE) and the USEPA define wetlands as:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Both Federal and State laws and regulations protect waters of the state, which includes wetlands. The Clean Water Act (CWA) is the primary law protecting U.S. waters. Section 404 of the CWA (33 USC 1344) prevents the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. Generally, whenever a Section 404 permit is

required, a Section 401 Water Quality Certification (WQC) issued by the State of Washington is also required.

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

Because of the U.S. Supreme Court Decision in the case of Solid Waste Agency of Northern Cook County (SWANCC) v. USACE 531 U.S. 159 (09 January 2001), the USACE no longer has authority to regulate isolated wetlands under the Section 404 permit. However, all wetlands in Washington State are regulated under the State Water Pollution Control Act (RCW 90.48), and/or the Shoreline Management Act (RCW 90.58).

A Wetland PLS for Washington Military Lands, including Camp Murray was completed in 2007 (Turnstone 2007). A total of 11 wetlands encompassing approximately 5.2 acres were identified on the installation (Figure 4). Wetlands are classified as Palustrine forested (PFO), Palustrine emergent (PEM), and Palustrine scrub-shrub (PSS) as described by Cowardin (1979). Wetlands consisted of lake fringe wetlands, riparian fringe wetlands, and a depressional wetland. All wetlands were rated as Category III wetlands using the 2004 Washington State Wetlands Rating System (Hruby 2004). The majority of wetlands are located along Murray Creek or the American Lake shoreline.

Scientific nomenclature of all plant species follows that of the PLANTS database (NRCS 2007) and Hitchcock and Cronquist (1976). The common and scientific names of all plants detected during field surveys are included in Appendix C of the INRMP.

Lake-fringe Wetlands

The 9 lake fringe wetlands totaled 4.02 acres. Vegetation in the lake fringe wetlands is composed primarily of a willow plant association, which occurs in places along the shoreline of American Lake with permanently-saturated soils (Turnstone 2008). At Camp Murray, Pacific willow and Sitka willow are co-dominant. Soils within the lake fringe wetlands confirmed the mapped type of Spanaway gravelly sandy loam, containing around 35 percent gravel on average. In terms of hydrology, all the lake fringe wetlands are saturated with the American lake's water for a significant period of the growing season.

Riparian fringe wetland

The riparian fringe wetland totaled 1.08 acres. The riparian fringe running along Murray Creek consists of a narrow vegetation zone that extends no more than 1 to 2 feet from the edge of the creek. Vegetation is often dominated by exotic turf grasses, particularly reed canary grass. Since the riparian fringe is so narrow, invasive weeds tend to colonize the wetland. Soil type and textures within the riparian fringe wetlands were also consistent with the mapped type, but had considerably less gravel than the lake fringe wetland soils. Murray creek is the hydrologic source for one contiguous riparian fringe wetland located around the boundary of the creek.

Swale wetland

The swale wetland was 0.08 acres in size. This wetland is a forested palustrine wetland with no visible outlet. Vegetation consists of an overstory of black cottonwood and Oregon ash. The shrub layer was relatively depauperate, with snowberry growing sporadically. In the herbaceous layer, species observed were slough sedge, ladyfern and some sparse reed canarygrass. Soils within the depressional swale wetland varied from the fringe wetlands. They consisted of silt loams and sandy clays, with gravel at about 5 percent cover on average. Hydrology in the swale wetland is not connected to either American Lake or Murray Creek. Because this is a depressional wetland with no outlet, hydrologic sources are limited to direct precipitation and overland flow.

Some invasive species are present in wetlands at Camp Murray, including purple loosestrife, reed canarygrass, yellow-flag iris, Scotch broom, and Japanese knotweed.

4.1.5 Ground Water

Groundwater beneath Murray Creek is contained primarily within the Surface Aquifer (Shapiro and Associates, Inc. 1997). The Surface Aquifer is located within two general sediment types, a silty-sand and/or gravel and a sand and/or gravel. The silty unit is less permeable than the sand and gravel unit. Flow direction within the aquifer is towards American Lake. The groundwater table dips down steeply towards American Lake west of I-5. Groundwater levels in the aquifer typically fluctuate 2 to 6 feet seasonally, and high surface infiltration rates occur over most of the watershed.

Groundwater was monitored at Camp Murray in October 2005 and January 2006. However, laboratory analytical results of groundwater monitoring were not statistically analyzed for trends and significance.

4.2 Biotic Environment

4.2.1 Ecosystem Classification

Camp Murray is located in the northern portion of the U.S. Ecoregion – Humid Temperate Domain – Marine Regime Mountains – Pacific Lowland Mixed Forest Province - Puget - Willamette Lowland ecosystem land classification. The Puget - Willamette Lowland subregion occupies a north-south depression between the Coast Ranges and the Cascade Mountains. The Puget Sound Valley is a moderately dissected tableland covered by glacial till, glacial outwash, and lacustrine deposits. This province includes isolated hills and low mountains (USFS 2007).

Before cultivation, dense coniferous forest dominated the vegetation in this region. In interior valleys, the coniferous forest is less dense than along the coast, and contains deciduous trees, such as big-leaf maple, Oregon ash, and black cottonwood. Prairies that support open stands of Oregon white oaks or mixed groves of oaks and Douglas fir and other trees are prevalent. Poorly drained sites with bog communities are also abundant throughout the region.

4.2.2 Vegetation

4.2.2.1 *Historic Vegetative Cover*

Prior to European settlement, dense coniferous forest dominated by western cedar, western hemlock, and Douglas fir comprised the majority of the landscape in this region (Bailey 1994). Mixed stands of Douglas fir with some Oregon white oak, Pacific dogwood and Pacific madrone were common on drier sites. Periodic flooding and infrequent fires were once the predominant disturbance regimes in the region (WWF 2001). Long intervals (centuries) between large-scale fire events were more typical of moister forest types with drier forests and prairies experiencing frequent fires due to both natural and anthropogenic factors. No sizable blocks of intact habitat remain in the region. A few relict stands of prairie-oak communities occur on Ft. Lewis and are managed by the base to maintain characteristic plant composition.

4.2.2.2 *Current Vegetation Communities*

Camp Murray is located within the Western Hemlock Zone, which is the most extensive vegetation zone in western Washington (Franklin and Dyrness 1988). Major tree species in this zone are Douglas fir, western hemlock and western red cedar, with black cottonwood, Oregon ash and red alder common along water courses. Pacific Madrone and Oregon white oak may be found on drier, lower elevation sites anywhere in the zone, and are a significant part of Camp Murray's habitat.

During field surveys conducted in spring and summer 2005 (Turnstone 2006a), four plant associations were identified within the forested areas of Camp Murray:

- Douglas fir/salal (approximately 60 acres);
- Oregon white oak woodland (approximately 48 acres);
- Oregon ash/snowberry (approximately 8 acres); and
- Willow (approximately 3 acres).

These vegetation communities are described below and depicted in Figure 5. The remaining natural portions of Camp Murray are primarily mowed and consist of maintained grass. Of particular significance are the Oregon white oak woodlands and riparian plant communities, which qualify as Priority Habitat as designated by the WDFW.

Douglas Fir/Salal Plant Association

This plant association occurs in the conifer dominated areas of Camp Murray, just east of the shoreline of American Lake and adjacent to the Oregon oak woodlands to the north and east. The overstory consists of Douglas fir, big leaf maple and Oregon Ash. Dominant understory species include snowberry, beaked hazelnut and salal. The herbaceous layer includes species such as Hooker's fairy bells, star-flowered Solomon's seal, starflower, and mountain sweet cicely.

A varying type of this plant association exists in areas with greater disturbance. These areas have a thinner canopy cover, a greater degree of disturbance from edge effects, greater coverage of shrubs, and sparse conifer regeneration.

Oregon White Oak Woodland

This plant association occurs in the north and east of Camp Murray and near buildings and offices where the understory is mowed. Overstory dominants consist of Oregon white oak, Douglas fir, and Pacific madrone. Dominant native understory species include orchard grass, velvet grass, snowberry, honeysuckle and Oregon grape. A large portion of the understory has been colonized by Scotch broom, a Class B noxious weed according to the Washington State Noxious Weed Control Board.

Oak woodlands in the Puget Sound area of Washington are a result of thousands of years of the shaping of vegetation by indigenous people, fire, a mild climate and diverse physiography (Thysell and Andrew 2001). Since the European settlement in the 1890's, Douglas fir has been systematically encroaching on both prairies and oak communities (Kruckeberg and Arthur 1991). Although Oregon white oak extends north to the islands of Puget Sound and southeastern Vancouver Island (Stein 1990), relatively intact oak communities exist primarily on the Fort Lewis Military Reservation (Thysell and Andrew 2001).

