ENVIRONMENTAL ASSESSMENT

SNIPER FIELD FIRE RANGE

Joint Base Lewis-McChord Yakima Training Center

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SNIPER FIELD FIRE RANGE
JOINT BASE LEWIS-MCCHORD YAKIMA TRAINING CENTER
YAKIMA, WASHINGTON

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Chapter 1 Purpose and Need for the Proposed Action

1.1 Introduction

The U.S. Army proposes to construct, operate, and maintain an Automated Sniper Field Fire (SFF) Range on Joint Base Lewis-McChord (JBLM) Yakima Training Center (YTC), Washington. The SFF range would meet critical training needs for both active and reserve component units that train on the installation.

1.2 Background

JBLM YTC is a training installation located in central Washington, northeast of the City of Yakima and west of the Columbia River (**Figure 1**). JBLM YTC encompasses approximately 327,242 acres (132,433 ha) in Yakima and Kittitas Counties. The active Army units assigned to JBLM, the Washington Army National Guard (WAARNG) 81st Heavy Brigade Combat Team **(**HBCT), and the Oregon Army National Guard (ORANG) 41st Infantry Brigade Combat Team (IBCT) are the principal users of JBLM YTC. Other units that also use the installation include the Special Operations Command (SOCOM), Marine Corps, Air Force, Navy, Coast Guard, local and federal law enforcement agencies, and forces from Canada, Japan, and other allied nations. Currently, JBLM YTC plays a major role as part of the Stryker Center of Excellence that is responsible for development of technical and tactical expertise for Stryker Brigade Combat Teams (SBCT). Training facilities encompass most areas of JBLM YTC outside of the 1,700-acre (690-ha) cantonment area and provide for live-fire and maneuver training, impact areas, drop zones, and bivouac areas. In particular, the Central Impact Area (CIA) and Multi-Purpose Range Complex (MPRC) are used for training with conventional and tactical weapons. The CIA is used primarily for tank, artillery, and infantry gunnery. The MPRC is a tank and infantry live-fire range with remotely controlled moving and pop-up targets.

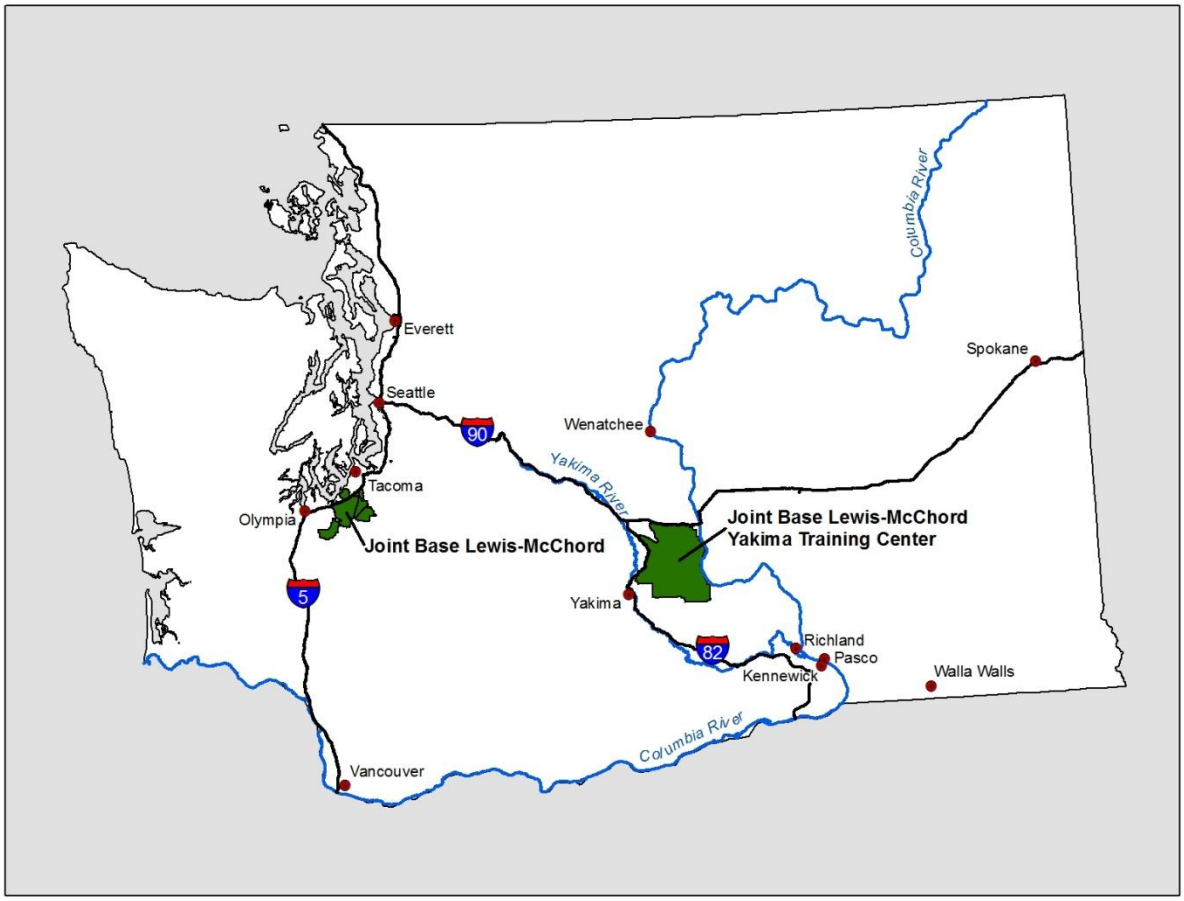

Figure 1. Location of Yakima Training Center (YTC CNRMP, 2002)

1.3 Purpose of the Proposed Action

The purpose of the proposed action is to provide year-round, comprehensive and realistic training and range facilities for units training at JBLM YTC. The SFF range provides sniper teams with necessary infrastructure to build marksmanship skills in weapons use, and to detect, identify, engage, and defeat stationary and moving infantry targets in a tactical array. This range design satisfies the training and qualification requirements of the M24 and M110 sniper rifles equipped teams. The SFF range provides sniper teams the capability to meet all live training tasks. The range would be used to train sniper teams to meet mission-essential live-fire training tasks (METL) while simultaneously providing the best possible training for current threats the Army encounters during combat operations in the contemporary operating environment.

1.4 Need for the Proposed Action

The Army has responded to recent changes in land combat operations, information and technology, and contemporary operating environments by restructuring the U.S. Armed Forces as part of Army Transformation. As part of the process, the Army has changed from an organization based around large Divisions to an Army consisting of modular, smaller,

standardized, self-contained, rapidly deployable Brigade Combat Teams (BCTs). This restructuring has dramatically increased the number of snipers by forming sniper teams within each unit that trains at JBLM YTC. A Sniper Field Fire Range that meets Army Training Circular (TC) 25-8 standards is needed to provide live-fire training for these Soldiers. This range is used to train and test Soldiers on the skills necessary to detect, identify, engage, and defeat stationary and moving infantry targets in a tactical array. This range is designed to satisfy the training and qualification requirements of the M24 sniper weapon system and the M110 semi-automatic sniper system. The standard requires a specified number of firing positions and targets that are computer automated and scored. Natural vegetation is required in the target area to provide realistic natural obstacles for the sniper to negotiate. Currently, JBLM and JBLM YTC do not have a SFF range that meets current Army Training Circular (TC) 25-8 standards to support sniper teams.

1.5 Scope of the Environmental Analysis and Decision to be Made

This Environmental Assessment (EA) considers direct, indirect, and cumulative effects of the Proposed Action and the No Action alternatives. It was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 [42 USC 4321 *et seq*.], Council on Environmental Quality (CEQ) Regulations 40 Code of Federal Regulations (CFR) Parts 1500-1508, and 32 CFR Part 651 (*Environmental Analysis of Army Actions*). A specific requirement for this EA is an appraisal of impacts of the proposed project, resulting in either a determination of a Finding of No Significant Impact (FNSI) or a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS).

The construction and operation of the proposed SFF range on JBLM YTC is the focus of this EA. This EA provides a discussion of the affected environment and the potential impacts to physical, natural, and socioeconomic resources. The following resources were identified and analyzed for the Proposed Action and No Action alternatives as resources that may be potentially affected by the construction and operation of a SFF range.

- Air Quality
- Noise
- Geology, topography, and soils
- Surface water resources
- Land Use
- Socioeconomics
- Infrastructure
- Cultural resources
- Wildland Fire
- Biological resources (upland vegetation, wildlife, fish, threatened and endangered species)

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

Groundwater: The contamination of groundwater is unforeseeable. Hazardous material spills that could potentially occur during construction would be addressed through a required spill response plan. All spills will be cleaned up in accordance with that spill response plan. There is one groundwater well that is located adjacent to the proposed site of the SFF Range, but is not on the footprint of the range. Two other groundwater wells are located northwest of the proposed site. No contamination of these wells is anticipated. A spring is located up-gradient from the proposed project site, and would not be impacted as a result of the construction, or operation and maintenance activities associated with this action.

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 SFF range 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.

Protection of Children: The type of training conducted and the operation of this range would not change from what is already occurring on adjacent ranges. The proposed location is isolated from populated areas and children do not have access to the site. No direct or indirect impacts to the health and safety of children is expected and will not be analyzed further.

Human Health: JBLM YTC is an access-controlled installation and access to ranges is managed through Range Control. Safety measures associated with range operation are administered by Range Control. These procedures help ensure controlled access down-range during weapons firing. Soldiers are well-trained with the safe use of these weapons on live-fire ranges. There would be negligible impacts to human health.

Solid Waste: Direct and indirect environmental impacts due to solid waste would be negligible. Contractors involved in the construction of the SFF Range would be contractually required to manage all wastes generated during the project properly. During operation of the SFF Range, waste generation and collection would be expected to remain consistent with current operation activities.

Hazardous Materials/Waste: Impacts from hazardous waste and materials during construction and operation of the SFF Range would be negligible. All recycling would be performed by legal and permitted companies; disposal would occur at permitted facilities. Non-hazardous, hazardous, and Toxic Substances Control Act (TSCA) wastes must be managed through the JBLM YTC One Stop Yard and are subject to established controls. Procurement and inventory of hazardous materials would be subject to installation guidelines. Hazardous waste generated by operation of the SFF Range would be

managed according to installation guidelines and policy, as well as Federal and state laws and regulations.

Riparian Vegetation: There are no riparian areas within the footprint of the proposed SFF range. There are two ephemeral drainages within the footprint of the range, but neither contain riparian vegetation.

Transportation: A SFF range does not have the potential to increase traffic beyond current capacities of the existing road network. The SFF range is located near the cantonment area and the existing road network has the capacity to provide access to the range for any reasonable increase in Soldiers coming onto the Installation for sniper training. Any increase in traffic associated with a SFF range would not be noticeable to other motorists and would not disrupt or alter local traffic patterns

Chapter 2 Description of the Proposed Action and Alternatives

2.1 Description of the Proposed Action

The proposed action is to construct, operate, and maintain a SFF range designed to train Forces Command (FORSCOM) and SOCOM sniper teams in the basic live-fire training tasks they require to sustain combat proficiency. Primary features of this range include 40 stationary infantry targets, eight moving infantry targets (MITs) and four firing positions and lanes. In addition, the range will include a combined instruction/operations building, latrine, bleacher enclosure, ammunition breakdown building, covered mess, and control tower. Two target maintenance roads will tier from an existing access road near the center of the range. Existing firebreaks and access roads from adjacent ranges will be utilized for access and to keep wildland fires from adjacent ranges from encroaching on the SFF range.

Elevated structures will include the observation tower, firing positions and utility poles. The tower will be approximately 10 feet at the platform level. Utility pole tops will be about 39 feet high and will be located in the Range Operation and Control Area.

Primary facility force protection measures consist of laminated and safety glass. Supporting facilities include electric service, communication lines, transformers and lighting, parking, drainage ditch, and latrine facility. Supporting facility force protection includes security fencing and gates. Other force protection measures are vehicle barriers, security lighting, and gates; however, the facility will be exempt from a specified standoff distance. An unexploded ordnance survey will be conducted prior to range construction.

Two weapon systems would be fired on the SFF range. The M24 and M110 sniper rifles fire non-tracer 7.62 mm, 30 caliber, or 300 Winchester Magnum (Win Mag) ammunition. Soldiers firing these weapons systems would fire from fixed positions, accurately firing single shots at stationary and moving targets. Tracer rounds will not be fired on the SFF range. Sniper and reconnaissance units training at JBLM YTC are allocated approximately 500,000 rounds of ammunition each year (HQDA 2011). Only about one third of these rounds would be fired on the SFF range; the other allocated ammunition would continue to be used for qualifications on other ranges.

Maintenance of the range will involve routine access road and firebreak grading, target replacement, and target berm repair.

2.2 Criteria for Evaluating Alternative Sites

The development and application of screening criteria is a critical element in determining appropriate and reasonable alternatives for implementation of the proposed action. The preliminary alternatives were weighed against a list of screening criteria to identify the preferred alternative and eliminate those sites that did not sufficiently meet the key objectives of the proposed action. Applying these criteria, the site must:

- Support JBLM YTC mission and range requirements (specified in TC 25-8);

- Have no or minimal conflicts between the Surface Danger Zones (SDZ) and land use within or outside of the installation;
- Have infrastructure capabilities to support the range (specifically, power and communications source within 10,000 feet);
- Provide a realistic training environment with natural surroundings and cover;
- Provide year-round training capabilities;
- Have no or minimal conflict with other training;
- Be economically feasible.

2.3 Description of Alternatives Carried forward for Analysis

2.3.1 Alternative 1 – No Action Alternative

Under this alternative, the installation will not construct a TC 25-8 standard SFF range. The installation would continue to use the two-lane non-standard sniper range that already exists. Since there are no SFF ranges on JBLM or YTC constructed to Army standards, the sniper teams that train on the installation would not be trained to Army standards. This would result in a degraded live-fire capability of the sniper teams. Since sniper teams would not be trained to Army standards, unit readiness would be affected.

2.3.2 Alternative 2 – Preferred Alternative

The preferred alternative is to construct a SFF range between Ranges 4 and 5. The site would support construction of a SFFR that fully meets the requirements of TC 25-8. The Surface Danger Zone (SDZ), the ground surface area that will contain all projectiles fired from the range, falls within the installation boundary (**Figure 2**). Even though the SDZ overlaps with adjacent ranges, this would have only minor conflicts with range operation and maintenance. Power and communication are readily available, well within the 10,000 feet requirement. Range utilization will be year-round and provide a realistic training environment. This site is economically feasible as the soil offers easy trenching for electrical lines and will not require mass-grading or excessive cut and fill. The overall footprint of the site is 98 acres (1500 meters x 300 meters) with .70 acre dedicated to the Range Operations Control Area (ROCA) and 2000 square feet for parking. Only 5.4 acres of the 98 acre site will actually be disturbed during construction. The preferred alternative may require some minor road construction and/or improvement.. The proposed range would be sandwiched between two existing ranges; Soldiers traveling to the proposed range would utilize the existing access road for these ranges. An additional road would be constructed on the range itself to facilitate routine maintenance of the targets. (An existing road cuts through the range, but this road is not needed to access existing ranges, and there would be no impact to its closure or diminished use..)

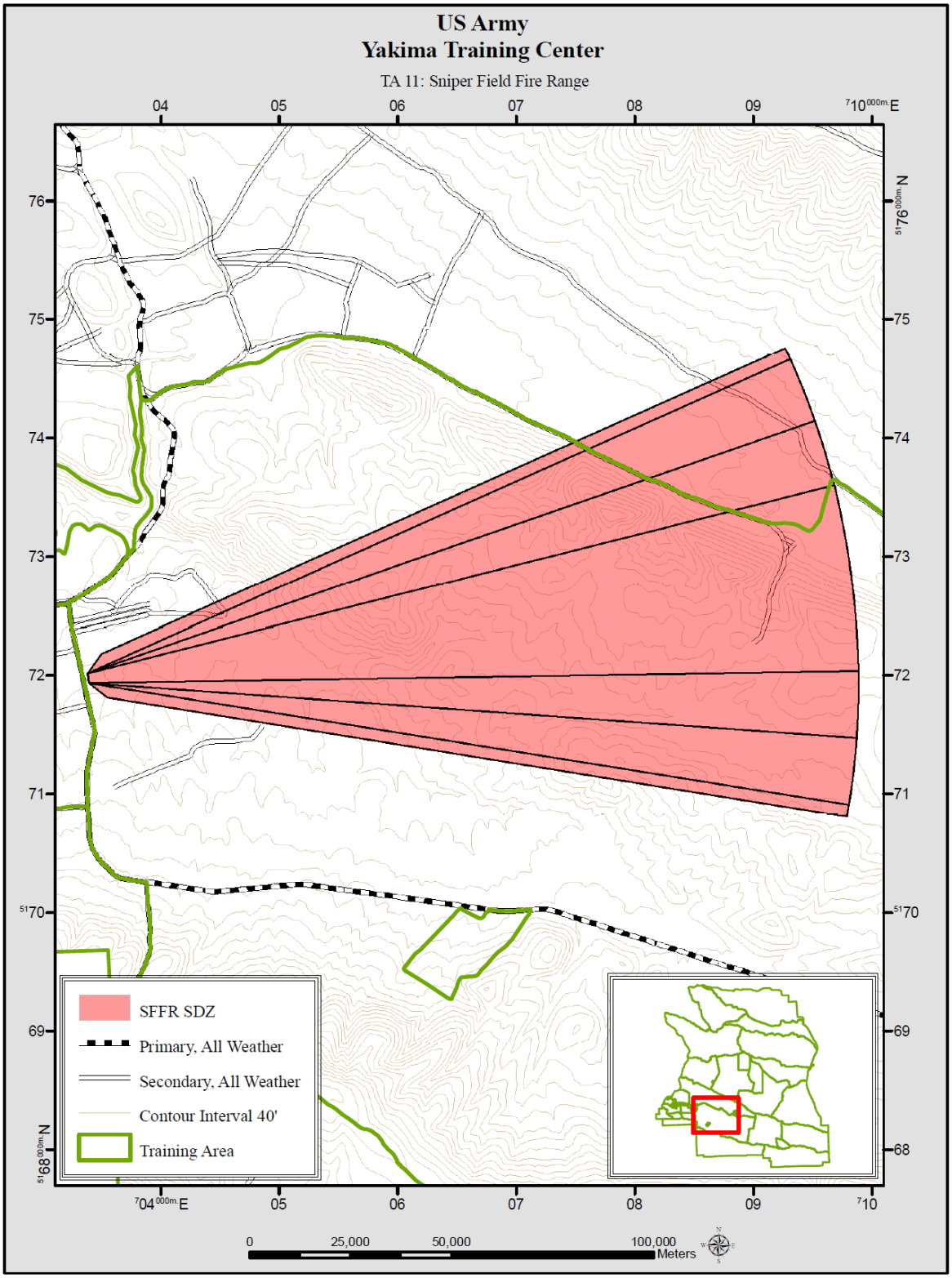

Figure 2. SDZ for Proposed SFF Range (JBLM YTC, Range Control, 2011)

