SHADOW UNMANNED AIRCRAFT SYSTEMS TRAINING FACILITY AT YAKIMA TRAINING CENTER, WASHINGTON

DRAFT ENVIRONMENTAL ASSESSMENT

PREPARED FOR:

U.S. Army Corps of Engineers, Seattle District
4735 E Marginal Way South
Seattle, WA 98134-2329
Contact: Dan Sacks
206.316.3962

PREPARED BY:

ICF International
710 Second Avenue, Suite 550
Seattle, WA 98104
Contact: Steve Seville
206.801.2800

October 2014

ICF International. 2014. Shadow Unmanned Aircraft Systems Training Facility Environmental Assessment. Draft. June. (ICF 00529.12.) Seattle, WA. Prepared for U.S. Army Corps of Engineers, Seattle District, Seattle, WA.

Executive Summary

The Yakima Training Center (YTC) is a 327,000-acre subinstallation of Joint Base Lewis-McChord (JBLM) located east of the Cascade Mountains, northeast of the City of Yakima, Washington. YTC is bordered on the north by Interstate 90 (I-90) and on the south by farmland that lies between Highway 24 and the Yakima Ridge, and is situated directly between Interstate 82 (I-82) on the west and the Columbia River to the east. The area surrounding YTC is predominantly agricultural, open land with a few concentrated areas of housing and commercial developments centered on the cities of Selah, Yakima, and Ellensburg. Managed under the U.S. Army (Army)'s authority (32 Code of Federal Regulations [CFR] 552), YTC serves as a desert-style training complex for service members stationed at JBLM, the Army National Guard, Special Operations Command, Marine Corps, Air Force, Navy, and Coast Guard units, local and federal law enforcement agencies, and allied forces from Canada and Japan.

The Army is proposing to construct a Shadow Unmanned Aircraft System (UAS) training facility on the northern portion of YTC consisting of a runway and parking lot. The Shadow UAS training facility is needed to support mission-critical military training for operating Shadow UAS. Currently, Shadow UAS operations at YTC share the runway at the Selah Airstrip several miles to the southwest. Increased usage of Selah Airstrip for manned aviation training is limiting the continued availability of this airstrip for UAS training. Providing a facility dedicated to this training at YTC would lead to more training opportunities, more seamless operations in preparing for future deployments to a theater of operation, more realistic Reconnaissance, Surveillance, and Target Acquisition (RSTA) support, and ultimately, the reduction in loss of service members during combat.

YTC identified three candidate sites for implementing the proposed action and developed a set of site-screening criteria for evaluating those sites regarding their potential to satisfy the proposed action's purpose and need. In this environmental assessment (EA), a No Action Alternative (Alternative 1) and two build alternatives (Alternative 2 and Alternative 3) have been analyzed for their potential to affect the environment. Under the No Action Alternative, construction and operation of a new UAS training facility would not occur; however, the UAS use at the existing Selah Airstrip facility would continue. Alternative 2 would entail constructing a UAS training facility at Site 3, and Alternative 3 would entail constructing a UAS training facility at Site 1.

The results of these analyses are presented in Table ES-1.

Table ES-1. Comparison of Alternatives for a Shadow Unmanned Aircraft Systems Training Facility at the Yakima Training Center

Resource Area	Activity	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Geomorphology	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Hydrology	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Vegetation	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	No Impact	No Impact
Fish	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Wildlife	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Threatened and Endangered Species	Construction	No Impact	No Impact or Insignificant Impact	No Impact or Insignificant Impact
	Operation	No Impact	No Impact or Insignificant Impact	No Impact or Insignificant Impact
Historic and Cultural Resources	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Air Quality	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Noise	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Land Use	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Aesthetics	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Recreation	Construction	No Impact	Insignificant Impact	Insignificant Impact

Resource Area	Activity	Alternative 1	Alternative 2 (Preferred)	Alternative 3
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Hazardous and Toxic, and Materials	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Global Climate Change	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Local Economy and Socioeconomics	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Environmental Justice	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Indian Treaty Rights	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Materials Source Environment & Transport	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Cumulative Effects	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact

The preferred alternative is to implement the proposed action, construct a UAS training facility on the northern portion of YTC, under Alternative 2. While the potential environmental impacts of Alternative 2 are very similar to those of Alternative 3, Alternative 2 offers operational advantages over Alternative 3 because the terrain profile in the vicinity of Alternative 2 offers total control of UASs operating in the northern training areas by allowing a direct line of sight across the training area. Implementing Alternative 2 would also require less grading and fill because the topography of the site is much flatter.

Based on the analysis discussed in this EA, the Army has determined that preparation of an EIS for the proposed action is not necessary and that adoption of a Finding of No Significance (FONSI) is appropriate.

Contents

Page

Executive Summary **1**

Chapter 1 **Introduction** **1-1**

1.1 Purpose and Need of the Proposed Action 1-3

1.2 NEPA Requirements and Scope of the Document 1-3

Chapter 2 **Proposed Action and Alternatives** **2-1**

2.1 Proposed Action 2-1

2.1.1 Construction 2-3

2.1.2 Operation 2-3

2.2 Alternatives 2-5

2.2.1 Alternative 1—No Action Alternative 2-6

2.2.2 Alternative 2—Construct UAS Training Facility at Site 3 2-6

2.2.3 Alternative 3—Construct UAS Training Facility at Site 1 2-6

2.2.4 Alternatives Considered but Eliminated 2-7

Chapter 3 **Affected Environment** **3-1**

3.1 Geomorphology and Hydrology 3-1

3.1.1 Geomorphology 3-1

3.1.2 Hydrology 3-4

3.2 Vegetation 3-7

3.2.1 Plant Communities 3-7

3.2.2 Noxious Weeds 3-9

3.3 Fish and Wildlife 3-11

3.3.1 Fish 3-11

3.3.2 Wildlife 3-12

3.4 Threatened and Endangered Species 3-13

3.4.1 Salmonid Fish 3-13

3.4.2 Wildlife 3-16

3.4.3 Invertebrates 3-24

3.4.4 Plants 3-24

3.5 Historic and Cultural Resources 3-27

3.6 Air Quality and Noise 3-28

3.6.1 Air Quality 3-28

3.6.2 Noise 3-29

3.7 Land Use and Aesthetics 3-29

3.7.1 Land Use....3-29
3.7.2 Aesthetics....3-29
3.8 Recreation....3-30
3.9 Hazardous and Toxic Materials....3-30
3.10 Global Climate Change....3-30
3.11 Local Economy and Socioeconomics....3-32
3.12 Environmental Justice Communities....3-32
3.13 Indian Treaty Rights....3-32
3.14 Staging Area Environment....3-33
3.15 Materials Source Environment and Transport....3-33
Chapter 4 **Environmental Consequences....4-1**
4.1 Geomorphology and Hydrology....4-1
4.1.1 Alternative 1....4-1
4.1.2 Alternative 2 and Alternative 3....4-2
4.2 Vegetation....4-3
4.2.1 Alternative 1....4-4
4.2.2 Alternative 2 and Alternative 3....4-4
4.3 Fish and Wildlife....4-5
4.3.1 Alternative 1....4-5
4.3.2 Alternative 2 and Alternative 3....4-6
4.4 Threatened and Endangered Species....4-9
4.4.1 Alternative 1....4-9
4.4.2 Alternative 2 and Alternative 3....4-10
4.5 Historic and Cultural Resources....4-17
4.5.1 Alternative 1....4-18
4.5.2 Alternative 2 and Alternative 3....4-18
4.6 Air Quality and Noise....4-19
4.6.1 Alternative 1....4-19
4.6.2 Alternative 2 and Alternative 3....4-19
4.7 Land Use and Aesthetics....4-20
4.7.1 Alternative 1....4-20
4.7.2 Alternative 2 and Alternative 3....4-21
4.8 Recreation....4-22
4.8.1 Alternative 1....4-22
4.8.2 Alternative 2 and Alternative 3....4-22
4.9 Hazardous and Toxic Materials....4-23
4.9.1 Alternative 1....4-23