Oregon white oak woodland is considered a Priority Habitat by the WDFW and Wildlife. WDFW has made this designation because the various plant communities and stage age mixtures within oak forests provide valuable habitat that contributes to wildlife diversity statewide (Larsen and Morgan 1998). Oaks can also provide habitat for a variety of species listed as state Sensitive, Threatened, Endangered or candidates for these listings.

WDFW classifies Oregon white oak woodlands as Priority Habitat if they meet the following description and classification (Larsen and Morgan 1998):

> "Priority Oregon white oak woodlands are stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25 percent; or where total canopy coverage of the stand is <25 percent, but oak accounts for at least 50 percent of the canopy coverage present. The latter is often referred to as an oak savanna. In non-urbanized areas west of the Cascades, priority oak habitat is stands 0.4 ha (1 ac) in size. East of the Cascades, priority oak habitat is stands 2 ha (5 ac) in size. In urban or urbanizing areas, single oaks, or stands of oaks <0.4 ha (1 ac), may also be considered priority habitat when found to be particularly valuable to fish and wildlife (i.e., they contain many cavities, have a large diameter at breast height [dbh], are used by priority species, or have a large canopy)."

The Oregon white oak woodlands at Camp Murray are in stands of mixed oak/conifer associations with average canopy cover of the oak component of the stands at least 25 percent overall and considerably more in places.

The condition of the oak woodlands throughout the installation is generally poor, due to mowing (in the areas adjacent to buildings) and the presence of invasive species. Scotch broom in particular, as well as non-native grasses, have degraded the habitat and reduced its value for wildlife as well as the likelihood of occurrence of listed or candidate plant species. The habitat is also imperiled by the encroachment of Douglas fir trees from the adjacent communities.

In spring of 2007, Pierce County required a portion of the Oregon white oak woodlands in the northern portion of Camp Murray to be restored as part of a Conditions of Critical Area

Approval regarding impacts to Priority Oak Woodlands from the development of three new buildings (20B, 91, and 92) and associated infrastructure. A total of 120 Oregon white oak trees were planted within a designated conservation easement tract adjacent to the project area in the northeastern-most oak woodland. This area is currently being monitored and maintained by Camp Murray staff. A tract of land proximate to this restored area has been reserved for the anticipated construction of underground utilities associated with the construction of the new commercial vehicle gate and for parking lot expansion for the Building 90s complex (see INRMP Section 5.3).

Oregon Ash/Snowberry Plant Association

This plant association occurs in places along the shoreline of American Lake, occupying areas with only seasonally saturated soils. The overstory contains black cottonwood, Oregon ash, Douglas fir, and Pacific madrone. Understory dominants include Oregon ash seedlings and saplings, snowberry, bulrush, willow, and spirea.

Willow Plant Association

This plant association often forms a dense thicket in places along the shoreline of American Lake in those areas with permanently saturated soils. Oregon ash and black cottonwood are present in the overstory, but appear farther inland and are not a significant component of the plant community. Understory dominants include willow, spirea, bulrush, slough sedge, yellow water lily, and reed canarygrass.

This community type is found throughout the Puget Trough lowlands, generally in permanently flooded areas, but it also occurs in areas that are seasonally flooded. Soils are muck with woody debris and some fibrous peat. Woody debris provides an elevated secondary substrate (Kunze, 1994). The vegetation usually consists of several shrubby species forming a dense stand where one or more species of Salix is dominant. At Camp Murray, Pacific willow and Sitka willow are co-dominant. Spirea is usually present and often co-dominant. There are several understory microenvironments related to water depth and substrate within the stands.

4.2.2.3 *Vascular Plants*

A vascular plant survey was conducted in May 2005 (Turnstone 2006a). The flora survey identified 132 vascular plant taxa. Listed or candidate species with a high likelihood of occurrence in Pierce County were specifically surveyed based on information provided by the Washington Natural Heritage Society. No sensitive or listed plant species were observed on Camp Murray during these surveys.

Species lists, including scientific and common names are included in Appendix C.

4.2.3 Noxious Weeds

Washington currently maintains lists of noxious weeds that pose a threat to the resources of the state. Noxious weeds are assigned to a series of four classes depending on their abundance, threat and distribution: Class A, Class B, Class C, or the Monitor List. Certain classes may be subject to eradication laws, sale prohibition, and other control measures.

The presence of noxious weeds was determined using the results of the 2005 floristic survey, and communication with Camp Murray staff. Eight Class B weeds and six Class C weeds were observed at Camp Murray. All information on status and regulation below was obtained from the Washington State Noxious Weed Control Board (2008) and the Pierce County Noxious Weed Control Board (2008).

Class A Weeds. Class A weeds have a limited distribution in the state. Eradication is required by law. No Class A weeds are present at Camp Murray.

Class B Weeds. These species are established within some regions of Washington State but are of limited distribution or not present in other regions of the state. Because of differences in distribution, treatment of Class B weeds varies between regions of the state. Table 1 identifies Class B weeds present at Camp Murray and identifies which species are subject to state control.

Class C Weeds. These species are already widely established within Washington State or are of special interest to the agricultural industry. They are placed on the state's noxious weed list to allow counties to enforce control if so desired. Table 2 identifies Class C weeds present at Camp Murray.

Table 1 Class B Weeds Present at Camp Murray

Scientific name	Common name	Designated for control in Pierce County?
Centaurea maculosa	Spotted knapweed	Yes
Cytisus scoparius	Scot's broom	No (control is recommended)
Hypochaeris radicata	Common catsear	No
Lepidium latifolium	Perennial pepperweed	Yes
Leucanthemum vulgare	Oxeye daisy	No
Lythrum salicaria	Purple loosestrife	Yes, with some exceptions
Senecio jacobaea	Tansy ragwort	Yes, with some exceptions
Sonchus arvensis	Perennial sowthistle	Yes
Polygonum cuspidatum	Japanese knotweed	No

Source: Turnstone 2006a

Table 2 Class C Weeds Present at Camp Murray

Scientific name	Common name
Cirsium vulgare	Bull thistle
Hedera helix	English ivy
Hypericum perforatum	St. Johnswort
Iris pseudocorus	Yellow flag iris
Phalaris arundinacea	Reed canarygrass
Senecio vulgaris	Common groundsel

Source: Turnstone 2006a

Of greatest concern is the establishment of Japanese knotweed and purple loosestrife along Murray Creek (TNC 2008). These species are currently present primarily along the upper reaches of Murray Creek, but will likely spread rapidly due to their ability to proliferate through rapid vegetative reproduction. Expansion of these populations downstream into the lower portions of Murray Creek and into American Lake could be detrimental to habitats along the creek and shoreline. Yellow flag iris along the shores of American Lake is also a concern to the greater aquatic system.

4.2.4 Fish and Wildlife

Wildlife habitat at Camp Murray includes open water associated with American Lake, shoreline, wetlands, mature forest, oak woodlands, early successional forest, and riparian areas. Wildlife surveys were conducted on 29 and 30 March, 26 and 27 May, and 28 July, 2005 (Turnstone 2006a). During the surveys, special attention was paid to state or federally-listed species. Special surveys were conducted specifically for the presence of bald eagles or their habitat as this species was federally listed as threatened at the time of the investigation.

Species lists, including scientific and common names, are provided in Appendix C.

4.2.4.1 *Mammals*

Mammal surveys were conducted in spring and summer of 2005. Species were recorded when they were seen or heard during pedestrian surveys, or if signs such as middens, scat, or tracks were observed. No bat sampling was conducted, and no trapping was performed. During the wildlife inventory, a protocol-specific survey was conducted for western gray squirrels, a species listed as threatened by the WDFW. The results from the western gray squirrel survey are discussed in Section 4.2.5.

Five species of mammals representing five genera were identified at Camp Murray in 2005. Species observed include Douglas squirrel, eastern gray squirrel, coyote, raccoon, and black-tailed deer. Except for the Douglas squirrel, all species detected on Camp Murray were generalist species, able to tolerate considerable levels of human disturbance.

It is likely that additional mammal species would have been detected had more exhaustive mammal survey methods such as trapping or scent-stations been used.

4.2.4.2 *Birds*

Bird surveys were conducted in spring and summer of 2005 (Turnstone 2006a). Species were recorded when they were seen or heard during pedestrian surveys, or if signs such as nests, scat, nesting cavities, foraging holes, feathers, or whitewash were observed. No protocol-specific nest surveys were conducted, nor were nocturnal surveys for owls performed. During the wildlife inventory, a species-specific survey was conducted for bald eagles, a species that was federally listed as threatened at the time of the inventory. The results of the bald eagle survey are discussed in Section 4.2.5.