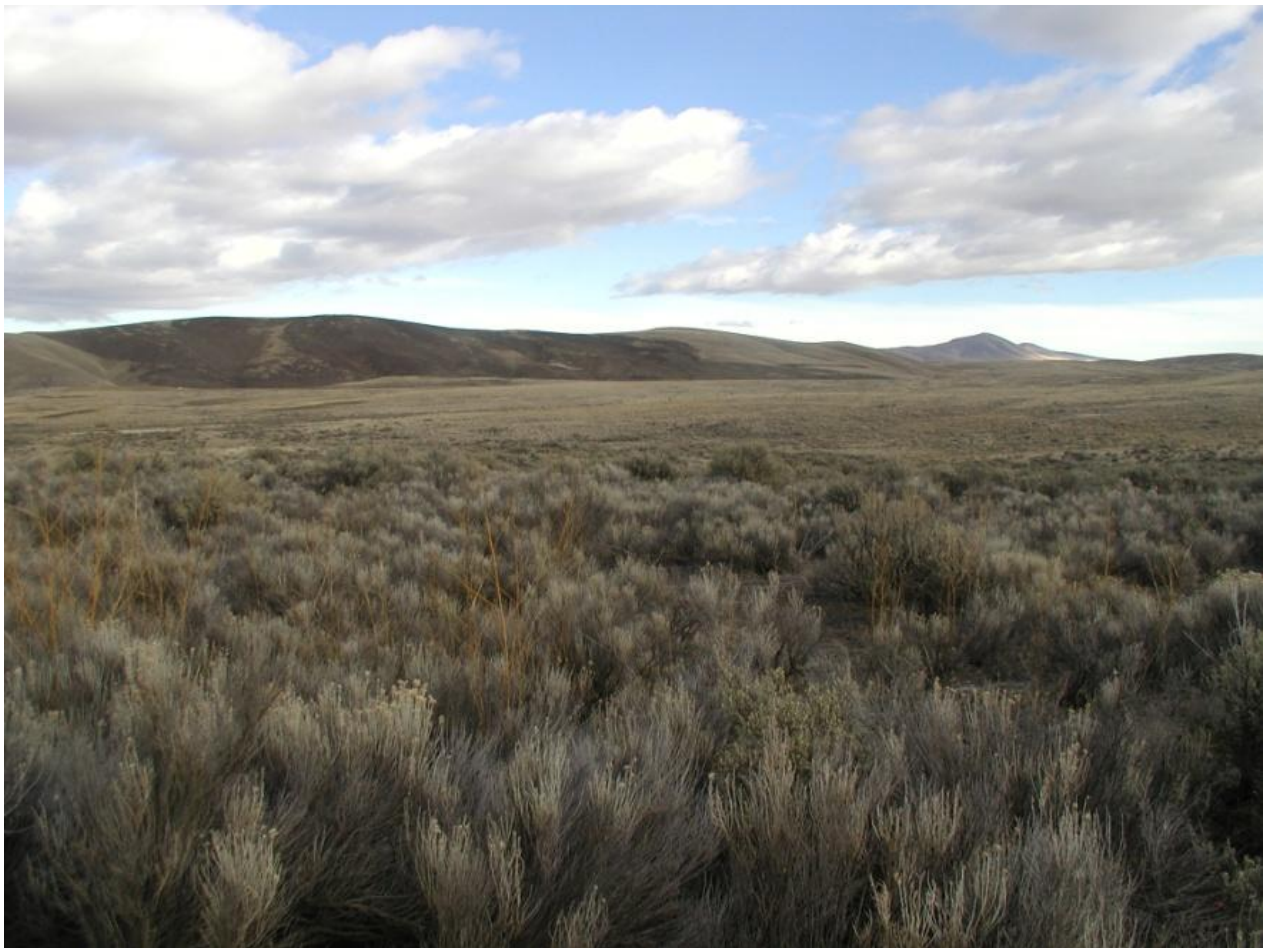

Figure 3. View down-range of preferred alternative (JBLM YTC, ENV, 2010)

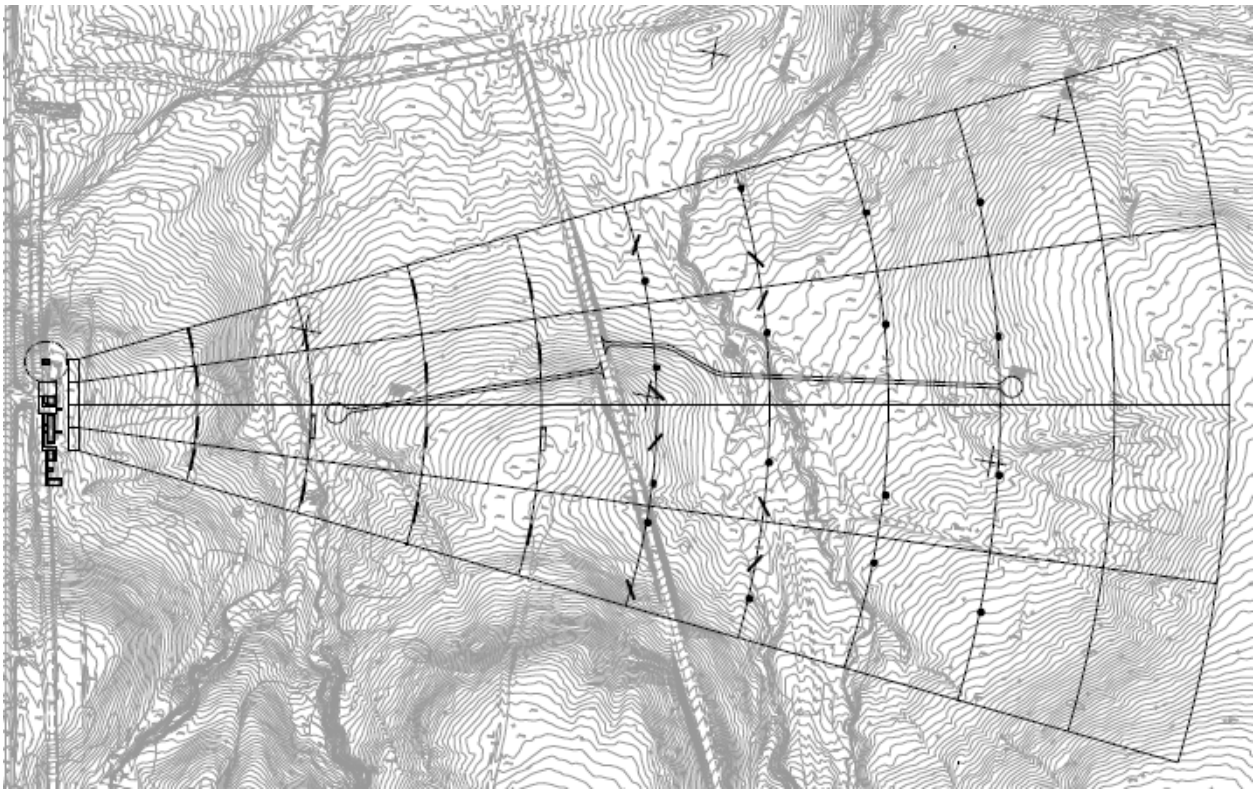

Figure 4 Footprint of Proposed SFF Range (USACE, 2011)

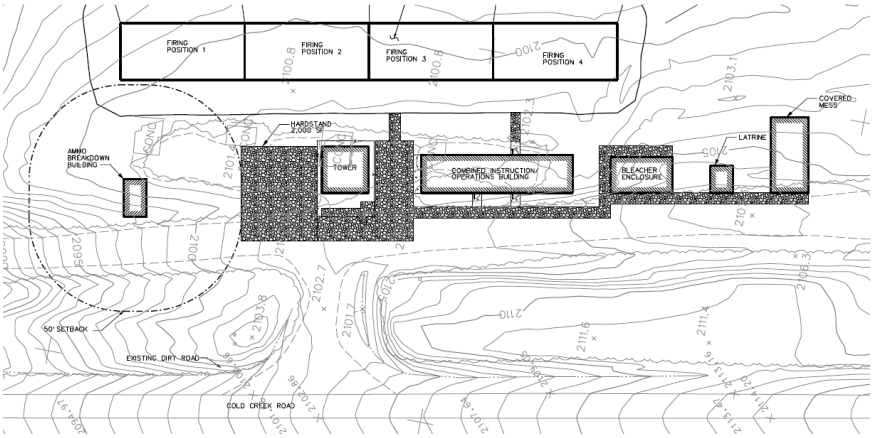

Figure 5 Range Operation and Control Area (ROCA) (USACE, 2011)

2.4 Alternatives Considered and Eliminated from Detailed Study

<u>West of Range 73</u>

Construction and operation of a SFF range west of Range 73 was assessed in the 2010 Fort Lewis Army Growth Environmental Impact Statement (GTA EIS). (**Figure 6)** During the subsequent range design, the doctrinal requirements for a SFF range were changed (TC 25-8). Moving Infantry Targets (MIT) were moved from the 500 meter and 600 meter target lines to a

100 meter and a 200 meter target line. This change would have put the new target line in an existing channel running across the site causing the targetry to not be visible from the firing line. Extensive grading would have been required for target placement in and beyond the channel, making this site economically unfeasible. New training range requirements also required the SFF range to accommodate the firing of a .300 Win Mag. After the SDZ was adjusted to include firing of this round, the SDZ extended beyond the installation boundary across Interstate Highway 82 (**Figure 7**). The location west of Range 73 was therefore eliminated from further consideration.

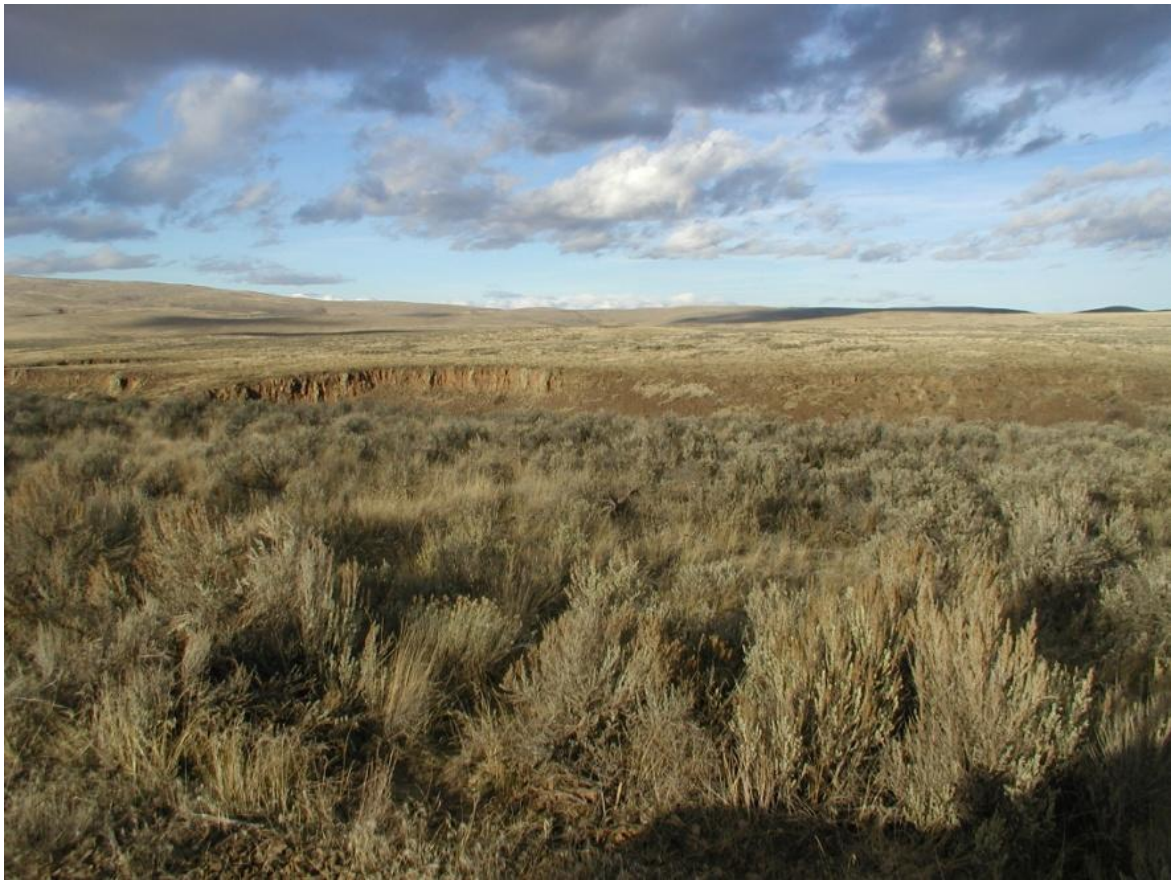

Figure 6. Down-range view of alternative west of Range 73, analyzed in GTA EIS, but eliminated from further consideration (JBLM YTC, ENV, 2010)

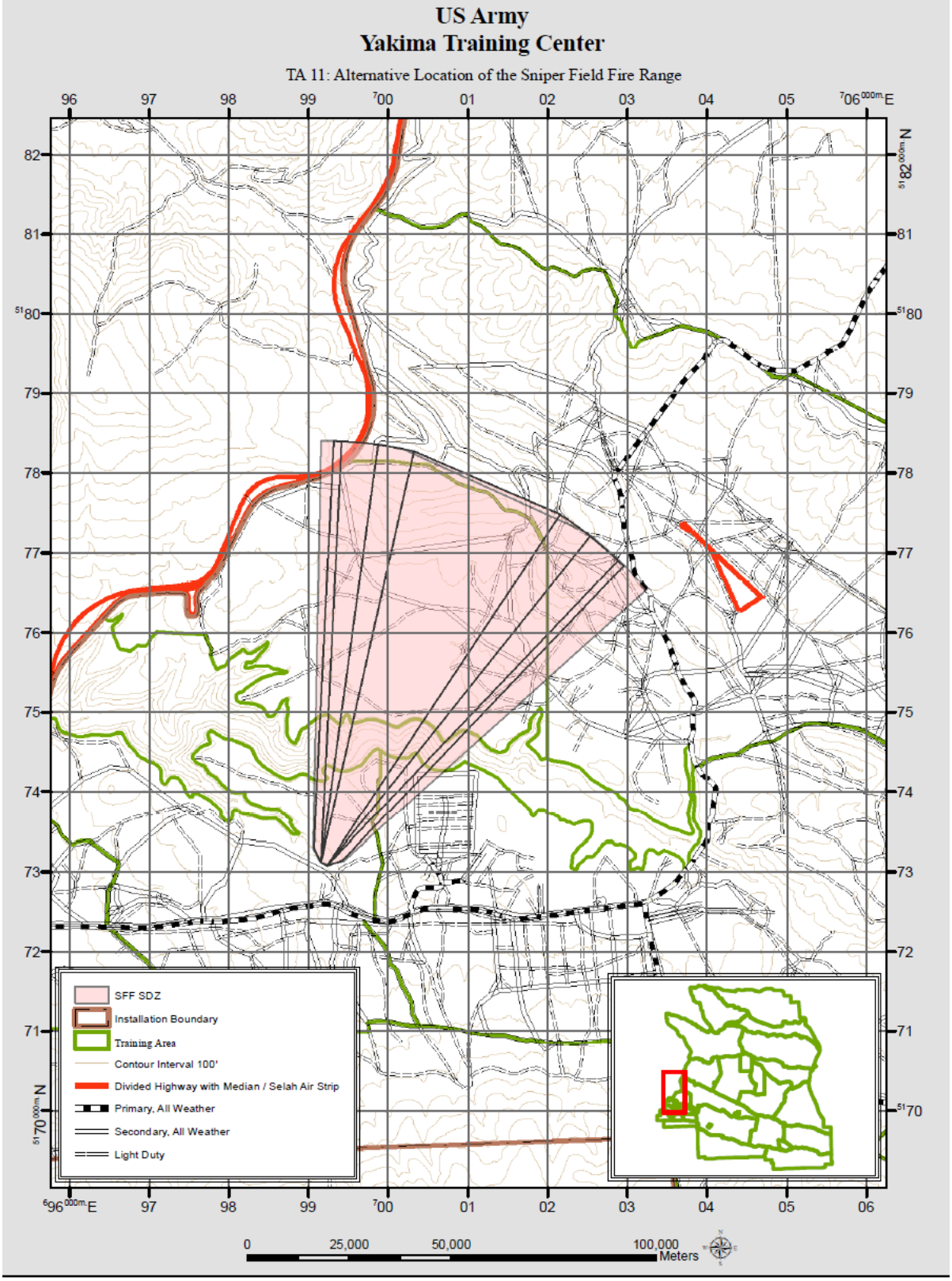

Figure 7. SDZ for alternative west of Range 73, analyzed in GTA EIS, but eliminated from further consideration. (JBLM YTC, Range Control, 2011)

Upgrade of Range 73
Another alternative considered but eliminated was an upgrade of Range 73. The SDZ for this alternative would also extend outside of the installation boundary. The SDZ would also prevent the use of other ranges in the vicinity while the SFF range is active, a direct training conflict. This alternative would not be economically feasible due to extensive grading requirements.

Borden Springs in Training Area (TA) 5
An alternative site in Training Area (TA) 5, Borden Springs, was eliminated from further consideration because of the lack of an electrical power and fiber optic communications source within 10,000 feet. This site is located in a remote area of the installation. Year-round access due to winter weather could be limited.

Table 1. Screening Criteria

		No Action	Preferred Between Ranges 4 & 5	West of Range 73	Range 73 Upgrade	TA 5 Borden Springs
Screening Criteria	Supports mission and TC 25-8 requirements	X	+	X	X	+
	Minimal SDZ conflicts	N/A	+	X	X	+
	Power and communication w/in 10,000 ft	N/A	+	+	+	X
	Allows year-round training	N/A	+	+	+	X
	Realistic training environment	N/A	+	X	X	+
	Minimal training conflicts	N/A	≈	+	X	+
	Economically feasible	+	+	X	X	X

X - Does not meet screening criteria or has significant shortfalls/difficulties
≈ - Satisfies screening criteria with some shortfalls/difficulties
+ - Adequately meets screening criteria

2.5 Use of Another DoD Range Asset

There is not another DoD range at JBLM, JBLM YTC, or any other nearby military installation that will accommodate SFF training to the required TC 25-8 standard. There is a two-lane SFF

range located at JBLM YTC but this range does not meet the Army Standards for a sniper range as outlined in TC 25-8. Using a SFF range at another installation presents logistical and scheduling issues as well as economic constraints for travel costs. Simulated training for snipers does not provide the realistic and comprehensive training provided by a live-fire range.

Chapter 3 Existing Environmental Conditions

JBLM YTC is located in the Columbia Basin, northeast of the city of Yakima, southeast of Ellensburg, and adjacent to and west of the Columbia River. The area lies in the rain shadow of the Cascade Mountain Range and can be described as open country with shrub-steppe-covered rolling hills and flats. Thin bands of trees and shrubs occur in the bottoms of canyons and along creeks. Rock outcrops, talus slopes, and cliffs are visible along the ridge tops, canyon walls, steep hills, and drainages. The installation is bounded on the north by Interstate 90 and Badger Pocket and on the east by the Columbia River. The southern boundary is south of Yakima Ridge, and most of the western boundary follows Interstate 82. The northern half of JBLM YTC lies within Kittitas County and the southern half lies within Yakima County. The proposed SFF range is located in the Yakima County portion of JBLM YTC. Surrounding land use includes rangelands, agricultural lands, urban areas, and state and federal wildlife and recreation areas.

3.1 Air Quality

JBLM YTC is registered with Yakima Regional Clean Air Agency (YRCAA) as a Complex Minor Source and is regulated by YRCAA in Yakima County and by Washington State Department of Ecology (WDOE) in Kittitas County. Air quality is generally considered good. JBLM YTC is in compliance with National Ambient Air Quality Standards (NAAQS), which are set by the Environmental Protection Agency (EPA). These standards specify maximum concentrations for carbon monoxide, nitrogen oxides, sulfur oxides, ozone, lead, and particulate matter less than 10 micrometers in size (PM10). Pollutants of concern during construction and operation of the SFF range would be carbon monoxide and volatile organic compounds (VOCs) from vehicle operation and PM10 from rock crushing activities and vehicle movement during construction and training exercises. Particulate matter pollutants at JBLM YTC tend to disperse quickly as a result of the prevailing westerly winds.

3.2 Noise

The dominant source of noise on JBLM YTC and lands immediately adjacent to the installation is military training operations. Weapon fire and explosive-type noise are produced during gunnery and demolition training. Other types of noise are associated with aviation, and movement of tracked and wheeled vehicles. Existing noise levels at JBLM YTC vary with location, time of measurement, and the types of activities and training underway. Noise levels within the cantonment area, range offices, and temporary barracks, are at or below 65 decibels adjusted day-night level (dBA DNL). Firing points, demolition ranges, and impact areas are the only areas with noise levels above 75 dBA DNL**.** Land use adjacent to JBLM YTC includes undeveloped, agricultural, rural residential, and recreation land. Nearby major towns and communities include Yakima, Terrace Heights, Selah, Moxee City, Ellensburg, and the Badger Pocket Area. As analyzed in the GTA EIS, there are currently few residences exposed to high noise levels. The lack of impact is primarily due to JBLM YTC's remote location and mountainous terrain surrounding it. (GTA EIS 2010).

