ENVIRONMENTAL ASSESSMENT

CONSTRUCTION AND USE OF AN URBAN OPERATION VILLAGE JOINT BASE LEWIS-MCCHORD YAKIMA TRAINING CENTER YAKIMA, WASHINGTON

Prepared by:

Environmental Division
Directorate of Public Works
Joint Base Lewis-McChord Yakima Training Center
970 Firing Center Road, Building 810
Yakima, Washington 98901-9399
June 2011

Printed on Recycled Paper

ENVIRONMENTAL ASSESSMENT

CONSTRUCTION AND USE OF AN URBAN OPERATION VILLAGE
JOINT BASE LEWIS-MCCHORD YAKIMA TRAINING CENTER
YAKIMA, WASHINGTON

Reviewed By:

Margaret A. Pounds
Chief, Environmental Division
Joint Base Lewis-McChord Yakima Training Center

Reviewed By:

James A. Reddick
Deputy to the Garrison Commander
Joint Base Lewis-McChord Yakima Training Center

Approved By:

for

Michael J. Daniels
Lieutenant Colonel, U.S. Army
Commanding
Joint Base Lewis-McChord Yakima Training Center

This page left intentionally blank

Table of Contents

Chapter 1 Purpose and Need For The Action 6
1.1 Introduction 6
1.1.1 Location 6
1.1.2 Mission 6
1.1.3 Background 6
1.2 Purpose Of And Need For The Proposed Action 6
1.3 Scope Of The Environmental Assessment 7
1.4 Public And Agency Involvement 7
1.5 Issues 8
Chapter 2 Proposed Action And Alternatives 11
2.1 Proposed Action (Preferred Alternative) 11
2.1.1 Site Preparation and Construction 11
2.1.2 Training Operations and Maintenance 11
2.2 Alternatives 12
2.2.1 Screening Criteria 12
2.2.2 Alternatives Considered but Eliminated from Further Analysis 14
2.2.3 No Action Alternative 14
Chapter 3 Affected Environment 16
3.1 Air Quality 16
3.2 Geology, Topography And Soils 16
3.3 Surface Water Quality 17
3.4 Wildland Fire Management 18
3.2 Cultural Resources 21
3.6 Biological Resources 21
3.6.1 Vegetation 21
3.6.2 Wildlife/Fish 23
3.6.3 Threatened and Endangered Species 23
3.2 Infrastructure 32
Chapter 4 Environmental Consequences 33
4.1 Air Quality 33
4.2 Geology, Topography and Soils 34

4.3 Surface Water Quality 35
4.4 Wildland Fire Management 36
4.5 Cultural Resources 38
4.6 Biological Resources 38
4.6.1 Vegetation 38
4.6.2 Wildlife/Fish 40
4.6.3 Threatened and Endangered Species 41
4.7 Infrastructure 43
4.8 Summary of Impacts 43
Chapter 5 Cumulative Effects 45
5.1 Actions Considered in Cumulative Effects Analysis 45
5.2 Cumulative Effect Assessment 45
5.2.1 Geology, Topography and Soils 45
5.2.2 Wildland Fire Management 46
5.2.3 Upland Vegetation 46
5.2.4 Wildlife/Fish 46
Chapter 6 Conclusions Regarding Impacts of the Proposed Action 48
6.1 Mitigation Measures And Best Management Practices 48
6.2 Conclusions 48
Chapter 7 References 49
Chapter 8 List of Preparers and Contributors 52
Chapter 9 Agencies and Individuals Contacted 53
Chapter 10 Glossary and Acronyms 54
10.1 Glossary 54
10.1.1 Context 54
10.1.2 Intensity (thresholds) 54
10.1.3 Significance 54
10.2 Acronyms 54

Table of Figures:

Figure 1-1. Location of JBLM YTC. 7
Figure 2-1. Location of the North Doris Site. 12
Figure 2-2. Locations of Alternatives eliminated from further consideration. 15
Figure 3-1. JBLM YTC Watershed Complexes 19

Chapter 1 Purpose and Need For The Action

1.1 Introduction

The Department of Army proposes to construct an Urban Operation Village (UOV) facility at Joint Base Lewis-McChord (JBLM) Yakima Training Center (YTC) that would provide necessary tactical and maneuver training for military forces.

JBLM YTC has prepared this Environmental Assessment (EA) to evaluate the potential impacts associated with constructing, operating and maintaining a UOV. This EA provides analysis of the environmental characteristics, constraints, and requirements for construction and use of this facility. The analysis presented includes evaluation of the Proposed Action and alternatives considered, including the No Action Alternative.

1.1.1 Location

JBLM YTC encompasses 327,231 acres (approximately 511 square miles) in Yakima and Kittitas Counties, approximately seven miles northeast of the city of Yakima in central Washington (see Figure 1-1). Interstate 82 runs along the installation's western boundary, while Interstate 90 follows much of the northern boundary. The west bank of the Columbia River serves as the eastern boundary of much of the installation, while the southern boundary is just north of the Moxee and Black Rock valleys.

1.1.2 Mission

JBLM YTC supports tough, realistic combined arms, joint and coalition forces training for U.S. and allied military units in order to enhance unit readiness by sustaining training lands, range complexes, and support facilities capable of meeting all present and future training requirements.

1.1.3 Background

The Army's mission is to fight and win the nation's wars, respond to national security threats and promote peace. Army forces must be able to perform their assigned strategic, operational and tactical missions, and training is the means to achieve the necessary tactical and technical proficiency. In recent years, the Army has experienced a wider range of threats and a more complex set of operating environments. The Army's training program has evolved accordingly, including the development of requirements determined by the wars in Iraq and Afghanistan.

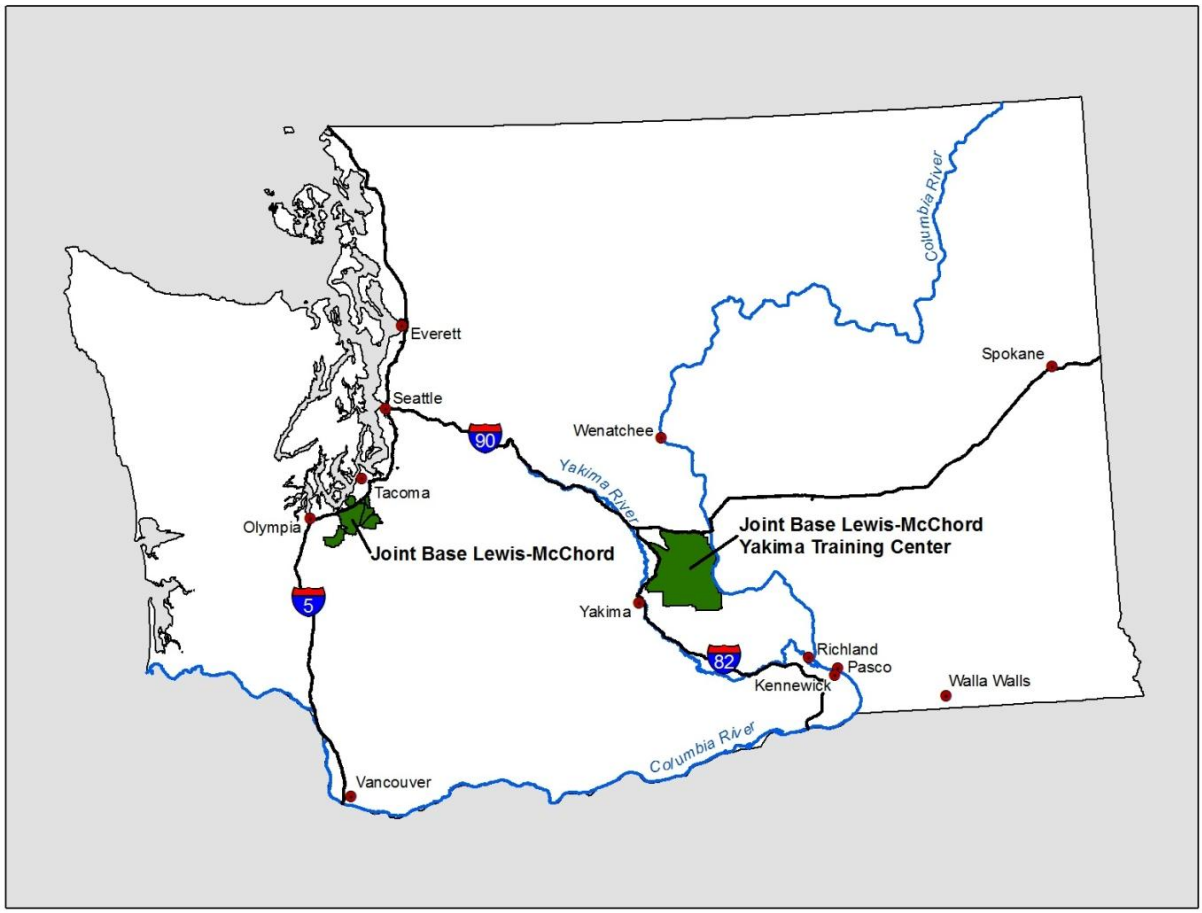
1.2 Purpose Of And Need For The Proposed Action

In order for Soldiers to support the Army mission and conduct urban combat operations effectively in wartime, they must maintain technical and tactical proficiency through effective training. Army forces must be prepared to operate in the full spectrum of today's operational environments, including urban environments found in the Middle East. JBLM YTC provides areas that are similar in topography to the terrain encountered in the current Afghanistan theater of operation.

This action will provide urban operations facilities necessary to support the training of Army warfighters in techniques to secure, identify, detect and operate within urban environments that replicate terrain and scenarios encountered in the current theater of operation. This training will

provide warfighters with advanced, realistic and rigorous operational experience and enhance combat readiness.

Figure 1-1. Location of JBLM YTC (YTC CNRMP, 2002).



1.3 Scope Of The Environmental Assessment

This EA presents analysis of potential direct, indirect and cumulative effects of the Proposed Action and the No-Action alternative. The EA will provide Army decision makers with the information needed to analyze the environmental consequences of the Proposed Action and its alternatives.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 [42 USC 4321 *et seq.*]; Council on Environmental Quality (CEQ) *Regulations for Implementing NEPA* [40 CFR Parts 1500-1508]; and Army Regulation 32 CFR Part 651 (*Environmental Analysis of Army Actions*). A specific requirement for this EA is an appraisal of impacts of the proposed project, including a determination of a Finding of No Significant Impact or Notice of Intent to prepare an Environmental Impact Statement.

1.4 Public And Agency Involvement

NEPA defines scoping as "an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to the proposed action" (40 CFR 1501.7). Identification of these issues is used to develop alternative actions, including mitigation measures, and to evaluate environmental consequences of these actions. Scoping is done internally by an interdisciplinary team and externally with stakeholders and the public. Public and stakeholder involvement is conducted through the required 30-day public review and comment period of the Draft-Final EA, which is made available to individuals at local public libraries. Comments can be provided to the following address.

Department of the Army
Installation Management Command
Headquarters, Yakima Training Center
970 Firing Center Road
Building 810, Attn: NEPA Specialist
Yakima, WA 98901-9399

1.5 Issues

The analysis presented in this EA includes a general description and analysis of the following resource areas:

- Air Quality
- Geology, Topography, and Soils
- Surface Water Quality
- Cultural and Historic Resources
- Upland Vegetation
- Riparian Vegetation
- Wildlife/Fish
- Threatened, Endangered and Special Status Plants and Animals
- Wildland Fire
- Infrastructure

The discussion will include the environmental effects (adverse or beneficial) of implementation of the proposed action, including direct, indirect, long-term and short-term impacts; any irreversible or irretrievable commitments of resources; and cumulative impacts.

The following resource areas would not be affected by the proposed action and have been eliminated from further analysis.

- **Socioeconomics:** The construction of the proposed urban operations village will be accomplished contractually, resulting in short-term and one-time expenditures for salaries, supplies, services, and materials. The long-term operation and maintenance of the facility would result in similar types of expenditures. The amount of such one-time (construction), and long-term (operation and maintenance) expenditures would be small and infrequent, resulting in little or no impact within the surrounding communities.
- **Environmental Justice:** Executive Order (EO) No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations [59 Federal Regulation No. 32, February 1994] provides that "*each Federal agency shall make*

achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The construction and operation of the proposed urban training facility will be located entirely within the boundaries of JBLM YTC and will be consistent with training operations already taking place in this area. Therefore, the proposed action will not disproportionately affect minority or low-income populations.

- **Human Health—Protection of Children:** Executive Order 13045 (1994), Protection of Children from Environmental Health Risks and Safety Risks, requires federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children. There are no schools located on or immediately adjacent to JBLM YTC and none are planned for the foreseeable future. A Child Development Center is planned for construction in 2011 or shortly thereafter, but its location in the cantonment area would isolate it from activities associated with the proposed action. As a result, there are no foreseeable impacts to the health and safety of children from implementation of the proposed action or its alternative.
- **Solid Waste:** Contractors working on construction of the UOV would be contractually responsible for proper disposal of all non-hazardous waste generated during operations. The proposed action or its alternative would not result in significant generation of solid waste above current levels at JBLM YTC.
- **Hazardous Materials/Waste:** During the operation (training) phase, vehicles and equipment containing hazardous materials (petroleum, oil and lubricants) will be present on the road adjacent to the UOV facility. The JBLM YTC Training Unit Standard Operating Procedure contains procedures for Training Unit preparedness and response to hazardous material/waste releases that may occur at JBLM YTC. As this location is already subject to vehicular traffic and military training uses, no changes in environmental effects related to hazardous materials/wastes are expected and no further analysis is required.
- **Ground Water:** The amount of impervious surface resulting from implementation of the preferred alternative would be limited to the modular containers used to construct the UOV. Because of the limited amount of impervious surface resulting from this action, groundwater recharge would not be affected. Also, the potential for groundwater contamination is negligible under all alternatives, as hazardous materials at the UOV site would be limited to fuel contained within vehicles and equipment. Because there are no foreseeable impacts to groundwater from implementation of the proposed action or its alternative, no further analysis is required.
- **Land Use:** The proposed action would not result in any changes to the current land use within the affected area of the proposed action; military training. Existing military training activities that occur in the area would continue, and would not be effected as a result of the proposed action.
- **Noise (pertaining to human receptors):** There are no human noise receptors within the affected area of the proposed UOV, therefore the effects of noise on the human environment will not be analyzed further.

- **Utilities:** The proposed UOV will not require the use of any utilities (e.g., electricity, water, sewage) to operate or maintain the facility. Utilities necessary during construction (e.g., electricity) would be provided by portable generators, and would be short-term in nature. Hence utilities will not be analyzed further.

Chapter 2 presents the Proposed Action for the construction, operation and maintenance of UOV facilities, the No Action Alternative, and other alternatives considered. Chapter 3 presents a broad description of the human and natural environment within the project area. Chapter 4 presents the evaluation of the potential environmental consequences of implementing either the Proposed Action or the No Action Alternative. The analysis concludes with Chapter 5 describing cumulative effects.

Chapter 2 Proposed Action And Alternatives

This chapter presents the Proposed Action for the construction and operation of UOVs, other alternatives considered, and the No Action Alternative.