4.9.2 Alternative 2 and Alternative 3 4-23
4.10 Global Climate Change 4-24
4.10.1 Alternative 1 4-25
4.10.2 Alternative 2 and Alternative 3 4-25
4.11 Local Economy and Socioeconomics 4-25
4.12 Environmental Justice Communities 4-26
4.13 Indian Treaty Rights 4-26
4.13.1 Alternative 1 4-26
4.13.2 Alternative 2 and Alternative 3 4-26
4.14 Staging Area Environment 4-27
4.15 Materials Source Environment and Transport Effects 4-27
4.15.1 Alternative 1 4-27
4.15.2 Alternative 2 and Alternative 3 4-27
4.16 Cumulative Effects 4-27
4.16.1 Actions Considered 4-28
4.16.2 Cumulative Effects Discussion 4-28
Chapter 5 **Public Involvement, Coordination and EA Review Process 5-1**
Chapter 6 **Environmental Compliance 6-1**
6.1 National Environmental Policy Act 6-1
6.2 Bald and Golden Eagle Protection Act 6-1
6.3 Endangered Species Act 6-2
6.4 Clean Water Act 6-2
6.5 National Historic Preservation Act 6-2
6.6 Clean Air Act 6-2
6.7 Fish and Wildlife Coordination Act 6-3
6.8 Migratory Bird Treaty Act 6-3
6.9 Tribal Treaty Obligations 6-3
6.10 Executive Order 12898, Environmental Justice 6-3
6.11 Executive Order 11988, Floodplain Management 6-4
6.12 Executive Order 11990, Protection of Wetlands 6-4
Chapter 7 **Conclusion 7-1**
Chapter 8 **List of Preparers 8-1**
Chapter 9 **References 9-1**
9.1 Printed References 9-1
9.2 Personal Communications 9-6

Appendix A **Terrestrial Vertebrate Species Occurring on Yakima Training Center**

Appendix B **Status of Migratory Birds on Yakima Training Center**

Appendix C **Cultural Resources Appendix**

Tables

Page

Table ES-1. Comparison of Alternatives for a Shadow Unmanned Aircraft Systems Training Facility at the Yakima Training Center 2
Table 2-1. Shadow Unmanned Aircraft System Specifications and Flight Capabilities 2-4
Table 2-2. Candidate Site Screening Criteria and Evaluation 2-5
Table 3-1. Soil Types and Erosion Factors at the Shadow UAS Alternative Sites 3-4
Table 3-2. Special Status Wildlife Species Found on or near the Yakima Training Center 3-16
Table 3-3 Special Status Plant Species Found On or Near the Yakima Training Center 3-26
Table 7-1. Comparison of Alternatives for a Shadow Unmanned Aircraft Systems Training Facility at the Yakima Training Center 7-1

Figures

Page

Figure 1-1. Yakima Training Center 1-2
Figure 2-1. Shadow UAS Training Facility Alternatives 2-2
Figure 3-1. Map of Soil Types and the Shadow UAS Alternative Sites 3-3
Figure 3-2. Water Resource Inventory Areas (WRIAs) and Hydrology 3-6
Figure 3-3. Vegetation Communities at the Shadow UAS Alternative Sites 3-10
Figure 3-4. Sensitive Plant and Animal Resources near the Alternative Sites 3-21
Figure 3-5. Build Alternative Sites and the Surrounding Vicinity 3-31

Acronyms and Abbreviations

APE	Area of Potential Effects
BMPs	best management practices
CAA	Clean Air Act
CEQ	Council for Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
dB	decibels
DoD	U.S. Department of Defense
DPS	distinct population segment
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
ESU	evolutionary significant unit
FONSI	Finding of No Significant Impact
GHGs	greenhouse gasses
HMMWVs/Humvees	High Mobility Multipurpose Wheeled Vehicles
HUD	U.S. Department of Housing and Urban Development
I-82	Interstate 82
I-90	Interstate 90
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
JBLM	Joint Base Lewis-McChord
LL	low lead
MBTA	Migratory Bird Treaty Act of 1918
MOA	memorandum of agreement
MRA	military readiness activity
MTCA	Model Toxics Control Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO	nitrogen oxide
NRHP	National Register of Historic Places
Pb	lead
PM10/PM2.5	ozone, particulate matter
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision

RSTA	Reconnaissance, Surveillance, and Target Acquisition
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCCP	spill prevention, control, and countermeasures plan
TCPs	Traditional Cultural Properties
TSCA	Toxic Substances Control Act
TUAS	Tactical Unmanned Aircraft Systems
U.S.	United States
U.S.C.	United States Code
UAS	Unmanned Aircraft Systems
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WAUs	watershed administrative units
WRIAs	watershed resource inventory areas
YRCAA	Yakima Regional Clean Air Agency
YTC	Yakima Training Center