3.3 Geology, Topography, and Soils

Topography at JBLM YTC varies from low plains and rolling hills to escarpment. Five basaltic ridges (anticlines) cross the installation in a northwest-southeast orientation: Yakima Ridge, Umptanum 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 part 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 -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.

The footprint of the SFF range is made up of five separate soil map units (**Appendix A**). Soil textures are silt loam and loam, making these soils predominately a sand and silt mixture with a low clay content. The five map units are Benwy silt loam, Brehm silt loam, Gorst loam, Manastash-Durtash complex, and Selah silt loam. With the low clay content, these soils do not hold together very well and are particularly susceptible to erosion in the absence of adequate vegetative cover and when the flow of runoff water becomes concentrated.

3.4 Surface Water

JBLM YTC drains into two major basins: the Columbia River Basin east of JBLM YTC and the Yakima River to the west. Within JBLM YTC, there are 28 sub-basins that have been consolidated into 10 watershed complexes. Surface water resources at JBLM YTC include streams or creeks, springs, and ponds. Sixteen man-made sediment retention ponds are maintained for erosion control and monitoring. Seven additional ponds include Greely for wildlife, Kiddy for recreation; Taylor, East Coyote, and Lambing Camp for fire fighting, and Foster and Dead Truck Farm for fire fighting and training support. Major streams flowing into the Columbia River include Alkali, Corral Canyon, Hanson, Sourdough, and Johnson Creeks. Many tributaries to the Columbia River discharge via subsurface flow when stream flows are low, particularly during the summer. Lmuma Creek flows year-round into the Yakima River. Other streams that have perennial flow within JBLM YTC but become intermittent in their lower reaches include Selah, Middle, and Cold Creeks. Although streams on JBLM YTC have not been classified by the State of Washington, they are considered to be Class A (excellent) by Washington State surface water quality standards for these respective stream types. Remaining surface water drainages on JBLM YTC are ephemeral streams, which only flow following rain or snow melt events; consequently they have no base flow component. Streams on JBLM YTC are fed by direct runoff of precipitation and in some cases by discharge of groundwater. As a consequence of its location in an arid region and the occurrence of occasional precipitation and

snowmelt that produces relatively high runoff, the 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 (cfs) 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. The SFF range project site lies within the Selah watershed and is southwest of Selah Creek. This watershed drains into the Yakima River. The WDOE has not designated any of the streams in the JBLM YTC Region of Interest (ROI) as impaired (Washington Department of Ecology 2004). The lower reach of the Yakima River, however, is listed on the 303(d) list as impaired by pH, temperature, and pesticides. The sources of impairing pollutants are irrigated cropland, animal holding areas, and in-place (sediment) contamination. JBLM YTC has not been identified as a source of water quality impairment to receiving waters. Selah Ditch, west of JBLM YTC, has been listed as impaired by fecal coliform and temperature from unknown sources. The primary water quality concern at JBLM YTC is introduction of fine sediment into streams with subsequent discharge to the Yakima and Columbia Rivers. Discharge of fine sediment is most likely following high, short-duration flow events, which typically involve rain falling on snow or frozen ground. Sources of fine sediment include degraded upland areas, improperly designed and located roads, degraded channels resulting from mass wasting, and natural erosion processes. In 1994 through 1995, the WDOE conducted a Total Maximum Daily Load (TMDL) evaluation, and in 1998, the EPA approved a Water Cleanup Plan designed to reduce suspended sediments and pesticides in the Yakima River. The more recent (2003) WDOE monitoring evaluated the suspended solids loads at the Kiona Station and concluded that the loads have been greatly reduced (by 50 to 70 percent) compared to previous decades (Coffin et al. 2006,WDOE 2008).

Programs exists at JBLM YTC to reduce and minimize discharge of sediment to the Yakima and Columbia Rivers. The programs includes management of training areas to allow vegetation to recover, active restoration by planting, construction of sediment trapping check dams at critical locations, and protection of critical riparian vegetation corridors by restricting use of those areas. The restoration program is consistent with the requirements for best management practices for compliance with the anti-degradation policy of the State of Washington (WAC 173–201A) for nonpoint sources of pollution, as required by Section 319 of the Clean Water Act (CWA) (Army 1994, McDonald 2009b).

Suspended solids discharged from JBLM YTC add to effects of suspended solids discharged naturally and from agricultural sources, but the magnitude of contribution of suspended solids from JBLM YTC is very small compared to other sources. Other causes of water quality impairment (bacteria, pesticides, and temperature) are not significantly affected by activities at JBLM YTC. Nutrients may be affected as a secondary effect of soil erosion and sediment discharge.

The Army’s land uses and land management programs have an effect on the quantity of sediment that could potentially leave the installation. Protocols have been established that address land use impacts to soil, vegetation, and surface water resources. Annual management efforts include resource monitoring, maintenance, and rehabilitation to off-set the effects of land use impacts.

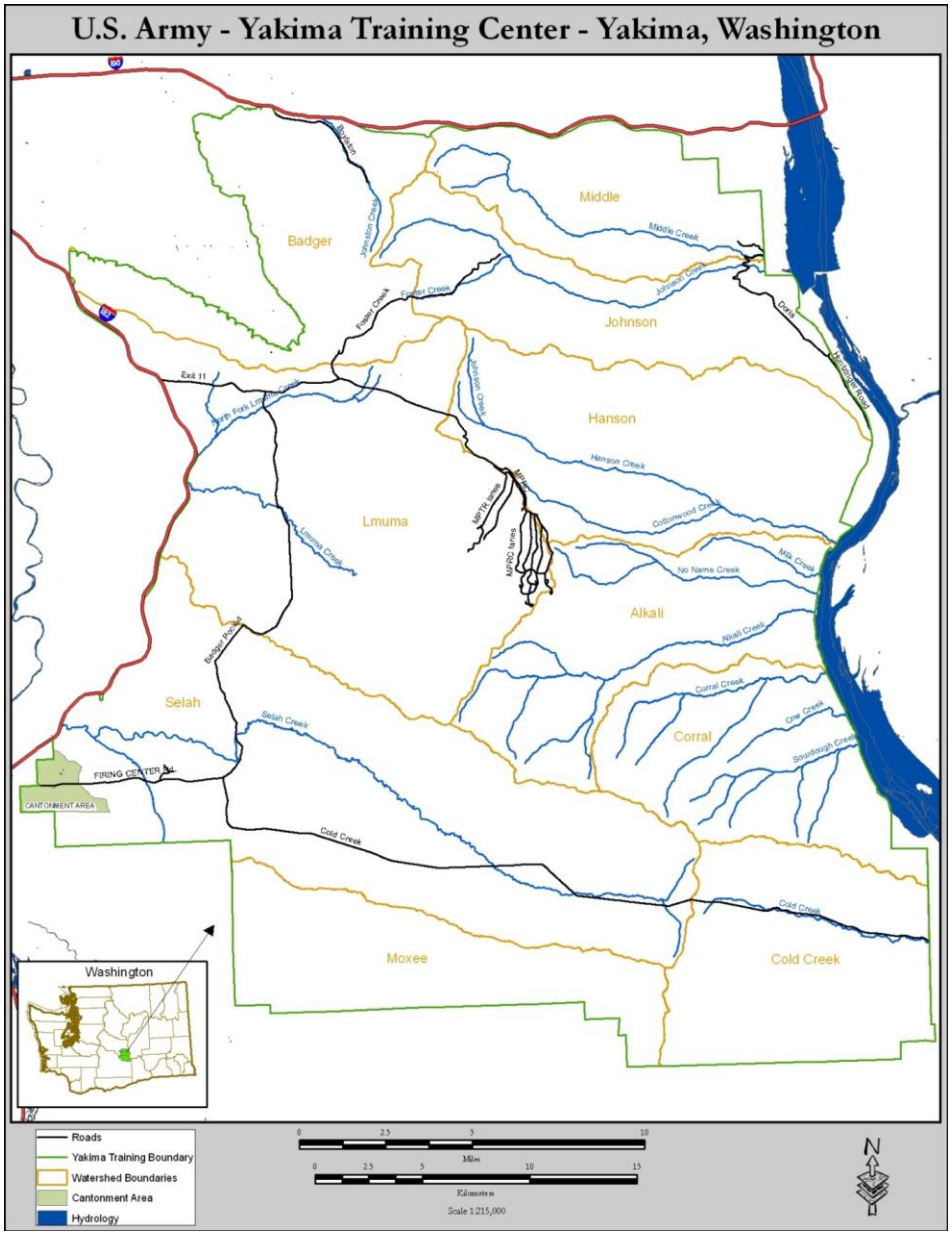

Figure 8. JBLM YTC Watershed Complexes (JBLM YTC, ENV, 2011)

3.5 Land Use

To aid in resource management, JBLM YTC is divided into five land use zones (JBLM YTC Cultural and Natural Resource Management Plan 2002). Zone 1 (Land Bank) is managed for significant and sensitive natural and/or cultural resources, such as wetlands, riparian areas, archeological, or sacred sites. Zone 2 (Conservation) is the Sage Grouse Protection Area. Most forms of training are allowed here, but are more controlled. Zone 3 (General Use) includes the MPRC, Multipurpose Training Range (MPTR), Cantonment Area, and all the primary training and vehicle maneuver areas. Zone 4 (High Use) accommodates heavy use and high-impact activities, such as Brigade Support Areas (BSA) and gravel pits. Zone 5 (Impact Areas) include impact and dud areas and the Selah Airstrip. These planning designations identify allowable

military training activities and acceptable levels of impact to resources, thereby maximizing military training opportunities while simultaneously safeguarding resources. Land use and management activities are undertaken within the context of the zone designation.

The proposed location of the SFF range is situated between Range 4 and Range 5. This area of JBLM YTC is in Land Use Zone 2, the Sage Grouse Protection Area, and is used for small arms ranges.

3.6 Socioeconomics

For this analysis, the region of influence (ROI) for JBLM YTC is defined as Yakima and Kittitas Counties. The ROI is the geographical area most affected by the economic activities associated with the installation resulting from the proposed action. Many of the supplies and services needed by the installation are purchased within the ROI. Residential, educational, and recreational facilities for military personnel and their families are also provided within the ROI. The interstate corridors of I-90 and I-82 provide easy access to the cities of Yakima, Selah, and Ellensburg.

The total population for the ROI was an estimated 269,200 in 2006 (Washington Office of Financial Management 2006). The largest city in the ROI is the city of Yakima in Yakima County, with a population of 81,710. In Kittitas County, the largest city is Ellensburg, with a population of 17,080. On JBLM YTC, barracks may house up to 2,600 people and are utilized on a temporary basis by military personnel participating in training exercises. Approximately 400 personnel (mixed military/civilian/contract) work at the installation of which very few live in barracks. There is no family housing on JBLM YTC; consequently, all married military families reside off-post.

The service industry is the largest employer in the Yakima Metropolitan Statistical Area (Yakima County), employing 63,700 individuals. Farming is the second largest employer with 19,090 employees. The unemployment rate in March 2011 for Kittitas County was 10% and the unemployment rate in Yakima County was 11%. The March 2011 unemployment rate for Washington State was 9.7% (WA. State Employment Security Dept 2011).

3.7 Infrastructure

The Cantonment Area is the primary developed area within JBLM YTC. It contains housing, food service, and exercise facilities as well as administrative, fire department, health services, and other 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, Yakima Research Station (YRS), and MPRC. Non-potable water is provided via 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, effluent is discharged to the Yakima River.

There are approximately 1,648 miles of roads on JBLM YTC. They consist of five classes of roads (i.e., primary, secondary, light duty all-weather, unimproved, and trail) with the majority being made up of unimproved and/or trails. The all-weather or maintained road system consists of approximately 516 miles of road.

3.8 Cultural Resources

Cultural resources at JBLM YTC include prehistoric and historic archaeological sites, sacred sites, and traditional cultural properties. The Yakama Nation and the Wanapum Band maintain active treaty rights in the subsistence and religious use of JBLM YTC lands. Historically, Euroamericans used sites now occupied by JBLM YTC for ranching, mining and quarry operations, and as settlements. Railroad construction and operation also took place across JBLM YTC. Remnants of historic uses are found throughout the installation concentrated in small areas of previous development and habitation.

Members of the Yakama Indian Nation, including the Wanapum Band, continue to use JBLM YTC for traditional cultural purposes consistent with their past practices. Current uses include gathering wild root crops, fruit and berries, and other plant materials for food, medicines, and crafts; hunting of deer and birds; and religious and ceremonial pursuits such as spirit quests. Table 2 identifies some common uses and the time of year they typically occur.

The most important root crop is commonly known as biscuit-root, desert parsley, or Indian celery (*Lomatium* spp.). Native American people also harvest the roots, leaves and stalks of balsamroot (*Balsamorhiza* spp.), rhizomes of cattail (*Typha* sp.), roots of bitteroot (*Lewisia redeviva*), and bulbs of wild onion (*Allium* spp.) and yellow bell (*Fritillaria pudica*). Crops are gathered primarily in the spring and mostly from the eastern and southwestern portions of the installation.

Table 2. Common Cultural and Religious Uses and Ceremonies Conducted at Yakima Training Center, Yakima, WA.

Use	Typical Time Period
Gathering of plant products and materials (roots, berries, textile materials)	Early March through early June
Hunting	Year round
Religious ceremonies	Year round
Fishing (Columbia River)	Spring and Fall (coordinated with spring and fall salmon runs)

3.9 Wildland Fire

Many ecosystems require fire for function and productivity, and fire is not always considered an adverse impact. However, wildland fires are a concern on JBLM YTC because of the potential

impact on human activities and structures, sensitive biological and cultural resources, air quality, and military operations. Alteration of the natural fire regime by increasing the rate of ignitions is an adverse impact. This is especially important in shrub-steppe ecosystems, like those present at JBLM YTC, where increased fire frequency has led to major shifts in plant communities. The result has been a decrease in size and density of mature native vegetation communities, and an increase in fire-susceptible communities. This has also impacted soil retention, water quality, wildlife, and habitat. In addition, large-scale fire is one of the most significant threats to the federal candidate species greater sage-grouse, which occurs at JBLM YTC. This species requires mid- to late-successional sagebrush habitat, and natural re-establishment of sagebrush is slow, taking up to 100 to 240 years. (Baker 2006).

Wildland fire is an unavoidable hazard associated with certain aspects of military training at JBLM YTC, particularly during the fire danger season (May through October). Army training activities require the use of munitions and weapons systems that often increase the chance of wildland fire ignition and may damage important resources. JBLM YTC has established several policies and procedures to reduce or mitigate this hazard. In accordance with the September 4, 2002 Policy Memorandum issued by the Assistant Chief of Staff for Installation Management, JBLM YTC has developed an Integrated Wildland Fire Management Plan (IWFMP) (Nissen and Melcher 2011) for the installation. The IWFMP is the primary guidance document with respect to fire prevention, fire suppression, post-fire actions, and fire management direction for the installation. The IWFMP establishes wildland fire risks, management goals, and strategies to be used to reduce the risk of fires on the installation and improve JBLM YTC's ability to reduce fire losses. It is JBLM YTC's policy to suppress all wildland fires on the installation, with the exceptions of those that occur in impact or dud areas and those that occur within the limits of established ranges where prior management actions have been implemented to contain fires, such as pre-burn areas. Fires occurring in impact areas are only suppressed when they threaten to escape the impact area boundary, and are only suppressed via aerial assets. However, ground suppression personnel are allowed to conduct operations along the outer perimeters of impact areas.

On JBLM YTC, most fires are started by military training activities (both ground-based and from helicopters) including live-fire exercises, pyrotechnics, use of tracer rounds, explosive ordinance, and some aspects of maneuver training. These fires primarily start on existing ranges in the CIA and dud areas. While most fires are contained in these areas, there is the risk of a fire escaping and burning training areas, as well as areas surrounding the installation.

Wildland fires have burned an average of approximately 9,000 acres (3,600 ha) annually for the past 25 years; however, annual burn acreages are highly variable and have ranged from 50 acres (20 ha) in 1991 to 63,296 acres (25,600 ha) in 1996 (this figure includes approximately 15,000 acres [6,100 ha] that burned off-Post). Some areas have been re-burned repeatedly. High fire loss years have occurred in the last 25 years. These include 27,921 acres in 1984, 28,070 acres in 1987 (of which approximately 4,011 acres burned off-post), and 34,827 acres in 1996 and 2003 (of which 146 acres burned off-post). Large fire loss years appear to be cyclical; during most years, between 1,500 and 6,000 acres (600 and 2,400 ha) are burned (GTA EIS, 2010).

The risk of fire on JBLM YTC depends on several factors, including:

- Weather conditions (both seasonal weather and weather at the time of ignition). Fire risk

at JBLM YTC is very responsive to the combined effects of fuel loading and moisture, temperature, humidity, and wind speed. Generally, the most extreme conditions occur between mid-day and early evening due to higher temperatures, lower humidity, and irregular afternoon winds.

- The frequency, intensity, and type of military training exercises. Pyrotechnic devices and tracers have been shown to be the most likely to ignite fires on the installation.
- The specific locations in which fires are ignited, including vegetation, terrain, and fuel loadings. On JBLM YTC, the shrub-steppe communities consist of fuel types ranging from 1 to 10hour fuels. These are light fuels that are easily ignited and burn rapidly due to their small diameter (less than 0.5 inch [1.3 cm]). As a result, fire spreads quickly. In areas of higher disturbance, such as repeated fires and mechanical disturbance, native species have been largely out-competed by nonnative species like cheatgrass. This shift in plant communities has resulted in the development of a more fire-prone system.
- Level of response and capability of fire suppression resources to effectively attack and contain fires quickly (Army 2002b, Nissen and Melcher 2004).

Since the large-scale fire in 1996, the cumulative average of burned areas at JBLM YTC has declined due to enhancements of fire management policy related to pre-suppression and suppression activities, implementation of a risk assessment, improved suppression resources, and improved personnel training. These activities and resources are described in the following sections. According to available data, through 1996, a cumulative average of approximately 11,335 acres (4,587 ha) burned annually due to fires originating at JBLM YTC; from 1997 through 2008, this cumulative average annual acreage decreased to approximately 8,866 acres (3,588 ha) (McDonald 2009g).

3.10 Biological Resources

3.10.1 Upland Vegetation

JBLM YTC lies within the shrub-steppe Columbia River Basin province of eastern Washington and Oregon (Franklin and Dyrness 1973). 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 community 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 on government holdings (JBLM YTC and Hanford Reach National Monument) and the Yakama Indian Nation. These properties 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 conversion of land to agricultural uses, grazing, 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.

Wildland fire from Range 4 and Range 5 has impacted the vegetation within the proposed project site. The Fire History Map in **Figure 9** shows specific areas in and around the proposed range that have burned. In a vegetation survey conducted by installation staff, the range footprint and surrounding area consisted of sparse big sagebrush/bunchgrass vegetation community. Sparse big sagebrush/bunchgrass is differentiated from big sagebrush/bunchgrass by having big sagebrush cover that is patchy or less than 5% throughout the mapped polygon. This has lower perennial bunchgrass cover, a preponderance of cheatgrass (*Bromus tectorum*) and areas seeded with crested wheatgrass (*Agropyron cristatum*). This vegetation community is generally the result of past disturbance from wildland fire, training activities, or other means that decreased the total cover of big sagebrush. This vegetation community occurs on 18,734 acres (5.8%) of the installation (CNRMP). The western two thirds of the proposed range footprint is vegetated with big sagebrush (*Artemesia tridentate*), bluebunch wheatgrass (*Pseudoregneria spicata*), and needle and thread grass (*Hesperostipa comata*). The eastern one third of the site is grey rabbitbrush (*Ericameria nauseousus*), rather than big sagebrush, and bluebunch wheatgrass. The big sagebrush, grey rabbit brush, and needle and threadgrass is scattered patchy to clumpy and moderately abundant. The bluebunch wheatgrass is scattered patchy to clumpy and highly abundant. The Hoover's tauschia (*Tauschia hooveri*), a Federal species of concern and a state threatened species, does not occur within the footprint of the proposed project site; however, the species is known to occur within the SDZs of the existing ranges adjacent to the proposed project site, and would occur within the SDZ of the proposed range. Non-native species, such as crested wheatgrass (*Agropyron cristatum*) are present on the site due to previous disturbance and fire (2010 SFF Rare/Sensitive Plant Survey, **Appendix B**).