2.1 Proposed Action (Preferred Alternative)

JBLM YTC proposes to construct a UOV facility in the eastern portion of Training Area 2 (approximately 3 kilometers north of the Doris site) to support advanced and realistic urban operations training. The complex will be located on the north side of North Doris Road with a footprint of 400 feet by 400 feet (see Figure 2-1). The UOV facility will consist of container modules configured into a complex of one- and two-story structures, sited topographically to replicate contemporary urban combat settings. Specifically, the complex will be sited along an existing travel route and contain 27 modular structures surrounded by 770 feet of simulated courtyard walls. The walls will be up to eight feet tall and constructed of pre-cast concrete. Stationary Infantry and Armor Targets and Moving Armor Targets may be placed around the structures.

2.1.1 Site Preparation and Construction

Prior to construction of the UOV, the site must be prepared. Site preparation will consist of clearing and grading the proposed site to a plus or minus 1% grade, application of a residual herbicide (sterilant) to prevent weed/vegetation growth within the area to be hardened, and preparing a hardened gravel base beneath each of the containers. Following site preparation, the facilities will be assembled on site. A staging area of approximately 300 by 300 feet will likely be required for construction vehicles and gravel storage. The length of time required to construct the facility will be a maximum of six weeks.

The site will be located adjacent to an existing maintained road, so neither construction of a new road nor upgrades to the existing road will be required. The structures are not instrumented and do not include provisions for electrical power. No utility expansions will be required, but portable generators may be used during the construction phase.

Some or all of the site preparation and construction activities may be accomplished by contractors. If contractors are used, contractors will be advised of and adhere to environmental requirements (e.g., conducting biological monitoring, preparing plans, and obtaining permits).

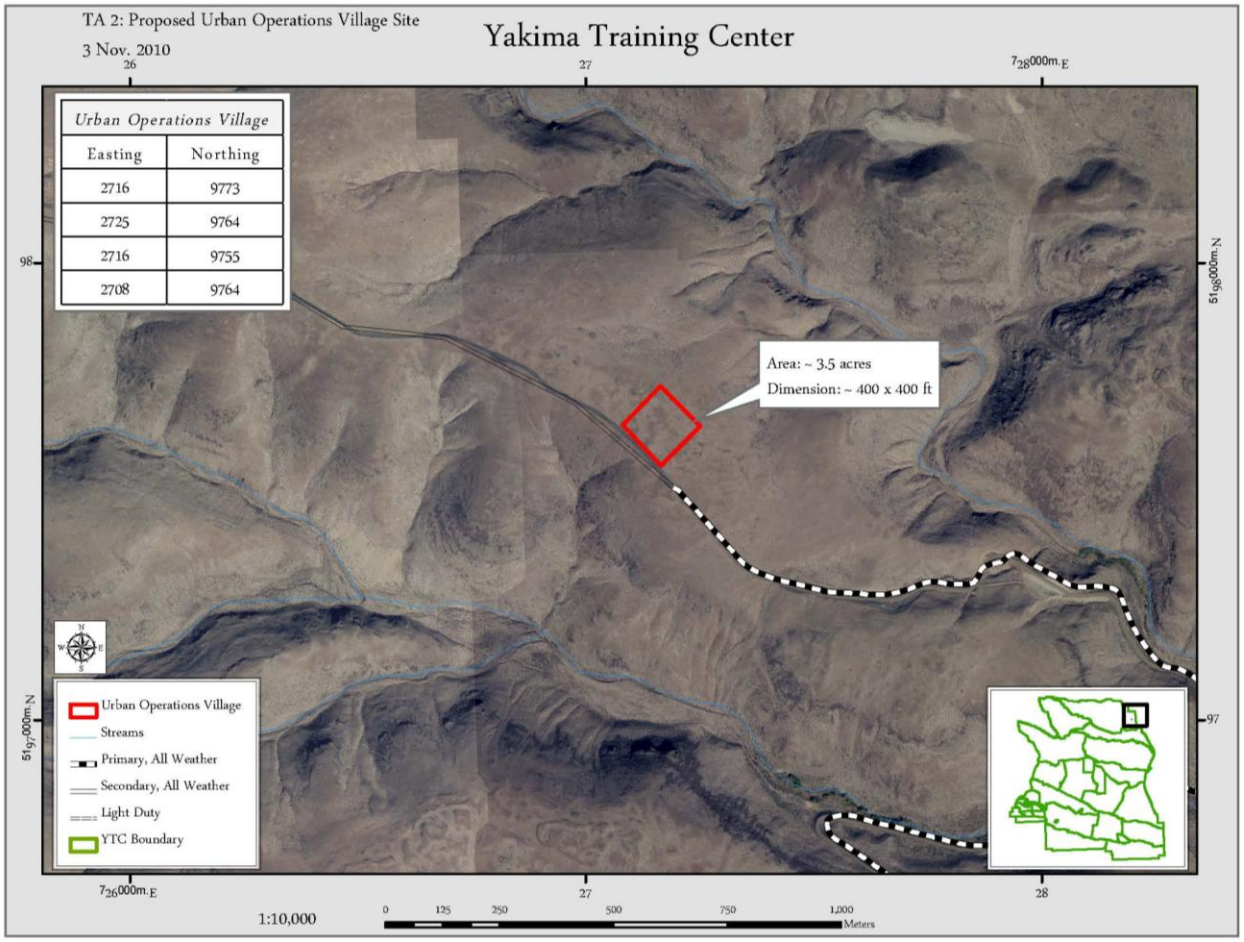
2.1.2 Training Operations and Maintenance

Training will be centered on tactics to secure, identify, detect and operate within an urban environment as found in the current theater of operation. The facility will be used by Trainers to practice dismounted search operations while moving tactical vehicles through an urban area. Siting of the compound simulates village locations in mountain terrain that are accessed by narrow roads, which forces tactical vehicles to travel in single file formation. Trainers will approach the training facility in their vehicles along the road, dismount, and practice entering the compound and the structures contained within. Trainers may also use surrounding vantage points (located in a two to five kilometer radius from the proposed project site) as overlook sites during training operations. These overlook sites will primarily be accessed on foot, but may occasionally be accessed by vehicles. No new roads will be constructed to access overlook sites.

Once inside the compounds, the Trainers will carry out searches for caches. The vehicles will remain on the road where they would be in position to support the dismounted Trainers. The UOV site will not support live fire, but will be able to support Multiple Integrated Laser Engagement Systems (MILES). Training may also involve limited use of pyrotechnical devices (e.g. smoke, flash-bang devices).

Maintenance of the site will be performed by JBLM YTC Range Division staff or contractually as necessary. Typical maintenance that may be required for this type of facility includes replacement of metal panels on the modular containers and mitigating ground surface deterioration within and around the compound caused by units entering on foot from multiple directions (primarily, northwest and southeast). Surface deterioration may be mitigated with grading, shaping, reseeding and/or hardening.

Figure 2-1. Location of the North Doris Site (JBLM YTC, Range Control, 2010).



2.2 Screening Criteria and Alternatives

2.2.1 Screening Criteria

Generally, placement of a UOV at JBLM YTC must be within the training lands, outside of the cantonment area, and outside of any existing ranges or surface danger zone (SDZ) of existing

ranges. Further, in order to meet training goals and requirements, the site selected must meet certain criteria. These criteria dictate that the site must:

- Provide a realistic training environment through its similarity to the rugged and mountainous terrain encountered in the current Afghanistan theater of operation, with necessary vantage points in the surrounding areas;
- Present minimal constructability challenges so that construction is economically feasible;
- Be located adjacent to or near existing roads and reasonably accessible to military vehicles from multiple directions;
- Have no encroachment from or conflicts with other training operations or range surface danger zones (SDZs);
- Present minimal impacts to high value resources known to occur in the area.

Five sites were proposed for location of the UOV facility. Table 2-1 contains an alternative comparison chart for satisfaction of the screening criteria in these proposed locations.

Table 2-1: Alternative comparison chart for satisfaction of screening criteria.

		Potential Site Locations				
		Alt. 1 (TA 10)	**Alt. 2 (TA 2)**	**Alt. 3 (TA 16)**	**Alt. 4 (TA 2)**	**Alt. 5 (TA 2)**
Screening Criteria	Realistic terrain and training environment	No	Yes	Yes	Yes	Yes
	Economically feasible	Yes	Yes	No	Yes	Yes
	Reasonably accessible to military vehicles	Yes	No	No	Yes	Yes
	No encroachments on or conflicts with other training facilities or SDZs	Yes	No	No	Yes	Yes
	Minimal known impacts to high-value resources	Yes	Yes	Yes	No	Yes

Of the locations proposed, only Alternative 5 satisfied all screening criteria (refer to Figure 2-1 for the location of Alternative 5). This site is in a rugged, mountainous environment, but is readily accessible to military vehicles due to its location along a secondary all-weather road. The site is relatively level with minimal required grading and site preparation required, and will not encroach upon SDZs or other training facilities. In addition to adequately meeting all screening criteria, the relative proximity of this site to other urban training facilities in TA 2 will provide the additional benefit of increasing JBLM YTC's collective training capacity for urban-type operations.

2.2.2 Alternatives Considered but Eliminated from Further Analysis

Five potential sites, located in TAs 2, 16 and 10 were considered for this action. Four of these sites were found to not meet the screening criteria for siting of a UOV at JBLM YTC. Alternative 1, located in TA 10 failed to provide realistic terrain and training environment, however it did satisfy the four remaining criteria. Alternative 2, located in TA 2 failed to provide reasonable access by military vehicles due to the confined nature of the surrounding terrain, and the location encroached upon other existing training facilities. The site satisfied the remaining screening criteria. Alternative 3, located in TA 16 failed to meet three criteria; the site is not economically feasible to construct due to the un-even and steep terrain, the site is not fully accessible by military vehicles, and the site encroaches upon other existing facilities in the area. Alternative 4, found in TA 2 failed to satisfy one screening element. Placement of the UOV at this site would result in impacts to high value resources found in the immediate area.

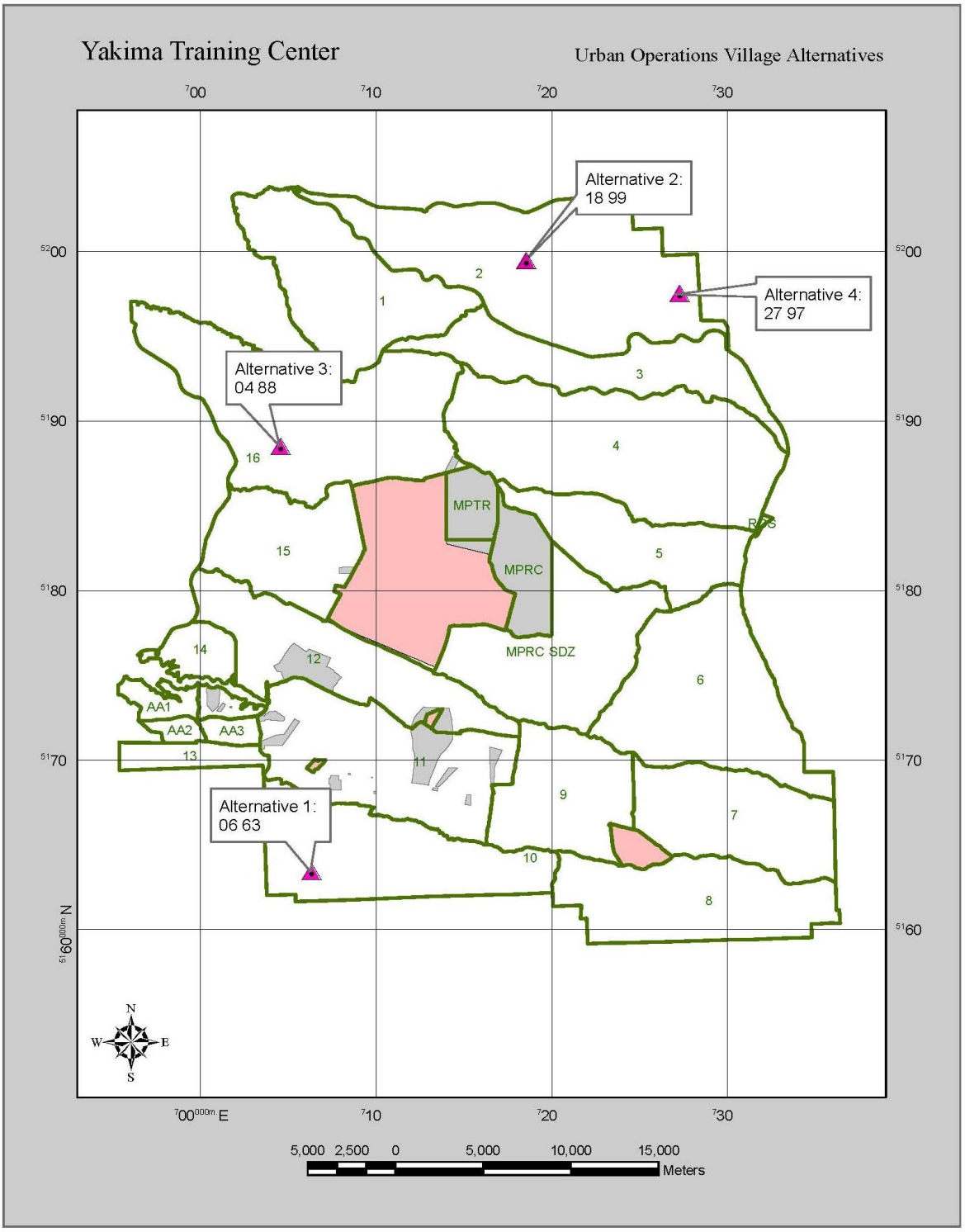
As a result of applying the screening criteria to the five sites considered for this action, the four sites described above have been eliminated from further consideration because they failed to satisfy all site selection/screening criteria, and they will not be further evaluated in this EA. See Figure 2-2 for locations of the alternatives that were considered but eliminated from further analysis.

2.2.3 No Action Alternative

The No Action Alternative serves as a baseline from which to compare all other reasonable alternatives and is not analyzed as a viable option to accomplish the proposed action. Analysis of the No Action Alternative provides the reviewer with a baseline against which the environmental effects of the Proposed Action and any Alternatives can be compared. Analysis of the No Action Alternative is required by CEQ and Army NEPA-implementing regulations.

Under the No Action Alternative, a new UOV facility would not be constructed. Training would take place within existing urban training facilities at JBLM YTC, which will restrict training to platoon size or smaller. JBLM, Washington Army National Guard (WAARNG) and joint coalition forces would not train at JBLM YTC for Middle Eastern urban-type operations in platoon to company or above size exercises, and collective capacity for urban-type training operations would be limited.

Figure 2-2. Locations of Alternatives eliminated from further consideration (JBLM YTC, Range Control, 2010).



Chapter 3 Affected Environment

The affected environment consists of all resource areas that could be directly or indirectly affected by the proposed action in the short and long terms. The resource areas that were reasonably expected to be affected by this action and are addressed further in this section include air quality; surface water quality; biological resources; geology, topography, and soils; cultural and historic resources; wildland fire; and infrastructure. The following resources were eliminated from detailed impact analysis, as it was determined that no impacts to these resources would occur: noise (human receptors), solid and hazardous waste, utilities, socioeconomics, land use, protection of children and environmental justice (refer to Section 1.3).