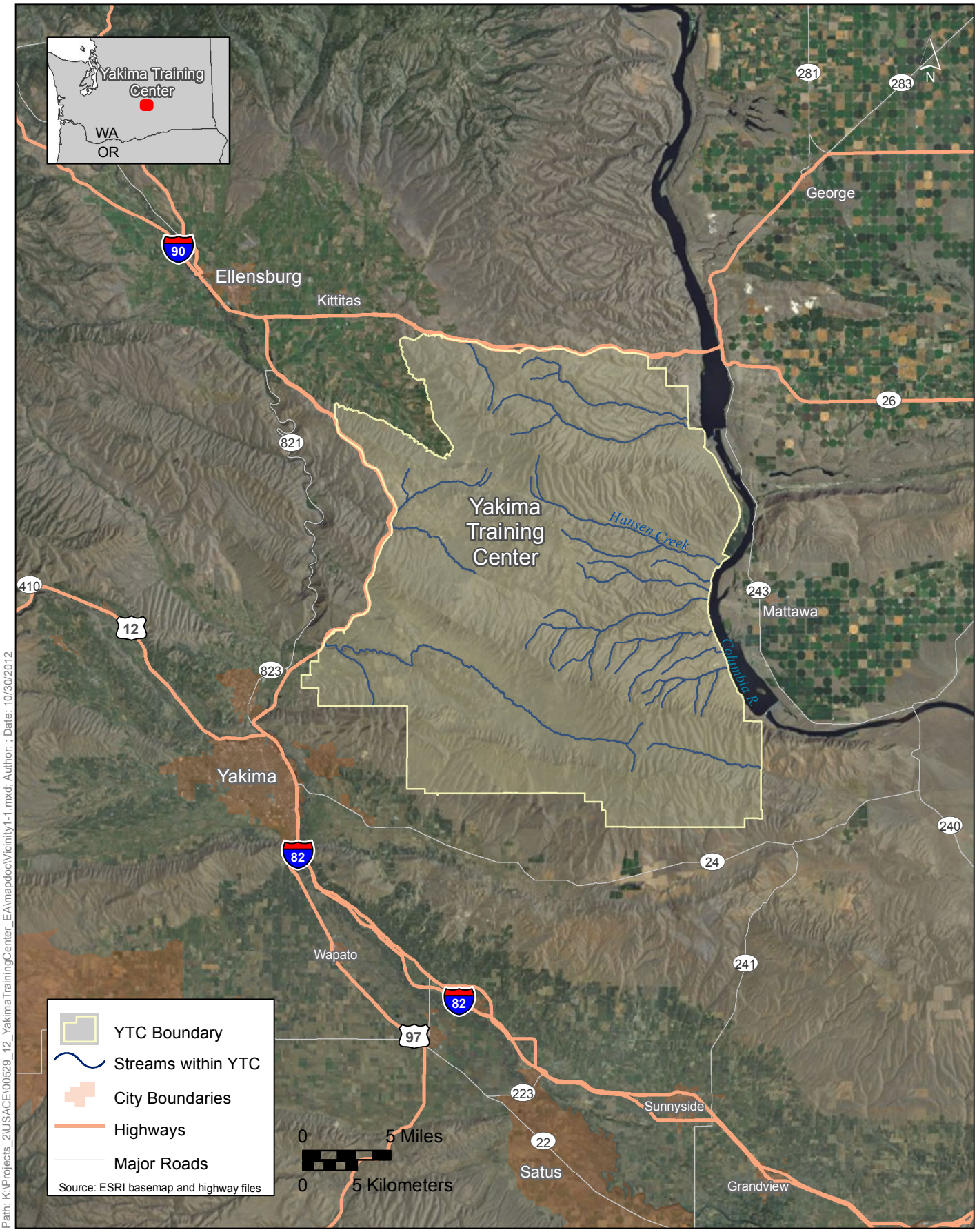
Chapter 1
Introduction

The Yakima Training Center (YTC) (Figure 1-1) is a 327,000-acre subinstallation of Joint Base Lewis-McChord (JBLM). While JBLM is located near Puget Sound, south of the City of Tacoma, YTC is located east of the Cascade Mountains, northeast of the City of Yakima, situated directly between Interstate 82 (I-82) on the west and the Columbia River to the east. YTC encompasses portions of Yakima and Kittitas counties which have a combined estimated population of 289,150. (Office of Financial Management 2013). The YTC area is bordered on the north by Interstate 90 (I-90) and on the south by farmland that lies between Highway 24 and the Yakima Ridge. The area is predominantly agricultural and open land with a few concentrated areas of housing and commercial development centered on the cities of Selah, Yakima, and Ellensburg.

YTC is located in a much dryer climate than that associated with the Puget Sound area, typically receiving less than 10 inches of annual precipitation mostly falling as snow, resulting in a largely treeless expanse dominated by sagebrush, bitterbrush, and bunchgrass, known as shrub-steppe habitat. YTC serves as a desert-style training complex for service members stationed at JBLM, the Army National Guard, Special Operations Command, Marine Corps, Air Force, Navy, and Coast Guard units, local and federal law enforcement agencies, and allied forces from Canada and Japan. Military maneuvering and live fire activities occur both along the 250 miles of improved roads on YTC and off-road in remote areas. Of YTC's 327,000 acres, roughly, 1,700 acres are devoted to Cantonment Area, the developed, city-like portion of the installation. The remaining 325,000 acres are devoted to training areas, ranges, impact areas, and other uses (Environment and Natural Resources Division 2008 as cited in Washington Army National Guard 2012).

Much of YTC has been used as a military training center since before World War II. Military units in the Pacific Northwest began using 160,000 acres near Yakima, Washington, leased from local landowners as an anti-aircraft artillery range for range firing and small-unit testing in 1941. In 1951, the Army purchased over 261,000 additional acres and enlarged the Yakima Firing Center to accommodate increased training needs. Several military units continued to train on the facility into the 1990s leading to the addition of 63,000 acres in 1992 as authorized in the National Defense Authorization Act for Fiscal Years 1992 and 1993 (Public Law 102-190) and the Military Construction Authorization Act of 1992 (Public Law 102-136). The Army manages YTC under its authority established in 32 Code of Federal Regulations (CFR) 552.

With the advancement of military technology, implementation of remote-sensing technologies in combat theaters to support ground commanders in gaining situational awareness on and off the battlefield in a quicker timeframe has provided tactical advantages and reduced the loss of service members in combat zones. Unmanned Aircraft Systems (UAS) have effectively accomplished this task —without risking an onboard flight crew— as the aircraft can fly virtually undetected, gathering near real-time Reconnaissance, Surveillance, and Target Acquisition (RSTA) data. To make use of this technology, the Army proposes to construct a Shadow UAS training facility on the northern portion of YTC consisting of a runway and parking lot, hereafter referred to as the proposed action.



Path: K:\Projects_2\USACE\00529_12_YakimaTrainingCenter_EA\mapdoc\Vicinity1-1.mxd; Author: ; Date: 10/30/2012

Figure 1-1: Yakima Training Center

The authority to plan, evaluate, and design this proposed action falls under the Army's Facilities Sustainment, Restoration, and Modernization program. This program provides funds to keep the Army's inventory of facilities in good working order and for minor construction to accommodate new functions or missions.

1.1 Purpose and Need of the Proposed Action

The purpose of the proposed action is to construct and operate a new Shadow UAS training facility on YTC. The Shadow UAS training facility is needed to support mission-critical hands-on military training for operating Shadow UAS. Shadow UAS operations currently share the runway at the Selah Airstrip several miles to the southwest. Selah Airstrip is experiencing an increase in manned aviation training, which conflicts with the Shadow UAS training. Manned aviation training is given priority usage of the airstrip and is limiting airstrip availability for UAS training. The recent stationing of the 16th Combat Aviation Brigade at JBLM and YTC resulted in an increase of 44 helicopters to the fleet. This has increased usage at Selah Airstrip, which could result in the inability to fully train service members to operate Shadow UAS. Four active Army UAS platoons currently use the Selah airstrip with the possibility of adding four more and a National Guard platoon in the near future. Providing a facility dedicated to this training in the northern portion of YTC would lead to fewer training conflicts at YTC, more seamless operations in preparing for future deployments to a theater of operation, more realistic RSTA support, and ultimately, the reduction in loss of service members during combat.

1.2 NEPA Requirements and Scope of the Document

This environmental assessment (EA) has been prepared because the proposed action has the potential to significantly affect the environment and is in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (Authority: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 United States Code [U.S.C.] 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609) and E.O. 11514, Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977), and 32 CFR 651, Environmental Effects of Army Actions (March 29, 2002). The scope of this EA is to analyze the potential environmental consequences of the proposed action. This document analyzes the potential environmental effects of the proposed action in the areas of geomorphology and hydrology; vegetation; fish, and wildlife; threatened and endangered species; historic and cultural resources; air quality; noise; land use; aesthetics; recreation; hazardous and toxic materials; global climate change; socioeconomics; environmental justice communities; and Indian treaty rights.

A decision will be made based on the findings of this analysis, on how best to meet the purpose and need of the proposed action while avoiding, minimizing, and mitigating adverse impacts on the surrounding environment. Should unavoidable significant adverse impacts be expected that cannot be fully mitigated, an environmental impact statement (EIS) will be prepared.