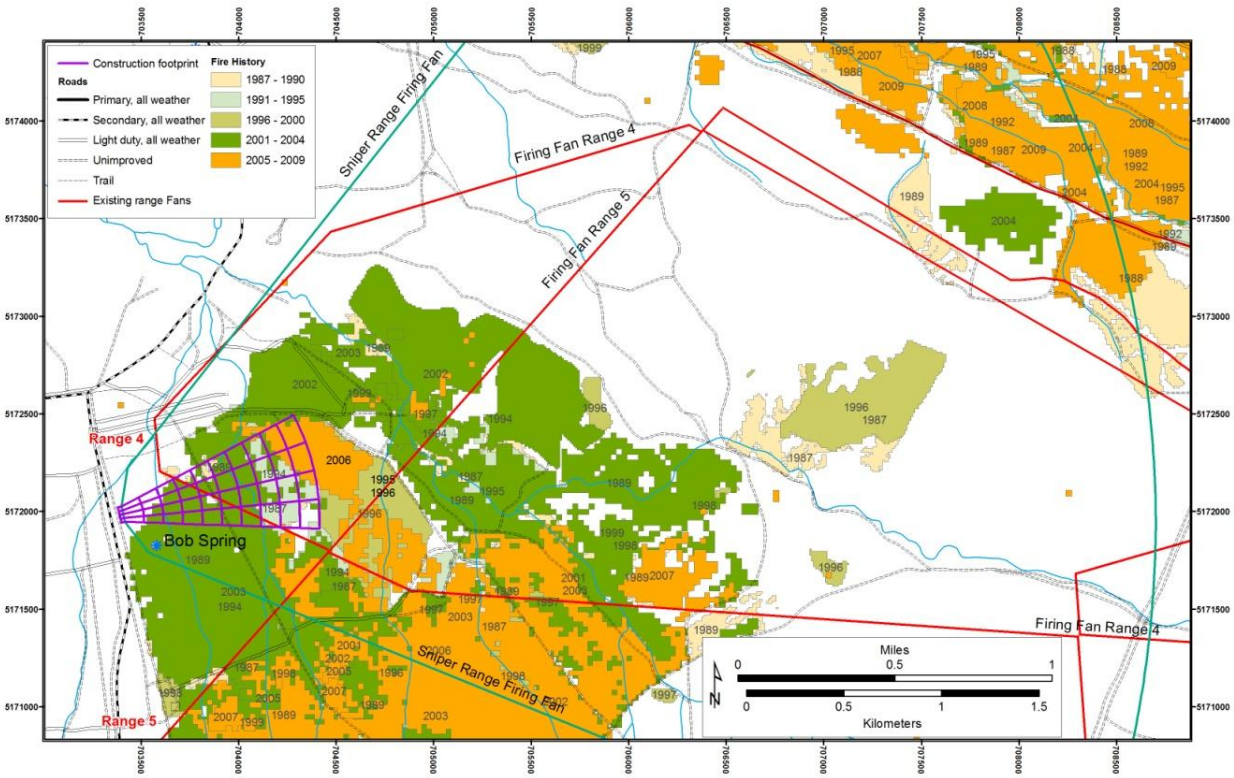

Figure 9. Fire History Map (JBLM YTC, ENV, 2011)

3.10.2 Wildlife/Fish

Johnson and O'Neal (2001) identified 651 species of wildlife that reside in Washington State of which some 300 species 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 (ENRD 2002). With such an array of fish and wildlife species, a combination of both coarse (wildlife habitat) and fine filter (species specific) approaches are used to manage fish and wildlife species 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 it is assumed that with a coarse filter approach that the needs of most species are met through provision of a mosaic of habitats, some species with status concerns require a species-specific approach (i.e., fine filter) to management.

Wildlife habitats characteristic of this region and JBLM YTC include those vegetation communities described above. Wildlife habitat elements include structural components, such as shrub height, percent shrub cover, and shrub age class. Wildlife habitat natural attributes are soil characteristics, cliffs, burrows, and large trees. Physical features are roads, buildings, towers, and lights. It is assumed that wildlife use habitat arranged or comprised of vital components that result in healthy and viable populations.

Within the proposed project area, wildlife habitats consist of shrub-steppe habitats with varying degrees of structural components and habitat elements associated with them, as described under Section 3.10.1.

3.10.3 Threatened and Endangered Species

Several species of fish, wildlife, and plants are of management concern for JBLM YTC due to their current or potential federal status under the Endangered Species Act (ESA) (**Table 3**). 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 (BA) that have concluded Section 7 ESA informal consultation with the regulatory agencies.

Bald Eagle

Effective July 28, 2007, the USFWS removed the bald eagle from the list of threatened and endangered species due to meeting or exceeding established recovery goals throughout the species range. However, the species 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 but bald eagles are known to successfully nest adjacent to the installation along the Yakima and Columbia Rivers. Known nesting attempts adjacent to the installation range from 3.5 to 6 km of the JBLM YTC's boundary, but both are located greater than 18 km away from the proposed project area. Portions of the installation contain suitable habitat for both wintering and migrating bald eagles from October through mid-to-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 at several sites on the installation along Hanson Creek, at Borden Springs, and historically in Alkali Canyon. Known nocturnal roosts located along Hanson Creek consist of mature size cottonwood trees. The Borden Springs roost is approximately 16 miles southwest of the proposed SFF range and the Alkali Canyon site no longer exists due to a wildland fire. Although wintering/migrating eagles use the areas described above from October through April, the period of consistent daily use is from December through March and a peak in number and frequency of observations usually occurs in February. JBLM YTC manages bald eagles under an Endangered Species Management Plan that provides both spatial and temporal protection measures for both populations of wintering bald eagles and existing habitat, as well as restoration efforts for future habitat. No known sightings or suitable nesting and/or foraging habitat for bald eagles occurs within the proposed project area.

Table 3. Threatened, Endangered and Species of Management Emphasis at Yakima Training Center, Yakima, WA.

Common Name	Scientific Name	Status	Critical Habitat Present on JBLM YTC
Bald Eagle	*Haliaeetus leucocephalus*	Delisted in 2007	No
Golden Eagle	*Aquila chrysaetos*	State Candidate	No
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

*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.

Golden Eagle

The Golden Eagle (*Aquila chrysaetos)* is not listed as a federal threatened and endangered species, but is afforded protection under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. The Golden Eagle is a year-round resident of JBLM YTC. Four historic nest sites have been identified on JBLM YTC. Golden eagles require isolation from human activity during the nesting season, February through June. The species builds its nests on cliffs. Military maneuver restrictions contained in Fort Lewis Regulation 420.5 include a 500-meter buffer between all military activities and all nest sites, a minimum of 300 feet above

ground level for all over-flights of the nest sites, and no air traffic is allowed below the rim of Selah Canyon between Badger Pocket Road and the I-82 bridge (Biological Assessment for Grow the Army EIS). Golden eagles have been observed within and adjacent to the proposed project area. The proposed project area does not contain suitable nesting habitat for Golden eagles, however it may be used for foraging as prey species (e.g., Black-tailed jackrabbit, Greater sage-grouse) are present.

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 bull trout 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, ten 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 which have degraded riparian communities. Hydropower and storage dams hindered and precluded migrations normal 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 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, large woody debris, and 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 perhaps 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. There is

no suitable habitat for bull trout or any other fish species within the proposed project area as no perennial stream reaches are located within it.

Critical Habitat for Columbia River bull trout DPS extends from the Columbia River mouth and estuary throughout the entire Columbia Basin, including all tributaries historically accessible to the species. On September 22, 2004, the USFWS designated approximately 737 miles of streams in the Columbia River Basin, Washington, as critical habitat for the bull trout under the ESA. Critical Habitat for Columbia Basin populations of bull trout is excluded from areas covered by the Federal Columbia River Power System, which includes those waters on and adjacent to JBLM YTC.

Upper Columbia River Spring Chinook Salmon Evolutionarily Significant Units (ESU)

NOAA Fisheries listed this ESU as endangered under ESA in March of 1999. 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.

All streams and drainages on JBLM YTC are located outside 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.

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 literally millions of hatchery spring Chinook released from facilities upstream.

Habitat requirements for spring Chinook consist of 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.

Habitat on 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.

Upper Columbia River Steelhead Trout ESU

NOAA Fisheries listed this ESU as endangered in 1997. The decline in the abundance of Upper Columbia steelhead mirrors that of Chinook, except for the 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 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 gravel 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, although 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 the 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 prefer cool water below 21 degrees Celsius, but

they can survive in waters from 0 to 26 degrees Celsius. Steelhead require plenty of oxygen and can tolerate a wide range of salinities.

Of the streams on JBLM YTC, Johnson Creek 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 or not 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. Although located on the installation, Johnson Creek is approximately 26 km north of the proposed project area and is upstream of any drainage flowing out of the proposed project area.

There is no suitable habitat for steelhead or any other fish species within the proposed project area as no perennial stream reaches are located within it. 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.

Middle Columbia River Steelhead Trout ESU

NOAA Fisheries listed this ESU as threatened in 1999. The Mid-Columbia ESU extends from the Klickitat River to the Yakima River, excluding the Snake River and includes 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 the 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 Rosa 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 (NPPC 1990). Storage reservoirs are operated in concert with 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 steelhead ESU has been determined to include 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 adjacent to the installation is designated critical habitat for this ESU. There is no suitable habitat for steelhead or any other fish species within the proposed project area as no perennial stream reaches are located within it.

Greater Sage-grouse

The Columbia Basin DPS of Greater sage-grouse (*Centrocercus urophasianus*) is a Washington State threatened species and a federal candidate species under ESA. This species (i.e., Columbia Basin DPS) 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. Both nesting and brood-rearing occur in relatively close proximity (i.e., within 8 km) to leks when suitable habitat exists.

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 (Livingston 1998) over time. 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.

Eighteen known leks were monitored in 2010 and nine were found to be active. Four of the nine active leks were classified as major leks (i.e., ten or more male sage-grouse observed at least once during the season). In 2010, the population estimate for sage-grouse on JBLM YTC was 174 and the 21-year population average was 284.

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 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. Fire regimes in the lower Columbia River Basin were historically characterized by regular, low-intensity burns, which created a mosaic of seral stages. Following fire, natural re-establishment of sagebrush is slow (about 100-240 years; Baker 2006). 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. The proposed area and its associated SDZ are located within a primary wildland fire containment area where fire is expected to burn on an annual basis.

The proposed SFF range is in Land Use Zone 2, a sage-grouse protection area. Suitable habitat within the proposed project area is very much reduced due to previous wildland fires. Consequently, nesting and/or wintering habitat is not as ideal as in surrounding areas. There is a lack of a sagebrush shrub component throughout most of the project area. A Vegetation Survey (Appendix B) indicates that in 1999, a majority of the site was a shrub/grass community dominated by big sagebrush and bluebunch wheatgrass. Wildland fires in 2003 destroyed much of this vegetation. Currently, on the western side of the proposed range, big sagebrush makes up 15-25% of the canopy cover. As the site progresses easterly, big sagebrush quickly decreases; The eastern part of the proposed site is only 5% shrub cover, with grey rabbitbrush being dominant instead of big sagebrush. Two leks are within 2 km of the associated SDZ, located east and southeast of the range footprint.

Ute ladies'-tresses

The USFWS listed Ute ladies'-tresses as a federally threatened species on January 19, 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) in the western region of its range 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*). One of the key habitat features necessary for survival of Ute ladies'-tresses is saturated soil throughout the growing season. It is usually located within 12 inches (30 cm) of the water table. While this species will tolerate periodic flooding, it does not occupy areas constantly inundated with water. Ute ladies'-tresses is commonly found in alkaline substrates. This species depends on natural disturbance, growing in areas where early successional conditions are perpetuated or competition from other vegetation is restricted (USFWS 2000). 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 is 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 to occur on the installation. Suitable habitat is not present in the proposed project as the area consists mostly of upland vegetation communities. A rare and sensitive plant survey was completed by installation staff and found no occurence of Ute ladies'-tresses on the footprint of the proposed SFF range.

Umptanum Wild Buckwheat

This 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 known to occur on Umptanum Ridge, southeast of the installation. As Umptanum Ridge bisects the entire installation, suitable habitat for this species may exist on JBLM YTC. Numerous sensitive plant and vegetation surveys, however, have never recorded its occurrence on the installation.

The known population 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. The overall vegetation is quite low in comparison of adjacent shrub-steppe vegetation communities characteristic of the Columbia Basin. No suitable habitat for this species occurs within the proposed project area.

Chapter 4 Environmental Consequences

The following examines the anticipated environmental effects associated with the implementation of any of the alternatives described in this document on the Affected Environment described in Chapter 3. For ease of presentation and comparison, impact analysis discussions are grouped by the same technical disciplines as addressed in Chapter 3, Affected Environment and summarized in **Table 4**.

The severity of environmental impacts will be characterized as negligible, minor, moderate, or major. A negligible impact may locally alter the resource, but would not measurably change its function or character. A minor impact would either be isolated and localized or not measurable on a wider scale. Moderate impacts to a resource would be measurable on a wide scale (e.g., across the entire installation or region). If moderate impacts are adverse, they would not exceed limits of applicable local, state, or federal regulations. A major impact may exceed limits of applicable local, state, or federal regulations or would untenably alter the function or character of the resource. The threshold of significance would be a major (significant) impact.

Table 4. Comparison of Environmental Consequences for Each Alternative

	Proposed Action	**No Action**
Air Quality	Negligible impact	No impact
Noise	Negligible impact	No impact
Geology, Topography, Soils	Minor impact	No impact
Surface Water	Minor impact	No impact
Land Use	Negligible impact	No impact
Socioeconomics	Negligible impact	No impact
Infrastructure	Negligible impact	No impact
Cultural Resources	Negligible impact	No impact
Wildland Fire	Minor impact	No impact
Biological Resources	Minor impact	No impact

"No impact" means no impact in addition to existing baseline conditions.

4.1 Air Quality

An impact to air quality would be considered significant if it affects the achievement or maintenance of NAAQS.

Negligible impacts to air quality and green house gases (GHG) generation are anticipated as a result of the implementation of the proposed action. No violations of NAAQS for criteria pollutants would occur from the construction and operation of a SFF range. Construction activities would contribute to minor increases in carbon monoxide (CO) and GHG emissions during construction of the SFF range. Best management practices (BMPs) will be used to minimize dust and the contractor must file a Dust Control Plan with the Yakima Regional Clean Air Agency prior to starting construction. For rock crushing activities, the contractor must provide basic operations data for air emission determinations prior to commencement of crushing operations. Emissions from construction equipment would not be expected to exceed any air quality thresholds. Heating and air conditioning in range operation buildings will be provided by air cooled heat pumps with supplemental electrical resistance heat. No boilers will be used.

Overall, effects to the air resources resulting from construction and training at the SFF range would not cause a violation of the NAAQS for criteria pollutants. Impacts to air quality and GHGs for this action are considered negligible.

No Action Alternative

Under the No Action Alternative, no construction would take place and training activities would remain the same. Existing levels of air quality would remain unchanged. Impacts to air quality for this action are considered negligible.

4.2 Noise

Impacts would be considered significant if noise from Army actions caused harm or injury to on- or off-site communities; or exceeded applicable environmental noise limit guidelines.

The types, levels, intensity, frequency, and duration of noise associated with operation and maintenance of the range would be consistent with current conditions at the two adjacent ranges. The GTA EIS analyzed noise impacts on ranges adjacent to the proposed SFF range. Some of the noise contours and complaint risk noise contours do cross the southwestern JBLM YTC boundary for a short distance. This area is rural and sparsely populated or unpopulated. The noise generated during construction would be associated with the operation of heavy equipment. This noise would be short-term and conclude at the end of construction. Noise impacts are expected to be negligible.

No Action Alternative

Under the No Action Alternative, there would be no noise from construction and noise generated from range activities would remain consistent with current range activities.

4.3 Geology, Topography, and Soils

Impacts on geology, topography, and soils would be considered significant if:

- the landscape cannot be sustained for military training,
- excessive soil loss impairs plant growth, or
- Federal, state, or local laws pertaining to this resource are violated.

There would be short term soil erosion because of the proposed construction. Soils on the footprint of the range, as well as most of JBLM YTC, are highly susceptible to erosion. This erosion can be accelerated when vegetation is removed and storm water runoff is concentrated. Earth moving activities necessary to construct the range would temporarily remove the current vegetation. Mass-grading would not be required to construct the range and this will decrease the erosion potential. Land disturbance would be limited to sites where specific range features (e.g., buildings, hard stand areas, targets, berms, etc.), trenching for electrical lines, target placement, and access road construction occurs. Appropriate Best Management Practices (BMPs) to control water runoff and erosion, and seeding specifications to establish the appropriate permanent vegetation would be implemented. Required storm water plans would provide details for these BMPs to meet permit requirements and comply with Federal, state, and local laws that pertain to erosion and sediment control. Current range maintenance programs would be used to address long-term erosion due to operation of the range.

There would be minor impacts to geology, topography, and soils, resulting in less than significant effects. The landscape will continue to sustain military training. Soil loss will be controlled through BMPs during construction and during long-term maintenance so that the soil will continue to support plant growth. All legal requirements for the control of sediment will be met through the storm water permit.

No Action Alternative

Under the No-Action Alternative, there would be no new impacts to the geology and soil.

4.4 Surface Water

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

Two ephemeral drainages cross the footprint of the range. While these drainage systems typically have no flowing water, they do retain moisture as evidenced by the vegetation growing there. Selah Creek is downstream and to the northeast of the site but is approximately 4000 feet away. Construction activities on the range will include BMPs to control erosion and minimize sediment leaving the construction site. These BMPs will be designed and implemented through a Construction Storm Water Pollution Prevention Plan (CSWPPP) and a National Pollutant Discharge Elimination System (NPDES) permit to control storm water runoff and minimize pollutants that may enter the Waters of the U.S. to the maximum extent practicable. Actual soil disturbance to construct the range will be minimal, with primary land disturbance related to construction of buildings, target placement, trenching for electrical cables, and a small access

trail. No mass-grading will be required. The ITAM program will be used to rehabilitate any disturbed areas on the SFF range after construction and during operation of the range. Due to storm water and erosion control BMPs, the lengthy distance to Selah Creek and ultimately the Yakima River, the relatively small footprint of land disturbance, and upland rehabilitation efforts following construction, the SFF range is not expected to have any impacts on water quality.

Lead fragments from spent ammunition will accumulate, over time, in the soil on the SFF range. Lead from weathered fragments can attach to soil particles and potentially leave the range through storm water runoff. Lead is relatively toxic and measures will be taken to prevent lead migration and protect human health. The Army has identified a broad number of engineering solutions and best management practices that can be incorporated into operating procedures to mitigate this issue and control the potential effects of lead and other metals from migrating into surface waters or wetlands areas. Those engineering solutions and best management practices are identified and discussed in detail in Army Small Arms Training Range Environmental Best Management Practices (BMPs) Manual (Fabian and Watts, 2005), and Prevention of Lead Migration and Erosion from Small Arms Ranges (U.S. Army Environmental Center, 1998).

There would be minor, short term impacts to surface water, caused by construction activities, resulting in less than significant effects. Implementation of the CSWPPP to control erosion and storm water runoff will mitigate any impacts to surface water. No Federal or state regulatory limits for surface water quality are expected to be exceeded.

No Action Alternative

Under the No Action Alternative, the impact to surface water would be negligible as no soil disturbance would take place and vegetation would not be impacted.

4.5 Land Use

Impacts to land use would be considered significant if the land use is incompatible with existing military land uses, land use designations, or major conflicts with Army land use plans, policies, or regulations.

This site is located within Land Use Zone 2, the Sage Grouse Protection Area. Military training is not prohibited within this land use zone. Rather, management practices are prescribed to allow training, while at the same time, provide for habitat and the well-being of the sage-grouse.

The proposed area where the new SFF range would be located is between two existing small arms ranges, and as such, land use has been determined by the sites' juxtaposition between the two existing ranges for this area. The land use, therefore, would remain unchanged under either alternative and there would be no direct or indirect, short or long term land use impacts associated with this action.