3.1 Air Quality

The U.S. Environmental Protection Agency (USEPA) regulates pollutants that are commonly found in the air, including particulate matter 2.5 and 10 microns in diameter ($PM_{2.5}$ and PM_{10}, respectively), ground-level ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides and lead. Based on their potential impacts to human health and the environment, the USEPA has set primary and secondary permissible levels for each of these criteria pollutants, known as the National Ambient Air Quality Standards (NAAQS). Each state is responsible for managing compliance with NAAQS. The Yakima Regional Clean Air Agency (YRCAA), with oversight by Washington Department of Ecology (WDOE), is responsible for air quality compliance in Yakima County, and WDOE is responsible for Kittitas County.

A geographic area that meets NAAQS compliance requirements is classified as an attainment area, and an area that does not meet these standards is a nonattainment area. The City of Yakima and some surrounding areas is located within a maintenance area, a geographic area that is currently in compliance with NAAQS but has a history of nonattainment, for the PM_{10} criteria pollutant. A far southwestern portion of JBLM YTC (49.5 acres of the Cantonment Area) is within this maintenance area; however, the proposed project site is located outside of this area on the opposite, northeastern side of the installation.

Air quality on JBLM YTC is generally considered good. Air emissions inventories from 1996, 1997, 2000 and 2008 documented that JBLM YTC did not generate sufficient air contaminants to require a Title V permit. The largest stationary source of air pollution at JBLM YTC is fuel-burning equipment, which includes generators and boilers. A generator may temporarily be located at the project site during the construction phase, but none of this equipment will be permanently present at the project site. Potential air quality impacts of the Proposed Action include construction equipment and vehicle emissions (CO and volatile organic compounds [VOCs]), and particulate matter (fugitive dust) generated from vehicles and equipment during the construction and operation phases. Particulate matter generated at JBLM YTC tends to dissipate quickly due to the prevailing westerly winds.

3.2 Geology, Topography And Soils

Topography at JBLM YTC is characterized by rolling hills and escarpment with wide flat valleys. Rock outcrops, talus slopes and cliffs are visible along the ridge tops, canyon walls, steep hills and drainages. Five basaltic ridges (anticlines) cross the installation in a northwest-southeast orientation: Yakima Ridge, Umtanum Ridge, Manastash Ridge, the Saddle Mountains,

and the Boylston Mountains. The ridges form rounded hills to mountains, with slopes varying from eight to 60 percent. Steepest slopes occur along crests of ridges. Topography tends to be more rugged in the eastern portion of the installation, along Corral Canyon, in Alkali Canyon, and along bluffs bordering the Columbia River. Steep escarpments occur along the western end of Selah Creek. Elevations vary from about 500 feet above sea level at the banks of the Columbia River to an elevation of 4,191 feet above sea level along Yakima Ridge in the southeast portion of JBLM YTC.

Most of JBLM YTC and much of the surface of the Columbia Plateau were covered with basalt flows in the Miocene era (13 to 16 million years ago), which was followed by a period of loess (wind - blown silt) deposition in the early Pleistocene. Later Pleistocene glaciations resulted in a mixture of soil parent materials, including glacial outwash, loess, residuum, alluvium, and basaltic colluviums distributed throughout the landscape. A predominance of silt loams in surface horizons is characteristic of arid to semiarid climates. Soils are fragile and easily eroded or broken down by vehicle traffic. In addition, there are some minor areas of bottomland or alluvial soils, primarily near the Columbia River and in the cantonment area.

Soils at the proposed project site (Nevo Extremely Gravelly Sandy Loam) are very shallow, well-drained, formed in residium, and derived from basalt. Nevo soils are lithic in nature, with a 5 to 12 inch surface layer of extremely gravelly loam atop basalt bedrock. The site is located on a ridge-top, and the slope at the site is less than 5 percent. The whole soil erodibility factor for Nevo Extremely Gravelly Sandy Laom is .15 ton/acre/year, while the T factor for the soil is 1 ton/acre/year. Generally, very shallow soils of this type are very stable and of low erodibility (U.S. Department of Agriculture 2006).

Soil management issues for consideration for the proposed action are the effects of increased erosion that would impact or impair the ability to support and sustain effective military training, the loss of effective medium necessary to support desirable plant growth and communities, and impacts to other resources that results in violation of laws or regulations. Erosion that results in development of gullies or steep drop offs (e.g., safety hazards) would be impacts that reduce the ability to support sustainable and effective training. Soil fertility is impacted through accelerated soil loss resulting in soils that can no longer support desirable plants or communities. Accelerated soil loss can also have indirect effects on other resources (e.g., air and surface water quality) that results in violation of other resource thresholds such as suspended solids (surface water), and particulate matter (air).

3.3 Surface Water Quality

Surface water resources within the boundaries of JBLM YTC include streams, seeps, springs, and ponds. Given its location in an arid region, naturally occurring wetlands are rare on JBLM YTC. JBLM YTC contains 17 major streams with intermittent or perennial stream flow and more than 200 springs, many of which have surface water flow. Major perennial streams that discharge into the Yakima River include Cold, Lmuma and Selah Creeks; major perennial streams that discharge into the Columbia River include Alkali, Corral, Hanson, Middle and Sourdough Creeks. The remaining surface water drainages on JBLM YTC are intermittent and do not flow in the summer. Seven man-made ponds on JBLM YTC are artificially maintained to support fire-fighting activities and recreation.

Due to the arid to semi-arid climate of the region and occasional high-volume precipitation and snowmelt events, streams at JBLM YTC have high variation in flows. Upper reaches of streams that are normally dry may carry in excess of 50 cubic feet per second of flow during extreme events (Bain, 1991). Infrequent high flows cause erosion in all reaches of streams, and carry sediment eroded from the land surface by the rapid runoff. Although the major streams on JBLM YTC have not been explicitly classified by the State of Washington, they are considered to be Class A (excellent) water quality by virtue of the provisions of state regulations (WAC 173-201A).

Surface water within the boundaries of JBLM YTC is managed as 10 management units or "watershed complexes" (refer to Figure 3-1), which are further divided into 28 watersheds. These watersheds drain into the Columbia River basin to the east and the Yakima River basin to the west. A primary management issue for surface water resources on JBLM YTC relates to non-point source erosion impacts that result in degraded surface water quality conditions. Degraded surface water quality can impact Threatened or Endangered salmonid species or their habitats in the Yakima or Columbia rivers.

3.4 Wildland Fire Management

3.4.1 Fire History

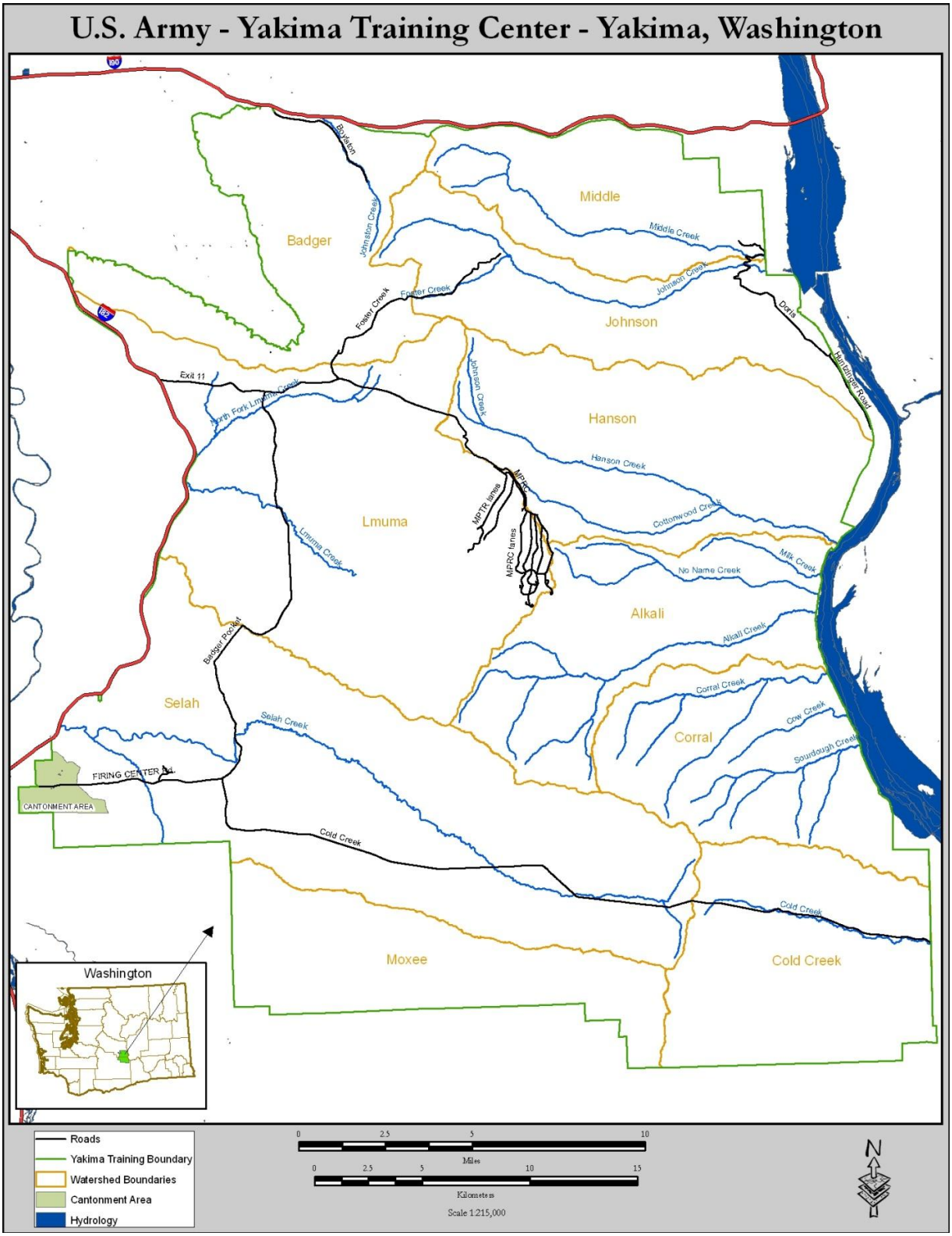
Fire is an integral part of the shrub-steppe ecosystem and serves as a disturbance factor under which shrub-steppe communities have evolved in this region. Prior to the last century, the rate of fire occurrence was approximately 1,000 acres per 10-year period (YTC Environmental Division 2002). However, over the past 100 years, a significant increase in fire frequency, compounded by other factors such as invasion of flammable non-native shrub-steppe species, resulting in increases in early seral grassland communities (both native and non-native) that tend to more readily ignite and expand rapidly resulting in larger burn area footprints. These changes have impacted not only the composition and structure of vegetation communities, but also soil retention, water quality, wildlife habitat, and training readiness.

On JBLM YTC, fires start primarily on existing ranges and impact areas. Since 1987, annual acreage burned has ranged from a low of 50 acres (1991) to a high of 63,296 acres (1996). Since 2003, annual average wildland fire losses have declined from approximately 10,080 acres in 2003 to 8,865 acres in 2008. However, there have been several fires in the last decade that have occurred outside of wildland fire containment areas (areas with expected fire occurrence that are designed and managed to contain fire within). Examples of fire locations outside of containment areas include Training Area (TA) 2 (186 acres in 2002); TA 11 (295 acres in 2004 and 1,256 acres in 2005); TA 15 (700 acres in 2007); Foster Creek in TAs 1 and 3 (340 acres in 2008); Cold Creek in TA 7 (826 acres in 2004 and 1,700 acres in 2008); and upper Selah Creek Watershed in TA 9 (3,600 acres in 2009). Fires occurring outside of containment areas are of greatest concern because they cause new impacts in areas where resource conditions are often managed to a higher standard than areas where fires typically recur, resulting in greater impacts to a wider range of resources.

3.4.2 Fire Management Overview

Average annual fire acreage losses have generally declined since 1996, with the exception of only a few years that experienced higher than average fires due to extreme weather or fire danger

Figure 3-1. JBLM YTC Watershed Complexes (JBLM YTC, Public Works, 2010).



conditions. Generally, the decline is attributed to wildland fire management policy and support enhancements that occurred following the large fire in 1996. JBLM YTC's policy is to aggressively suppress all wildland fires on the installation except those occurring in impact areas and within the limits of established ranges where prior fire containment management actions have been implemented (such as pre-burn areas).

Fires in impact areas are suppressed when they threaten to escape the impact area boundary. The highest fire suppression priority is given to fires that threaten human life and property, followed by fires that have the potential to spread onto or off of JBLM YTC, followed by fires that threaten environmentally sensitive areas.

The JBLM YTC Integrated Wildland Fire Management Plan incorporates safety, resource management, and training requirements. It provides a strategy for implementing pre-suppression and suppression activities annually, and for implementation of a Fire Risk Assessment. To reduce fire hazards in areas where fires typically recur (e.g., ranges), the firebreak network in these areas is maintained to contain fires within the control area. Controlled burns are also used to reduce potential for fires to spread to other areas. While military units are using ranges, they are also required to have a designated suppression team on site that is responsible for extinguishing fires. These teams are supported by the JBLM YTC Fire Department, as required.

An electronic weather station is located near Range Control and is used to collect data and calculate a daily adjective fire danger rating (low, medium, high, very high or extreme). This information is used by Range Control and Fire Department personnel to implement a Fire Risk Assessment, set the daily adjective fire danger rating, and to monitor conditions during fire fighting activities and throughout the day. The Fire Risk Assessment is completed by Range Control personnel to evaluate risks associated with various activities during the fire danger season. It is used to determine whether live-fire activities or use of pyrotechnic devices creates an unreasonable fire risk. When the risk becomes too great, military training is curtailed or postponed until the risk of uncontrolled fire is reduced. The assessment considers current environmental conditions, the type of training being conducted and personnel/availability of pre-suppression or suppression measures. If the Fire Risk Assessment indicates that a specific risk of fire ignition is exceeded, other measures to reduce risk, such as terminating use of pyrotechnic or incendiary devices, are implemented.

Other fire management activities on JBLM YTC include enhanced fire suppression team support, annual prescribed burns, maintenance and upgrade of firebreaks and roads to aid in compartmentalizing fires, development of fire bucket dip ponds and fire suppression wells, enhanced troop education; remote sensing and fire history monitoring. Primary management issues associated with wildland fire are the effects on human health (e.g., fires that leave the installation and impact neighboring residents and properties), and the effects of fires that occur outside of established containment areas (e.g., ranges and impact areas).

The portion of TA 2 where the Preferred Alternative is located has experienced one fire within the last 10 years (specifically located approximately 1.5 kilometers south of the site, along Johnson Creek). Therefore, this area currently experiences very low impacts from wildland fire. In the event of fire occurrence, suppression resources are readily available from the Columbia River (2.5 kilometers east) for aerial firefighting, and from the Doris Site or Sagebrush Springs

Well (three kilometers southeast and four kilometers northeast, respectively) for ground firefighting. Resources in this area that would be impacted from a wildland fire occurrence include cultural and natural resources (e.g., vegetation, water, wildlife and soils), air, and surrounding neighbors in the vicinity of Gettys Cove.

3.5 Cultural and Historic Resources

JBLM YTC contains numerous archaeological, historic, and traditional Native American cultural resources. Approximately 1,800 archaeological sites have been inventoried, the vast majority of which (more than 85 percent) date to the prehistoric period. Prehistoric archaeological resources are generally found near watercourses, at the bases of cliffs, and on upland areas where valued plants or exposures of stone for tool making were located. Prehistoric sites most commonly consist of concentrations of stone tool-making debris, and seasonal camps or habitation sites are the second most common type of prehistoric site.