Bird species detected during the surveys included both year-round resident and migratory species. Primary considerations with regard to migratory bird management are compliance with the Migratory Bird Treaty Act (MBTA); implementation of migratory bird management actions in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*; and support, contribution and compatibility with the goals and efforts of numerous regional migratory and game bird conservation programs. The MBTA controls many actions that may negatively affect migratory birds, particularly the collection and transportation of birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes.

A total of 60 species of birds were observed during the faunal surveys, including both habitat generalists that are well adapted to human disturbance and birds that are dependent on the unique habitats present at Camp Murray (Turnstone 2006a). Birds unique to the mature forested habitats of Camp Murray include pileated woodpecker, brown creeper, and varied thrush. Birds unique to wetlands of Camp Murray include red-winged blackbird, yellow warbler, and great blue heron. The aquatic habitats on Camp Murray provide foraging sites for a variety of wintering waterfowl, including Barrow's goldeneye, bufflehead, and common merganser. An active rufous hummingbird nest was observed during faunal surveys.

Five species of birds observed at Camp Murray are listed as Priority Species by the WDFW. Priority species are discussed in Section 4.2.5.

4.2.4.3 *Reptiles and Amphibians*

Both amphibians and reptiles may be found in forests and grasslands; however many species are especially prevalent in seasonally ponded areas that dry out and do not contain fish. Amphibians are water-dependent during the early parts of their life cycle and spring mating.

No reptiles or amphibians were observed during faunal surveys (Turnstone 2006a). The lack of amphibian and reptile detections is likely due to the lack of class-specific surveys. Additional surveys would be required to determine if reptiles and amphibians are present at Camp Murray. Reptile and amphibian surveys are included in the list of planned projects and will be conducted as funding allows.

4.2.4.4 *Macroinvertebrates of Murray Creek*

Biological monitoring of surface waters provides a comprehensive approach to measuring stream health, because degradation of sensitive ecosystem processes is more frequently observed within the biological community. Because stream dwelling invertebrates are affected by physical, chemical and other biological variables in their localized environment, they can

be used as biological indicators and provide a historical, site-specific view of a stream's health.

A macroinvertebrate study of Murray Creek was conducted in fall of 2005 (Turnstone 2006b).Results for the survey indicated that the current biotic integrity or health is currently low to very low. Invertebrate densities ranged from 242 to 2804-per square meter. In general, densities less than 500 are very low, less than 1000 are low, and from 1000 through 5000 are normal. Total taxa richness ranged from 7 to 29 taxa. In general, taxa richness less than 10 is very low and less than 20 is low.

Tolerant, non-insect invertebrates dominated most sampled areas, and many or the most sensitive or intolerant stream taxa were conspicuously absent from surveys. Long-lived taxa that take more than one year to develop and taxa intolerant of high water temperatures and low dissolved oxygen levels were nearly absent from all sites. Many of the most sensitive or intolerant stream taxa (those in the Ephemeroptera, Plecoptera, and Trichoptera orders) were absent from surveys.

Murray Creek possesses lower benthic macroinvertebrate diversity than typical communities found in other montane streams in the Puget Lowlands ecoregion. These findings are not unusual because Murray Creek is a low-gradient, urbanized stream with reaches that have dried up periodically in the past. The low levels of biotic integrity could be the result of numerous factors, which may or may not be anthropocentric in origin.

4.2.4.5 *Fish*

Information regarding the presence of fish in American Lake and Murray Creek was obtained during the spring and summer of 2005 from Fort Lewis websites and personal communication with anglers (Turnstone 2006a).

Nine species of fish were determined to be present in American Lake. Game fish include largemouth bass, smallmouth bass, and kokanee (Turnstone 2006a). Of the nine species of fish present in American Lake, four species have been identified by the WDFW as Priority Species, including kokanee, resident cutthroat trout, rainbow trout, and largemouth bass.

4.2.5 Threatened and Endangered Species

No federally-listed endangered, threatened, or candidate plant or animal species are known to occur on Camp Murray.

State-listed species known to occur on the site include bald eagles and pileated woodpeckers. As recently as 2003, a pair of bald eagles has nested in the forested areas adjacent to American Lake. The bald eagle was listed as federally threatened until June 28, 2007, and is still listed as threatened in Washington State (WDFW 2007). Pileated woodpeckers are candidates for endangered species listing in Washington State, and are known to use the forested areas on Camp Murray. Camp Murray also contains habitat for four other federally- or state-listed species (Table 3). Protocol-specific surveys were conducted for most listed species in spring and summer of 2005.

The WDFW and Wildlife Habitat Program has developed a Priority Habitats and Species (PHS) list that identifies habitats and species considered priorities for conservation and

management. There are 18 habitat types, 140 vertebrate species, 28 invertebrate species, and 14 species groups currently on Washington's PHS list (WDFW 2007).

Priority Species are defined as fish and wildlife species requiring protective measures and/or management guidelines to ensure their perpetuation (WDFW 2007). Priority Habitat is defined as a habitat type with unique or significant value to many species. Classifications and definitions are as follows:

Priority Species: Species that require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable.

Priority Habitats: These are habitat types or habitat features with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type or dominant plant species, a described successional stage or a specific structural element (WDFW 2007).

An area identified and mapped as priority habitat has one or more of the following attributes:

- Comparatively high fish and wildlife density.
- Comparatively high fish and wildlife species diversity.
- Important fish and wildlife breeding habitat.
- Important fish and wildlife seasonal ranges.
- Important fish and wildlife movement corridors.
- Limited availability.
- High vulnerability to habitat alteration.
- Unique or dependent species.

Three species of birds and four species of fish present at Camp Murray are listed as Priority Species (Table 3). In addition, potential habitat exists on Camp Murray for two other Priority Species.

Potential and existing federal-, state-, and priority-listed species on Camp Murray are shown in Table 3. Figure 6 shows the location of species and habitats of concern at Camp Murray. Management of protected species is discussed in Section 6.4 of the INRMP. Common and scientific names of all species detected during surveys are included in Appendix C. Appendix C also contains a list of the rare plant species considered, habitat needs, and survey efforts.

Table 3 Federal-, State-, and Priority-listed Species at Camp Murray

Common name	Scientific name	Federal status	State status	Detected at Camp Murray?
Fauna				
Western gray squirrel	*Sciurus griseus*	Species of concern	Threatened	No
Bald eagle	*Haliaeetus leucocephalus*	Species of concern	Threatened	Yes
Pileated woodpecker	*Dryocopus pileatus*		Candidate	Yes
Barrow's goldeneye	*Bucephala islandica*		Priority	Yes
Bufflehead	*Bucephala albeola*		Priority	Yes
Great blue heron	*Ardea herodias*		Priority	Yes
Kokanee	*Oncorhynchus nerka*		Priority	Yes
Rainbow trout	*Oncorhynchus mykiss*		Priority	Yes
Largemouth bass	*Micropterus salmoides*		Priority	Yes
Purple martin	*Progne subis*		Priority	No
White-breasted nuthatch	*Sitta carolinensis*		Priority	No
Flora				
Rush aster	*Aster borealis*		Threatened	No
A moss	*Encalypta brevicolla var cruminana*		Endangered	No
Torrey's peavine	*Lathyrus torreyi*		Threatened	No

Source: Turnstone 2006a

4.2.5.1 *State Listed Species*

Western Gray Squirrel

The western gray squirrel is listed as threatened in Washington State, and is a federal species of concern. Western gray squirrels have been found at nearby Fort Lewis in oak ecotones 332 hectares in size and bordering Douglas fir communities and prairies (Bayrakgi, et al. 2001), and suitable habitat likely exists on Camp Murray (TNC 2008). Both visual and audio surveys were conducted for Western gray squirrels during the surveys.

Western gray squirrels in Washington rely on transitional forests of mast-producing Oregon white oak, ponderosa pine, and Douglas fir. Mast-producing trees of pine and oak with interconnected crowns are particularly important in the life history of the western gray squirrel.

Most of the Oregon oak woodlands that occur at Camp Murray have been extensively fragmented and the understory has been mowed, resulting in less than ideal habitat for the Western gray squirrel. The prevalence of invasive species such as Scotch broom has further degraded western gray squirrel's habitat on Camp Murray.

The majority of the higher quality oak woodland forest that the western gray squirrel requires is located on Fort Lewis property, which contains one of the few remaining Western gray squirrel populations in western Washington. Interstate 5 separates Camp Murray from Fort Lewis, and likely acts as a barrier to colonization and dispersal (Ryan and Carey 1995). While

suitable western gray squirrel habitat may be too small on Camp Murray to support a population, existing habitat could help support regional populations by providing areas for forage and cover (USDA 2008).