4.6 Socioeconomics

Socioeconomic impacts would be considered significant if they caused substantial change to the sales volume, income, employment or population of the surrounding ROI.

During the construction phase, a short term increase of expenditures would likely occur within the ROI. Much of these expenditures would be for contract costs incurred to construct the new range. Overall, level of expenditures and duration would be low for a short period while the range is being constructed. Ongoing expenditures in the future would be low as well for supplies and services purchased to operate and maintain the new facility.

There would be no substantial change to the local economy or employment levels resulting from constructing, operating or maintaining the SFF range.

No long-term socioeconomics impacts are expected for the operation and maintenance of this range.

No Action Alternative

There would be no new socioeconomic impact associated with this alternative as there would be no increase in the current labor force.

4.7 Infrastructure

Impact to infrastructure would be significant if the action affected the ability to meet the overall training mission.

The proposed location of the SFF range is between Ranges 4 and 5. This area of JBLM YTC is used for small arms ranges. It is just outside the cantonment area and in close proximity to needed infrastructure resources. Electrical and communication are within 10,000 feet. Water and sewer are not required. Hardened roads provide access to the range and hardened parking areas are already in place at Ranges 4 and 5.

The action would result in addition of a SFFR at JBLM YTC that is fully compliant with Army TC 25-8, which currently does not exist at JBLM YTC. This would result in a positive impact to the installation's infrastructure by enhancing the ability to meet the overall training mission.

No Action Alternative

Under this alternative, a SFF range would not be built and no impacts would occur.

4.8 Cultural Resources

Impacts to cultural resources would be considered significant if Army actions: 1) permanently restricted access of tribal members to traditional cultural places; 2) appreciably increased safety risks to tribal members using traditional cultural properties; 3) resulted in a long-term loss or degradation of plant or animal populations of traditional cultural importance to Native Americans; or 4) diminished 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.

The area has been surveyed and there are no known archeological sites within the footprint of the proposed SFF range and National Historic Preservation Act (NHPA) Section 106 consultation is not required. Mitigation procedures have been coordinated with the Washington State Historic

Preservation Office (SHPO) and are in place if subsurface artifacts are discovered during construction.

No Action Alternative

Under the No Action Alternative, there would be no new construction and therefore no new impacts to cultural resources.

4.9 Wildland Fire

The threshold for significance for wildland fire management is based on the potential of the action to increase wildland fire risk or adversely impact the ability of JBLM YTC to manage wildland fires.

Analysis has found that most fires (over 90 percent) start and are contained within established range areas. (Fort Lewis GTA FEIS). The risk of wildland fire occurring when an ignition source is present depends on several factors including weather conditions, location of ignition, and fuel loads. The vegetation communities at the SFF range consist of light fuels that easily ignite and burn rapidly, potentially resulting in fires that could spread quickly. A wildland fire at the SFF range could damage animal and plant communities, including listed species, increase soil erosion from vegetation removal, and contribute to the spread of invasive plant species. Fires that move off post have the potential to damage surrounding homes and community resources.

It is important to realize that sniper training does not involve pyrotechnics or tracer rounds. Operation of the SFF range, therefore, is not expected to be a wildland fire hazard because tracer rounds and explosives will not be used. As with any range or facility, there is always a chance of incidental fires from ricochets, cigarettes, or careless error. Wildland fire impacts are more likely to start from range activities at adjacent ranges 4 and 5.

Several measures to minimize wildland fire risk and suppress fires are already in place under JBLM YTC's Integrated Wildland Fire Management Program. These measures would reduce the risk of wildland fire occurring as a result of training activities at the SFF range, and more importantly at adjacent ranges. There would also be a decrease in the extent and intensity of fires that do occur. Pre-suppression actions include the construction and maintenance of firebreaks, development of suppression water resources, prescribed burning, pre-incident planning, and implementation of a system of risk management that considers daily fire danger and proposed activities. Suppression measures include providing for adequate ground and aerial assets (e.g., seasonal wildland firefighters and firebucket assets during the fire danger season) necessary to rapidly suppress and control fires to contain them on JBLM YTC, and preventing fires from escaping from designated control areas (e.g., impact areas and wildland fire containment areas). Specific methods for accomplishing these measures are addressed in the IWFMP and CNRMP. Additional mitigation measures were outlined in the Fort Lewis GTA FEIS. These measures include revised firebreak coverages, the establishment of primary and secondary containment areas, development of pre-incident wildland fire plans, and increased wildland fire management resources.

With the absence of pyrotechnics and tracer rounds in sniper training, and on-going, and planned wildland fire control measures on JBLM YTC, construction and operation of a SFF range is not

expected to increase wildland fire risks or adversely impact the ability of JBLM YTC to manage wildland fires. Impacts from wildland fire are expected to remain unchanged from current conditions, and not result in additional impacts to this resource.

No Action Alternative

Under the No Action Alternative, an increase in wildland fires would not be expected and there would be no change in impacts from baseline conditions.

4.10 Biological Resources

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

(1) long-term loss or degradation or loss of diversity within unique or high-quality plant communities (2) unpermitted "take" of federally listed species (3) local extirpation of rare or sensitive species not currently listed under the Endangered Species Act (4) unacceptable loss of critical habitat as determined by the US Fish and Wildlife Service (5) non-compliance with policies, regulations, and permits related to wetlands conservation and protection (6) high probability of increasing the frequency and intensity of wildland fires, especially in sensitive ecological areas.

Based on the discussion below, only minor impacts to biological resources are expected from construction and operation of a SFF range. Biological resources would continue to be managed in accordance with the installation's Cultural and Natural Resources Management Plan (2002). Replanting native vegetation to disturbed areas, the lack of pyrotechnics and tracer ammunition, an existing Integrated Wildland Fire Management Program, and management measures in the Sage-grouse Management Plan will keep impacts to less than significant. No loss of plant diversity is expected. There would be no unpermitted "take" of a federally listed species nor local extirpation of rare or sensitive species. No wetlands are in the project area. Wildfires are not expected to increase with implementation of the proposed action.

4.10.1 Upland Vegetation

Upland vegetation on the site of the proposed SFF range is a native shrub-steppe community. Impacts to vegetation during construction could allow for establishment of noxious weeds. Impacts to vegetation during operation and maintenance may also result in opportunities for noxious weeds to invade areas managed for bareground conditions. Seed source for noxious weeds may come from surrounding areas where non-native exotics such as cheatgrass, kochia, and diffuse knapweed already exist.

Impacts to the shrub-steppe vegetative community would occur from soil disturbance during construction. Actual earth moving will remove the vegetation and construction equipment has the potential to damage vegetation in the vicinity of the ground disturbance. The existing terrain will not require that the site be mass-graded. Soil disturbance will be primarily limited to the few buildings behind the firing line, target placement, trenching of electrical lines for targets, and a small access trail. Vegetation may also be damaged by construction equipment working on the site. Replanting the disturbed areas with native vegetation will be required to prevent the spread of noxious weeds, re-establish soil stability, and help maintain the shrub-steppe community

within the areas directly impacted by construction activities. Actual ground disturbance due to construction is expected to be 5.4 acres.

Sagebrush vegetation in this shrub-steppe community is not fire tolerant. Pyrotechnic devices and tracers are typically the cause of wildland fires on ranges (Final Biological and Essential Fish Habitat Assessment for the Army Growth and Force Structure Realignment at Fort Lewis and Yakima Training Center, Washington). Sniper training does not involve pyrotechnics or tracer rounds. Operation of the SFF range, therefore, is not expected to be a wildland fire hazard because tracer rounds and pyrotechnics will not be used.

No Action Alternative

There would be no construction or range operation under this alternative. Consequently, there would be no change to the current status of upland vegetation. Fires from adjacent ranges, however, would continue to have the potential to impact the vegetation on this site.

4.10.2 Wildlife/Fish

Any impacts to wildlife or fish would be negligible under either alternative due to the location of the proposed project and the lack of suitable habitat for all species with the exception of those adaptable to habitat conditions and disturbance associated with existing ranges. There are no aquatic or riparian resources in close proximity to the proposed SFF range. BMPs to control erosion will further ensure that sediment will not impact fish. The proposed SFF range is adjacent to existing ranges and wildlife species more tolerant of disturbance have likely acclimated to range operations and noise. (Greater sage-grouse is discussed below.)

4.10.3 Threatened and Endangered Species

The analysis below has resulted in a determination of “no effect” for the proposed SFF range for all Federal listed threatened and endangered species. This analysis and determination will suffice for the biological assessment requirement of Section 7 of the Endangered Species Act (ESA). The “no effect” determination will not require concurrence or consultation with the USFWS or NOAA. The greater sage-grouse is a federal candidate species, which does not require ESA consultation. Although there is no requirement for formal or informal consultation for candidate species, greater sage-grouse, an Army’s species at risk, is included below given its management emphasis on JBLM YTC and the installation’s commitment to management of this species. From a NEPA analysis standpoint, no additional impacts to threatened and endangered species, beyond the baseline condition, are anticipated. Impacts to greater sage-grouse are less than significant given the already sparse sagebrush habitat and the expected control of wildland fires considering SFF range operations and proposed wildland fire mitigation under the Fort Lewis GTA FEIS. Also, the restrictions in place during breeding season are designed to reduce or eliminate impacts to the down-range lek.

Bald Eagle and Golden Eagle

There is no suitable nesting habitat for bald eagles or golden eagles at the proposed site and no impacts are expected. Foraging habitat for Golden eagles exists within the proposed project area and would continue to exist after the implementation of the proposed action.

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

There are no fish-bearing streams or potential habitat within the project site resulting in no anticipated direct or indirect impacts on any federally listed fish species.

Greater Sage-grouse

The proposed project site offers little suitable habitat to the greater sage-grouse. The proposed location of the SFF range is between Range 4 and Range 5. Sage-grouse habitat here is sparse big sagebrush/bunchgrass. As described in 3.10.3 above, this habitat is already sparse because wildland fires from adjacent ranges have modified the vegetation and allowed the encroachment of noxious weeds. Soil disturbance to construct the range would further damage the vegetation. Mass grading of the site will not be required, due to the existing topography and the requirements for the range. Disturbance will be limited to grading for construction of small cadre buildings and a parking area, target emplacements, and trenching for electrical lines to the targets. Construction equipment will also run over vegetation, causing inadvertent damage. Unless disturbed areas are revegetated, the encroachment of noxious weeds is likely.

Unlike other small arms ranges, the operation of a sniper range does not involve firing tracer rounds or the use of pyrotechnics. Tracer ammunition has a small pyrotechnic charge at the base that is ignited by the burning gun powder when the weapon is fired. This allows the shooter to follow the path of the round to the target. Sniper training does not utilize the tracer round because of the stealthy mission of the sniper. Also, sniper fire will produce a very tight grouping at the target, virtually eliminating the chances of stray rounds that could start a fire. The possibility of wildland fires from ricochets and human carelessness will always exist. The greatest threat of wildland fire at the SFF range is not from the sniper range itself, but from adjacent ranges where pyrotechnics and tracer rounds are used. As previously discussed in the Wildland Fire section, the Integrated Wildland Fire Management Program at JBLM YTC already has measures in place to minimize wildland fire risk from other ranges.

The proposed location of the SFF range, between Range 4 and Range 5, is within Land Use Zone 2, the Sage-grouse Protection Area (SGPA). The management of this protective area is designed to maximize military training within the zone while at the same time providing for the sage-grouse. The Sage Grouse Management Plan (SGMP) provides protection and management measures that apply to this land use zone. Two leks are located within the SDZ of the SFF range. Leks are afforded special protection during the breeding season, 1 February to 15 May. During this time, all activities are restricted within a designated SGPA between 2400 and 0900 and weapons firing is only allowed on designated ranges between 0900 and 2400. Construction, as well as maintenance and repair activities will be accomplished outside the nesting and brood rearing protection period to the greatest extent possible. When such activities must occur during the protection period, all actions are reviewed by the JBLM YTC wildlife biologist to ensure

disturbance to sage grouse is minimized and habitat protection is maintained. Predators are another threat to the sage-grouse. Avian predators can perch on elevated structures to spot and attack sage-grouse that may be in the area. The observation tower, utility poles, and utility lines are all potential perches for predators. Perch guards and other predator deterrents will be used to eliminate access to predators.

Due to the lack of suitable habitat in the proposed project site, any impacts to the greater sage-grouse are expected to be minor. Mitigation will consist of the establishment of permanent, native vegetation on disturbed areas after construction and the application of perch deterrents where appropriate. Also, restrictions that are already outlined in the Sage-grouse Management Plan will be followed to protect the down-range leks.

Listed Plant Species (Ute Ladies'-tresses and Umptanum Wild Buckwheat)

The proposed site for the SFF range does not have the riparian and wetland habitats that support Ute ladies'-tresses and this species has not been found on JBLM YTC. Suitable habitat for Umptanum wild buckwheat is exposed basalt flows. This habitat does not exist on the proposed project site. The lack of habitat and negative findings from on-site vegetative surveys indicate that impacts to listed plant species would be less than significant.

No Action Alternative

Because there would be no new construction and training activities would remain consistent with present levels, there would be no new direct or indirect impacts to biological resources with this alternative.

Chapter 5 Cumulative Effects and Conclusions

Cumulative impacts would occur if incremental impacts of the Proposed Action, added to the environmental impacts of past, present, and reasonably foreseeable similar actions, would result in an adverse effect to resources in the region. Actions that have the potential to combine with incremental effects of the Proposed Action to result in cumulative impacts are those that are similar to the Proposed Action or could affect environmental resources similar to those affected by the alternatives considered, are located in geographic proximity to JBLM YTC, and have occurred, are ongoing, or are reasonably foreseeable. Reasonably foreseeable actions include those that have an application for operations pending before an agency with permit authority and would occur in the same timeframe as the Proposed Action and alternatives.

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.

Urban Operations Village (UOV) (Pending)
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)
Proposed construction of a Combined Arms Collective Training Facility in central or southwestern areas of JBLM YTC (FY2015)
Fort Lewis Grow the Army
Combat Aviation Brigade Stationing (CAB) at JBLM

The Fort Lewis Grow the Army EIS and the Programmatic EIS for Realignment, Growth, and Stationing of Army Assets are the most recent and thorough documents that analyzed cumulative effects impacts at JBLM YTC. Significant cumulative effects were identified for Biological Resources and Wildfire Management. Cumulative Effects for Geology and Soils, and Water Resources were considered to be mitigable to less than significant.

Resources that could have potential Cumulative Effects are discussed below. Land use, socioeconomics, infrastructure, and cultural resources are not expected to have any cumulative effects and warrant no further discussion.

5.2 Biological Resources

Cumulative Effects to biological resources would be considered significant if Army actions resulted in: (1) long-term loss or degradation or loss of diversity within unique or high-quality plant communities (2) unpermitted “take” of federally listed species (3) local extirpation of rare or sensitive species not currently listed under the Endangered Species Act (4) unacceptable loss of critical habitat as determined by the US Fish and Wildlife Service (5) non-compliance with policies, regulations, and permits related to wetlands conservation and protection (6) high

probability of increasing the frequency and intensity of wildland fires, especially in sensitive ecological areas.

The proposed action will include planting native vegetation on areas disturbed by construction. The Sage-Grouse Management Plan will afford protection of the sage-grouse and active leks. Even though the Fort Lewis Grow the Army EIS identified significant cumulative effects for biological resources, the cumulative effects resulting from the construction and operation of a SFF range, would not add to the overall cumulative effects for biological resources.

5.3 Wildland Fire

The threshold for significance for wildland fire management is based on the potential of the action to increase wildland fire risk or adversely impact the ability of JBLM YTC to manage wildland fires.

The absense of pyrotechnics in sniper training and the use of existing wildland fire control measures are expected to avoid wildland fire impacts at the SFF range. Although the Fort Lewis Grow the Army EIS determined that there would be significant wildland fire impacts as a result of GTA action, analysis, however, did not find the proposed SFF range would further contribute to cumulative wildland fire impacts at JBLM YTC.

5.4 Air Quality

In the Yakima Valley, real estate development, population increases, and agriculture have contributed to pollutant emissions. Car emissions and winter wood smoke have been the primary regional source of carbon monoxide (CO) emissions around JBLM YTC. CAB training has the potential to increase emissions. BMPs will be implemented to control fugitive dust during SFF range construction. Range construction equipment would have only minor and short term impacts. Construction of a SFF range is not expected to add to any air quality impacts. Past, present, and reasonably foreseeable future actions are expected to be minor impacts resulting in less than significant cumulative effects. None of the anticipated actions would prevent the achievement or maintenance of NAAQS.

5.5 Noise

While there will be additive noise impacts from Grow the Army and Combat Aviation Brigade (CAB) activities, new ranges would also contribute to noise impacts. Noise associated with construction of the proposed SFF range, such as the operation of heavy equipment, would be temporary, lasting only through the construction phase. Operation of the proposed SFF range would generate noise from small arms firing and would be consistent with the noise level, frequency, and intensity with the adjacent ranges. These new additions to noise, in conjunction with current noise-generating activities and actions at JBLM YTC and in the region are expected to be less than significant cumulative effects.

5.6 Geology, Topography, and Soils

The proposed action has a potential of creating short term soil erosion impacts during construction. With the implementation of required storm water and erosion control BMPs, soil erosion is expected to have only minor impacts. Other land disturbing projects in the past,

present, and reasonably foreseeable future have the same BMP requirements that keep cumulative effects to less than significant.

5.7 Surface Water

Cumulative effects to surface water at JBLM YTC could occur as a result of short term vegetation removal and soil disturbance during construction, contributing to erosion, sedimentation, increased surface water runoff, and degradation of stream channels. Historically, Yakima River basin has received high sediment inputs from sources such as runoff from agricultural lands, particularly irrigation return flows. Cumulative effects on surface water resources at JBLM YTC will be highest shortly after construction begins and will decrease over time in response to site reclamation. Required storm water BMPs to control adverse impacts will ensure that activities have minimal effects on water resources and do not exceed significance criteria thresholds. Similarly, engineering solutions and BMPs to prevent lead migration ensure that activities have minimal effect on surface water.

Chapter 6 Conclusions

This EA concludes that the construction and operation of a SFF range at JBLM YTC would have no significant environmental impacts above the current baseline conditions. Mitigation measures discussed throughout the EA would be implemented to prevent adverse environmental effects. Based on the analysis presented here, including the cumulative effects analysis, and the baseline conditions evaluated in the GTA EIS and associated Record of Decision, the preparation of an Environmental Impact Statement (EIS) is not warranted for this proposed action. It is recommended that a Finding of No Significant Impact (FNSI) be issued.

To control soil erosion and the resulting effects on water resources, a Construction Storm Water Pollution Prevention Plan must be developed to address storm water runoff and soil erosion. Subsequently, a National Pollutant Discharge Elimination System (NPDES) permit would also be required prior to commencing construction. Reseeding of sites disturbed during construction with native species would occur to re-establish and maintain soil stability, and protection of surface water and vegetation community resources. Existing seasonal temporal land use constraints in place at Ranges 4 and 5 (e.g., during sage grouse protection periods) would be implemented at the SFF Range. During the sage-grouse breeding season, (March 1 to May 15), all activities are to be restricted within a 1 kilometer radius of a lek between 2400 and 0900 and weapons firing is only allowed on established ranges between 0900 and 2400. Construction, as well as maintenance and repair activities should be accomplished outside the nesting and brood rearing protection period to the greatest extent possible. When such activities must occur during the protection period, all actions are to be reviewed by the JBLM YTC wildlife biologist to ensure disturbance to sage grouse is minimized and habitat protection is maintained.

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Chapter 12 Glossary and Acronyms

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 JBLM YTC.

Regional: Has the potential to migrate off-post.

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.

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).