Chapter 2
Proposed Action and Alternatives

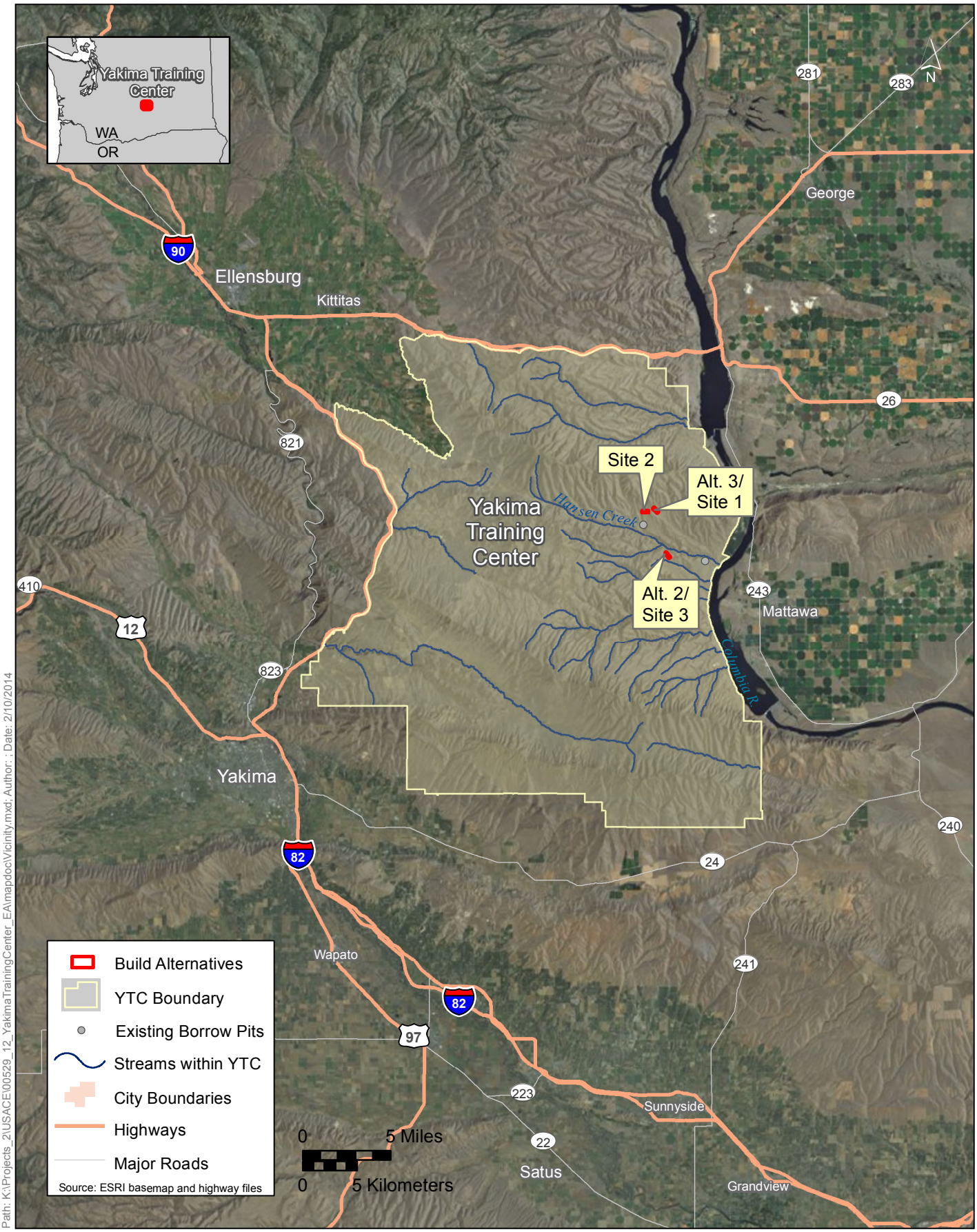
Further described in Section 2.2, Alternatives, YTC identified three candidate sites (Figure 2-1) for the proposed action along with a set of site-screening criteria for evaluating those sites on their potential to satisfy the proposed action's purpose and need (Section 2.2, Table 2-2).

- **Site 1 (Alternative 3).** Site 1 meets two of seven screening elements. The terrain profile does not allow for total control of UASs operating in the northern training areas because of Manastash Ridge. This would decrease the direct line of sight to the aircraft from the controller's position.
- **Site 2.** Site 2 meets two of seven screening elements and would require additional extensive excavation and fill to construct the facility. Construction costs would exceed available funding. It is also possible that existing facilities, e.g., a well house, storage tank, and fast fill facilities, would need to be removed and relocated since they would become vertical obstacles during operations of the proposed action. This site would also exhibit the same operational control issue that would occur at Site 1. Site 2 was eliminated from consideration as an alternative.
- **Site 3 (Alternative 2—preferred).** Site 3 meets six of seven screening criteria; however, it would result in an encroachment issue with existing drop zones and a flight route. These encroachment conflicts would also exist at the two other sites; however, this issue can be mitigated for all sites through operational controls and coordination with the Range Operations Center.

2.1 Proposed Action

The Army proposes to construct a Shadow UAS training facility on YTC consisting of a runway and parking lot. The runway would consist of an 800-foot-long by 50-foot-wide paved surface, with 5-foot unpaved shoulders (AHBL 2013). Unpaved gravel overruns measuring approximately 100 feet long and 60 feet wide would occur at each end. A 120-foot-wide zone (as measured from the centerline of the runway) that extends 100 feet from the ends of the runway would be cleared of all obstacles and graded to prepare the site. The runway would consist of 3 inches of hot-mix asphalt surface course over roughly 6 inches of densely graded aggregate base course over 4 inches of subbase course on compacted subgrade (AHBL 2013). No lighting or utilities would be provided at the site. The runway ends would be marked with reflective white bars about 10 feet wide and would stretch the full width of the runway and marked with a "U" indicating that the runway is designated for unmanned aircraft use only.

The parking lot would be roughly 100 feet long by 90 feet wide consisting of 8 inches of unbound aggregate surface course on compacted subgrade. The area would be sized to accommodate 10 High Mobility Multipurpose Wheeled Vehicles (HMMWVs/Humvees), seven trailers, and one 5-ton truck.



Path: K:\Projects_2\USACE\00529_12_YakimaTrainingCenter_EA\mapdoc\Vicinity.mxd; Author: ; Date: 2/10/2014

Figure 2-1: Shadow UAS Training Facility Alternatives
Yakima Training Center

Stormwater runoff would be managed via sheet flow dispersion to either side of the airstrip using grass buffers or filter strips to act as the water quality filter (AHBL 2013). The airstrip would be crowned along the center with the centerline maintaining the same level elevation. The longitudinal edges of the airstrip would be level (i.e., same elevation) with no concentration of runoff. Ditches between 2% and 10% slope would be provided on each side of the new access road to the airfield. Any runoff from extreme events would collect in the ditches that would generally discharge to the existing gullies. Additional infiltration capacity would be available in the ditch prior to overflow to the gullies. No further stormwater mitigation is anticipated.

2.1.1 Construction

Constructing the proposed action would involve removing vegetation, grading, importing aggregate from either of two existing borrow pits within 2 miles of the build alternative sites, crushing rock onsite, and paving the surface with asphalt. The water source for construction would be from one of two wells located near the sites. The area and depth of earth removal would be determined during construction by the contractor's geotechnical engineer. The approximate depth of stripping at either site would be approximately 2 inches per the geotechnical investigation; however, greater depths could be encountered and would have to be removed (AHBL 2013). Any over-excavation areas would be replaced with structural fill.

It is estimated that 6.5 acres of ground disturbance would be required to construct the airfield, parking lot, and access road (Kaul pers. comm.). It is assumed that staging would occur in the proposed 90-foot-by-100-foot gravel parking area or other defined work limits. Site earthwork is not expected to generate significant waste that would require a disposal area. Temporary impacts outside the defined work limits would be negligible. Typical construction equipment that could be used includes bulldozers, graders, excavators, backhoes, loaders, pavers, road rollers and dump trucks.