More extensive live/bait trapping and line transect surveys would need to be conducted to determine conclusive presence/absence of the Western gray squirrel on Camp Murray.

Bald Eagle

The bald eagle was removed from the federal list of threatened and endangered species on June 28, 2007, but is still listed as a federal species of concern and as a threatened species in Washington State (WDFW 2007). The WDFW is expected to recommend to the Washington Fish and Wildlife Commission that the bald eagle be downlisted to sensitive status (WAANG 2007).

The bald eagle is one of the largest birds of prey in North America. Bald eagles are opportunistic feeders, with fish comprising much of their diet. They also eat waterfowl, shorebirds, small mammals, turtles, and carrion (Birdweb 2006). In the Pacific Northwest, preferred nesting habitat is mature forests along major waterways where nests are often built in the tallest tree. Bald eagles tend to return to the same territory year after year.

As of 2003, four active nesting territories have been identified at nearby Fort Lewis, one of which is located in the western portion of American Lake directly across from Camp Murray (DA 2003). This nest was first identified in 2000. Although bald eagles have historically nested on Camp Murray as late as 2003, no active nesting sites were located during the 2005 surveys (Turnstone 2006a).

Protocol-specific surveys were conducted for bald eagles at Camp Murray in spring and summer 2005. Two previous nesting sites were identified on Camp Murray. These had been previously marked by biologists with wildlife placards. Identified nesting trees were late seral stage Douglas fir trees with masses of sticks placed near the top. It was unclear whether any of the nesting material had been placed recently.

One pair of adults and at least eight juvenile bald eagles were observed perching and soaring along the shorelines of American Lake. Juveniles were most likely offspring from Fort Lewis nesting sites.

Although the bald eagle has been federally de-listed, numerous state and federal laws continue to regulate activities that could have adverse affects on this species. These laws are discussed in Section 6.4 of the INRMP and in Appendix D.

Pileated Woodpecker

The pileated woodpecker is currently a candidate for endangered species listing by the WDFW (WDFW 2007). Nearly as large as a crow, the pileated woodpecker is the largest woodpecker in North America (Birdweb 2006). Both sexes have a black body and a red crest on the head. Males have a red forehead and red in the black mustache stripe. The female has a gray to yellow-brown forehead and no red in the mustache stripe.

Any forest type (broadleaved, coniferous, or mixed) can sustain pileated woodpeckers as long as there are trees large enough for roosting and nesting. Pileated woodpeckers are often associated with mature and old-growth forests but can breed in younger forests if they contain some large trees. In western Washington, they typically roost in western hemlock and western red cedar (Birdweb 2006). The pileated woodpecker digs characteristically rectangular holes in trees to find ants.

Auditory detections as well as signs of presence (rectangular-shaped drill holes on trees) of pileated woodpeckers were made during the surveys in 2005.

4.2.5.2 *Priority Species*

Barrow's Goldeneye

Barrow's goldeneye duck is a medium-sized diving duck with a chunky body and a large head. The male is white with a black back and head, and crescent-shaped white spot on face. The female is smaller with a gray-colored body and a brown head.

Barrow's goldeneye duck is primarily a bird of the western mountain region of North America that prefers small, clear lakes and ponds that are not crowded with submergent and emergent vegetation, and that do not support populations of fish. Goldeneyes are cavity-nesting ducks and typically use forested habitat with mature trees (deciduous or coniferous) that offer suitable nesting cavities. During migration, goldeneyes stop to feed on large lakes and rivers (Birdweb 2006). All breeding grounds in Washington State are considered priority habitat for this species.

Barrow's goldeneye ducks were observed at American Lake in early spring 2005 and were not observed during subsequent surveys. It is likely that Barrow's goldeneye ducks use American Lake as a stopover *en route* to their breeding grounds.

Bufflehead

The bufflehead is a small diving duck with a rounded head. The male has a white underside and a dark back that appears black, but upon closer inspection, is actually a deep iridescent greenish-purple. A large white patch is located on the back of the head. The female is duller and darker, with gray sides and small white patch on the head.

Buffleheads breed in boreal forests with nearby stands of poplar and aspen adjacent to small lakes and ponds. Buffleheads nest near water in abandoned flicker holes, and in man-made boxes. In the winter, they are most often found in coastal areas in shallow bays and inlets. Birds found in Washington in winter come from many western breeding areas. The birds arrive in Washington in fall and return to their breeding grounds in early spring (Birdweb 2006). All breeding grounds in Washington State are considered priority habitat for this species.

Buffleheads were observed at American Lake during surveys in early spring 2005, and were not observed during subsequent surveys. It is likely that buffleheads use American Lake as a stopover *en route* to their breeding grounds.

Great Blue Heron

The great blue heron is the largest and most widespread heron in North America, found in a variety of habitats. The great blue heron has a large, gray body with a long S-shaped neck, a thick bill, and a white crown stripe. The neck is reddish or gray with shaggy feathers. Sexes are similar.

Great blue herons forage alone or in small groups, but they nest in colonies. Nesting colonies are typically found in mature forests, on islands, or near mudflats, and do best when they are free of human disturbance and have foraging areas close by. All breeding grounds in Washington State are considered priority habitat for this species.

Great blue herons were detected on American Lake in Camp Murray by auditory and visual detections. No rookery or breeding area was confirmed to be present on Camp Murray property.

Kokanee

Kokanee are sockeye salmon that spend their entire lives in freshwater. They are usually found in lakes that have either limited or no access to the ocean. Kokanee tend to be smaller in size than sockeye due to more limited food sources. Before spawning, kokanee will turn bright red with green heads; males will also develop a humped back and hooked jaw. Kokanee return to their natal areas in an inlet stream or lakeshore gravel bed to spawn in early fall.

Murray Creek provides habitat for a resident population of kokanee on Camp Murray. Habitat includes gravel beds in the lower 800 feet of the creek before the confluence with American Lake, and in gravel beds along the lakeshore (Shapiro and Associates, Inc. 1996). Much of the suitable kokanee spawning habitat in Murray Creek has been compromised since 1992, when the lower reach of Murray Creek began to go intermittently dry during the summer months, probably due to a variety of natural and anthropogenic causes.

Kokanee are currently managed as a game species by the WDFW. Since the early 1980's, WDFW has stocked several thousands kokanee annually into American Lake to bolster recreational angling opportunities (Mueller and Downen 1999). Efforts are currently underway to restore ecological functions to Murray Creek that enhance a naturally spawning kokanee population. Restoration has included the rearing and introduction of kokanee fingerlings as broodstock, the enhancement of vegetation within the stream's riparian zone, eradication of invasive weed species, and public education.

During the 2005 surveys, biologists received verbal confirmation of the presence of kokanee in American Lake from anglers.

Rainbow Trout

Rainbow trout is a salmonid fish native to streams of the Pacific Northwest. Rainbow trout can be found in small creeks, rivers, lakes, and reservoirs. The larger, anadromous form (steelhead) can be found in the open ocean, and has been designated as Washington's state fish. Rainbow trout spawn in rock and gravel, usually in streams. Diet includes invertebrates, other fish, and fish eggs, depending upon body size and habitat.

Rainbow trout are currently managed as a game species by the WDFW. Since the early 1980's, WDFW has stocked several thousand rainbow trout annually into American Lake to bolster recreational angling opportunities (Mueller and Downen 1999).

During the 2005 surveys, biologists received verbal confirmation of the presence of rainbow trout in American Lake from anglers.

Largemouth Bass

The largemouth bass is the largest of the black basses found in lakes and large, slow streams. Largemouth bass are not native to Washington State. Prey items include mainly fish and invertebrates, but can also include small birds and mammals. Spawning occurs in shallow areas of lakes and ponds.

Largemouth bass are currently managed as a game species by the WDFW. Verbal confirmation of the presence of the fish in American Lake was obtained during 2005.

Cutthroat Trout

Cutthroat trout are native to western North America. Most populations stay in freshwater throughout their lives, although some may be anadromous. Cutthroat trout vary widely in size, coloration, and habitats, and readily hybridize with rainbow trout, a closely related fish species. As adults, different populations and subspecies of cutthroat can range from 6 to 40 inches in length. There are 14 subspecies of cutthroat trout.

Cutthroat trout are currently managed as a game species by the WDFW. Verbal confirmation of the presence of the fish in American Lake was obtained during 2005.