Acronyms

AEC – Army Environmental Command

AT/FP - Anti-terrorism/force protection

BA - Biological Assessments

BMP – Best Management Practice

BSA – Brigade Support Area

CAB – Combat Aviation Brigade

CACTF - Combined Arms Collective Training Facility

Cfs – cubic feet per second

CIA - Central Impact Area

CLF - Convoy Live Fire Training Course

CNRMP – Cultural and Natural Resources Management Plan

CWA – Clean Water Act

CO – carbon monoxide

CO2 – carbon dioxide

dBA DNL - 65 decibels adjusted day-night level

DoD – Department of Defense

DPS - Distinct Population Segment

EA – Environmental Assessment

EIS – Environmental Impact Statement

ENV – Environmental Division

EO – Executive Order

EPA - Environmental Protection Agency

ESA - Endangered Species Act

ESU - Evolutionarily Significant Units

FEIS – Final Environmental Impact Statement

FORSCOM - Forces Command

Fort Lewis GTA FEIS – Fort Lewis Army Growth and Force Structure Realignment Final Environmental Impact Statement

GHG – green house gas

GTA – Grow the Army

HBCT - Heavy Brigade Combat Team

HQDA – Headquarters Department of the Army

IBCT - Infantry Brigade Combat Team

IWFMP - Integrated Wildland Fire Management Program

ITAM – Integrated Training Area Management

JBLM – Joint Base Lewis-McChord

MIT – Moving Infantry Target

MRF - Modified Record Fire Range

MPRC - Multi-Purpose Range Complex

MPTR – Multi-Purpose Training Range

NAAQS - National Ambient Air Quality Standards

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NOAA - National Oceanic and Atmospheric Administration

NPDES - National Pollutant Discharge Elimination System

ORANG - Oregon Army National Guard

PM – particulate matter

ROCA – Range Operation and Control Area

ROD – Record of Decision

ROI – Region of Influence

SBCT - Stryker Brigade Combat Teams

SDZ – Surface Danger Zone

SFF – Automated Sniper Field Fire Range

SHPO – State Historic Preservation Office

SIT – Stationary Infantry Target

SOCOM – Special Operations Command

TA – Training Area

TC 25-8 - Training Circular 25-8 Training Ranges

TDY – Temporary Duty

TMDL - Total Maximum Daily Load

TSCA - Toxic Substances Control Act

USACE – United States Army Corps of Engineers

USFWS - U.S. Fish and Wildlife Service

VOC - Volatile Organic Compounds

WAARNG - Washington Army National Guard

WDFW - Washington Department of Fish and Wildlife

WDOE -Washington State Department of Ecology

WDNR – Washington State Department of Natural Resources

Win Mag - 300 Winchester Magnum

WNHP - Washington Natural Heritage Program

YRCAA - Yakima Regional Clean Air Agency

YRS – Yakima Research Station

YTC – Yakima Training Center

Appendix A Soil Report

Custom Soil Resource Report for Yakima Training Center, Proposed Sniper Field Fire Range

Appendix B Plant Survey

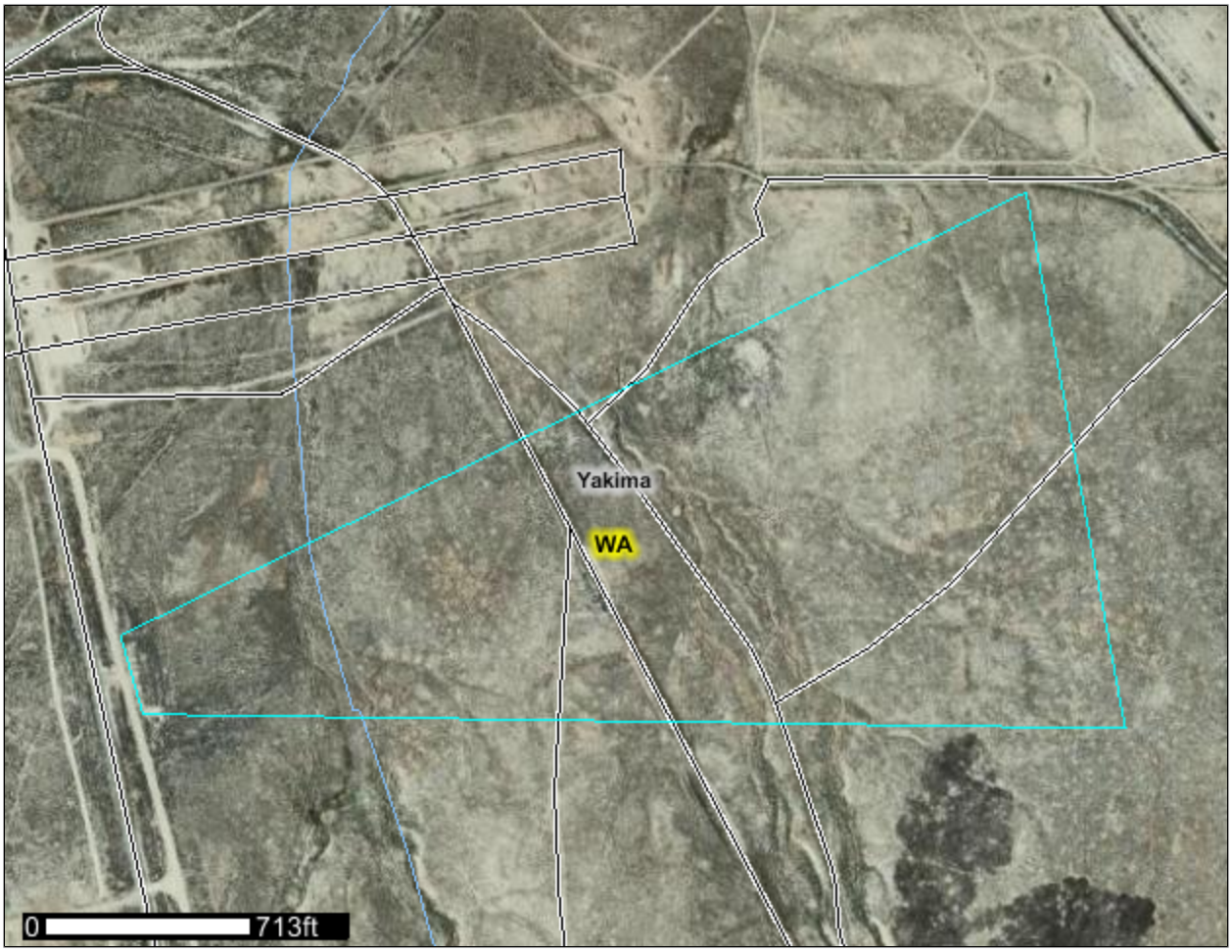
2010 Sniper Field Fire Range Rare/Sensitive Plant Survey

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington



February 10, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

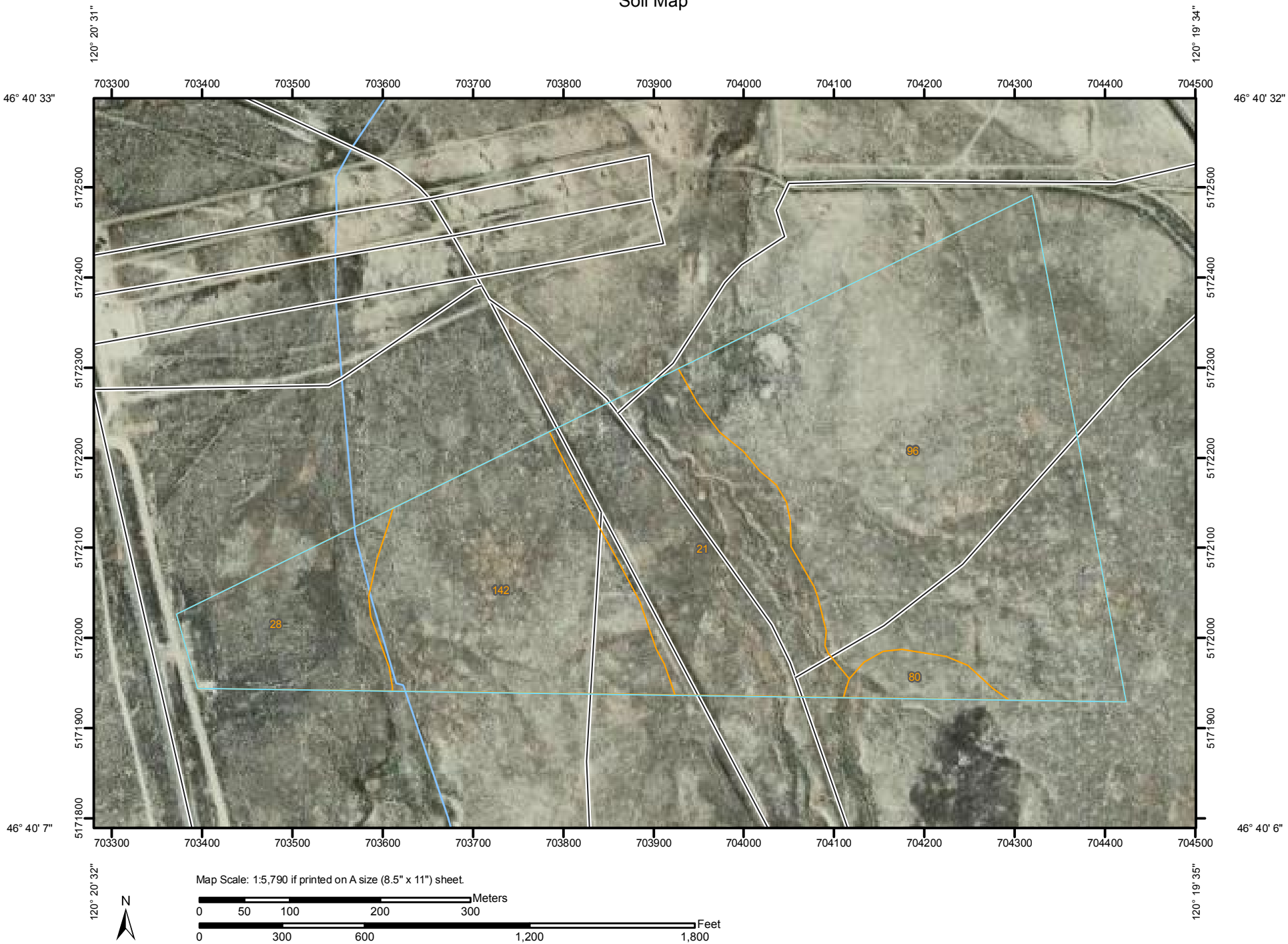
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

- Cities

Federal Land

- Department of Defense

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:5,790 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington
Survey Area Data: Version 8, Jun 12, 2009

Date(s) aerial images were photographed: 7/23/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington (WA681)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
21	Benwy silt loam, 10 to 15 percent slopes	16.3	19.8%
28	Brehm silt loam, 5 to 10 percent slopes	7.5	9.1%
80	Gorst loam, 2 to 5 percent slopes	1.7	2.1%
96	Manastash-Durtash complex, 5 to 10 percent slopes	40.1	48.8%
142	Selah silt loam, 2 to 5 percent slopes	16.6	20.2%
Totals for Area of Interest		**82.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that

have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington

21—Benwy silt loam, 10 to 15 percent slopes

Map Unit Setting

Elevation: 1,600 to 2,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 130 to 170 days

Map Unit Composition

Benwy and similar soils: 75 percent

Description of Benwy

Setting

Landform: Alluvial fans, hillslopes, structural benches
Down-slope shape: Linear
Across-slope shape: Linear, convex

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: High (about 10.3 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Ecological site: DRY LOAMY 9-15 PZ (R008XY101WA)

Typical profile

0 to 4 inches: Silt loam
4 to 14 inches: Silt loam
14 to 33 inches: Silt loam
33 to 45 inches: Gravelly loam, loam

28—Brehm silt loam, 5 to 10 percent slopes

Map Unit Setting

Elevation: 1,800 to 2,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 130 to 170 days

Map Unit Composition

Brehm and similar soils: 75 percent

Description of Brehm

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and alluvium

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Ecological site: DRY LOAMY 9-15 PZ (R008XY101WA)

Typical profile

0 to 4 inches: Silt loam
4 to 10 inches: Silt loam
10 to 24 inches: Very cobbly loam
24 to 28 inches: Cemented material

80—Gorst loam, 2 to 5 percent slopes

Map Unit Setting

Elevation: 1,200 to 2,900 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 130 to 170 days

Map Unit Composition

Gorst and similar soils: 75 percent

Description of Gorst

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loess

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 12 to 20 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6e
Ecological site: DRY STONY 9-15 PZ (R008XY201WA)

Typical profile

0 to 6 inches: Loam
6 to 14 inches: Loam, gravelly loam
14 to 24 inches: Cemented material
24 to 60 inches: Stratified indurated to very gravelly sandy loam

96—Manastash-Durtash complex, 5 to 10 percent slopes

Map Unit Setting

Elevation: 1,500 to 2,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days

Map Unit Composition

Manastash and similar soils: 45 percent
Durtash and similar soils: 35 percent

Description of Manastash

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and alluvium

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability (nonirrigated): 6e
Ecological site: DRY LOAMY 9-15 PZ (R008XY101WA)

Typical profile

0 to 4 inches: Loam
4 to 10 inches: Loam
10 to 16 inches: Gravelly clay loam
16 to 25 inches: Gravelly clay
25 to 35 inches: Cemented material
35 to 60 inches: Stratified indurated to very gravelly sandy loam

Description of Durtash

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and alluvium

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability (nonirrigated): 6e
Ecological site: DRY STONY 9-15 PZ (R008XY201WA)

Typical profile

0 to 4 inches: Stony loam
4 to 15 inches: Extremely gravelly clay, very gravelly clay loam
15 to 25 inches: Cemented material
25 to 60 inches: Stratified indurated to very gravelly sandy loam

142—Selah silt loam, 2 to 5 percent slopes

Map Unit Setting

Elevation: 1,800 to 2,900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days

Map Unit Composition

Selah and similar soils: 75 percent

Description of Selah

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and alluvium

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water capacity: Moderate (about 8.9 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Ecological site: DRY LOAMY 9-15 PZ (R008XY101WA)

Typical profile

0 to 10 inches: Silt loam
10 to 14 inches: Silt loam, silty clay loam
14 to 20 inches: Silt loam, silty clay loam, clay loam
20 to 27 inches: Clay loam, gravelly clay loam
27 to 37 inches: Cemented material
37 to 60 inches: Stratified indurated to very gravelly sandy loam

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Site Visit Report: Proposed sniper range
Dates: 20 and 24 May 2010
Observers: Lisa Saperstein, Wendy Mee, Brian Knapp, Brad Wilson, Kevin White
Report Date: 4 June 2010
Authors: Lisa Saperstein, Wendy Mee

Summary:
A vegetation survey for rare/sensitive plants was conducted on 20 and 24 May, 2010 within the construction footprint for a proposed sniper range between ranges 4 and 5. No rare/sensitive plant populations had been previously located within the construction site, but several populations of *Tauschia hooveri*, a state threatened species and federal species of concern, were known to occur within the firing fan for the sniper range. These populations were already within the overlapping firing fans for ranges 4 and 5, so the proposed range was not considered an additional threat. Bob Spring is located just south of the construction footprint and several drainages for Selah Creek are within it. It is recommended that the currently unprotected spring be fenced or Siebert staked to restrict access. Disturbance to drainages should be minimized and existing roads/trails should be utilized when possible. No rare/sensitive plant species were detected during the survey. Much of the site had been previously disturbed, and non-native species were present including crested wheatgrass (*Agropyron cristatum*) and noxious weeds such as knapweed (*Centaurea* spp.).

Methods
The proposed construction footprint was mapped prior to the survey using a Geographic Information System (GIS) layer provided by Range Control (Fig. 1). Known rare plant locations were overlain on the map to determine if previously identified populations occurred within the site. The site was also overlain on a fire history map and a 1999 vegetation map to provide an overview of habitats that would be encountered.

Three to four observers walked the site along parallel transects, spaced at approximately 20 m intervals. Waypoints (WP) were recorded at areas of interest along the route using Garmin GPS units, particularly at the start of a new habitat type. A general description was provided for each habitat and observed plant species were recorded, along with relative abundance. Observers visited Bob Spring, located just south of the construction site to determine if the site required measures to protect it from anticipated increases in human activity.

Results
Preliminary analyses indicated that the only previously located rare/sensitive plant locations were outside of the proposed construction site, within the existing firing fans of ranges 4 and 5 (Fig. 1). Most of the proposed construction site has burned in the past 20 years, according to fire history records from 1987 – 2009 (Fig. 2). Many sites have burned repeatedly during this time, which is not surprising considering that part of the construction footprint lies within the firing fan of range 4. The 1999 vegetation map of the installation indicates that a majority of the site was a shrub/grass community dominated by big sagebrush (*Artemisia tridentata*) and bluebunch wheatgrass (*Pseudoregneria spicata*) (Fig. 3). However, much of this area burned in 2003, after the map was completed. The eastern end of the construction site had fewer shrubs, most of which were grey rabbitbrush (*Ericameria nauseosus*) rather than sagebrush. This area had burned in 1994.

Four observers surveyed most of the site on 20 May and three returned on 24 May to finish a strip at its southern end (Fig. 4). Notable waypoints along the route are in Figure 5, with descriptions of the waypoints in Table 1. Figure 6 includes photographs of the survey area. Species encountered during the survey are in Table 2, including species code, scientific and common names, and relative abundance.

The survey began slightly southwest of the proposed construction site, near Cold Creek Road and almost due west of Bob Spring. Shrub cover was variable at the start of the survey, ranging between 15-25% canopy cover and comprised mostly of big sagebrush. Cover of other species was as follows: 50-60% grass, <5% forbs, 25% moss/crust, and 10-15% bare ground. Cover can exceed 100% due to overlapping layers of vegetation. Cover was comprised primarily by native species, although there were occurrences of cheatgrass (*Bromus tectorum*) and sweetclover (*Melilotus* spp.). Shrubs declined and habitat transitioned to mixed grassland as observers approached the drainage downstream from Bob Spring. Grass species included bluebunch wheatgrass, Sandberg's bluegrass (*Poa secunda*), needle and thread grass (*Hesperostipa comata*), Cusick's bluegrass (*Poa cusickii*), Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass, and Idaho fescue (*Festuca idahoensis*). Cheatgrass and knapweed also increased in this area. The drainage, which did not contain standing water, supported mountain rush (*Juncus articus*spp *littoris*).

Observers left the construction footprint to visit Bob Spring. The spring is unprotected, with no fencing or Siebert stakes. There are 4 partially burned wooden posts surrounding the spring, suggesting that it had been fenced previously. Non-native weeds in the spring area included Canada thistle (*Cirsium arvensis*), Scotch thistle (*Onopordum acanthium*), hound's tongue (*Cynoglossum officinale*), and teasel (*Dipsacus fullonum*). Scotch thistle and hound's tongue are considered Class B noxious weeds in Washington, as is diffuse knapweed (*C. diffusa*) which was located elsewhere in the survey area. Class B weeds are species designated for control in regions of the state where they are not yet widespread, and prevention of new infestations in these areas is the primary goal. These species are considered to be abundant in Yakima County, so containment and prevention of spread are the primary goals. Control is determined at the local level (Washington State Noxious Weed Control Board, http://www.nwcb.wa.gov/ weed_list/Class_B_weeds.htm). Crested wheatgrass, a species widely planted on the installation in the past, was also noted in the spring area. Numerous animal burrows, species unknown, were present in the steeper banks of the spring.

Observers returned to the construction footprint after visiting the spring. Habitat remained fairly consistent within the site with a couple of notable exceptions. Shrub cover declined to an average of about 5% on the eastern side of the road bisecting the site (Figs. 2-3, Table 1). Grey rabbitbrush was the dominant shrub in this area rather than big sagebrush. Observers also encountered a broad patch of basin wildrye (*Leymus cinereus*) that indicated moist soil despite the absence of a channelized drainage (Fig. 2, Table 1).

Discussion/Recommendations

Much of the proposed construction site has been previously disturbed, and fires are likely to recur as it is located within the firing fan of range 4 and near the fan for range 5. No rare/sensitive plants were detected within the construction site, but several populations of *Tauschia hooveri* occur on lithosols in the existing firing fans of ranges 4 and 5 and in the proposed firing fan for the sniper range. Although the type of weaponry used on these ranges are not anticipated to cause undue damage to the plants, the populations should be checked in April 2011 prior to activation of the sniper range and again several years later to determine if the additional activity has a deleterious effect on the populations. All of the

populations were surveyed in 1998, according to the Washington Natural Heritage database, and some were resurveyed in 2008.