Aggregate required for construction would be sourced from existing gravel pits within YTC (AHBL 2013). Alternative 2 is close to the Hanson East gravel pit, while Alternative 3 is near the TA4 pit. Rock would likely be drilled and blasted at these locations then crushed and stockpiled on site. A front-end loader would load the rock into dump trucks that would carry the rock on existing roads to the construction location.

Construction is anticipated to take about 24 weeks to complete (AHBL 2013). The timeline may need to be increased, depending on the season that construction begins, to meet the window for any required vegetation seeding.

2.1.2 Operation

Specifications and flight capabilities of the Shadow UAS are listed in Table 2-1. The normal vertical range of operation for the Shadow is from 3,000 feet above ground level to 15,000 feet mean sea level and the normal horizontal range is 68 miles. Standard operational altitude for Shadow training is 6,000 feet for night operations and 8,000 feet for day operations. Although the range of this aerial vehicle is 68 miles, all UAS training operations are required to remain in the restricted use airspace within YTC's borders.

The number of UAS flights using Selah Airstrip is highly variable seasonally and from year to year. Due to weather, very limited or no flights occur in the winter. Usage generally begins in April or May

and continues intermittently until November. Multiple units train at this facility, with a typical unit training approximately every other month for four to six days. No new units are anticipated to train at the proposed airstrip and usage of the proposed airstrip is expected to be generally equivalent to that of Selah Airstrip. Having a dedicated airstrip for the UAS will reduce conflicts with other training efforts, which may open up time allowing for a slight increase in flights; however the overall average number of flights per year is not expected to change greatly.

Table 2-1. Shadow Unmanned Aircraft System Specifications and Flight Capabilities

Characteristics	Shadow Capability
Altitude (max): (km/ft)	4.6km/15,000 ft
Operating (km/ft)	0.9–3.7km/3,000–12,000 ft
Endurance (max): (hrs)	6 hrs
Radius of Action: (km/mi)	109.5 km/68 mi
Speed (max): (km/hr -- kts)	227.8 km/hr -- 123 kts
Cruise (km/hr -- kts)	120–130 km/hr -- 65 – 70 kts
Loiter (km/hr -- kts)	120–130 km/hr -- 65 – 70 kts
Climb Rate (max): (m/min -- fpm)	366 m/min -- 1200 fpm
Propulsion: Engine	One rotary
Prop	One pusher
Guidance & Control	Remote Control/Preprogrammed/Autonomous
Length (m/ft)	3.4 m / 11 ft
Wingspan: (m/ft)	3.9 m / 14 ft
Weight (max): (kg/lbs)	170 kg / 375 lbs
Payload (kg/lbs)	27.3 kg / 60 lbs
Fuel:	100LL
Capacity (kg/lbs)	23.1 kg / 50.7 lbs

Source: United States Army Intelligence Center 2000.
km = kilometers; m = meters; ft = feet; hrs = hours; mi = miles; km/hr = kilometers per hour; kts = knots; m/min = meters per minute; fpm = feet per minute; kg = kilograms; lbs = pounds; LL = low lead.

No on-site storage of vehicles, fuel, maintenance equipment or other materials would occur at the site. Aerial vehicles would be refueled from a truck-mounted tank and pump unit. A fuel dam would be placed around the vehicle during refueling or maintenance to contain any spillage. Only very minimal maintenance would occur on site during training events. Occasional usage of degreasers on the wings may occur. No de-icers would be used. In the unlikely event of an aerial vehicle malfunction leading to an uncontrolled descent, an onboard parachute will deploy and bring the aerial vehicle to rest with a greatly reduced risk of aircraft damage. In the training environment, it is Army policy to deploy the onboard parachute any time control of the aerial vehicle has been lost. The parachute has roughly an 80% rate of full aircraft recovery and a relatively mild landing can be inferred when parachute assisted. In 2009, a total of 26 Shadow accidents were reported out of all Shadow flights accomplished in training and in a theater of operations (United States Army Combat Readiness/Safety Center 2009). In addition, out of all Shadow UAS training accidents for the 5-year period from 2005 through 2009, none have resulted in a fire (Doyle pers. comm.).

2.2 Alternatives

YTC developed a detailed set of screening criteria for identifying sites that have the potential to meet the proposed action's purpose and need and that warrant further analysis and evaluation as alternatives through NEPA environmental review. YTC identified three candidate sites based on initial map and aerial imagery review (Figure 2-1). The screening criteria were then applied to the candidate sites as described in Table 2-2 to develop a reasonable range of alternatives for further evaluation. The No Action Alternative is not evaluated in Table 2-2. While Selah Airstrip meets all physical site screening criteria, conflicts over availability of the airstrip for Shadow UAS training makes the No Action Alternative unable to maintain current levels of training. In addition to the No Action Alternative (Alternative 1), two build alternatives (Alternative 2 and Alternative 3) are further evaluated in this EA.

Table 2-2. Candidate Site Screening Criteria and Evaluation of Actionable Alternatives

		Candidate Sites		
Screening Criteria	**Rationale**	**Site 1 (Alt 3)**	**Site 2**	**Site 3 (Alt 2)**
Site supports training activities/Tactical Training Plans (TTPs) for Training Areas (TAs)	Site must be suitable for UAS operations to support realistic training and missions on YTC. Site must allow for maneuver space for one platoon (20-30 service members) with vehicles and equipment. Site must be accessible in all weather conditions.	+	+	+
Site slope allows for minimal fill and excavation	Due to limited funding, site must allow for minimal fill and excavation in the construction process. Site must allow for a +/- 1% slope that can be constructed within proposed action funding limits.	-	-	+
Site Restricted Operating Zone (ROZ) is fully contained within YTC airspace	The ROZ must be contained within the YTC Restricted airspace. The ROZ should not interfere with other training activities when possible.	+	+	+
Vertical obstacles do not exist that would conflict with UAS siting or operations	Vertical hazards do not exist that would impede UAS operations (e.g., trees, power lines, buildings, terrain). UAS operations rely on an auto approach and landing that requires the glide path to be clear of all obstructions within the approach and landing zone. Steep terrain is also a factor; large hills cannot occur within the glide path.	0	-	+
Encroachment	Any new facility should not encroach on other ranges or training facilities, or it should have minimal effects upon those facilities. Other facilities should not encroach on UAS operations or have minimal effects.	0	0	0

Screening Criteria	Rationale	Candidate Sites		
		Site 1 (Alt 3)	Site 2	Site 3 (Alt 2)
Size of site is suitable for construction and operation of UAS facilities, IAW TC 25-8	The site/area is large enough and of suitable terrain to properly accommodate a UAS strip IAW the requirements found in TC-25-8 or standard design. The site must accommodate a minimum construction foot print of 1,200 feet by 200 feet.	0	0	+
The site allows for positive operational control of UAS vehicles during operation	The site is located in an area where positive operational control can be maintained at all times between the UAS and operators (e.g., 30KM), with area available to place relay stations for extended distance operations (e.g., ridgelines, towers) to maintain line of site up to 15,000 FT MSL.	0	-	+

+ = Site fully meets or satisfies the screening element.
0 = Site partially meets or satisfies the screening element.
- = Site does not meet or satisfy the screening element.