Purple Martin

Camp Murray may contain suitable habitat in the forest opening created by American Lake for purple martins (TNC 2008). The Purple Martin is the largest swallow in North America (Birdweb 2006). In Washington State, purple martins nest and forage on open land near water. Purple Martins can be found in developed areas, along waterfronts, and in fields, wetlands, and clearings. They are cavity nesters that historically nested in tree cavities, old woodpecker holes, rotted pilings, and other natural cavities, but most purple martins now nest in man-made nest boxes. Purple Martins have been regionally targeted for conservation, and many landowners have effectively provided nesting habitat by creating clustered birdhouses near large canopy openings, such as water.

Purple martins were not detected during field surveys.

White-breasted nuthatch

Suitable habitat may exist in the Oregon white oak woodlands on Camp Murray for the white-breasted nuthatch (TNC 2008). The white-breasted nuthatch has a bright white breast and face, and is the largest of the three species of nuthatch in Washington (Birdweb 2006). This species was historically present in the oak woodlands of western Washington, and efforts are currently underway to restore populations through habitat enhancement and re-introduction.

The Nature Conservancy has identified the restoration of oak woodlands on Camp Murray as an opportunity to enhance habitat for white-breasted nuthatches.

White-breasted nuthatches were not detected during field surveys.

4.3 The Human Environment

4.3.1 Land Use

Camp Murray is the headquarters of the WAARNG. The WAARNG at Camp Murray provides facilities through the Construction and Facilities Management Office to support the military mission through offering state-wide vehicle maintenance and administration as well as construction and facilities maintenance to the WMD. Camp Murray also provides drill grounds, classroom training, and physical fitness training facilities to WAARNG, WAANG and EMD personnel. No live combat training is conducted at Camp Murray.

Approximately 48 percent of the installation consists of undeveloped natural areas. Natural resources in the site include several types of forest, a large tract of shoreline adjacent to American Lake, a perennial stream, and wetlands that are primarily associated with Murray Creek and American Lake shoreline. Several state-listed Priority Habitats are present on the installation, and bald eagles are known to use the area for breeding and foraging.

Camp Murray is one of the three military bases - Camp Murray, McCord Air Force Base, and Fort Lewis - that lie in close proximity to each other along the I-5 corridor in western Washington. Most of the southern, western, and northern boundaries of Camp Murray lie directly adjacent to Fort Lewis, an approximately 86,000-acre military reservation that consists of training areas, housing, open space, and support facilities (ENSR 2007).

A neighborhood of single-family homes that functions as a suburb to Tacoma lies adjacent to the northeastern boundary of Camp Murray. The southeastern boundary of Camp Murray is separated from Fort Lewis by I-5, the main transportation corridor for the State of Washington.

Access to Camp Murray is restricted. Persons accessing the installation must check-in with guards posted at one of the two entrances located on the north and south ends of the property.

Land use on Camp Murray is shown on Figure 2**.**

4.3.2 Infrastructure

Infrastructure resources include potable water supply, solid waste disposal, energy sources, stormwater treatment facilities, and transportation systems. Camp Murray obtains its potable water supply from the Fort Lewis Military Reservation. Pierce County Refuse provides solid waste disposal services. Puget Sound Energy provides gas and electric services. Qwest supplies telecommunications (for example, cable, phones, and Internet) services.

A separate storm sewer system exists for the collection of runoff. Stormwater control structures on the installation include catch basins, dry wells/underground injections controls (UIC), oil/water separators, ditches, bioinfiltration swales, culverts, and a Stormceptor™ vault. These facilities are maintained according to guidance outlined in the WDOE Stormwater

Management Manual for Western Washington (SWMM) Publication Number 99-11 through 99-15, and described in the Camp Murray Stormwater Control System Maintenance Plan (WDOE 2001; Tetra Tech, Inc. 2004a).

Traffic circulation along the two-lane roads within Camp Murray is good. The 41st Division Way is the main paved road that runs northeast – southwest throughout the developed portion of Camp Murray (see Figure 2). Other paved roads that are frequently used by Camp Murray personnel include Quartermaster Road, Aviation Drive, and Infantry Drive. Armor Drive is the main gravel road, and runs northeast – southwest along the eastern boundary of the western forest. A network of unpaved roads is located throughout the undeveloped portions of Camp Murray, primarily in the western part of the installation.

Buildings at Camp Murray are a mixture of relatively newly built or renovated facilities, old buildings that have been identified for historic preservation, and old buildings that are in relatively poor condition.

Additional infrastructure includes a helipad located in the eastern portion of Camp Murray, and several towers.

4.3.3 Cultural Resources

Cultural Resources are the physical evidence of our heritage. Cultural resources are: historic properties as defined in the National Historic Preservation Act (NHPA), cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources as defined in the Archaeological Resources Protection Act (ARPA), sacred sites as defined in EO 13007, *Indian sacred sites*, dated 24 May 1996 to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections as defined in 36 CFR 79 Curation of Federally-Owned and Administered Collections. Requirements set forth in NEPA, NHPA, ARPA, NAGPRA, AIRFA, 36 CFR 79, EO 13007, and Presidential Memorandum on Government to Government Relations with Native American Tribal Governments define the basis of the Army's compliance responsibilities for management of cultural resources. Regulations applicable to the Army's management of cultural resources include those promulgated by the Advisory Council on Historic Preservation (ACHP) and the National Park Service (NPS).

The WAARNG completed the *Integrated Cultural Resources Management Plan* (ICRMP) for Washington Army National Guard in September 2007 (WAARNG 2007). An ICRMP is a five-year plan required by AR 200-4 and DoDI 4715.3 for compliance with applicable federal laws and regulations concerning cultural resources. The ICRMP is a component of the installation master plan and functions as a decision document for cultural resources management actions and specific compliance procedures. The plan's purpose is to integrate cultural resources requirements with ongoing mission activities so that the availability of mission essential properties and acreage is maintained and compliance with requirements is achieved.

A complete installation-wide archaeological survey of Camp Murray was conducted in 2005 (WAARNG 2007), at which time archaeological sites were inventoried and evaluated for nomination for listing to the NRHP. A total of six archaeological sites and six structures were recorded, of which two are eligible for nomination to the NRHP and one (CMS-7) requires further work to evaluate its NRHP eligibility.

Of the 88 buildings and structures present at Camp Murray, 28 are currently 50 years old or older and have been evaluated. Seven buildings are eligible as contributing resources to a historic district for listing in the NRHP; two of those buildings are also individually eligible for the NRHP, and one is currently listed on the NRHP. Most of the historic buildings at Camp Murray are located in a central area known as the Camp Murray historic district. Additional structures and landscape elements considered to be part of the historic district include stonework, an outdoor stone fireplace, a 1923 memorial, and mature trees and other landscaping features.

Military records, documents, photographs, artifacts, and donated private collections that are associated with the WAARNG's military history and installations are curated and/or stored at the Washington National Guard State Historical Society Museum at Camp Murray (The Arsenal, Building 2), which is located in the historic district. The museum currently houses an extensive collection of military artifacts. It does have secure storage for weapons and high-value items, but does not meet the requirements of 36 CFR 79 because it lacks appropriate climate controls. The museum is open on Wednesday and the last Saturday of the month.

No known cultural resources will be affected by proposed projects at Camp Murray.

4.3.4 Native American Considerations

Consultation with Native American tribes or nations is required under the provisions of the NHPA regulations, 36 CFR Part 800, revised rules effective August 5, 2004, and the NAGPRA and its implementing rules. Both statutes recognize the rights and privileges of federally recognized tribes or nations, but not tribes without federal standing or activist groups (Indians and/or non-Indians). The Bureau of Indian Affairs maintains a list of federally recognized tribes. Only federally recognized Tribes or Nations can participate in the consultation process under the provisions of these statues and their regulations.

The DoD American Indian and Alaskan Native Policy provides guidance for interacting and working with federally recognized American Indian and Alaska Native governments or tribes. The policy is based on tribal input, federal policy, treaties, and other federal statutes. The DoD policy supports tribal self-governance and government-to-government relations between the federal government and tribes. Although these principles are intended to provide general guidance to DoD components on issues affecting the tribes, DoD personnel must consider the unique qualities of individual tribes when applying these principles, particularly at the installation level. These principles recognize the importance of increasing understanding and addressing tribal concerns, past, present, and future. These concerns should be addressed prior to reaching decisions on matters that may have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands.

Camp Murray has not previously been surveyed for sacred sites or traditional cultural properties. Consultation for this INRMP and EA was initiated by the WAARNG in accordance with NEPA, NHPA, NAGPRA, and DoD American Indian and Alaskan Native Policy. In regards to the proposed INRMP, the WAARNG contacted three federally recognized Native American tribes that may have ancestral ties to the Camp Murray area, including the Steilacoom Tribe, the Puyallup Tribe, and the Nisqually Tribe. Copies of letters submitted to these federally recognized Native American tribes and their responses are included in Appendix A, which includes a Memorandum for Record (MFR) summarizing consultation efforts .