Approximately 133 historic archaeological sites have been inventoried throughout the installation, concentrated in small areas of previous development and habitation. These resources are primarily related to homesteading, mining, railroading, and ranching uses during the 19th and 20th centuries.

JBLM YTC also contains resources of traditional importance to local Native American tribes, including the Yakama Indian Nation and the Wanapum Band. These resources include specific plants and animals, landscape features, and places where rituals have traditionally been held. JBLM YTC is part of lands ceded in the Treaty of 1855 by the Yakama Indian Nation, who maintain treaty rights to use these lands for traditional subsistence and spiritual practices. Contemporary Native American uses of JBLM YTC include gathering wild root crops, berries, and other plant materials for food, medicines and crafts; hunting of deer and birds; and religious and ceremonial pursuits such as spirit quests.

The project area was surveyed for archaeological resources in 2004 and resurveyed in 2010. No areas of cultural significance in the Area of Potential Effect (APE) were recorded in either survey.

3.6 Biological Resources

3.6.1 Vegetation

3.6.1.1 Upland Vegetation

JBLM YTC lies within the shrub-steppe Columbia River Basin province of eastern Washington and Oregon (Franklin and Dyrness 1988). Shrub-steppe vegetation is characterized as the potential big sagebrush/bluebunch wheatgrass zone as described by Daubenmire (1970) and was once widespread throughout the Columbia Plateau. This is the community that is expected to occur without disturbance, alteration of habitat, or invasion by non-native species. Today very little shrub-steppe remains undisturbed or unaltered from its condition prior to Euro-American settlement and it is considered one of North America's most imperiled and neglected ecosystems (Dobkin and Sauder 2004). Historically, approximately 10.4 million acres of shrub-steppe existed in Washington prior to the arrival of settlers during the 19th century. Today, only about 40% of the original shrub-steppe in Washington remains (Dobler et al. 1996) due to changes in land use over the past century. Yakima County supports the largest amount of shrub-steppe in the

state, retaining 58% of its original acres. The few remaining large areas of shrub-steppe in Washington are primarily found on government and tribal holdings (JBLM YTC, Hanford Reach National Monument and Yakama Indian Nation lands) and may represent the only sites suitable for species requiring extensive areas of continuous shrub-steppe (Dobler et al. 1996).

Upland vegetation communities on the installation consist of a mosaic of native and non-native grasslands and a variety of shrubland communities often composed of several species of Sagebrush (*Artemisia*). The intricate mosaic of these plant communities is the result of complex soil patterns, topography, precipitation, and past and current land uses. Historic and present day causes of disturbance to vegetation on JBLM YTC include grazing, conversion of land to agricultural uses, fire, construction, road building, the deliberate and inadvertent introduction of non-native species, and maneuver training exercises. Disturbance reduces native plant species cover and diversity, changes species composition and structure, and increases the likelihood of invasion by non-native species (Rickard et al. 1988). Native bunchgrasses and native forbs are particularly vulnerable to disturbances and have decreased dramatically in most portions of the shrub-steppe in Washington.

Within the proposed project area, vegetation consists primarily of a Stiff sagebrush-Sandberg's Bluegrass (*Artemisia rigida-Poa secunda*), habitat type typical of shallow rocky soils. Additional common species occurring in the area include *Allium robinsonii, Balsamorhiza hookeri, Astragalus purshii, Lomatium gormanii,* and *Erigeron species.* Given the nature of the soils and vegetation community present on the proposed site the risk of fire is low compared to deeper soils areas.

3.6.1.2 Riparian Vegetation

Riparian zones are associated with ponds, springs, and perennial and intermittent streams and provide a variety of critical ecosystem functions, including providing habitat for wildlife, fish and plant species, improving flood control, and trapping sediment. Although riparian areas comprise only a fraction of the total land area at JBLM YTC, they have a much higher plant and animal species diversity and biomass per unit area. Higher species diversity can be attributed to riparian habitat's location within the narrow zone between aquatic and terrestrial ecosystems (Youngblood et al. 1985). This interface allows species of both aquatic and terrestrial habitats to occupy and utilize this habitat. Riparian habitats are especially important to wildlife when they are adjacent to relatively less productive habitats such as shrub-steppe, steppe, and deserts (Bock et al. 1992).

Riparian habitat is limited geographically and is vulnerable to loss and degradation through human activities and land uses. In the arid and semi-arid regions of the West, riparian habitat is a resource of equal or greater value than wetlands of the East, Midwest, and South (Kusler 1985). Various causes (e.g., urbanization, flood control and grazing) have lead to the destruction of riparian habitat in 20 states west of the Mississippi River (Kusler 1985). Since the arrival of settlers in the early 1800s, at least 50% and as much as 90% of riparian habitat in Washington has been lost or extensively modified (Knutson and Naef 1997). On JBLM YTC, riparian areas have sustained repeated damage from livestock grazing prior to 1995 and from impacts associated with military training (e.g., fire, cross-country maneuver and poor road design) since the 1940s. Natural events, such as periodic flooding from high precipitation events, also impact

riparian habitat. Riparian habitat is in a constant state of change, with newly created habitats shifting over time as point bars are created and eventually eroded away as streams change position (Davis et al. 1996). Protecting riparian habitat may yield the greatest gains for fish and wildlife across the landscape while involving the least amount of area (Knutson and Naef 1997).

Riparian vegetation is primarily dominated by woody shrubs and trees such as black cottonwood (*Populus baslimifera var. trichocarpa*), water birch (*Betula occidentalis*), white alder (*Alnus rhombifolia*), quaking aspen (*Populus tremulolides*), several species of willow (*Salix*), Wood's rose (*Rosa woodsii*), mock orange (*Philadelphus lewisii*), and species of currant (*Ribes*). Riparian communities are also composed of a variety of graminoids including species of rush (*Juncus*), sedge (*Carex*), bulrush (*Schoenoplectus*), bluegrass (*Poa*), and wildrye (*Leymus*). Herbaceous species include species of horsetail (*Equisetum*), cattails (*Typha*), and goldenrod (*Solidago*). The proposed project site does not contain riparian habitat as characterized by the description above, but rather consists entirely of a Stiff sagebrush-Sandberg's Bluegrass (*Artemisia rigida-Poa secunda*) habitat type that is typical of shallow rocky soils and upland sites.

3.6.2 Wildlife/Fish

Johnson and O'Neal (2001) identified 651 species of wildlife that reside in the State of Washington, 300 of which inhabit the arid and semi arid shrub-steppe region of the Columbia Basin. On JBLM YTC there are approximately 246 species of wildlife and 10 to12 species of fish that either occur or are expected to occur based on known ranges and habitat preferences. With such an array of fish and wildlife species, a combination of both coarse- (general) and fine-filter (species-specific) habitat management approaches are used on JBLM YTC. Habitat is fundamentally linked to the distribution and abundance of species and underlies explanations of the factors, patterns, and processes that support fitness of wildlife at individual, population, and community levels, as well as their continuing evolution (Johnson and O'Neil 2001). Although a coarse-filter approach meets the needs of most species by providing a mosaic of habitats, some species with status concerns require fine-filter management.

Within the proposed project area, wildlife habitat consists of a Stiff sagebrush-Sandberg's Bluegrass (*Artemisia rigida-Poa secunda*) habitat type typical of shallow rocky soils or lithosols. The habitat associated with the proposed project site is relatively intact with little disturbance from fire given its lack of contiguous fuels. Wildlife species diversity is generally related to the structural complexity of dominant vegetation so it is not surprising that the diversity of wildlife species associated with lithosol areas is lower than that typical of structurally more complex deeper soils shrub-steppe habitat types. Wildlife species known or suspected to occur at this site include Least chipmunk, Great Basin pocket mouse, Deer mouse, Sagebrush vole, Coyote, Elk, Mule deer, Chukar, Horned lark, Short-horned lizard, Sagebrush lizard, gopher snake, and Western rattlesnake.

3.6.3 Threatened and Endangered Species

There are several species of fish, wildlife, or plants that are of management concern for JBLM YTC due to their current or potential federal status under the Endangered Species Act (ESA) and/or the Bald and Golden Eagle Protection Act (Table 3-1). This list was developed in consultation with U.S. Fish and Wildlife Service (USFWS) and National Oceanic and

Atmospheric Administration (NOAA) Fisheries web-based resources and review of species and habitat lists contained in recent Biological Assessments (representing Section 7 ESA informal consultation with regulatory agencies).

Table 3-1. Endangered, Threatened and Known Candidate Species at JBLM YTC.

Common Name	Scientific Name	Status	Critical Habitat Present on JBLM YTC
Bald Eagle	Haliaeetus leucocephalus	Delisted Taxon—Recovered	N/A
Columbia River DPS Bull Trout	Salvelinus confluentus	Threatened	No*
Upper Columbia River Spring Run Chinook ESU	Oncorhynchus tshawytscha	Endangered	No*
Upper Columbia River Steelhead ESU	Oncorhynchus mykiss	Endangered	No*
Middle Columbia River Steelhead ESU	Oncorhynchus mykiss	Threatened	No*
Ute ladies'-tresses	Spiranthes diluvialis	Threatened	No
Greater Sage-grouse Columbia Basin DPS	Centrocercus urophasianus	Candidate**	N/A
Umptanum Wild Buckwheat	Eriogonum codium	Candidate**	N/A
Northern Wormwood	Artemisia campestris ssp. Borealis var. wormskioldii	Candidate**	N/A

*Critical habitat is designated for these species but JBLM YTC is excluded from designation.

**Only Candidate species that have been analyzed in past Biological Assessments and are known to occur on or adjacent to JBLM YTC with potential for impacts from the proposed action are included.

3.6.3.1 Wildlife/Fish

Bald Eagle

On July 28, 2007, the U.S. Fish and Wildlife Service removed bald eagles that inhabit the lower 48 states from the Federal list of Endangered and Threatened Wildlife (i.e., protections under the ESA) due to the species meeting or exceeding established recovery goals throughout its range. However, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, and will therefore be included in this analysis.

Populations of breeding, wintering, and migratory bald eagles occur throughout Washington State. No known nesting occurs on JBLM YTC as suitable habitat does not currently exist, however bald eagles have successfully nested adjacent to the installation along the Yakima and Columbia Rivers. The nearest known nest site to the proposed project area is located approximately 3 km east at Getty's Cover on the Columbia River.

Portions of the installation contain suitable habitat for wintering and migrating bald eagles that frequent the installation from October through late April. Suitable habitat for migrating and wintering bald eagles consist of diurnal perches adjacent to abundant sources of prey and nocturnal roost areas relatively free of disturbance. Wintering bald eagles found on JBLM YTC forage off the installation primarily along the Wanapum and Priest Rapids Reservoirs. Wintering eagles frequenting the Columbia River have been known to roost nocturnally at several sites on the installation, including Hanson Creek, Borden Springs, and historically Alkali Canyon. The closest known nocturnal roosts to the project area are located along Hanson Creek some 10-12 km to the south and consist of individual and small stands of mature size cottonwood trees. Diurnal roosts used by nesting and wintering birds are located as close as 3 km to the east along the Columbia River.

Bull Trout

The USFWS designated the Columbia River Distinct Population Segment (DPS) of bull trout as threatened on June 10, 1998 (63 Fed. Reg. 31647). The Columbia River bull trout DPS consists of all populations in the Columbia Basin, which includes four major stocks: the Yakima; Wenatchee; Entiat; and Methow Rivers. These rivers contain 39 subpopulations recognized by the Washington Department of Fish and Wildlife (WDFW 1998) or alternately, 16 subpopulations as recognized by the USFWS. Bull trout are thought to be extirpated from two streams within the Columbia Basin: Satus Creek and Hanford Reach of the mainstem Columbia River. Of the 16 subpopulations recognized by USFWS, 10 are considered to be at risk of extinction (63 Fed. Reg., 31651).

Factors contributing to the decline of bull trout in the Columbia Basin are similar to those affecting salmon, but also include additional elements. Since bull trout are less tolerant of higher water temperatures and sediment loading, they have been affected to a greater degree by logging practices, channelization, water diversions, mining, and grazing practices that have degraded riparian communities. Hydropower and storage dams have hindered normal migration patterns for fluvial and adfluvial populations. Bull trout are highly susceptible to capture by anglers because of their aggressive nature. As road networks have expanded and angler access has increased, bull trout populations have declined. Finally, bull trout will interbreed with brook trout, resulting in sterile hybrids. In the past, brook trout were planted widely in the Columbia Basin and elsewhere throughout the west.

Bull trout in the Columbia Basin DPS spawn in September and sometimes into mid-October, depending on the subpopulation. Variations in timing likely follow temperature patterns in the various tributaries. Movement into spawning areas is not well documented but would vary between resident, fluvial, and adfluvial type fish and habitat constraints in the various drainages. In general, movement toward spawning areas occurs in late summer. Spawning areas are characteristically cold, clean reaches within complex habitat with large woody debris, preferentially with groundwater influence.

Although there has been some mention of potential bull trout spawning and rearing habitat on JBLM YTC (Bottorff and Swanson 1993), this is highly unlikely. The streams on JBLM YTC are not cold enough for long enough periods of time to provide suitable spawning and rearing habitat. In addition, most streams do not have continuous flow from the installation to either the Yakima or Columbia Rivers during the time in which bull trout would potentially be spawning or migrating to spawn. However, bull trout could forage in streams on JBLM YTC for short periods of time when temperatures are tolerable and flows are more suitable. If there is any use, it is likely to be short-term in nature and located at the mouths of streams during the colder months when streams may provide more tolerable temperatures and dependable flows. Although some suitable foraging habitat may be found in off-installation portions of Johnson Creek and select areas of Hanson and Alkali Creeks on JBLM YTC, bull trout have never been documented on JBLM YTC. There is no suitable habitat for bull trout within the proposed project area, as the site is characterized by upland vegetation communities.

Upper Columbia River Spring Chinook Salmon ESU

NOAA Fisheries listed the Upper Columbia River Spring Chinook Salmon Evolutionary Significant Unit (ESU) as endangered under ESA on March 24, 1999, and endangered status was reaffirmed on June 28, 2005. The decline in abundance of upper Columbia River stocks began in the late 1800s due to over-harvest, hydropower development, creation of water storage reservoirs, water diversions, logging, mining, and domestic livestock grazing. In particular, Chief Joseph and Grand Coulee Dams on the Columbia River block access to a substantial portion of the historic range of this ESU. The upper Columbia and upper Snake tributary stocks are thought to be among the first to be decimated by the early fishery present on the Columbia River at the turn of the nineteenth century.

Included in this ESU are all naturally spawned populations occurring in all accessible river reaches in the Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Nine Upper Columbia spring Chinook stocks occur in this ESU. The Upper Columbia spring Chinook salmon ESU includes all wild stocks upstream of the Wenatchee River confluence, and does not include the Yakima River system. All nine stocks are considered depressed due either to chronically low escapement, a long-term negative trend, or a short-term severe decline in escapement. All stocks are native with wild production, except for the Methow stock, which has composite production because of hatchery stray introgression.

Upper Columbia Chinook have a stream-type life history pattern, with an 18-month freshwater rearing period prior to migration to the ocean. Spring Chinook in the upper Columbia begin to smolt and initiate migration in April, and may migrate in an early transitional state (not fully

smolted). They migrate past JBLM YTC from mid-April to early June as indicated from fish trapping records collected at Priest Rapids Dam. Wild spring Chinook in the Columbia River are mixed in with millions of hatchery spring Chinook released from facilities upstream.