2.2.1 Alternative 1—No Action Alternative

The No Action Alternative serves as a baseline from which to compare all other reasonable alternatives and is not analyzed as a viable option to accomplish the proposed action. The construction and operation of a new UAS training facility would not occur; however, UAS use at the existing Selah Airstrip facility would continue. Because of the increased usage of Selah airstrip for manned aviation training, the ability to train service members on Shadow UAS could be compromised with the implementation of this alternative.

2.2.2 Alternative 2—Construct UAS Training Facility at Site 3

Alternative 2 would entail constructing a UAS training facility at Site 3. Site 3 meets six of seven screening criteria, but only partially satisfies the encroachment criterion due to conflicts with existing drop zones and a flight route. These encroachment conflicts would also exist at Site 1 but could be mitigated through operational controls and coordination with the Range Operations Center for all alternatives.

2.2.3 Alternative 3—Construct UAS Training Facility at Site 1

Alternative 3 would entail constructing a UAS training facility at Site 1. Site 1 meets two of seven screening criteria, partially meets four screening criteria, and does not meet one screening criterion. The terrain profile in the vicinity of this site would not allow for total control of UASs operating in the northern training areas because Manastash Ridge would reduce the direct line of sight to the aircraft from the controller's position.

2.2.4 Alternatives Considered but Eliminated

Constructing a UAS training facility at Site 2 would meet two of seven screening criteria, would partially meet three screening criteria, but would fail to meet two screening criteria. The slope at this site greatly exceeds +/-1% and would require extensive excavation and fill to construct the facility. Construction costs would exceed those at Site 1 or Site 3 and the available funding for this proposed action. There are also vertical hazards that may impede UAS operations at this site. Currently, a well house, storage tank, and fast fill facilities are located within the conceptual footprint of the proposed action at this site. It is possible that existing facilities would need to be removed and relocated if the proposed action were constructed at Site 2. In addition, this site would not allow for positive operational control to be maintained at all times between the UAS and operators because of its proximity to Manastash Ridge. For these reasons, constructing the proposed action at Site 2 is not further considered as an alternative.

Chapter 3
Affected Environment

The affected environment consists of all areas or resources within each aspect of the environment that could be directly or indirectly affected by the proposed action in the short and long term. The characteristics of the environment for the following resources with the potential to be affected by the proposed action are described in this chapter.

- Geomorphology and Hydrology
- Vegetation
- Fish and Wildlife
- Threatened and Endangered Species
- Historic and Cultural Resources
- Air Quality and Noise
- Land Use and Aesthetics
- Recreation
- Hazardous and ToxicMaterials
- Global Climate Change
- Local Economy and Socioeconomics
- Environmental Justice Communities
- Indian Treaty Rights
- Staging Area Environment
- Materials Source Environment and Transport Effects

3.1 Geomorphology and Hydrology

3.1.1 Geomorphology

The three major controls on soil formation are climate, parent material (the underlying bedrock or unconsolidated sediment), and topography. Climate controls the rate of soil formation; parent material controls the composition of the resultant soil; and topography delineates the most conducive areas for soils to form. YTC lies within the Columbia Plateau physiographic province. The geologic formations underlying YTC include Miocene-aged basalt flows overlain by early Pleistocene-aged loess (windblown silt) (U.S. Army 2002). The thickest loess deposits were—and are today—on leeward-facing slopes, while deposits on the windward slopes are relatively thin. During the Pleistocene, no glaciers reached the area of YTC; however, the overall climate was much wetter resulting in the alteration of the composition and lateral extent of the soil parent materials that were previously deposited.

YTC topography is dominated by east-west-trending anticlinal and synclinal ridges and north-south-trending drainages that dissect the ridges (U.S. Army 2002). Because of this topography, the most mature soils are found in the valleys as weathering processes, over time, have transported sediments from the steeper adjacent slopes. The combination of these factors results in silt loams being the predominant soil type throughout YTC. There are two soil types mapped for both the build alternative sites. The site for Alternative 2 primarily contains Wanapum cobbly loam, 2 to 5% slopes, with a small area of Wanapum complex, 10 to 15% slopes; while the site for Alternative 3 supports mainly Drysel loam, 2 to 5% slopes, and a small area of Gorskel complex, 3 to 15% slopes (Figure 3-1).

Soil erodibility is a descriptive feature, determined through K-factor values of low, medium, or high, based on the soil's allowable effective stress, defined as the maximum hydraulic stress that may be applied directly to the soil without the occurrence of unacceptable erosion. K-factor, which is used in the Universal Soil Loss Equation and Revised Universal Soil Loss Equation, indicates the susceptibility of a soil to sheet and rill erosion by water (U.S. Department of Agriculture-Natural Resources Conservation Service 2006). K-factors less than 0.37 have low soil erodibility, K-factors greater than 0.37 and less than 0.49 have moderate erodibility, and K-factors greater than 0.49 have high erodibility. Soils in and around the sites for Alternative 2 and Alternative 3 have K-factors ranging from 0.37 to 0.49, indicating moderate to high soil erodibility (Table 3-1). In addition to the K-factors, the T-value of soils describes the soil loss tolerance of a given soil (U.S. Department of Agriculture-Natural Resources Conservation Service 2006). The majority of soils in or near the build alternative sites have a tolerance of 2 tons per year of acceptable soil loss (Table 3-1). Wind erodibility is also a factor in the amount of soil loss that can occur over time (U.S. Department of Agriculture-Natural Resources Conservation Service 2006). At both build alternative sites, the wind erodibility ratings indicate a low susceptibility to erosion.

Both build alternative sites for the Shadow UAS training facility are located on relatively flat, vegetated areas. The Alternative 2 site is located on a gently sloping ridge top about 0.26 mile south of Hanson Creek. However, the somewhat diagonal orientation of the airstrip across the more narrow width of the ridge top results in each end of the airstrip extending onto adjacent side slopes. The Alternative 3 site lies on gently sloped terrain about 1 mile north of Hanson Creek.