Disturbance to drainages within the construction footprint and to Bob Spring, just south of the area, are the primary concerns for the project. All drainages within the footprint were dry at the time of the survey, but there was some standing water near the spring. Presence of mountain rush and large stands of basin wildrye indicate moist soils. Existing roads and trails, some of which paralleled the drainages, should be used as much as possible to avoid further disturbance. Bob Spring should be fenced and/or Siebert staked to protect it.

Weeds are another concern, particularly the Class B noxious weeds found at the site. Diffuse knapweed is not designated for control in Yakima County as it is already widespread, but it is designated for control in Noxious Weed Region 5, which includes Joint Base Lewis-McChord. Seeds can be transported between regions on vehicles and equipment. Dried weeds tend to detach and get blown around, accumulating in drainages where they serve as fuel for fires and a concentrated seed source. Dried weeds should be periodically removed from drainages and other accumulation sites to reduce fire risk and spread of noxious species.

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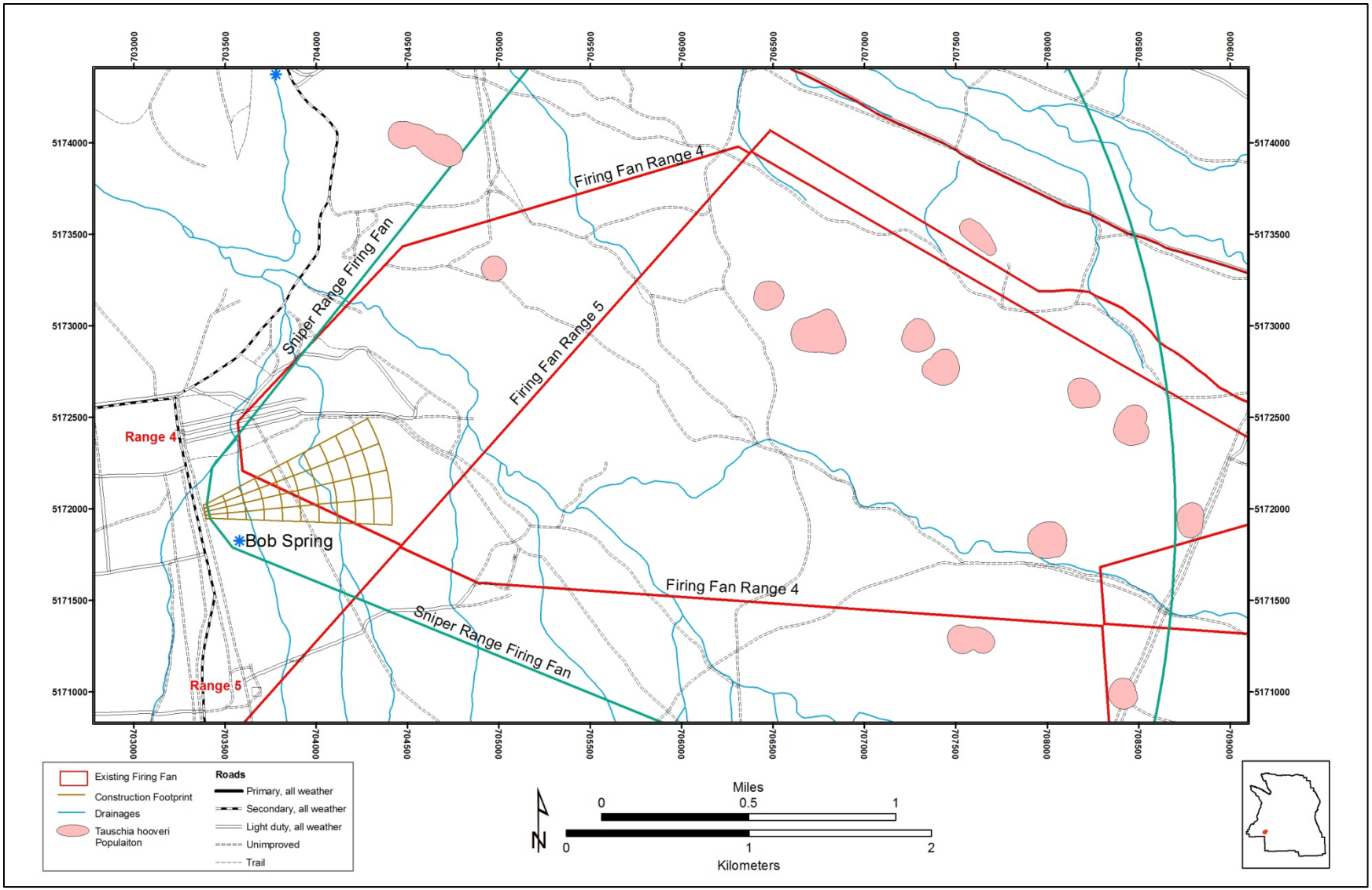


Figure 1. Overview of proposed sniper range showing construction footprint, springs, firing fans, and populations of *Tauschia hooveri*, a State threatened plant species.

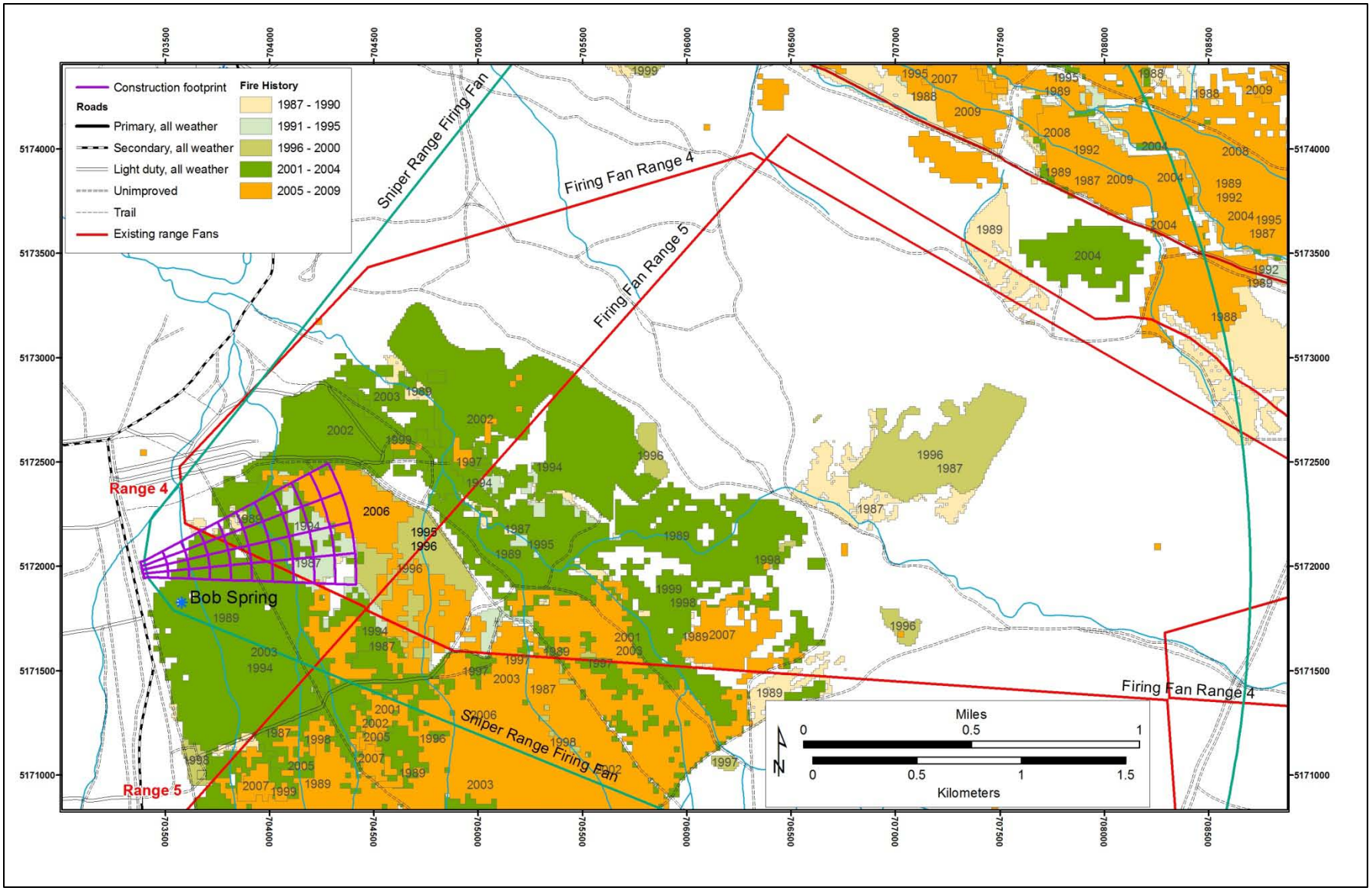


Figure 2. Fire history within and adjacent to proposed sniper range.

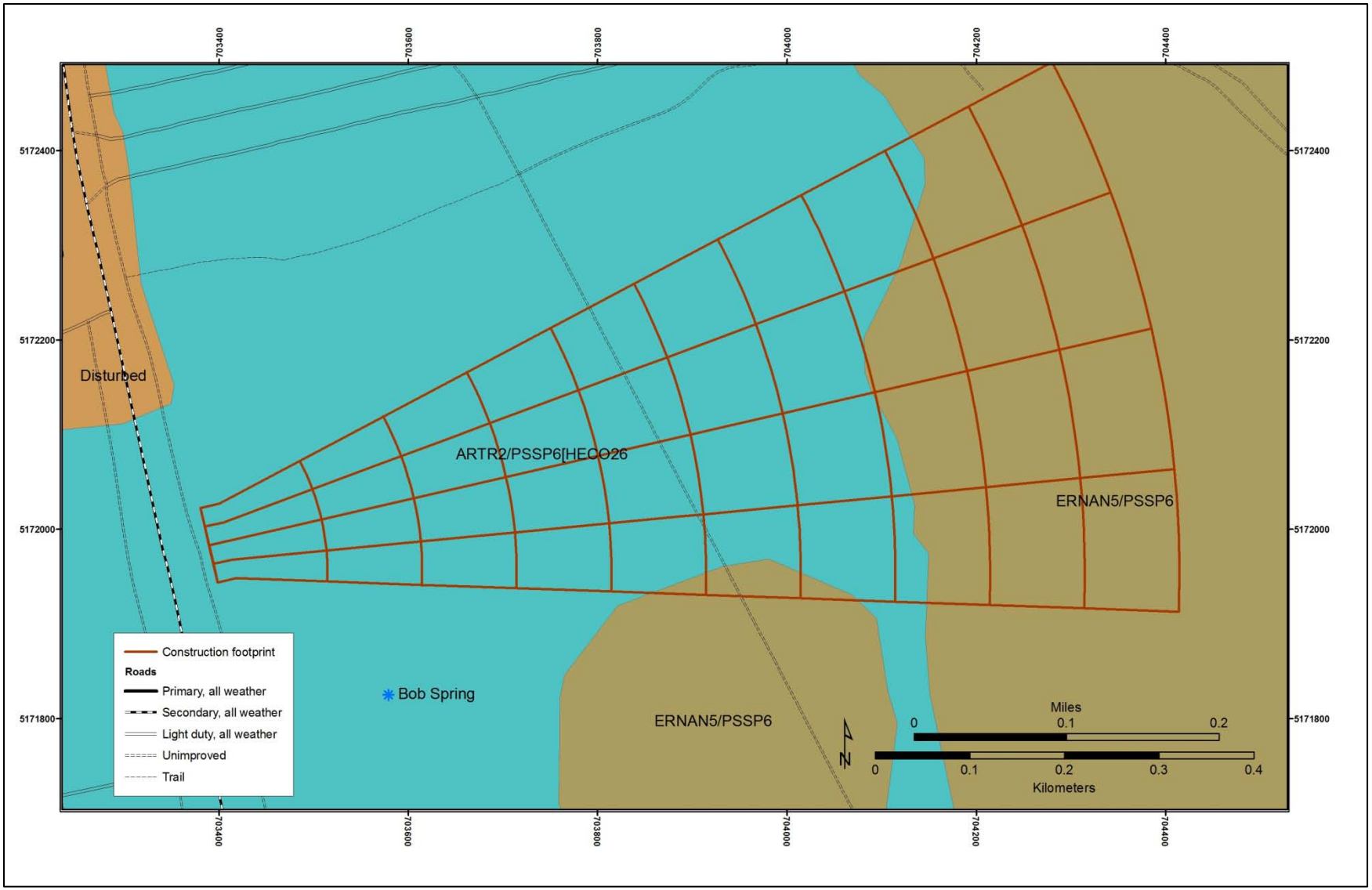


Figure 3. Map units from 1999 vegetation maps overlain on proposed sniper range construction site. See Table 2 for definition of plant codes.

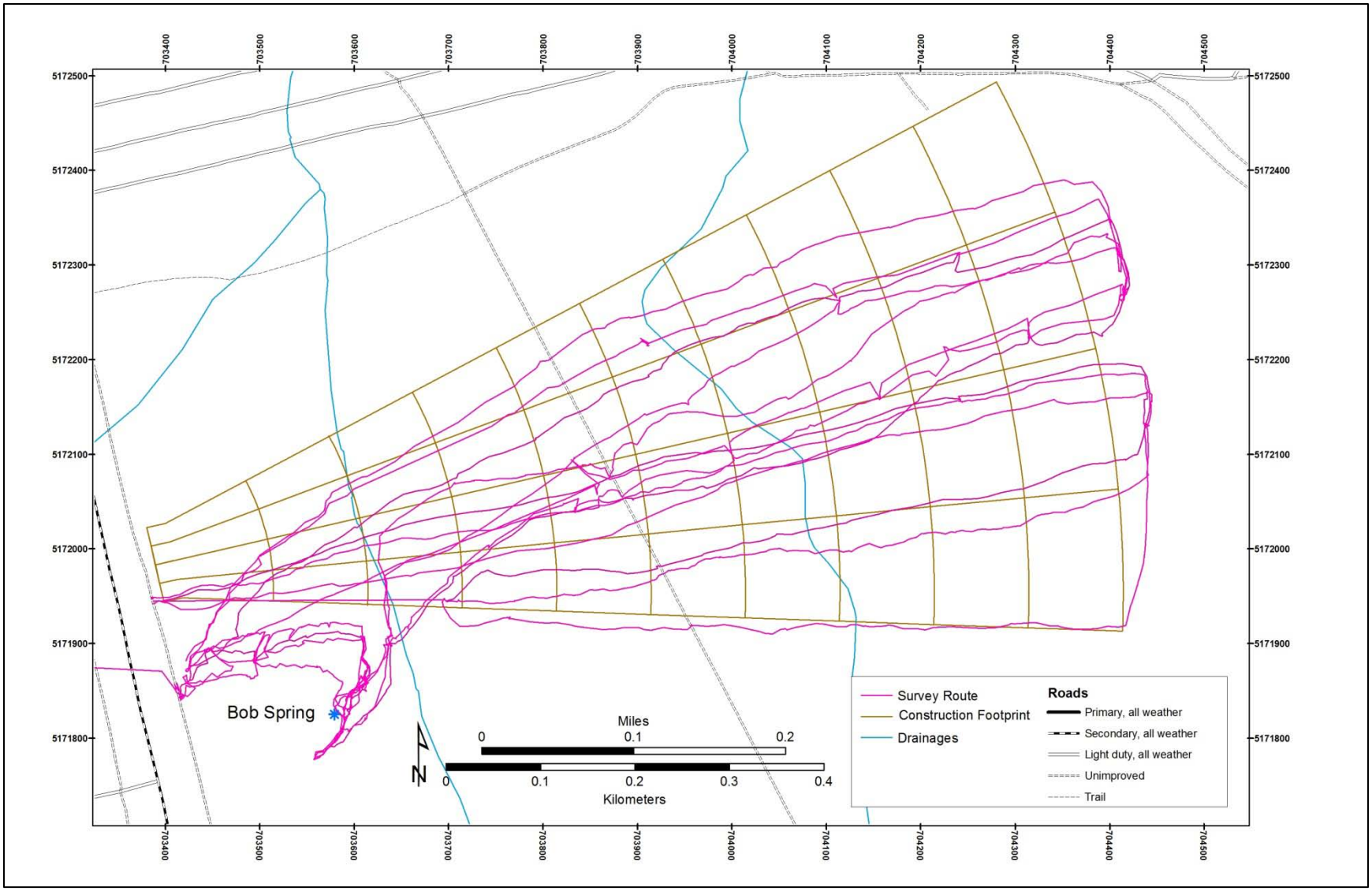


Figure 4. Plant survey route in proposed sniper range construction site, 20 and 24 May 2010.

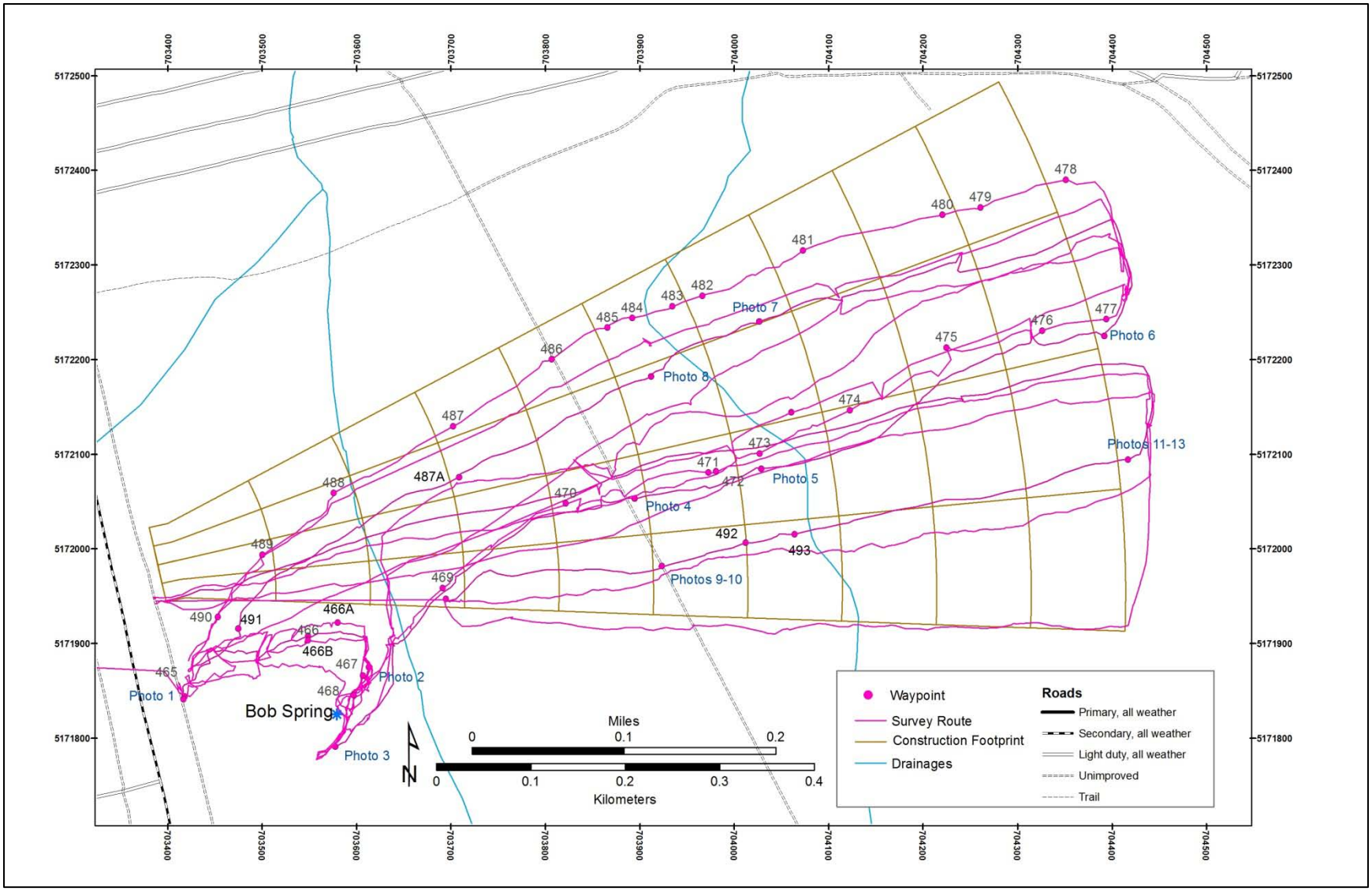


Figure 5. GPS waypoints and photo locations along survey route.