Suitable habitat for spring Chinook is dependent on water quality, passage, water velocity and, to a lesser extent, food availability. Chinook salmon have the lowest high-temperature threshold in the genus *Oncorhynchus*. Of the salmonids evaluated in this document, only bull trout require cooler water. Turbidity and sediment transport is an issue as it relates to food production. Gravel, cobble, and boulder substrates produce benthic macroinvertebrates when not embedded with sand or silt particulates. Chronic turbidity can also hinder the photosynthetic basis of the food chain. Passage of downstream migrants as impacted by water velocity and dam design is a limiting factor affecting salmon stocks throughout the Columbia River system.

JBLM YTC is excluded from Critical Habitat designation for Upper Columbia spring-run Chinook salmon (Proposed Rule 2004) pursuant to the National Defense Authorization Act for Fiscal Year 2004 (Public Law No. 108-136). However, the Columbia River immediately adjacent to the installation is designated critical habitat for this ESU. The reach of Columbia River adjacent to JBLM YTC is a migratory corridor for these fish and individual residence times can be measured in days rather than weeks. Upriver runs start passing JBLM YTC in early May and extend through August, based on counts at Priest Rapid Dam. Spawning occurs from late August to mid-September and all documented spawning areas in this ESU are upstream of JBLM YTC and the proposed project area. There is no suitable habitat for Upper Columbia spring-run Chinook salmon within the proposed project area, as the site is characterized by upland vegetation communities.

Upper Columbia River Steelhead Trout ESU

NOAA Fisheries listed this ESU as endangered on August 18, 1997. The status was upgraded to threatened on January 5, 2006, and was subsequently reinstated to endangered in June 2007 per a U.S. District Court decision. The cause of decline in abundance of Upper Columbia steelhead mirrors that of Chinook, with the exception of commercial fishery. Commercial harvest of steelhead was never very large, reflecting the fact that steelhead populations have never been as large as Chinook populations.

Three Upper Columbia River ESU steelhead stocks are present in the Columbia River adjacent to the installation and include the Wenatchee, Entiat, and Methow/Okanogan populations. As with Chinook salmon, steelhead from the upper Columbia River are transient residents in the Wanapum and Priest Rapids Reservoirs of the Columbia River migrating past as either adults or juveniles. All three stocks are considered depressed, mixed stock, and are maintained with composite production.

Steelhead are the anadromous form of rainbow trout. Steelhead move to the ocean beginning in April and continue through June, with a peak around mid-April. Unlike other salmonids, adult steelhead usually survive spawning and migrate as individuals, rather than in schools (Page and Burr 1991). Spawning typically occurs in March, but may extend into July. The eggs incubate from late March through June, and fry may emerge from late spring to August. However, steelhead found near JBLM YTC in both the Yakima and Columbia Rivers spawn from February to May, and fry emerge in May and June (Cummins 1999). Out-migration of smolts occurs from

March to early June, with smolts having spent from one to seven years in freshwater (the average is two to three years).

Run timing of adult spawners is generally the same for the stocks listed above with small differences due to their position in the system. Steelhead pass by JBLM YTC from early June through mid-October as adults, entering natal rivers starting mid-July. Spawning occurs in tributary rivers from March through May. After rearing for two to three years (or more), steelhead smolts migrate downstream past JBLM YTC from mid-March through mid-May.

Habitat requirements for steelhead are essentially the same as for Chinook, except that they can use smaller tributaries for spawning and prefer higher-gradient stream reaches. Temperature tolerances are also somewhat higher. Steelhead trout prefer cool water below 21 degrees Celsius, but they can survive in waters from 0 to 26 degrees Celsius. They also require plenty of oxygen and can tolerate a wide range of salinities.

Johnson Creek (specifically, the segments downstream of JBLM YTC) contains both resident (rainbow trout) and steelhead (Rogers et al. 1989, Cummins 1999). As such, Johnson Creek is considered part of the Upper Columbia River Steelhead ESU. Several adults have been observed in the lower portion of this creek and are likely hatchery strays that have become naturalized over the years. Despite whether the fish observed in Johnson Creek were naturalized or not, it is certain they are not of Johnson Creek origin prior to 1967. Before the Wanapum Dam was constructed, Johnson Creek was physically separated from the Columbia River. It previously spilled out into a steep, porous alluvial fan of cobble deposited by the Missoula flood. The creek flowed below the ground surface through this formation before eventually connecting with the Columbia River. For the purpose of this analysis, naturalized steelhead that inhabit Johnson Creek, however few, will be considered part of the Upper Columbia River Steelhead ESU.

Habitat on JBLM YTC is excluded from Critical Habitat designation for Upper Columbia River steelhead (Proposed Rule 2004) pursuant the National Defense Authorization Act for Fiscal Year 2004 (Public Law No. 108-136). However, the Columbia River immediately adjacent to the installation is designated critical habitat for this ESU, approximately 3 km from the proposed project site. There is no suitable habitat for Upper Columbia River steelhead within the proposed project area, as the site is characterized entirely by upland vegetation communities.

Middle Columbia River Steelhead Trout ESU

NOAA Fisheries listed this ESU as threatened on March 25, 1999 and reaffirmed its threatened status on January 5, 2006. The Mid-Columbia ESU extends from the Klickitat River to the Yakima River, excluding the Snake River and including reaches of the Klickitat, Deschutes, John Day, Umatilla, Walla Walla, Yakima, and Columbia Rivers. The Yakima River is the only stock near JBLM YTC, as it is located adjacent to the installation's western boundary. The Yakima River flows into the Columbia River downstream of JBLM YTC.

Historically, the Yakima River steelhead run has been estimated to be approximately 10,000 fish (Busby et al. 1996). The current run size averages approximately 1,000 fish, with an escapement of about 800 wild fish. Stock status has been determined to be depressed because of chronically low spawner escapement. Within the Yakima Basin, five distinct populations have been identified. These include runs to Satus Creek, Toppenish Creek, Naches River, the mainstem

Yakima River between Rosa Dam and Wapato, and the mainstem Yakima River above Roza Dam.

The Yakima stock is a native, wild stock sustained by wild and artificial production. Causes for declines (in addition to the usual hydropower, habitat, hatcheries, and harvest problems in the Columbia basin) include passage at irrigation diversions, high temperatures/low dissolved oxygen, and a highly altered hydraulic regime (NWPPC 1990). Storage reservoirs are operated in concert with the water needs of an extensive irrigation program in the basin. This leads to an inverted hydraulic regime, with lower than optimal spring flow rates and excessive summer flow rates.

Run timing in the Yakima is bimodal, with an early migration entering the river from September through November. The later migration is from February through June. Spawning occurs from mid-February to late May. Information on emergence timing for the mainstem river is lacking, but occurs May through June in Satus and Toppenish Creeks and from June to August in the colder Naches system. Smolt out-migration at Prosser occurs from early March through mid-June, mostly as two-year-olds. The median date for passage at Prosser is April 30. Habitat requirements for Mid-Columbia steelhead are similar to Upper Columbia steelhead, as described above.

Critical habitat for the Mid-Columbia River steelhead ESU includes all tributaries known to support steelhead within the ESU boundary, the mainstem Columbia River downstream of the Yakima River, and the Columbia River estuary. Habitat on JBLM YTC is excluded from Critical Habitat designation for Mid-Columbia River steelhead (Proposed Rule 2004) pursuant the National Defense Authorization Act for Fiscal Year 2004 (Public Law No. 108-136). However, the Yakima River immediately west of the installation is designated critical habitat for this ESU and is located greater than 30 km from the proposed project site. There is no suitable habitat for Mid Columbia River steelhead within the proposed project area, as the site is characterized by upland vegetation communities and does not drain into the Yakima River.

Greater Sage-grouse

The Greater sage-grouse (*Certracercus urophasianus*) is a Washington State threatened species and a federal candidate species under ESA. This species is a candidate for federal listing due to a reduction in its range as a result of habitat conversion for development and agriculture and from intensive grazing and fire impacts. Suitable sage-grouse habitat consists of medium to dense sagebrush stands exhibiting a range of heights, as well as a variety of forbs and grasses (WDFW 1998). Sagebrush is an essential food for sage-grouse throughout the year and comprises 60 to 80 percent of the species' diet (Remington and Braun 1985). Sage-grouse on JBLM YTC tend to use habitat with slopes of less than 15 percent and areas where the dominant species are Wyoming big sagebrush, three-tipped sagebrush, and bluebunch wheatgrass (Livingston 1998). Shrubs provide nests with shelter from avian predators and weather elements while grasses provide shelter from ground predators and create a favorable microclimate (WDFW 1995). Critical periods of sage-grouse life history include lek attendance, nesting, and brood-rearing. Lek attendance is initiated in late winter/early spring and extends through mid-May. Nesting typically occurs March through May and brood-rearing extends through mid-June.

JBLM YTC supports one of two distinct populations still present in Washington and the largest and only population of sage-grouse occurring primarily on federally-owned land. These remaining populations are isolated from each other and larger contiguous populations located in the Columbia Basin and throughout the range of Greater sage-grouse. Populations of sage-grouse on JBLM YTC have been characterized by short-term fluctuations and have exhibited trends similar to those of statewide populations, with male sage-grouse numbers per lek decreasing over time (Livingston 1998). Annual surveys for leks (communal mating grounds) and lek counts have been conducted on JBLM YTC since 1989 to monitor trends and assess population status.

Nineteen known leks were monitored in 2011 and ten were found to be active. Two of the ten active leks were classified as major leks (i.e., ten or more male sage-grouse observed at least once during the season). In 2011 the population estimate for sage-grouse on JBLM YTC was 205 an increase from the previous two years.

Population declines in greater sage-grouse throughout Washington have resulted from large-scale removal of native vegetation for agriculture purposes, combined with reduced habitat quality caused by intensive grazing by livestock (WDFW 1997). Sagebrush removal using herbicides and fire have contributed to this decline as well (WDFW 1995). From 1960 to 1995 land on JBLM YTC was used for livestock grazing, which likely resulted in decreased habitat quality for sage-grouse. Indirect threats to Greater sage-grouse on JBLM YTC are habitat-related and are primarily from fire and military training activities. Fire is a threat because it kills big sagebrush, and repeated fires will make an area vulnerable to invasions by noxious weeds such as cheatgrass and knapweed. Following fire, natural re-establishment of sagebrush is slow (about 20 to 30 years; Britton and Clark 1985). With the loss and fragmentation of shrub-steppe, fire poses a significant threat to remaining Greater sage-grouse habitat in Washington. Furthermore, damage to soil and vegetation from vehicles and foot traffic associated with military training is a concern for sage-grouse and other wildlife.

JBLM YTC has established a Sage-Grouse Protection Area (SGPA), an area managed with an emphasis on protection and maintenance of this species and its habitat. The proposed project site is not located within the SGPA and does not contain suitable nesting/brood-rearing habitat for sage-grouse. There is no known sage-grouse use within this site and minimal documented use of TA 2, given the lack of large contiguous stands of big sagebrush and the presence of four existing power lines that isolate the project area from known core-use areas for sage-grouse.

3.6.3.2 Plants

Ute ladies'-tresses

The USFWS listed Ute ladies'-tresses as a federally threatened species on January 17, 1992 due to habitat loss and modification. Ute ladies'-tresses is a perennial, terrestrial orchid known to occur in eight states: Nevada, Utah, Colorado, Idaho, Washington, Nebraska, Wyoming, and Montana. In Washington, this species is known to occur in the north-central portion of the state (Okanogan and Chelan Counties; WDNR 2006). Ute ladies'-tresses grows in lowland areas at elevations ranging from 1,500 to 7,000 feet (457 to 2,134 m), usually abutting or near moderate gradient, medium to large streams and rivers. The plant is typically found in open riparian areas in the transition zone between mountains and plains. The species' microhabitat consists of grass-dominated openings in shrubby areas, often associated with beaked spikerush (*Eleocharis*

rostellata). This species depends on natural disturbance, growing in areas where early succession conditions are perpetuated or competition from other vegetation is restricted (USFWS 2000).

One key habitat features necessary for survival of Ute ladies'-tresses is saturated soil throughout the growing season, although it does not occupy areas constantly inundated with water. Riparian and wetland habitats that provide suitable habitat for Ute ladies'-tresses throughout its range have experienced impacts from urban development, stream channelization, water diversions and other watershed and stream alterations that degrade natural stream stability and diversity.

Ute ladies'-tresses was listed by USFWS as a species that may occur in Kittitas and Yakima Counties, Washington. Although potential habitat for this species may occur on JBLM YTC, Ute ladies'-tresses has not been documented on the installation and suitable habitat does not exist within the proposed project area.

Umptanum Wild Buckwheat

Umptanum wild buckwheat is a federal Candidate species with a Washington State status of threatened. As little information regarding this species exists, much of the following discussion on population trends, habitat, and threats to this species is provided from Washington Natural Heritage Program's Field Guide to Washington's Rare Plants (WNHP 2000). This endemic species is known from a single population located in Benton County in south-central Washington. It has been impacted in the past from wildland fire and is currently experiencing a declining trend in numbers. It is currently only known to occur on Umptanum Ridge, southeast of the installation. As Umptanum Ridge extends onto the installation, suitable habitat for this species may exist on JBLM YTC. However, numerous sensitive plant and vegetation surveys have never recorded its occurrence on the installation.

The known population southeast of the installation occurs at elevations ranging between 1100 and 1320 feet on flat to gently sloping microsites near the top of the steep, north-facing basalt cliffs overlooking the Columbia River. It is apparently restricted to the exposed top of one particular basalt flow (the Lolo Flow). Associated species include spiny hopsage (*Grayia spinosa*), grayball sage (*Salvia dorrii*), threadleaf scorpionweed (*Phacelia linearis*), winged cryptantha (*Cryptantha pterocarya*), small evening primrose (*Camissonia minor*), and cheat grass (*Bromus tectorum*). The species' restriction to exposures of one particular basalt flow may suggest a dependent relationship with the chemical composition of that flow. The relatively high water-holding capacity of the substrate also has been suggested as an important factor. Overall vegetation at these sites is quite low in comparison to the adjacent shrub-steppe vegetation communities that are characteristic of the Columbia Basin. Suitable habitat for this species does not exist within the proposed project area.

Northern Wormwood

Northern wormwood is a state endangered species and a federal candidate for listing under the Endangered Species Act. It is a small perennial in the composite family (Asteraceae) occurring within the Columbia Basin physiographic province. It is a regional endemic species only known from two widely disjunct locations along the Columbia River; one each in Klickitat and Grant Counties; and historically in adjacent Hood River and Wasco counties, Oregon. The Grant County population occurs near the town of Beverly on the eastern shore of the Columbia River and is the closest population to JBLM YTC. At this site, northern wormwood occurs on partially

vegetated, stabilized cobble-sand peninsulas and gravel bars. Plant surveys on JBLM YTC have never documented this species occurring on the installation and recent surveys associated with the relicensing of Columbia River dams reported only the known population.