4.3.5 Noise

Under NEPA of 1969, the Noise Control Act of 1972 (Public Law [PL] 92-574), EO 12088, AR 200-1, and 32 CFR 651, the U.S. Army, including the ARNG, is required to assess the environmental impact of noise produced by their activities. Within such an assessment, strategies are promulgated to establish proper land-use planning criteria that protect both on- and off-post receptors from environmental noise.

The Installation Operational Noise Management Program (IONMP) is the primary tool the ARNG uses to analyze noise impacts and land use compatibility. The IONMP program requires that studies be performed to identify noise contours with both location and intensity described. Management practices are then implemented to isolate and minimize noise based on the results of the study. If noise complaints were made because of activities at Camp Murray, they would be directed to the CFMO-EN.

The unit of measure for non-impulse noise is A-weighted in decibels (dBA) over a 24-hour day/night level. Conversely, impulse noise sources are of short duration, such as explosive detonations. The unit of measure for impulse noise is C-weighted in decibels (dBC) over a 24-hour day/night level.

No weapon training is conducted at Camp Murray; therefore, noise levels are expected to be minimal. Examples of anticipated noise sources at Camp Murray include:

- General light vehicle use
- Construction activities
- Helicopters
- Use of authorized, personally owned vehicles
- Weapon training at Fort Lewis
- Vehicles traveling along I-5

4.3.6 Hazardous and Toxic Materials/Wastes

Hazardous materials are defined within several laws and regulations to have certain meanings. For this document, a hazardous material is any one of the following:

- any substance designated pursuant to Section 311(b)(2) 9A0 of the CWA;
- any element, compound, mixture, solution, or substance designated pursuant to Section 102 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA);
- any hazardous waste under the Resource Conservation and Recovery Act (RCRA) as defined below;
- any toxic pollutant listed under the Toxic Substances Control Act (TSCA);
- any hazardous air pollutant listed under Section 122 of the CAAA; and
- any imminently hazardous chemical substance or mixture with respect to which the USEPA Administrator has taken action pursuant to Subsection 7 of TSCA.

Hazardous wastes are defined as any solid, liquid, contained gaseous or semi-solid waste, or any combination of wastes, which pose either a substantial present or potential hazard to human health or the environment, as determined by ignitable, corrosive, reactive, or toxic characteristics as defined in RCRA or are specifically listed in the law as an “F”, “K”, “P”, or “U” listed waste.

Hazardous waste generated at Camp Murray is managed in accordance with the WAARNG Pollution Prevention Plan (Kleinfelder, Inc. 2001). Military waste is generated from vehicle and aircraft general maintenance, fuel storage and transfer, engine degreasing, and parts washing, painting operations, weapons maintenance and repair of communications equipment.

Diesel fuel accounts for most of the hazardous material used at Camp Murray, followed by other petroleum, oil, and lubricant products. Most of the hazardous waste consists of fluorescent light bulbs, aerosol cans, batteries, filters, and paint. Used oil, antifreeze, lead acid batteries, and off-spec fuel are recycled.

4.3.7 Socio-economic Environment

Socio-economic data are presented at the city, county and state levels. The city of Tacoma was used for comparison because of its close proximity to Camp Murray. Regional demographic and economic information is presented in Tables 4 and 5. Socio-economic factors not discussed include local housing, schools, medical facilities, service facilities, and associated issues of health and safety, because of their general non-applicability to natural resources management. Implementation of the subject INRMP would not affect these activities outside the boundaries of Camp Murray.

The City of Tacoma encompasses a racially diverse community that includes a higher percentage of several minority groups than the Washington State average (Table 4). As presented in Table 5, incomes in the City of Tacoma are slightly lower than the averages for the county and state. Additionally, the poverty level is higher than both the county and state. Incomes and the poverty level in Pierce County are comparable to those of the statewide average.

1175 **Table 4 Information on Race in the Camp Murray Vicinity**

Area	All Individuals	White (%)	African-American (%)	American Indian & Alaska Native (%)	Asian (%)	Native Hawaiian and Other Pacific Islander (%)	His-panic or Latino* (%)	Other Race (%)
State of Washington	6,395,798	80.5	3.4	1.5	6.6	0.4	9.1	4.3
Pierce County	766,878	77.6	6.0	1.4	5.9	0.9	7.0	2.5
City of Tacoma	199,663	70.1	11.8	2.1	7.4	0.4	9.2	3.0

1176 Persons of Hispanic or Latino origin may be of any race
1177 Source: U.S. Census Bureau 2006

1178 **Table 5 Regional Economic Information**

Area	Number of Households	Median Household Income ($)	Per Capita Income ($)	Population Below Poverty Level (%)
State of Washington	2,471,912	52,583	27,346	11.8
Pierce County	286,031	53,923	25,207	11.5
City of Tacoma	77,166	44,262	22,796	16.8

1179 Source: U.S. Census Bureau 2006

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5. ENVIRONMENTAL CONSEQUENCES

5.1 General Overview

Short-term management practices included in the INRMP have been developed without compromising long-range goals and objectives. This review assesses known, potential, and reasonably foreseeable environmental consequences related to management presented in this INRMP. Additional NEPA analysis could be required prior to the implementation of certain actions or projects that affect natural resources. Furthermore, because the plan will be modified over time, additional environmental analyses pursuant to NEPA may be required if major changes are to be made to the management strategies, goals, and objectives of the INRMP, or because of unforeseen future conditions.

This section identifies beneficial positive and adverse environmental, cultural, and socioeconomic impacts of the identified alternatives on each of the technical issues presented in this INRMP, and compares and contrasts potential effects from the alternatives. Per 40 CFR Part 1501.7 (a)(3), the CEQ recommends that agencies identify and eliminate from detailed study any issues, which are not significant or which have been covered in another environmental review, narrowing the discussion to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere. Resource areas considered but excluded from further analysis in Sections 4.0 and 5.0 of this EA include: climate, physical setting, topography, and geology. No impacts either positive or negative are anticipated to occur to these resources because of the Preferred Action Alternative or No-Action Alternative. In addition, this section identifies any mitigation measures that may be associated with each resource area that when implemented, will reduce the level of identified impacts.

Overall, the implementation of an INRMP is expected to result in long-term benefits to Camp Murray's people and environment by implementing a holistic management approach. No known potential negative impacts are anticipated to result from the implementation of the INRMP.

5.2 The Physical Environment

5.2.1 Air Quality

No effect on air quality would be expected from either alternative.

5.2.2 Hydrology

5.2.2.1 *Preferred Action Alternative*

Implementation of the Preferred Action Alternative would be expected to result in beneficial effects to Camp Murray's water resources, water quality, and wetlands. Implementation of the Preferred Action Alternative would protect wetlands through conservation and preservation. The establishment of appropriate wetland and stream buffer zones (Project 3.4.2), baseline flow monitoring in Murray Creek (Project 2.2.1), surface and ground water quality monitoring (Project 8.1.1), and an environmental awareness brochure (Project 4.1.2) for Camp Murray staff will enhance protection for water resources on the installation, and ensure compliance

with all applicable laws. Several beneficial aquatic habitat projects would be implemented, which include the continued enhancement of Murray Creek (Project 3.3.2).

Overall, the implementation of the Preferred Action Alternative would be anticipated to result in several long-term positive effects to water resources and water quality. No known negative impacts to water resources and water quality are anticipated.

5.2.2.2 *No-Action Alternative*

Implementation of the No Action Alternative could result in long-term negative effects to Camp Murray water resources due to the lack of protection, information and environmental awareness regarding the location and regulatory requirements of wetlands, streams, and shorelines on the installation.

5.3 Biotic Environment

5.3.1 Vegetation

5.3.1.1 *Preferred Action Alternative*

Implementation of the INRMP would benefit biological resources by maintaining and improving habitat conditions. An FMP has been developed concurrently with the Camp Murray INRMP, and is included as Appendix E of the INRMP. Conducting a revised Forest Inventory and updating the FMP (Project 3.5.1) would improve forest management on the installation, while ensuring no net loss of lands available to support the current and future military mission at Camp Murray.

Implementation of management strategies outlined in the FMP will improve the structure and diversity of the forests in Camp Murray, enhancing habitat for wildlife and ensuring the safety of people and property on the installation. Restoring oak woodlands and other sensitive habitats (Projects 3.3.1 and 3.3.2) will aid in the conservation of regional biodiversity. Removing invasive species will help ensure the perpetuation of native ecosystems, enhance biodiversity, and ensure compliance with federal and state noxious weed laws. No known negative impacts to vegetation are anticipated as a result of implementing the Preferred Action.