Table 1. Descriptions GPS waypoints along survey route within the proposed sniper range construction site.

Waypoint	Description
465	Start survey, 20 May.
466	Grassy area; fewer shrubs as we approached drainage downstream from Bob spring. Cheatgrass and knapweed present.
466A	Big sagebrush increases; evidence of old burn.
466B	Transition to mixed grassland: bluebunch wheatgrass, Sandberg's bluegrass, needle and thread grass, Cusick's bluegrass, Indian ricegrass, crested wheatgrass, and Idaho fescue..
467	Spring marker.
468	Pipe inserted in ground at spring (±6 m positional error for waypoint).
469	Needle and thread grass- appears planted.
470	Grasses increase. More bluebunch wheatgrass than crested wheatgrass; planted crested wheatgrass was dominant grass in some areas before this.
471	Band of basin wildrye indicates drainage; wildrye also present .on next transect to the north.
472	Gravel road with dense diffuse knapweed. High cover of cheatgrass between road and the next drainage at WP 473.
473	Drainage. Weedy site.
473A	Transition into upland grassland/sparse shrub habitat.
474	Tiny draw not indicated on map.
475	Target debris.
476	Fewer shrubs beyond this point, cover about 2%, mostly small rabbitbrush species with some winterfat (*Krascheninnikovia lanata*).
477	Spent missiles, deer pellets. Burned site.
478	Targetry.
479	Low spot with basin wildrye.
480	Target debris.
481	Start of wildrye patch.
482	Wildrye thins, but still present. Wildrye remains dense on next transect to the south.
483	Thick stand of wildrye.
484	Drainage: well defined banks, 1-1.5 m tall.
485	Old road, end of wildrye concentration.
486	Active road.
487	Small burn spots.
487A	Crested wheatgrass zone
488	Drainage, about 2 m wide.
489	Cover of big sagebrush increases to about 25%.
490	Drainage from Cold Creek Road area.
491	Seep zone with dense wildrye grading into dense big sagebrush.
492	Swath of wildrye.
493	Drainage with knapweed.

Table 2. Plant species, distribution, habitat type, and relative abundance during surveys of the proposed sniper range, May 20 and 24, 2010.

USDA code	***Scientific nomenclature***	***Common name***	***Distribution: Habitat type and (Relative abundance)***
SHRUBS			
ARTR2	*Artemesia tridentata*	*big sagebrush*	*Scattered patchy to clumpy: sparse big sagebrush/bunchgrass (moderate)*
CHVI8	*Chrysothamnus viscidiflorus*	*green rabbitbrush*	*Scattered patchy: sparse big sagebrush/bunchgrass (moderate)*
ERMIL2	*Eriogonum microthecum var. laxiflorum*	*slenderbush buckwheat*	*Random scattered : sparse big sagebrush/bunchgrass (minor)*
ERNAN5	*Ericameria nauseousus*	*grey rabbitbrush*	*Scattered patchy: sparse big sagebrush/bunchgrass (moderate)*
KRLA2	*Krascheninnikovia lanata*	*winterfat*	*Random patchy : sparse big sagebrush/bunchgrass (minor)*
RONO	*Rosa nootkana*	*Nootka rose*	*Isolated : sparse big sagebrush/bunchgrass (minor)*
ROWO	*Rosa woodsii*	*Wood's rose*	*Isolated clumpy : spring (minor)*
GRASSES			
ACHY	*Achnatherum hymenoides*	*Indian ricegrass*	*Random: sparse big sagebrush/bunchgrass (minor)*
AGCR	*Agropyron crestatum*	*crested wheatgrass*	*Scattered patchy to clumpy: sparse big sagebrush/bunchgrass (moderate)*
BRTE	*Bromus tectorum*	*cheat grass*	*Scattered even: sparse big sagebrush/bunchgrass (moderate)*
ELEL5	*Elymus elymoides*	*squirrel tail*	*Random: sparse big sagebrush/bunchgrass (minor)*
FEID	*Festuca idahoensis*	*Idaho fescue*	*Random: sparse big sagebrush/bunchgrass (minor)*
HECO26	*Hesperostipa comata*	*needle & thread grass*	*Scattered patchy to clumpy: sparse big sagebrush/bunchgrass (moderate)*
HOJU	*Hordeum jubatum*	*foxtail barley*	*Isolated : sparse big sagebrush/bunchgrass (minor)*
JUARL	*Juncus articusspp littoris*	*mountain rush*	*Isolated clumpy : spring (minor)*
POPR	*Poa pratensis*	*Kentucky bluegrass*	*Isolated clumpy : spring (minor)*
POCU	*Poa cusickii*	*Cusick's bluegrass*	*Random scattered: sparse big sagebrush/bunchgrass (minor)*
POSE	*Poa secunda*	*Sandber's bluegrass*	*Scattered even: sparse big sagebrush/bunchgrass (high)*
PSSP6	*Pseudoregneria spicata*	*bluebunch wheatgrass*	*Scattered patchy to clumpy: sparse big sagebrush/bunchgrass (high)*

Table 2, continued. Plant species, distribution, habitat type, and relative abundance during surveys of the proposed sniper range, May 20 and 24, 2010.

USDA code	*Scientific nomenclature*	Common name	Distribution: Habitat type and Relative abundance
LECI4	*Leymus cinereus*	basin wildrye	Random patchy : sparse big sagebrush/bunchgrass (moderate)
FORBS			
ACMI2	*Achillea millifolium*	yarrow	Random scattered: sparse big sagebrush/bunchgrass (minor)
ALLIUM	*Allium spp*	wild onion	Random scattered: sparse big sagebrush/bunchgrass (minor)
ANDI2	*Antennaria dimorpha*	low pussytoes	Random scattered: sparse big sagebrush/bunchgrass (minor)
ASFI	*Astragalus filipes*	thread-stalk locoweed	Random scattered: sparse big sagebrush/bunchgrass (minor)
ASLEL3	*Astragalus lentiginosus*	freckled milkvetch	Random scattered: sparse big sagebrush/bunchgrass (minor)
ASLY	*Astragalus lyalli*	Lyall's milkvetch	Random scattered: sparse big sagebrush/bunchgrass (minor)
ASPU9	*Astragalus purshii*	wooly-pod locoweed	Random scattered: sparse big sagebrush/bunchgrass (minor)
ASRE6	*Astragalus reventiformis*	Yakima milkvetch	Random scattered: sparse big sagebrush/bunchgrass (minor)
CATH4	*Castelleja thompsonii*	Thompson's paintbrush	Random scattered: sparse big sagebrush/bunchgrass (minor)
CEDI3*	*Centaurea diffusa*	diffuse knapweed	Scattered patchy: sparse big sagebrush/bunchgrass (minor)
CETE5	*Ceratocephala testiculata*	burr buttercup	Random scattered: sparse big sagebrush/bunchgrass (minor)
CEPR*	*Centaurea pratensis*	meadow knapweed	Scattered patchy: sparse big sagebrush/bunchgrass (minor)
CHDO	*Chaenactis douglasii*	false yarrow	Random scattered: sparse big sagebrush/bunchgrass (minor)
CHTE2	*Chorispora tenella*	blue mustard	Isolated clumpy : spring (minor)
CIAR4	*Cirsium arvensis*	Canada thistle	Isolated clumpy : spring (minor)
COBO	*Conyza bonariensis*	shaggy fleabane	Random scattered: sparse big sagebrush/bunchgrass (minor)
COGR4	*Collomia grandiflora*	large flowered collomia	Random scattered: sparse big sagebrush/bunchgrass (minor)
COUM	*Comandra umbellatua*	bastard toadflax	Random scattered: sparse big sagebrush/bunchgrass (minor)
CRAT	*Crepis atrabarba*	slender hawksbeard	Random scattered: sparse big sagebrush/bunchgrass (minor)
CYOF	*Cynoglossum officinale*	Hound's tongue	Isolated clumpy : spring (minor)
DESO2	*Descuriania sophia*	flixseed	Random scattered: sparse big sagebrush/bunchgrass (minor)

Table , continued. Plant species, distribution, habitat type, and relative abundance during surveys of the proposed sniper range, May 20 and 24, 2010.

USDA code	*Scientific nomenclature*	Common name	Distribution: Habitat type and Relative abundance
DIFU2	*Dipsacus fullonum*	teasel	Isolated clumpy : spring (minor)
EPCI	*Epilobium ciliatum*	common willowherb	Isolated scattered : spring (minor)
EQAR	*Equisetum arvense*	field horsetail	Isolated clumpy : spring (minor)
ERLA	*Eriophyllum lanatum*	Oregon sunshine	Random scattered: sparse big sagebrush/bunchgrass (minor)
ERLI	*Erigeron linearis*	linear leaf daisy	Random scattered: sparse big sagebrush/bunchgrass (minor)
ERPU2	*Erigeron pumilis*	shaggy daisy	Random scattered: sparse big sagebrush/bunchgrass (minor)
HOUM	*Holosteum umbellatum*	jagged chickweed	Random scattered: sparse big sagebrush/bunchgrass (minor)
LASE	*Lactuca seriola*	prickly lettuce	Isolated scattered : spring (minor)
LEPE2	*Lepidium perfoliatum*	clasping pepperweed	Isolated scattered : spring (minor)
LILE3	*Linum lewisii*	wild blue flax	Random scattered: sparse big sagebrush/bunchgrass (minor)
LIRU	*Lithospermum ruderale*	puccoon	Random scattered: sparse big sagebrush/bunchgrass (minor)
LOGR	*Lomatium grayi*	Grays biscuitroot	Random scattered: sparse big sagebrush/bunchgrass (minor)
LOTR2	*Lomatium triternatum*	nine-leaf biscuit root	Random scattered: sparse big sagebrush/bunchgrass (minor)
LUPINE SP	*Lupine species*	lupine	Random scattered: sparse big sagebrush/bunchgrass (minor)
MELEL	*Melilotus spp.*	sweetclover	Isolated clumpy : spring (minor)
MESA	*Medicago sativa*	alfalfa	Isolated scattered : spring (minor)
MYST2	*Myosotis stricta*	strict forget-me-not	Isolated scattered : spring (minor)
NAOF	*Nasturtium officinale*	watercress	Isolated clumpy : spring (minor)
ONAC	*Onopordum acanthium*	scotch thistle	Isolated scattered : spring (minor)
PENST	*Penstemon spp.*	beardtongue spp	Random scattered: sparse big sagebrush/bunchgrass (minor)
PHHO	*Phlox hoodii*	Hood's phlox	Random scattered: sparse big sagebrush/bunchgrass (minor)
PHLO2	*Phlox longifolia*	long leaf phlox	Random scattered: sparse big sagebrush/bunchgrass (minor)
SIAL	*Sisibrium altissimum*	tumble mustard	Random scattered: sparse big sagebrush/bunchgrass (minor)
TRDU	*Tragopogon dubious*	yellow salsify	Random scattered: sparse big sagebrush/bunchgrass (minor)
TRGRG2	*Triteleia grandiflora* var. *grandiflora*	Largeflower triteleia	Random scattered (minor)
VETH	*Verbascum thapsus*	common mullein	Isolated scattered : spring (minor)
ZIVE	*Zigademus venenosus*	death camas	Random scattered: sparse big sagebrush/bunchgrass (minor)

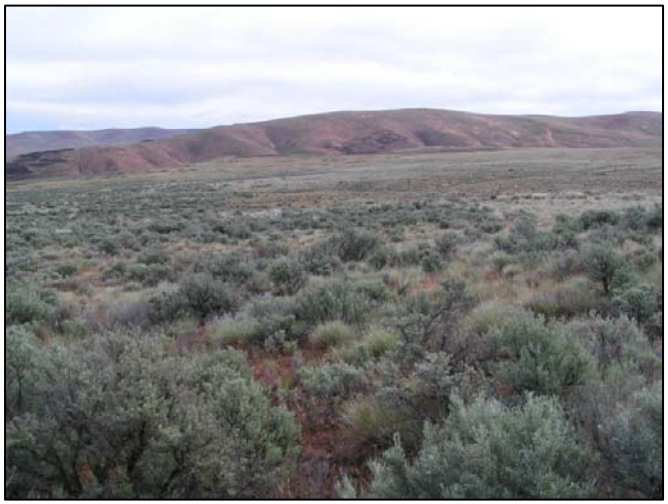


Photo 1. Big sagebrush/bluebunch wheatgrass community near start of survey.

Photo 2. Bob Spring area

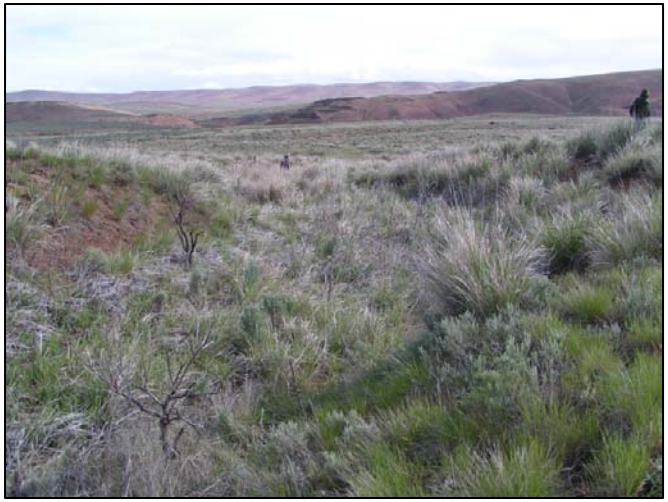


Photo 3. Photo of drainage and mixed grassland above Bob Spring, outside of construction footprint.

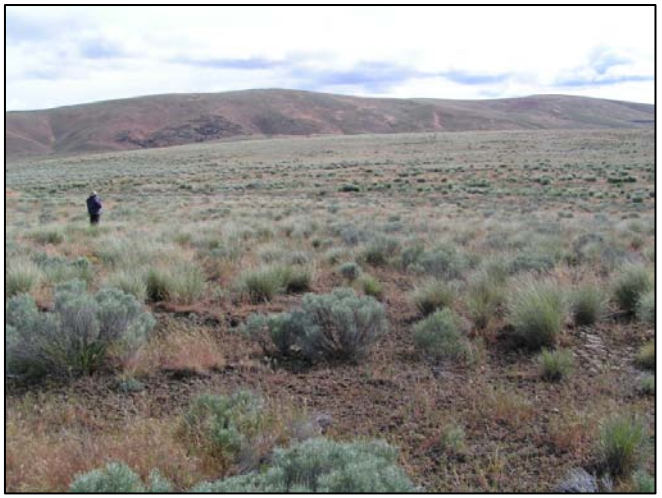


Photo 4. Habitat northeast of road bisecting construction site .

Figure 6. Photographs of sniper range construction site. See Figure 5 for location of photographs.

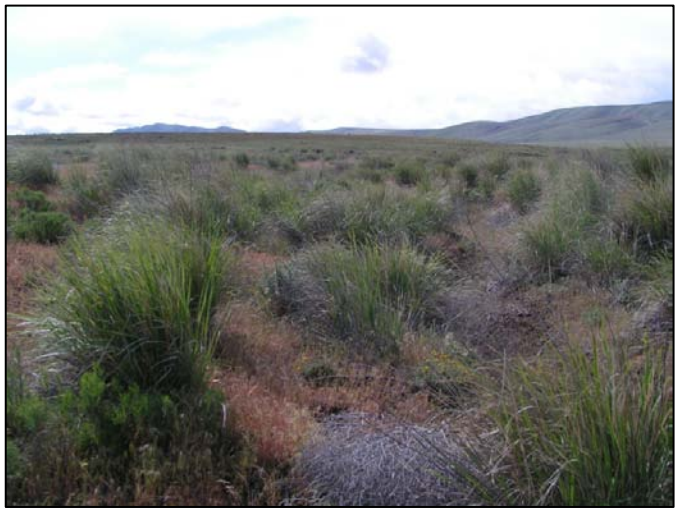


Photo 5. Drainage, showing Great Baisin wildrye and dried weeds.

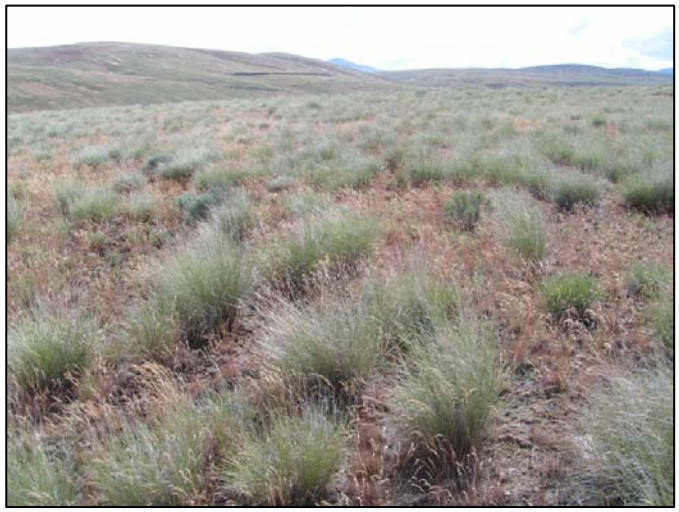
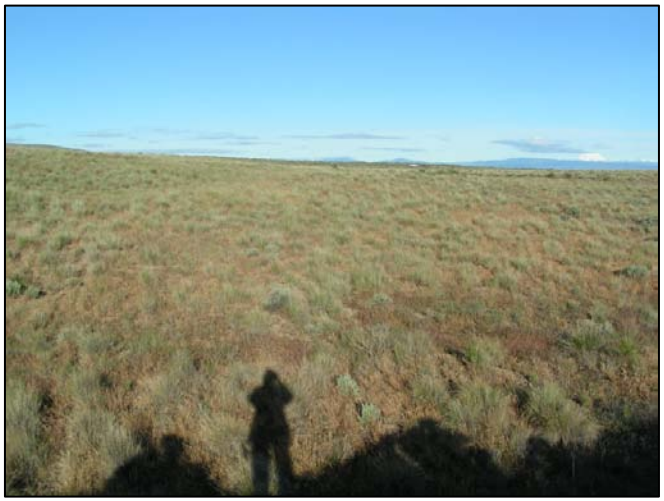


Photo 6. Grassland, with few shrubs; habitat in eastern portion of survey area

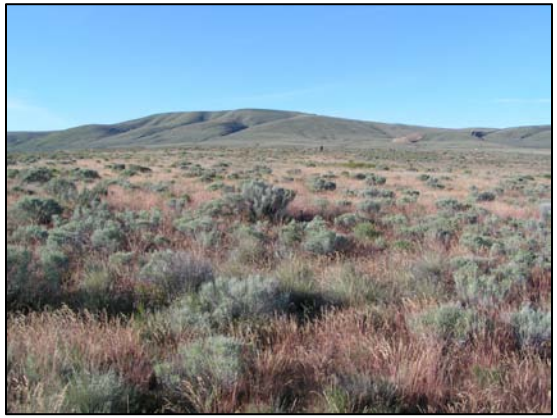
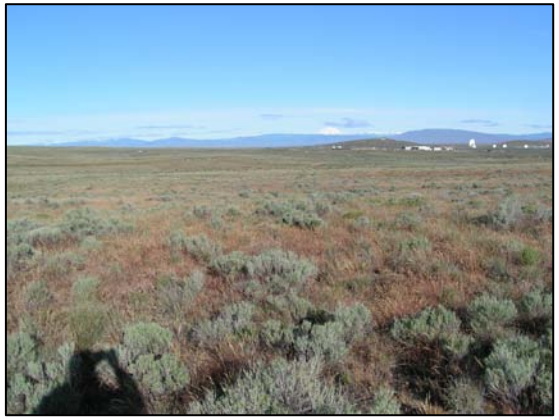
Photo 7. Basin wildrye.

Photo 8. Big sagebrush regeneration in old road.

Figure 6, continued. Photographs of sniper range construction site. See Figure 5 for location of photographs.



Photos 9 and 10: Overviews looking east (left) and west (right). .

Photos 11 - 13: Overview looking north (left), south (middle), and west (right)

Figure 6, continued. Photographs of sniper range construction site. See Figure 5 for location of photographs.