Northern wormwood habitat is characterized by arid climates that generally support shrub-steppe vegetation. This species grows on basalt, compacted cobble, and sand on relatively flat terrain. The taxon is within the floodplain of the Columbia River and presumably withstands occasional short periods of inundation. As described, habitat for this species is not typically susceptible to fires. This species begins to flower in early April, with the majority of individuals flowering by mid-April. Individuals with flowers are occasionally seen throughout the season, though the length of flowering time for individuals is not known. Flowering in April may help keep the taxon reproductively isolated from other members of the species complex that flower later. Suitable habitat likely exists on both shores of the Columbia River and current threats to the known population include recreational use (vehicle compaction) and weed invasions. Flooding may pose a threat as well, due to the limited population size and limited habitat availability. Dam construction along the river is responsible for most of the habitat loss. Suitable habitat for this species does not exist within the proposed project area.

3.7 Infrastructure

The Cantonment Area is the primary developed area within JBLM YTC. It contains housing, dining, exercise, health services, administrative, and support facilities. Thirty-five barracks are available to trainers as temporary housing during training events. Dining facilities are operated by units as needed, but are closed during non-training periods.

Three discrete Class A potable water systems service JBLM YTC personnel: Pomona (serving the Cantonment Area), Yakima Research Station (YRS), and the Multi-Purpose Range Complex (MPRC). Non-potable water is provided via Class B wells and several developed springs (Gray & Osborne, Inc. 2003).

Wastewater generated within the Cantonment Area is handled at the JBLM YTC Wastewater Treatment Plant. Following primary and secondary treatment, water is discharged to the Yakima River. Buildings found in the range areas of JBLM YTC include small compounds at the MPRC, Badger Pocket Assembly Area, and the Doris Site.

There are approximately 1,648 miles of roads on JBLM YTC classified into five groups: primary, secondary, and light duty all-weather, unimproved, and trail. The majority of roads across the installation are classified as either unimproved or trails, which are not actively maintained. The all-weather or maintained road system consists of approximately 516 miles of road. North Doris Road, leading to the UOV site, is classified as a secondary all-weather road and is actively maintained.

Chapter 4 Environmental Consequences

The following examines the potential environmental impacts of the Proposed Action and the No Action Alternative. For ease of presentation and comparison, the environmental consequences are grouped by the same environmental disciplines presented in Chapter 3, *Affected Environment*.

Council on Environmental Quality (CEQ) regulations for implementing NEPA define types of impacts that can result from actions. Direct impacts are caused by an action and occur at the same time and place as that action. Effects that are caused by an action but occur later in time or are farther removed are indirect impacts. A cumulative impact is an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (CEQ 40 CFR Sec. 1508.7). Cumulative impacts will be discussed separately in Chapter 5.

This chapter includes discussion of criteria used to determine the significance of impacts to each resource area (significant, significant but mitigable to less than significant, less than significant, beneficial, or no impact). Significance is considered in terms of context and intensity (CEQ 40 CFR Sec 1508.27). Context refers to the setting and duration in which an impact would occur, and intensity refers to the severity of an impact (negligible, minor, moderate, or major). A more detailed discussion of significance, context and intensity is provided in Chapter 10, *Glossary and Acronyms*.

4.1 Air Quality

Impacts to air quality would be considered significant if the proposed action would:

- Increase ambient air pollutant concentrations above any NAAQS;
- Interfere with or delay timely attainment of NAAQS; or
- Produce emissions of hazardous air pollutants exceeding state or federal emission levels at the installation boundary.

Proposed Action Alternative

Impacts associated with construction would be temporary and minor, primarily associated with fugitive dust and emissions produce by construction vehicles and generators. The construction period will last no more than six weeks and best management practices (BMPs) will be used to minimize dust production. The contractor would be required to file a Dust Control Plan with the YRCAA and JBLM YTC Environmental Division for review and approval prior to starting construction. Construction plans do not include the permanent installation of any new or modified air emission sources.

Operation of a UOV would generate particulate matter (fugitive dust) and emissions from training and vehicles. However, these impacts would be would be negligible and short-term in nature and occur at or below levels already experienced from training operations. Overall, no impacts to air quality are expected from operation and training activities.

The U.S. Environmental Protection Agency "general conformity" rule (40 CFR Subpart W, 51.850) requires a review of proposed federal actions that may affect air quality in nonattainment

and maintenance areas. The proposed action is located is located outside of the City of Yakima maintenance area for PM_{10} and will not require conformity analysis.

No Action Alternative

Since no new UOV facilities would be built under the no-action alternative, there would be no short- or long-term impacts to current air quality.

4.2 Geology, Topography and Soils

Impacts to geology topography and soils would be considered significant if the proposed action would:

- Impair the ability of the Army to sustain land resource to maintain effective training lands and facilities;
- Result in loss of soil that exceeds the amount of soil loss at which a medium for plant growth can be maintained; or
- Conflict with existing Federal, state, or local laws pertaining to this resource area.

Proposed Action Alternative

Overall impacts to geology, topography and soils as a result of the proposed action would be less than significant. Construction procedures would include grubbing and hardening of sites where UOV structures would be installed and where high traffic would occur. The hardening provides a stable surface on which to place the UOV features, but also provides a surface that is resistant to transport of sediments away from the site during runoff events. Additionally, existing BMPs would be applied as needed during construction and the training/operation phase to maintain the site in a manner that prevents soils from being displaced.

Minor construction-related impacts (e.g., compaction and reduced permeability) would occur at and around the site as a result of the operation of construction vehicles and equipment. Duration of the impacts would be short-term, since site rehabilitation will occur immediately following construction and full recovery (to the extent that soil stability would be fully returned to sites where disturbance occurred) would be expected within the first two years. Long-term construction impacts would result from the installation of permanent features within a relatively small (400 feet by 400 feet) footprint. Since site hardening will occur in areas of high traffic, and storm water best management practices will be put in place to prevent soil from eroding from the site during construction and operation maintenance phases, the effects of residual herbicides used to prevent vegetation/weed growth within the developed compound is not expected to impact resources outside the footprint of the hardened area. Placement of the herbicide below the gravel layer will not expose the herbicide to erosive effects of stormwater runoff events. Due to the limited size of the area affected by construction activities and the generally stable properties of the soils (low erodibility factor), the short- and long-term impacts to soils would be minor.

Minor impacts to soils would be expected from recurring use of the site during operations. Specifically, minor compaction and erosion of soils could occur from soldiers accessing the site on foot during training operations, or from maintenance staff accessing the area to conduct routine maintenance activities.

No Action Alternative

Since no new UOV facilities would be built under the no-action alternative, there would be no short- or long-term impacts to current condition of geology, topography or soils.

4.3 Surface Water Quality

Impacts to surface water resources would be considered significant if the action resulted in applicable Federal and state regulatory limits for surface water quality to be exceeded.

Proposed Action Alternative

Overall impacts to surface water as a result of the proposed action would be negligible. The analysis that led to this conclusion was based on evaluation of anticipated impacts associated with short- and long-term construction and operation activities.

Approximately half of the UOV site drains north (Sagebrush Creek) and half drains south (Middle Creek) from the ridge-top location. Annual precipitation for the area is approximately six to nine inches annually, and slopes at the site are fairly uniform and less than five percent. Due to the site's stable and very shallow soils, low slope gradient, low annual precipitation, and distance to mainstem drainages (Sagebrush and Middle Creeks), the potential for increased transport of suspended sediments from this site is very low. Surrounding vegetation is also very stable, which provides additional abilities to capture and retain suspended sediments within the area.

Short term construction impacts would occur at and around sites where permanent and temporary features are installed resulting from indirect impacts to vegetation and soil resources. There are no anticipated direct impacts to surface water due to construction activities. Indirect impacts would result from runoff events that contain higher levels of suspended sediments due to the removal of vegetation and compaction of soils during construction. Standard best management practices (BMPs) would reduce the potential for such effects through placement of temporary barriers (e.g., silt fence, straw wattles, sediment logs, and other sediment trapping devices) to filter runoff water before it exits the construction areas (as a note, applicable BMPs would be identified and included within the Construction Storm Water Pollution Prevention Plan for this project). In addition, long term impacts related to construction would be reduced through implementation of site rehabilitation activities that establish desirable vegetation (where feasible) and stabilize sites where ground disturbing activities occur. Analysis therefore concludes that due to the limited scope of total area where ground disturbing activities would remove vegetation and compact soils, the limited slope of the area, low annual precipitation, use of appropriate BMPs during construction, and follow up site rehabilitation, an overall negligible effect to surface water would occur as a result of construction-related activities.

Operation and maintenance impacts to surface water quality would result through soil compaction and/or loss of vegetative cover. Vegetative cover provides protection to soils to interrupt the channelization and overland flow of water that causes accelerated erosion and increase of suspended sediments in runoff waters. Soil compaction exacerbates this problem by preventing the soil from absorbing moisture to reduce or limit the amount of runoff water. Operational activities that may cause loss of vegetation or soil compaction are limited. The site is limited to pedestrian use by training units only (no off-road use in the area is planned), and

impacts due to foot traffic are expected to be very low. Periodic access to the sites by maintenance personnel will not result in long-term effects on soil or vegetation resources that would increase concentrated flow of runoff waters. Analysis therefore concludes that the construction and operation impacts would be negligible and not exceed the threshold for significance.

No Action Alternative

Overall impacts to surface water resources as a result of the no action alternative would be negligible.

Since no new facilities would be built, there would be no short or long term impacts associated with construction activities. No additional ground disturbing activities would occur that would result in vegetation removal or soil compaction that contributes to degraded surface water conditions within the affected area. Effects to water resources from the no action alternative would result from the ongoing land use activities that periodically occur in the affected project areas. Therefore, overall effects would be negligible.

Since no new UOV facilities would be built under the no-action alternative, there would be no short- or long-term impacts to current condition of surface water quality.

4.4 Wildland Fire Management

Wildland fire is a major concern on JBLM YTC due to potential impacts to human health and safety on and off the installation. Fire also has the potential to directly or indirectly impact facilities and infrastructure, sensitive biological and cultural resources, air quality, soils and military operations. JBLM YTC is susceptible to wildland fires due to the presence of easily ignitable light fuels across the installation and the arid climate of the region. The threshold for significance for wildland fire management is based on the potential of the action to:

- Adversely impact wildland fire risk (i.e., increase the rate at which wildland fires would occur); or
- Adversely impact the ability of JBLM YTC to manage wildland fires (i.e., increase the potential for fires to occur outside of established containment areas).

There are five primary causes of fire at YTC: live fire; pyrotechnics; operation of vehicles and equipment; natural causes (e.g., lightning); and other human sources of ignition not otherwise described. Lightning is the least controllable and is wholly dependent on weather conditions; however, the incidence of lightning caused fires at YTC has been historically low. Live fire, pyrotechnics and movement of vehicles are activities that are most likely to cause fires at JBLM YTC. However, these activities can also be effectively managed to reduce the risk of wildfire. The wildland fire danger risk assessment contained in the Integrated Wildland Fire Management Plan (IWFMP, YTC 2004) is an effective tool for managing such risk. The risk assessment considers current fire danger conditions (e.g., weather, fuels, adjective danger rating), proposed activity, pre-suppression actions (e.g., pre-burning of areas), and availability of fire suppression assets on site.

Proposed Action Alternative

The location of the site in an area with rugged terrain with limited access would hamper ground fire suppression team efforts; however, aerial suppression assets are readily supported by the nearby Columbia River. Fuel loading at the site is low due to the presence of lithosol vegetation communities (which are typical of ridge-top areas with shallow soil types), and the features of the UOV will be constructed of non-flammable materials (e.g., metal and concrete). Overall analysis found that expected impacts to wildland fire management would not exceed significance thresholds at the proposed site.

Potential wildland fire impacts associated with construction activities are short-term in nature, and result from the operation of vehicles and equipment and other human sources of ignition (e.g., smoking). All of these sources are controllable through existing administrative policies (e.g., smoking policy), and operational procedures that reduce increased risks for ignition (e.g., hot work permits for welding and cutting, and availability of standby equipment if conditions warrant). Wildland fire risks to human health during construction would be based upon whether sources of ignition and suitable fuels exist that would represent a danger to workers during construction. While effective policies, procedures, and controls are in place to prevent fires during such conditions, there remains a possibility of accidental ignition from unknown sources. In the event that a fire would ignite, it would pose a potential risk to construction workers that have not been properly trained to perform wildland fire suppression. Therefore, effects of such ignition could harm construction workers. However, due to low fuel loading, overall potential effects of wildland fire due to construction activities for this action are negligible at this site, and less than significant.

During training operations, live fire will be prohibited and vehicles will remain on the adjacent road, thus reducing the potential for fires to start from these common sources of ignition. Furthermore, the use of pyrotechnics during training operations will be limited to further reduce potential sources of ignition. Standard best management practices and operational constraints would be used to limit the risk of ignition from pyrotechnic devices (e.g., pre-incident planning and emplacement of barrels in dedicated cleared areas to contain pyrotechnic devices). However, in spite of the reduced risk of ignition through operational procedures, low fuel loading, and non-flammable construction materials, a low risk that a wildland fire could be started does remain. However, such fires could be predicted, controlled and suppressed rapidly due to low fuel loads. Further, the existing road network around the site would serve as an effective firebreak and nearby water resources are available (suppression water located approximately three kilometers to the southeast and the Columbia River approximately three kilometers to the east).

Maintenance activities at the site may entail a low level risk of wildland fire ignition due to periodic need for vehicles to transport operation and maintenance materials into the sites. However, these risks would be reduced through similar operational procedures employed during construction that are designed to ensure that ignition and suppression capabilities are available as conditions warrant. Therefore, the impacts that training and maintenance operations would have on wildland fire management would be negligible at this site, and less than significant.

No Action Alternative

Since no new UOV facilities would be built under the no-action alternative, there would be no short- or long-term impacts to current condition of wildland fire.

4.5 Cultural Resources

Impacts to cultural resources would be considered significant if the proposed action would:

- Permanently restrict access of tribal members to traditional cultural properties;
- Appreciably increase safety risks to tribal members using traditional cultural properties;
- Result in a long-term loss or degradation of plant or animal populations of traditional cultural importance to Native Americans; or
- Diminish the integrity of a historic property or archaeological site such that it was no longer eligible for listing in the National Register of Historic Places.

Proposed Action Alternative

The proposed action would result in no overall impacts to historic and cultural resources at JBLM YTC.

Construction of the UOV facility at the proposed project site would have no direct or indirect impacts to any known cultural or historic resources in the area. The site was surveyed by JBLM YTC Cultural Resource Program personnel and no sites were identified in the vicinity of the proposed project area.

No impacts to cultural and historic resources would result from the training and operation of the UOV facility. The project site has been surveyed and is not located near any known historic or cultural sites. Training at the UOV site would be dismounted and maintenance activities would be limited to the footprint of the site. While high elevation points in a two to five-kilometer radius around the UOV site may be used periodically as overlook sites, these areas have also been surveyed and contain no known historic and cultural resources.

No Action Alternative

No impacts to historic or cultural resources would occur under the no-action alternative. No structures would be built, and therefore no construction or maintenance impacts would occur. Known historic and cultural sites are protected from training activities through existing management policies, and training operations would occur outside of areas with known cultural and historic resources.

4.6 Biological Resources

4.6.1 Vegetation

Impacts to vegetation would be considered significant if the proposed action resulted in:

- Long-term loss or degradation of unique plant communities;
- Measurable reduction in diversity within unique plant communities;
- Mortality of federally listed or proposed/candidate plant species; or
- Local extirpation of rare or sensitive species not currently listed under the Endangered Species Act.