The INRMP does not include prescribed burning as a vegetation management technique.

5.3.1.2 *No Action Alternative*

Implementation of the No Action Alternative could result in direct and indirect long-term negative impacts to flora and terrestrial communities because of habitat degradation, especially in oak woodlands and along Murray Creek and the American Lake shoreline. Negative impacts could include a decrease in biodiversity due to the continued presence of invasive plant species, the continued loss of valuable Oregon oak woodlands, and decreased wildlife habitat. The FMP would not be implemented under the No Action Alternative, which may result in the loss of trees and wildlife habitat, and/or loss of life and/or personal property because of hazard trees.

5.3.2 Fish and Wildlife

5.3.2.1 *Preferred Action Alternative*

Implementation of the INRMP (Preferred Action Alternative) would maintain or improve habitat conditions. As part of forest and aquatic habitat management, snags and downed trees and woody debris would be preserved as nesting and forage sites unless these are deemed unsafe to Camp Murray users. The best management practices for vehicle use would be established to sustain forested habitat and the health of individual trees in the urban forest. Protecting surface water quality in aquatic habitats would provide an indirect benefit to fish and wildlife. Encouraging the development of a native forest understory through invasive species removal and restoration along Murray Creek and in oak woodlands would result in increased wildlife habitat for many species. No known negative impacts to wildlife are anticipated because of implementing the Preferred Action.

5.3.2.2 *No Action Alternative*

Implementation of the No Action Alternative could result in direct and indirect long-term negative impacts to biological resources because of habitat degradation, especially in forests, wetlands, Murray Creek, and nearshore habitat on American Lake. Negative impacts could include a decrease in the amount of available habitat for priority species such as bald eagles, western gray squirrels, game fish, and migratory birds, and the loss of diverse habitats due to the establishment of invasive plant species.

5.3.3 Threatened and Endangered Species

5.3.3.1 *Preferred Action Alternative*

In general, beneficial impacts would be expected for threatened and endangered species on the installation under the Preferred Action Alternative. The bald eagle is no longer on the federal list, but is still managed as a sensitive species. Responsibilities for protection of the bald eagle nesting area, including provisions included in the WAANG BEMP (Appendix F) would not change under the preferred action alternative. Forested habitat in the vicinity of bald eagle foraging and perching areas would be maintained or enhanced, and activities would be restricted during the breeding season. In addition, following the management guidelines outlined in the Camp Murray FMP (Appendix E) would provide additional protection for bald eagles, pileated woodpeckers, and oak woodlands. Protecting surface water quality in Murray Creek would provide an indirect benefit to other sensitive species in American Lake. No known negative impacts to threatened and endangered species are anticipated as a result of implementing the Preferred Action.

5.3.3.2 *No Action Alternative*

Responsibilities for the protection of bald eagle habitat, including provisions included in the WAANG BEMP would not change. Forest in the vicinity of existing habitat would be managed the same as present. Restrictions on activity within the forest would continue to avoid disturbance during the breeding season.

However, implementation of the No Action Alternative could result in indirect, long-term negative impacts to state-listed species because of habitat degradation, particularly in forested, riparian, and nearshore environments. No effect on federally-listed threatened and

endangered species will be expected from either alternative as no species have been identified at Camp Murray.

5.3.4 Wetlands

5.3.4.1 *Preferred Action Alternative*

Implementation of the INRMP would benefit wetland habitats, by maintaining or enhancing the existing levels of biodiversity. Wetlands adjacent to Murray Creek and the American Lake shoreline will be enhanced through restoration and/or invasive plant species removal. Establishing buffers and educating Camp Murray staff and users through the environmental awareness brochure would provide further benefit to surface water on the installation and ensure compliance with applicable federal, state, and local regulations. No known negative impacts to wetlands are anticipated as a result of implementing the Preferred Action.

5.3.4.2 *No Action Alternative*

Implementation of the No Action Alternative could result in direct and indirect, long-term negative impacts to wetlands. Negative impacts to wetlands could include wildlife habitat degradation, and a loss of the ability of the wetland to provide water quality and hydrologic functions due to unauthorized activity within wetlands and their buffers**.**

5.4 The Human Environment

5.4.1 Land Use

5.4.1.1 *Preferred Action Alternative*

The INRMP includes strategies that, when implemented, would ensure long-term sustainability of natural resources, on which the WAARNG depend on to fulfill their military mission. Implementation of land management practices and projects, as described in the INRMP, would improve the quality and usability of existing lands. The management goals and objectives contained within the INRMP would allow for continuance and even improvement of military lands, maintenance of a cooperative relationship with regulatory agencies, and improvement of the habitat and water quality throughout the site via implementation of the FMP (Appendix E), enhanced communication, and increased environmental awareness outlined in the INRMP. Therefore, this action would have direct and indirect, long-term positive impacts to land use and management. No known negative impacts to land use are anticipated as a result of implementing the Preferred Action.

5.4.1.2 *No Action Alternative*

Implementation of the No Action Alternative could result in direct, long-term negative impacts to land use and management of the few remaining undeveloped areas, and could lead to a net loss in training area. Negative impacts to land use could include a decrease in the amount of land available to sustain the military mission.

5.4.2 Infrastructure

No effect on infrastructure would be expected from either alternative.

5.4.3 Cultural Resources

No effect on cultural resources would be expected from either alternative. Prior to any new projects, building alterations, or ground disturbing activities at Camp Murray, the Cultural Resource Manager in the CFMO-EN must be contacted. The CFMO-EN will assess whether an architectural or archaeological survey is required and what permits need to be obtained to comply with all Federal and State regulations pertaining to cultural resources.

The WAARNG will follow all established regulations and the Standard Operating Procedures (SOPs) for the protection of cultural resources established in the 2007 ICRMP during all ground disturbing activities.

5.4.4 Native American Considerations

5.4.4.1 *Preferred Action Alternative*

Implementation of the Preferred Action Alternative is not anticipated to have an effect on protected tribal resources, tribal rights, or Indian Land at Camp Murray because no tribe-sensitive areas are known to be present on the installation. In accordance with the ICRMP, all WAARNG actions potentially affecting protected tribal resources, tribal rights, or Indian Land, will be coordinated through the cultural resources manager to determine potential effects, NEPA compliance, and compliance with other applicable laws, regulations, and policies as outlined in the INRMP.

The WAARNG will continue to consult with the Native American tribes having potential ancestral ties to Camp Murray that either have expressed interest in participating in the NEPA process or have not responded to previous consultation attempts. The consultation process is discussed in greater detail in Section 6.9.3 of the INRMP. A Memorandum For Record is included as Appendix A.

The WAARNG will follow SOP No. 6 outlined in the ICRMP in case of inadvertent discovery of cultural items.

5.4.4.2 *No Action Alternative*

Implementation of the No Action Alternative is not anticipated to have an effect on protected tribal resources, tribal rights, or Indian Land at Camp Murray because no tribe-sensitive areas have been identified on the installation.

In accordance with the ICRMP, all WAARNG actions potentially affecting protected tribal resources, tribal rights, or Indian Land, will be coordinated through the cultural resources manager to determine potential effects, NEPA compliance, and compliance with other applicable laws, regulations, and policies as outlined in the INRMP.

5.4.5 Noise

No changes in the noise environment would be expected from either alternative. There are no planned natural resources activities that will increase noise. Mowing and grounds maintenance are existing activities and the level of these activities would not change.

5.4.6 Hazardous and Toxic Materials/Wastes

5.4.6.1 *Preferred Action Alternative*

The Preferred Action Alternative would not be expected to cause an increase in the generation of hazardous and/or toxic materials. With the exception of herbicides and pesticides, the Preferred Action Alternative does not include management practices associated with hazardous and toxic materials.

Camp Murray would continue to use pesticides for pest control and would continue to generate hazardous waste from non-natural resource operations. Hazardous and toxic materials would continue to be handled in accordance with Federal laws and regulations, including RCRA; Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and appropriate ARs. The proposed action may cause a slight decrease in the use of herbicides, since many areas that are currently maintained would be allowed to develop into self-sustaining native vegetation communities.

5.4.6.2 *No Action Alternative*

Implementation of the No Action Alternative would be unlikely to result in any changes to the existing use of hazardous and toxic materials and to the generation of wastes. Camp Murray would continue to use pesticides for pest control and would continue to generate hazardous waste from non-natural resource operations.