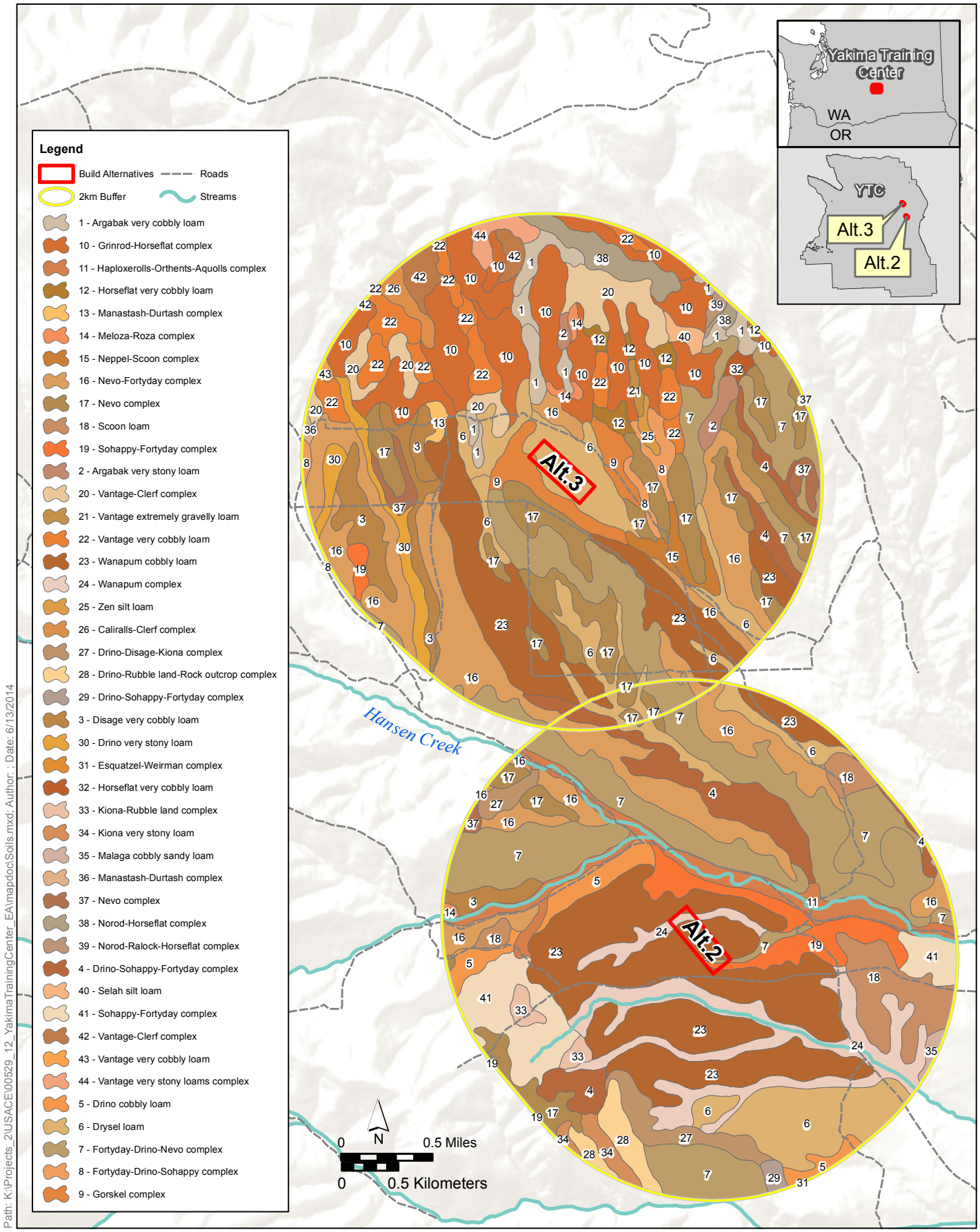


Figure 3-1: Soil types within 2km of the Shadow UAS alternative sites
Yakima Training Center

Table 3-1. Soil Types and Erosion Factors at the Shadow UAS Alternative Sites

Alternative	Soil Type	K-Factor	Soil Erodibility	T-Factor	Wind Erodibility Group	Wind Erodibility Index
Alternative 2	Wanapum cobbly loam, 2 to 5% slopes	0.37	Moderate	1	6	48
	Wanapum complex, 10 to 15% slopes	0.49	High	1	5	56
	Fortyday-Drino-Nevo complex, 30 to 45% slopes	37	Moderate	1	8	0
	Sohappy-Fortyday complex, 15 to 30% slopes	64	High	3	5	56
Alternative 3	Drysel loam, 2 to 5% slopes	0.49	High	2	5	56
	Gorskel complex, 3 to 15% slopes	0.49	High	1	5	56

Source: U.S. Department of Agriculture-Natural Resource Conservation Service 2006

3.1.2 Hydrology

YTC lies within three watershed administrative units (WAUs) whose boundaries coincide with watershed resource inventory areas (WRIAs), as defined by the State of Washington natural resource agencies. These include Lower Yakima (WRIA 37), Upper Yakima (WRIA 39), and Alkali/Squilchuck (WRIA 40) (Figure 3-2). The alternative sites lie within the Alkali/Squilchuck WRIA.

YTC's hydrologic conditions vary annually depending on seasonal snowpack and runoff characteristics (U.S. Army 2002). Flash runoff events with minimum water retention can occur when rain falls on snow or frozen ground. Gradual melting of snow creates more consistent spring flows and recharges shallow aquifers, which results in higher, more consistent summer base flows. Several years of drought conditions can cause perennial streams to become intermittent or ephemeral in certain reaches. When shallow aquifers are recharged temporarily, intermittent reaches or ephemeral reaches may return to a perennial condition.

3.1.2.1 Surface Water

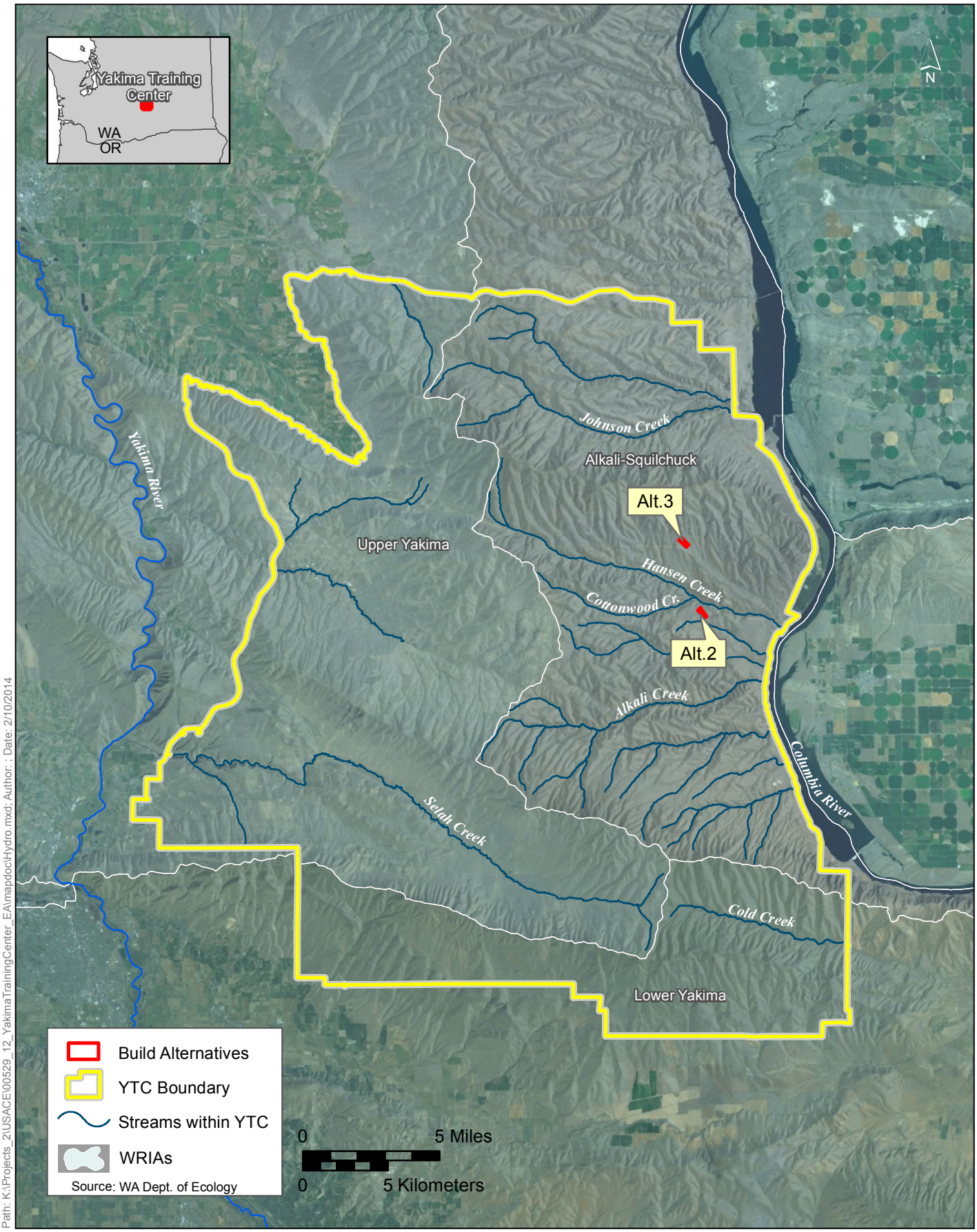
The main surface water features near YTC include the Columbia River to the east and the Yakima River to the west. Surface water resources at YTC include streams, seeps, springs, and ponds (U.S. Army 2002). These water resources are used for recreation, fire protection, fish and wildlife, and erosion control. Natural wetlands on YTC are rare given the arid to semi-arid climate of the region. However, there is a network of streams that carry runoff to either the Columbia River to the east or the Yakima River to the west (Figure 3-2).