4.6.1.1 Upland Vegetation

Impacts to upland vegetation resources are dependent on the type and location of activity proposed and the existing condition of those resources within the proposed sites. Ground disturbing activities have potential to change upland vegetation through direct impacts (e.g., destruction through trampling or clearing) and indirect impacts (e.g., introduction of noxious weeds and manipulation of site conditions). Native stands with high integrity of composition and structure have a greater potential to be adversely impacted than previously disturbed sites displaying modified stand characteristics.

Proposed Action Alternative

Construction of the UOV will result in direct, less than significant impacts to upland vegetation. The footprint of the site will be cleared and graded prior to emplacement of the UOV structures and courtyard walls, and the areas directly beneath the structures will be hardened. However, while upland vegetation loss will be permanent, these impacts do not meet any thresholds for significance. Given the site's size (less than four acres) and its location adjacent to an existing improved road (which has already reduced the site's potential to maintain intact upland vegetation), the impacts to upland vegetation are minor.

Operations and maintenance of the site will result in indirect impacts to upland vegetation resources. The areas used during operations will have already been cleared of vegetation during the construction phase. However, the use of the site for training and maintenance may increase the potential for fires to occur and for noxious weeds to spread. However, these impacts would be minor and less than significant.

The overlook sites would experience some level of impacts to vegetation resources through recurring use that could negatively impact existing species composition and structure. These effects increase the potential for noxious weed species to be introduced to those sites, necessitating periodic inspection of the sites to identify need for implementation of control measures.

No Action Alternative

Since no new UOV facilities would be built, there would be no short or long term impacts associated with construction, operation or maintenance activities. No additional ground disturbing activities would occur that would result in upland vegetation removal within the proposed project areas. Any effects to upland vegetation from the no action alternative would result from the ongoing land use activities that periodically occur in the same general area, essentially those mentioned as indirect impacts above.

4.6.1.2 Riparian Vegetation

Proposed Action Alternative

There is no riparian vegetation present within the proposed site and there is none that is expected to be impacted from the operations of the UOV as proposed. As such, no direct, indirect, or cumulative impacts to riparian vegetation would occur under the proposed action alternative.

No Action Alternative

Since no new UOV facilities would be built, there would be no short or long term impacts to riparian vegetation associated with construction, operation or maintenance activities. Any effects to riparian vegetation from the no action alternative would result from the ongoing land use activities.

4.6.2 Wildlife/Fish

Impacts to wildlife would be considered significant if Army actions resulted in:

- Substantial, long-term (>2 years) reduction in the quantity of habitat critical to the survival of local populations of common wildlife species;
- Injury or mortality to common wildlife species, such that species populations would not recover within 2 years;
- Reduction in the population, habitat, or viability of a species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing;
- Any loss of critical habitat, or nesting habitat critical to birds under the Migratory Bird Treaty Act, in the project area; or
- Mortality to a listed species or species proposed for listing that could result in a "take" under the Endangered Species Act.

Impacts to fish and other aquatic resources would be considered significant if the proposed action resulted in:

- Mortality of a federally listed species or species proposed for listing;
- Loss of designated critical habitat;
- Long-term impact on populations and/or habitat of federal or state species of concern that would result in a trend toward endangerment or the need for federal listing;
- Long-term loss of habitat for single or multiple common aquatic species; or
- Creation of a fish barrier that would prevent fish migration.

Impacts on fish and wildlife species can be either direct or indirect. Direct impacts include changes in a species presence, survival, or productivity as a result of some action. Temporary displacement and/or abandonment from an area due to disturbance, or injury/death associated with encounters with construction equipment are examples of direct impacts to species. Indirect impacts include changes in habitat characteristics or quantities/quality of habitat resulting in a response in species presence, survival, or productivity. Direct and indirect impacts can exhibit either positive or negative effects. The degree to which a species is impacted varies with each individual animal, species-specific habitat requirements, and sensitivity to disturbance and habitat change.

The conservation status of the species also aids in determining the level of impact, as rare species that are habitat specialists are assumed to be more sensitive to impacts than relatively common species that are habitat generalists. Additional management emphasis, such as for those species of birds that are protected under the Migratory Bird Treaty Act, may also influence the level of impact that is determined to occur. The construction of range facilities is not considered a "military readiness activities" (MRA) as defined by Migratory Bird Permits; Take of Migratory Birds by the Armed Forces Rule, Final Rule, 28 February 2007 (70 Federal Register § 8931-8950) and thus, the development of a UOV is not considered an MRA.

Proposed Action Alternative

The proposed action would result in less than significant direct and indirect impacts to wildlife species that currently inhabit the proposed site. Construction related activities would cause the permanent loss of habitat at the site, resulting in the direct effect of displacement and/or abandonment of the area by species sensitive to loss of intact stiff sagebrush/Sandberg bluegrass (lithosol) habitat and noise. Although this habitat loss is long-term in nature, the development of the UOV is small in scale (approximately 4 acres). Additionally, the site is adjacent to an existing road, reducing its effectiveness as wildlife habitat for all but a few wildlife species tolerant of such conditions (i.e., within the zone of influence of existing roads). There are no anticipated direct effects on fish species as there are no aquatic resources present at the site.

Impacts to migratory birds in the context of the Final Rule referenced above would include similar direct impacts (disturbance and displacement) during the construction phase from the permanent loss of intact stiff sagebrush/Sandberg bluegrass habitat (approximately 4 acres) and if the project occurs during the nesting and brood rearing season (February through August). Although some impacts will occur at the individual level of multiple species of migratory birds, there are no population-level adverse effects anticipated as a result of the direct impacts associated with the proposed action. Indirect impacts to migratory birds are similar to those mentioned above for wildlife species in general, with the increased potential for fire and introduction of noxious weeds likely being potentially the most severe.

Indirect impacts would occur and consist of displacement/disturbance during use of the sites for training, an increase in potential for fire, and further degradation through the introduction of noxious weeds.

Although the proposed action is relatively small in scale, given the permanent loss of intact stiff sagebrush/Sandberg Bluegrass habitat, its associated direct effects of displacement/disturbance, the indirect effects to include increased potential for fire and noxious weeds, the intensity of impacts of the proposed action on wildlife species is considered moderate. This level could be reduced to minor through the employment of management practices related to the timing of construction outside the nesting/brood-rearing period of migratory birds; fire prevention and suppression (e.g., requiring fire fighting assets on site when sites are occupied and the addition of helitanks at existing well facilities within close proximity); noxious weed control; and restricting use of the site during periods of soil saturation.

No Action Alternative

Since no new facilities would be built, there would be no short or long term impacts associated with construction activities. No additional ground disturbing activities would occur that would result in habitat loss within the proposed project areas. Any effects to fish and wildlife resources and associated habitats from the no action alternative would result from the ongoing land use activities that periodically occur in the same general area.

4.6.3 Threatened and Endangered Species

Given the analysis below, determinations of “no effects” have been made for all Federal listed species (threatened, endangered, candidate) analyzed within this document primarily due to the absence of species and suitable habitat within the proposed project area. As such, analyses and

determinations made within this environmental assessment will suffice for the biological assessment requirement of Section 7 of the Endangered Species Act (ESA) and as a result of the determinations, do not require concurrence or consultation with the regulatory agencies. Only federally-listed threatened, endangered, and/or proposed species require Section 7 ESA consultation. The greater sage-grouse is currently a federal candidate species, and it and the other candidate species analyzed within this document do not require ESA consultation. Although there is no requirement for formal or informal consultation for candidate species, Greater sage-grouse, an Army species-at-risk, and other candidate species are included below given their management emphasis on JBLM YTC and the installation's commitment to management of this species. From a NEPA analysis standpoint, the impacts of both the proposed action and the no action alternative are considered negligible for threatened and endangered species. Impacts to Greater sage-grouse are considered negligible and below the threshold for significance due to the site's location outside the sage-grouse protection area and lack of suitable nesting/brood-rearing habitat or documented sage-grouse use.

Proposed Action Alternative

Bald Eagle

There is no suitable bald eagle nesting or wintering habitat present within the proposed project area. In addition, there is no known/documented use of the proposed project areas by bald eagles. As such, there are no direct, indirect, inter-related, or interdependent impacts to bald eagles and/or their habitat and a "no effect" determination has been made.

Listed Salmonid Species (Bull Trout, Chinook Salmon, Steelhead)

There is no suitable salmonid habitat present within the proposed project area or potential for adverse impacts to adjacent Critical Habitat (i.e., Columbia and Yakima River). As such, there are no direct, indirect, inter-related, or interdependent impacts to federally-listed salmonid species and/or their habitat and a "no effect" determination has been made.

Greater Sage-Grouse

There is no suitable sage-grouse nesting/brood rearing habitat within the proposed project area. The area is outside of the Sage-Grouse Protection Area (SGPA) managed specifically for the protection and conservation of core-use areas known to be occupied by sage-grouse on the installation. There are no known observations of sage-grouse within the proposed project area and very few documented in TA 2. Given the lack of suitable sage-grouse habitat present within the project area, the small scale (i.e., less than 4 acres) nature of the project, and location (i.e., outside SGPA and north of existing power lines), there are no direct, indirect, interdependent, and interrelated impacts to greater sage-grouse as a result of the proposed action. As such, a determination of "no effect" has been made for Greater sage-grouse and its habitat.

Listed Plant Species (Ute Ladies'-tresses, Umptanum Wild Buckwheat, Northern Wormwood)

There is no suitable habitat present within the proposed project areas for any of the federally listed plant species mentioned above. As such, there are no direct, indirect, inter-related, or interdependent impacts to these species and/or their habitat and a "no effect" determination has been made.

No Action Alternative

Under the no-action alternative, no new facilities would be built and there would be no short- or long-term impacts associated with construction activities. No additional ground disturbing activities would occur that would result in direct or indirect impacts to threatened or endangered species. Any effects to threatened or endangered species and associated habitats from the no action alternative would result from the ongoing land use activities that periodically occur in the same general area. Management direction for federally listed species and habitats analyzed in this document is contained within Endangered Species Management Components (ESMC) of the Installation's INRMP and generally consists of monitoring, protection, and restoration measures. These ESMC's will continue to be implemented and provide the direction for threatened and endangered species management requirements for JBLM YTC. Therefore, overall effects of the no action alternative would be negligible for threatened and endangered species.

4.7 Infrastructure

Impacts to infrastructure would be significant if the action affected the ability of JBLM YTC to meet the overall training mission.

Proposed Action

Construction of UOV in TA 2 would not require any new electricity, sewer or water connections. New roads are not required, as the site was selected for its location adjacent to an existing secondary, all-weather, improved road that is regularly maintained. Although there may be an increase in use of this road in the vicinity of the UOV, impacts to the road maintenance requirements would be negligible. Further, the UOV would add structures to provide training opportunities and provide moderate beneficial impact to the infrastructure at JBLM YTC. Therefore, impacts to infrastructure are minor and beneficial.

No Action Alternative

There would be no direct changes to infrastructure as a result of this alternative; therefore, there will be no impacts to infrastructure under this alternative.

4.8 Summary of Impacts

Table 4-1. Summary of Imapcts Associated with the Proposed Action and No-Action Alternative.

Resource Area	No Action Alternative	Proposed Action
Air Quality	No Change	Operation of a UOV would generate particulate matter (fugitive dust) and emissions from training and vehicles. Impacts would be negligible and short-term in nature and occur at or below levels already experienced from training operations. No overall impacts to air quality would result from the Proposed Action.
Geology/ Topography/	No Change	Minor, short-term construction-related impacts (e.g., compaction and reduced permeability) would occur at and around the site as a result of the operation of construction vehicles and equipment. Minor compaction and erosion of

Resource Area	No Action Alternative	Proposed Action
Soils		soils could occur during operation and maintenance activities. Overall impact would be less than significant.
Surface Water Quality	No Change	Overall impacts to surface water as a result of the proposed action would be negligible and less than significant.
Wildland Fire Management	No Change	Wildland fire impacts associated with construction activities are negligible and short-term in nature, and result from the operation of vehicles and equipment and other human sources of ignition. Standard best management practices and operational constraints (management plans) would be used during training and maintenance operations, and impacts from these operations would be negligible. Overall impacts to wildland fire management are less than significant.
Cultural and Historic Resources	No Change	The project site has been surveyed and is not located near any known historic or cultural sites. No impacts to cultural and historic resources would result from the training and operation of the UOV facility.
Upland Vegetation	No Change	Direct but minor impacts to upland vegetation would result from construction activities and the associated permanent loss of a relatively small (less than four acre) area of upland vegetation. Minor, indirect impacts would occur during the training and operation activities, including from use of overlook sites during training. Overall impacts to upland vegetation are less than significant.
Riparian Vegetation	No Change	No riparian vegetation is present within the proposed site. No direct, indirect, or cumulative impacts to riparian vegetation would occur.
Wildlife/Fish	No Change	Although the proposed action is relatively small in scale, given the permanent loss of intact stiff sagebrush/Sandberg Bluegrass habitat, its associated direct effects of displacement/disturbance, and the indirect effects of increased potential for fire and noxious weeds, the intensity of impacts of the proposed action on wildlife species is considered moderate. The overall impact to wildlife species is less than significant.
Threatened & Endangered Species	No Change	Determinations of “no effects” have been made for all Federal listed species (threatened, endangered, candidate) analyzed within this document primarily due to the absence of species and suitable habitat within the proposed project area.
Infrastructure	No Change	The proposed action would not require any new roads or electricity, sewer or water connections. The UOV facility would add structures to provide training opportunities Impacts to infrastructure are minor and beneficial.

Chapter 5 Cumulative Effects

Cumulative effects are the incremental environmental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such action. They may result from individually minor but collectively significant actions taking place locally or regionally over a period of time.

5.1 Actions Considered in Cumulative Effects Analysis

Recent, ongoing and reasonably foreseeable actions that may take place on or in the vicinity of JBLM YTC are listed below, referred to as cumulative actions.

- Ongoing construction of an Afghan Battle Complex to the southeast of the UOV site (FY2011);
- Proposed construction of a Sniper Field Fire Range in the vicinity of Ranges 4 and 5 (FY2011);
- Proposed construction of up to two fire bases in TAs 6 and 16 (FY2011-2012);
- Proposed construction of Unmanned Aircraft System (UAS) training facilities at Selah Airstrip by the Washington Army National Guard, and increased UAS training at Selah Airstrip by U.S. Army units (FY2011-2012);
- Proposed construction of a 230 kilovolt electrical transmission line by PacifiCorps near the southern and/or eastern boundaries of JBLM YTC (FY2012);
- Proposed construction of a Convoy Live Fire Course in central or east-central areas of JBLM YTC (FY2013); and
- Proposed construction of a Combined Arms Collective Training Facility in central or southwestern areas of JBLM YTC (FY2015).

The U.S. Army recently published two Records of Decision (RODs) that affect JBLM and JBLM YTC; the February 2011 Fort Lewis Grow-the-Army ROD and the March 2011 Realignment, Growth and Stationing of Army Aviation Assets ROD. These decisions will increase the number of soldiers stationed at JBLM and are expected to increase the amount of training that will be conducted at JBLM YTC. The effects of this increased training at JBLM YTC were considered in the analysis done in Chapter 4.