5.4.7 Socio-economic Environment

No effects to the Camp Murray's socio-economic environment would be expected under either alternative. Under either Alternative, various trends in population, housing, and economic changes in the area of Camp Murray would be expected to continue in their current patterns. Potential effects are precluded by the fact that the Preferred Action Alternative would not involve any activities that alter the existing socio-economic resources or burdens.

5.4.8 Protection of Children and Environmental Justice

Because children may suffer disproportionately from environmental health risks and safety risks, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was introduced on 21 April 1997. EO 13045 was intended to prioritize the identification and assessment of environmental health risks and safety risks that may affect children and to ensure that Federal agencies' policies, programs, activities, and standards address environmental risks and safety risks to children. No children reside at the installation. No other child care centers, schools, parks, or other concentrations of children exist on the installation.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, dated 11 February 1994, was issued to focus attention of federal agencies on human health and environmental conditions in minority and low-income communities and to ensure that potential disproportionately high and adverse human health or environmental effects on these communities are identified and addressed.

Implementation of either Alternative would not be expected to create any advantage or disadvantage for any group or individual, nor would be expected to create disproportionately

high or adverse human health or environmental effects on children, minorities or low income populations in the communities surrounding Camp Murray.

5.5 Cumulative Effects

As defined by CEQ regulations in 40 CFR Part 1508.7, cumulative impacts are those which "result from the incremental impact of the proposed actions when added to other past, present and reasonably foreseeable future actions, without regard to the agency (federal or non-federal) or individual who undertakes such other actions." Cumulative impact analysis captures the effects that result from the proposed action(s) in combination with the effects of other actions taken during the duration of the proposed action(s) in the same geographic area.

NEPA requires the analysis of cumulative environmental effects of a proposed action, or set of actions, on resources that may often be manifested only at the cumulative level, such as traffic congestion, air quality, noise, biological resources, cultural resources, socio-economic conditions, utility system capacities, and others. Currently, there are no known MILCON (Military Construction) or other projects planned at Camp Murray during the implementation period of the INRMP that would contribute to cumulative impacts.

5.5.1 Preferred Action Alternative

Implementation of the INRMP would have long-term positive effects on the natural environment at Camp Murray. In addition, implementation of this plan would ensure the sustainability of WAARNG lands to support mission requirements and training activities. Due to the integration of mission requirements in the creation of this plan, no negative impacts to the military mission would be anticipated.

The INRMP has been developed in coordination with Camp Murray staff and will not add negative cumulative impacts to any planned project at Camp Murray. Implementation of the INRMP would help reduce the potential negative impacts of other projects by providing site-specific guidelines for managing soil erosion, surface water quality, vegetation, habitats, and sensitive species on the installation. The INRMP supports other projects and provides guidance in initiating other projects to avoid, minimize, or mitigate potential adverse environmental impacts.

Implementation of the INRMP would result in coordinated management of shared natural resources on Camp Murray and Fort Lewis (Project 1.1). Fort Lewis currently manages adjacent natural resources that have a significant indirect impact on natural resources at Camp Murray, including American Lake, Murray Creek, sensitive wildlife species, and invasive species. Implementation of this INRMP would ensure that efforts to manage natural resources at Fort Lewis - for example, the control of knotweed in Murray Creek - are supported by coordinated downstream efforts implemented at Camp Murray. This would result in increased regional habitat for sensitive species and habitats, including western gray squirrels, bald eagles, Oregon oak woodlands, and fish.

Implementation of the INRMP would result in a comprehensive natural resources management strategy for Camp Murray that includes compliance, restoration, prevention, and conservation of military training lands. The goals and objectives of the INRMP, if implemented, would improve the overall management approach for training integration with

natural resources management, and meet legal and policy requirements consistent with land management philosophies. The implementation of the INRMP would be expected to initially improve existing environmental conditions at Camp Murray and, over time, enable the WAARNG to achieve its goal of maintaining ecosystem viability and ensuring the sustainability of military lands. As such, a long-term positive cumulative effect would be expected for Camp Murray.

5.5.2 No Action Alternative

Adoption of the No Action Alternative would mean that an INRMP would not be implemented and the existing level of natural resources management would continue. Implementation of the No Action Alternative could cause the degradation over time of undeveloped land on Camp Murray and existing natural resources both on the base and its vicinity. This could ultimately affect the military mission at Camp Murray. Implementation of the No Action Alternative would, therefore, be expected to result in a long-term negative impact. Cumulative negative impacts in the vicinity of American Lake could be expected particularly because it is open for public use.

5.6 Required Mitigation Measures

No mitigation measures are necessary to reduce adverse environmental impacts to below significant levels. The INRMP identifies environmental coordination requirements necessary to implement training activities and construction projects. Any mitigation needed at Camp Murray would be in association with and in support of individual construction projects and not the direct implementation of the INRMP. The INRMP's function is to provide guidance, so that permitting and mitigation requirements for mission support can be met.

5.7 Comparison of Alternatives and Conclusions

Generally, the potential environmental consequences associated with implementing the Preferred Action Alternative, as proposed, would be expected to result in either a positive effect or no effect to the natural, cultural, and socioeconomic environments. Overall, through its emphasis on natural resource impact avoidance as well as repair and/or monitoring, the implementation of the INRMP is anticipated to result in net positive effects by sustaining and enhancing extant on-site natural resources while allowing training to proceed, and has been determined to be the best, most appropriate, and most practicable alternative.

Adoption of the No Action Alternative would mean that an INRMP would not be implemented and the existing level of natural resources management would continue. Implementation of the No Action Alternative could be expected to result in a long-term negative impact, including the degradation of Camp Murray lands.

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8. AGENCIES AND INDIVIDUALS CONSULTED

8.1 State and Federal Resource Agencies

State and Federal resource agencies were consulted in the development of the INRMP and EA. The WAARNG also requested input from other organizations with expertise regarding regional natural resources. Consultation included written or telephone correspondence, and a meeting on 02 November 2007. Copies of correspondence can be found in Appendix A of the INRMP. This section summarizes all correspondence received.

The USFWS provided information regarding Camp Murray habitat and endangered species in the vicinity of the installation. The WDNR provided information regarding the presence of rare plants or high quality ecosystems in the vicinity of Camp Murray. The USDA Forest Sciences Laboratory provided recommendations for managing oak woodlands on Camp Murray. The Nature Conservancy provided recommendations on managing invasive species, and habitat for rare species found on Camp Murray. The USDA-NRCS provided soils data. This information has been incorporated into the INRMP as appropriate.

The draft INRMP will be made available for public comment. Comments received on the draft INRMP will be incorporated into the INRMP and included in Appendix A. Agencies and organizations that were consulted during the development of the INRMP are listed below, followed by a summary of correspondence received.

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- The WDNR Natural Heritage Program responded by mail on January 11, 2008, and had no comments regarding rare plants or high quality ecosystems in the vicinity of Camp Murray.
- The NRCS responded by email on December 28, 2008, indicating that pertinent information regarding soils on Camp Murray was contained in the Soil Survey for Camp Murray submitted to the WAARNG in November 1999.
- The USDA, Forestry Sciences Laboratory responded by mail on January 7, 2008, and recommended that the condition of Oregon white oak woodlands be enhanced and preserved in coordination with other land managers in the vicinity of Camp Murray.
- The USDA Forest Services responded by telephone on January 24, 2008, and had no comments on natural resource issues in the vicinity of Camp Murray.
- The USFWS responded by mail on January 23, 2008, and noted a population of white-topped aster (*Aster curtus*), a federally-listed species, located to the southeast of Camp Murray on Fort Lewis.
- The Nature Conservancy responded by email on January 15, 2008, and suggested that Camp Murray consider the following environmental issues during planning: invasive plant species, oak and prairie habitat, and habitat for bald eagles, purple martins, white-breasted nuthatches, and other cavity-nesting forest species.
- The Olympic National Forest responded by mail on January 25, 2008, and had no comments on natural resource issues in the vicinity of Camp Murray.

8.2 Public Coordination

A notice of availability for the draft INRMP and draft EA will be advertised, and documents will be made available for public review. Appendix A of the INRMP will include a copy of the Public Notices and distribution lists.

8.3 Native American Groups

Consultation for the EA was initiated by the WAARNG in accordance with NEPA, NHPA and DoDI 4710.02, which implements *DoD American Indian and Alaskan Native Policy* on 7 June 2007. A list of federally-recognized tribes contacted is included below. These entities were invited to participate as Sovereign Nations per EO 13175 in the EA and the NHPA Section 106 process. Consultations with these tribes were conducted in accordance with the protocol set forth in the NGB (2006) NEPA Handbook. Copies of correspondence and a MFR are included in Appendix A of the INRMP.

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