5.2 Cumulative Effect Assessment

Resources that may potentially be affected by cumulative actions are discussed below. The remaining resources (air quality, surface water quality, cultural and historic resources, riparian vegetation, and threatened and endangered species) would not be impacted by the Proposed Action, and are therefore not included in the cumulative effect assessment.

5.2.1 Geology, Topography and Soils

Construction of the UOV facility would contribute to the overall disturbance of soils on JBLM YTC. Soils within the 400 foot by 400 foot proposed compound would be permanently altered through site preparation (e.g., grubbing, grading, compaction, and placement of gravel with herbicides below the gravel) efforts. While the site preparation efforts will enable the site to support the proposed construction, operation and maintenance of the new facility, those efforts will also result in eliminating soil function properties at the site (e.g., ability to provide suitable

media for vegetative growth, nutrient cycling, and nature infiltration of water to recharge ground water aquifers). Due to site compaction, placement of gravel, and use of appropriate best management practices (e.g., erosion and sediment control measures and revegetation of surrounding areas) during and after construction, soil loss from the site will be negligible. Overall, the cumulative effects to soils would not surpass the significance thresholds.

Cumulative effects of the proposed action to geology, topography, and soil resources have been considered locally (within the immediate area and within the boundary of JBLM YTC) and regionally. When considered in conjunction with the nine past, present, and reasonable proposed future actions listed above, the overall cumulative effects are negligible. This determination is based on the relatively small size, location, and lack of effect the proposed action would have on these resources. There are no scarce, highly erodible, or limited geology, topographic, or soil resources that would be impacted either locally or regionally as a result of implementing the proposed action. Therefore, the cumulative effects of implementing the proposed action on geology, topography, and soils would be less than significant.

5.2.2 Wildland Fire Management

The February 2011 GTA ROD included a number of mitigation requirements to address wildland fire management impacts. While those mitigation requirements may also serve to reduce impacts caused by the Proposed Action, analysis found that the Proposed Action would result in negligible impacts within the project area independent of these mitigation items. This conclusion is based on low fuel loading conditions at the site and operational constraints to be put in place during construction, operation and maintenance periods.

The site is located on a ridgeline that is composed of lithosol soils, which support very sparse vegetation. Lithosols typically provide natural firebreaks across the landscape because they do not support the growth of fuels necessary for ignition and advancement of wildland fires. Therefore, the low fuel availability at the site and operational constraints during construction, operation and maintenance phases would result in a negligible overall effect to wildland fire management. While the February 2011 GTA ROD determined that wildland fire impacts at YTC as a whole are significant, the effects of this proposed action would not add to or change the overall cumulative impacts to wildland fire management at YTC.

5.2.3 Upland Vegetation

Construction of the UOV facility would contribute to the overall permanent loss and degradation of upland vegetation resources. However, the loss associated with the Proposed Action is restricted to a relatively small (approximately four acre) area on the far northeast portion of the installation. Overall, the cumulative effects to upland vegetation would not exceed the significance thresholds.

5.2.4 Wildlife/Fish

The loss of habitat resulting from construction of the UOV facility would constitute a negligible addition to cumulative impacts to wildlife resources. While cumulative actions have the potential to impact a significant amount of wildlife habitat across the installation, these impacts would occur independently of the Proposed Action. With the use of standard management practices (e.g., timing of construction outside the nesting/brood-rearing period of migratory birds; fire

prevention and suppression; noxious weed control; and restricting use of the site during periods of soil saturation), overall impacts to wildlife resources would not surpass the significance thresholds.

Chapter 6 Conclusions Regarding Impacts of the Proposed Action

6.1 Mitigation Measures And Best Management Practices

This EA has not identified any significant impacts resulting from the Proposed Action. Mitigation is not required to offset any environmental impacts resulting from the construction, operation, and maintenance of the UOV. JBLM YTC proposes to follow existing Best Management Practices (BMPs) and management plans to reduce impacts, many of which are described in the EA.

6.2 Conclusions

As described in Chapter 4, *Environmental Consequences*, analysis revealed that impacts from the proposed action range from negligible to moderate, with the potential to reduce moderate impacts to minor through the use of BMPs. The construction and operation of an Urban Operations Village in TA 2 will have less than significant impacts on the surrounding natural and human environment at JBLM YTC. Analysis of cumulative effects at Chapter 5 also found that the effects of the propose action to be less than significant for all resources. Based on this analysis, preparation of an Environmental Impact Statement is not required, and issuance of a Finding of No Significant Impact is appropriate.

Chapter 7 References

32 Code of Federal Regulations § 651. Environmental Analysis of Army Actions. 2002

40 CFR § 1500 et seq. Council on Environmental Quality. 1978

59 Federal Register § 32. Executive Order 1298, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, February 11, 1994.

62 Federal Register § 19885. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. Federal Register. Washington, D.C. 1997.

63 Federal Register § 31647. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Klamath River and Columba River Distinct Population Segments of Bull Trout, June 10, 1998.

63 Federal Register § 31651. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Klamath River and Columba River Distinct Population Segments of Bull Trout, June 10, 1998.

70 Federal Register § 8931-8950. Migratory Bird Permit; Take of Migratory Birds by the Armed Forces Rule, Final Rule, 28 February 2007.Bain, R.C. Upper Squaw Creek Watershed Project: Grade control Plan. Richard C. Bain, Jr., Consulting Engineer. Ellensburg, WA. 1991.

Bock, C.E., A. Cruz, J.R., M.C Grant, C.S. Aid, and T.R. Strong. 1992. Field experimental evidence for diffuse competition among southwester riparian birds. American Naturalist 140:815-828.

Bottorff, J.A. and D. Swanson. 1993. Biological Assessment of the Restoration of an Armored Division at Fort Lewis DACA 88-93-M-0808. Report Prepared by Resource Northwest, Inc. Olympia, Washington, for the Directorate of Engineering and Housing, Fort Lewis Military Reservation, U.S. Dept. of Defense, Fort Lewis, WA.

Britton, C.M., and R.G. Clark. 1985. Effects of Fire on Sagebrush and Bitterbrush. K.Sanders and J.Durham (Tech. Eds). Rangeland Fire Effects. U.S. Dept. of Int., Bureau of Land Management. Boise, ID.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarino. 1996. Status Review of West Coast Steelhead form Washington, Idaho, Oregon, and California. NOAA Tech Memorandum NMFS-NWFSC-27.

Cummins, J. 1999. Fisheries Biologist, Washington Department of Fish and Wildlife, Yakima, Washington. December 6 and 16, 1999 Telephone Communication with Alissa Boyce and Kim Anderson, ENSR. Redmond, WA.

Daubenmire, R. 1970. Steppe Vegetation of Washington. Washington State University, Agriculture Experiment Station Publication XT0062, 131 pp.

Davis, M.M., W.A. Mitchell, J.S. Wakeley, J.C. Fischenich, and M.M. Craft. 1996. Environmental Value of Riparian Vegetation. U.S. Army Corp of Engineers Waterways Experiment Station. TR EL-96-16.

Department of the Army. Yakima Training Center Final Cultural and Natural Resource Management Plan (CNRMP), 2002–2006. U.S. Army, Directorate of Public Works, Environment and Natural Resource Division, Yakima Training Center, Yakima, Washington.

Department of the Army. 2008, Yakima Training Center Integrated Cultural Resources Management Plan. Department of the Army, U.S. Army Yakima Training Center, Yakima, Washington.

Department of the Army. 2010. Final Environmental Impact Statement for the Fort Lewis Army Growth and Force Structure Realignment. Joint Base Lewis-McChord, WA.

Department of the Army. 2011. Record of Decision for the Fort Lewis Army Growth and Force Structure Realignment. Joint Base Lewis-McChord, WA.

Dobkin, S.D., and J.D. Sauder. 2004. Shrubsteppe landscapes in jeopardy. Distribution, abundances, and uncertain future of birds and small mammals in the Intermountain West. High Desert Ecological Institute, Bend, OR. 199pp.

Dobler, F.C., J. Eby, C. Perry, S. Richardson, and M.Vander Haegen. 1996. Status of Washington's Shrub-Steppe Ecosystem: Extent, Ownership and Wildlife/Vegetation Relationships. Research Report. Washington Department Fish and Wildlife, Olympia, WA. 39pp.

Franklin, J.E., and C.T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press, 452 pp.

Johnson, D.H., and T.A. O'Neil. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press. Corvallis, OR. 736pp.

Knutson, K.L. and V.L. Naef. 1997. Priority Habitat Management Recommendations:Riparian. Washington Department of Fish and Wildlife, Olympia, WA.

Kusler, J.A. 1985. A call for action: Protection of riparian habitat in the arid and semi-arid west. Pages 6-8 in Proceedings of the first North American riparian conference, riparian ecosystems and their management: Reconciling conflicting issues.

Livingston, M. 1998. Western Sage Grouse Management Plan. Report Prepared for Directorate of Environmental and Natural Resources, Yakima Training Center. Yakima, WA.

Northwest Power Planning Council (NWPPC). 1990. Mid-Columbia River Subbasin (Bonneville Dam to Priest Rapids Dam) Salmon and Steelhead Production Plan. Washington State Dept. of Fisheries, Olympia, WA.

Page, L.M. and B.M. Burr. 1991. Peterson Field Guides: A Field Guide to Freshwater Fishes. Houghton Mifflin Company, New York, NY.

Remington, T.E. and C.E. Braun. 1985. Sage grouse food selection in winter, North Park, Colorado. Journal of Wildlife Management 49:1055-1061.

Rickard, W.H., L.E. Rogers, B.E. Vaughn, and S.F. Liebertrau. 1988. Shrub-steppe, Balance and Change in a Semi-arid Terrestrial Ecosystem. Elsevier, NY.

Rogers, L.E., P.A. Beedlow, L.E. Eberhardt, D.D. Dauble, and R.E. Fitzner. 1989. Ecological Baseline Study of the Yakima Firing Center Proposed Land Acquisition: A Status Report. Pacific Northwest Laboratory. Richland, WA.

United States Fish and Wildlife Service (USFWS). 2000. Ute ladies'-tresses, *Spiranthes diluvialis*, Letter, May 10, 2000. Spokane, WA.

U.S. Army, Yakima Training Center (YTC). 2004. Yakima Training Center Integrated Wildland Fire Management Plan. Yakima, Washington.

U.S. Army, Yakima Training Center (YTC). 2007. Training Unit Standard Operating Procedure. Yakima, Washington.

Washington Department of Natural Resources (WDNR). 2006. Background on Ute ladies'-tresses. Olympia, WA. [http://www.dnr.wa.gov/nhp/refdesk/fguide/htm/fsp_spdi.htm].

Washington Department of Fish and Wildlife (WDFW). 1995. Washington State Management Plan for Sage Grouse. Game Division, WDFW. Olympia, Washington.

Washington Department of Fish and Wildlife (WDFW). 1997. Wildlife Research Prairie Grouse. Olympia, Washington.

Washington Department of Fish and Wildlife (WDFW). 1998. 1998 Washington Salmonid Stock Inventory, Appendix Bull Trout and Dolly Varden. Olympia, Washington.

Washington Natural Heritage Program (WNHP). 2000. Field Guide to Washington's Rare Plants.

Youngblood, A.P., W.G. Padgett, and A.H. Winnard. 1985. Riparian Community Type Classification of Northern Utah and Adjacent Idaho. Unpublished report prepared for the USDA Forest Service, Intermountain Region, Ogden Utah., 104 pp.

Chapter 8 List of Preparers and Contributors

Richard Barry	Natural Resource Specialist, JBLM YTC
Joan Bartz	Environmental Compliance Specialist (Contractor), JBLM YTC
George Holman	Range Officer, JBLM YTC
Randy Korgel	Cultural Resource Manager, JBLM YTC
Jon Kurtz	Environmental Compliance Specialist (Contractor), JBLM YTC
Colin Leingang	Wildlife Resources Manager, JBLM YTC
Peter Nissen	Natural Resources Manager, JBLM YTC
Margaret Pounds	Chief, Environmental Division, JBLM YTC
Andrea Trickey	NEPA Specialist (Contractor), JBLM YTC

Chapter 9 Agencies and Individuals Contacted

U.S. Fish and Wildlife Service

Wenatchee Field Office

ATTN: Jessica Gonzalez, Supervisor

215 Melody Lane

Wenatchee, WA 98801

U.S. Department of Commerce, NOAA-F

Ellensburg Office

ATTN: Dale Bambrick

304 S. Water St, Suite 201

Ellensburg, WA 98926

Washington Department of Fish and Wildlife

ATTN: Jeffrey Tayer, Regional Director

Region 3, WDFW

1701 South 24th Avenue

Yakima, WA 98902

Yakima Regional Clean Air Authority

ATTN: Lawrence Odell, Director

Six South Second St., Suite 1016

Yakima, WA 98901

Yakama Nation

ATTN: Ruth Jim

PO Box 151

Toppenish, WA 98948

Yakama Nation

ATTN: Johnson Meninick

P.O. Box 151

Toppenish, WA 98948

Wanapum Band

ATTN: Mr. Rex Buck, Wanapum Leader

P.O. Box 275

Beverly, WA 99321

Yakima Valley Audubon Society

ATTN: Mr. Andrew Stepniewski, President

PO Box 2823

Yakima, WA 98907

Washington Department of Archaeology and Historic Preservation

ATTN: Rob Whitlam, State Archaeologist

1063 S. Capitol Way, Suite 106

Olympia, WA 98501

Chapter 10 Glossary and Acronyms

10.1 Glossary

10.1.1 Context

Duration

Short-term : Would not persist beyond 5 years.

Long-term: Would persist beyond 5 years or be permanent.

Spatial Scale

Local : Would occur in the area immediately surrounding a project or activity and within the boundaries of YTC.

Regional: Has the potential to migrate off-post.

10.1.2 Intensity (thresholds)

Negligible: May locally alter the resource, but would not measurably change its function or character.

Minor: Any change to the resource would either be isolated and localized or not measurable on a wider scale.

Moderate: Changes to the resource would be measurable on a wide scale (e.g., across the entire installation or region). If impacts are adverse, they would not exceed limits of applicable local, state, or federal regulations.

Major: May exceed limits of applicable local, state, or federal regulations or would untenably alter the function or character of the resource.

10.1.3 Significance

For the purposes of this EA the threshold of significance is synonymous with a "major" impact. For example, an action that would violate existing pollution standards; cause water, air, noise, soil, or underground pollution; impair visibility for substantial periods; or cause irreparable harm to animal or plant life [would] be determined significant (32 CFR § 651.39).

10.2 Acronyms

BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DPS	Distinct Population Segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENRD	Environmental and Natural Resources Division
EO	Executive Order
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
FNSI	Finding of No Significant Impact

IPM	Integrated Pest Management
IWFMP	Integrated Wildland Fire Management Plan
km	Kilometer
MILVAN	Military-Owned Demountable Container
MPRC	Multi-Purpose Range Complex
MRA	Military Readiness Activities
NEPA	National Environmental Policy Act of 1970
NOAA	National Oceanic and Atmospheric Administration
PM_{10}	Particulate matter less than 10 micrometers in size
SGPA	Sage-grouse Protection Area
TA	Training Area
TUAS	Tactical Unmanned Aerial System
TUSOP	Training Unit Standard Operating Procedure
USFWS	United States Fish and Wildlife Service
WAARNG	Washington Army National Guard
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
JBLM YTC	Joint Base Lewis-McChord Yakima Training Center