YTC's network of streams is grouped into 10 distinct watershed complexes (U.S. Army 2002). Both build alternative sites are located in the Hanson Creek watershed complex, which drains to the Columbia River. Hanson Creek contains perennial flow for part of its length (U.S. Army 2002). Any runoff in connection with the proposed action would drain east toward the Columbia River, via Hanson Creek.

Water quality of the primary streams at YTC has not been formally classified; however, they are considered Class A (excellent) based on the Washington State criteria for water quality (U.S. Army 2002; Washington Administrative Code (WAC) 173-201A). This rating can be highly variable in eastern Washington given the wide spectrum of differing conditions that can occur along the length of any one stream. For example, the upper reaches of a stream may be considered excellent, while other reaches or sections of the same stream may not even be supporting water flow (simply due to lack of precipitation or a lowered groundwater table). Historic land use activities (including grazing), military training, and disturbance have resulted in degradation of many streams at YTC (U.S. Army 2002).

The primary water quality concern is the introduction of fine sediment into streams and its subsequent discharge into the Yakima and Columbia Rivers. Discharge of fine sediment is most likely to occur following high, short-duration flow events, i.e., typically 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 recent years, YTC has completed improvements in road structure, road closure and realignments, and channel crossings, and ceased domestic livestock grazing (mid 1990s). YTC has also instituted riparian and upland restoration programs to minimize the quantity of fine sediment reaching YTC streams and the Columbia and Yakima Rivers.

Suspended solids discharged from YTC contribute to the sediment load discharged naturally and from agricultural sources, but the magnitude of the contribution from YTC is very small compared to other sources (U.S. Army 2010a). Other causes of water quality impairment (bacteria, pesticides, and temperature) are not significantly affected by activities at YTC. Nutrients may be affected as a secondary effect of soil erosion and sediment discharge.



Path: K:\Projects_2\USACE\00529_12_YakimaTrainingCenter_EA\mapdoc\Hydro.mxd; Author: ; Date: 2/10/2014

Figure 3-2: Water Resource Inventory Areas (WRIAs) and hydrology Yakima Training Center

3.1.2.2 Groundwater

Extensive folding of sedimentary and basalt layers has created a complex groundwater system at YTC with variable hydraulic properties, depths to water, and flow directions (U.S. Army 2002). Groundwater in the vicinity of YTC occurs within four principal aquifers: surficial sedimentary units (principally Ellensburg Formation), Saddle Mountains Basalt, Wanapum Basalt, and Grande Ronde Basalt. Aquifers are not present everywhere across the installation. The occurrence and movement of groundwater at a given location depends on rock type, geologic structure, and topography. Shallow aquifers beneath YTC largely recharge from precipitation (rain and snow) falling directly within the boundary of the installation. Water infiltration and recharge is partly dependent on the condition of soils (i.e., compacted versus intact soil structure) and the area's vegetative cover (i.e., sparse, dense). Deeper basalt aquifers recharge over broader areas, particularly to the west of YTC.

Groundwater at YTC is accessed for potable and nonpotable uses. The Washington State Department of Health governs all drinking-water-related issues as tasked by the U.S. Environmental Protection Agency (EPA) and a Sanitary Control Area is applied to all drinking water wells per the guidance of WAC 246-290. Individualized Wellhead Protection Areas for each drinking water well are required by Washington State Department of Health (WAC 246-290-135), and are defined by subsurface geology/hydrology, surface water infiltration rates, and groundwater flow rates. YTC has an established potable water infrastructure and an ample supply of potable water. The Shadow UAS training facility would not include a well or connection to any other potable water system as part of its design; however, water would be drawn from existing wells located near the proposed sites during construction. These withdrawals would be minor and short term.

3.2 Vegetation

3.2.1 Plant Communities

YTC lies within the shrub-steppe region of the Columbia River Basin province of eastern Washington and Oregon (Franklin and Dyrness 1973). Shrub-steppe vegetation is characterized as the potential big sagebrush (*Artemisia tridentata*)/bluebunch wheatgrass (*Pseudoroegneria spicata*) zone (Daubenmire 1970) and was once widespread throughout the Columbia Plateau. This is the climax community that is expected to occur without disturbance. Today, very little shrub-steppe remains undisturbed or unaltered from its condition prior to European-American settlement, and it is considered one of North America's most imperiled and neglected ecosystems (Dobkin and Sauder 2004). Only about 40% of the original shrub-steppe in Washington remains (Dobler et al. 1996), with Yakima County supporting 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 federal holdings such as YTC and Hanford Reach National Monument and on the Yakama Indian Nation reservation. These areas may represent the only suitable sites for those species requiring large expanses of continuous shrub-steppe to meet their life-history needs (Dobler et al. 1996).

YTC upland vegetation communities consist of a mosaic of native and nonnative grasslands and a variety of shrubland communities typically composed of several species of sagebrush (*Artemisia* spp.). The intricate mosaic of these plant communities is the result of complex soil patterns, topography, precipitation patterns, and past and current land uses (U.S. Army 2002). Historic and present-day causes of disturbance to upland vegetation on YTC include conversion of land to

agricultural uses, grazing, fire, construction, road building, the deliberate and inadvertent introduction of nonnative 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 nonnative species (Rickard et al. 1988). Native bunchgrasses and forbs are particularly vulnerable to disturbances and have decreased dramatically in most portions of the shrub-steppe in Washington.

Riparian or streamside habitats serve as critical linkages and transition zones between the upland and aquatic environment. Riparian zones provide a variety of ecosystem functions, such as fish and wildlife habitat, sensitive plant species habitat, floodwater storage, and natural erosion control. Although riparian areas comprise only a fraction of the arid landscape, they typically support higher productivity and much higher plant and animal species diversity. Riparian habitats are especially important to wildlife when they are adjacent to relatively less productive habitats such as shrub-steppe, steppe, and deserts (Bock et al. 1992). Riparian habitat is vulnerable to loss and degradation through human activities and land uses. Since the arrival of settlers in the early 1800s, at least 50% and as much as 90% of riparian habitat in Washington has been lost or extensively modified (Knutson and Naef 1997). On YTC, riparian areas have sustained repeated damage from livestock grazing prior to 1995 and from impacts associated with military training (e.g., fire, cross-country maneuver, poor road design) since the 1940s (U.S. Army 2002). Riparian habitat on the YTC includes riparian and wetland plant communities associated with ponds, springs, and perennial and intermittent streams. There are 17 major streams with intermittent or perennial flow and more than 200 springs on the installation (U.S. Army 2002). Riparian vegetation is primarily dominated by woody trees and shrubs such as black cottonwood (*Populus balsamifera* var. *trichocarpa*), water birch (*Betula occidentalis*), white alder (*Alnus rhombifolia*), willow (*Salix* spp.), and Wood's rose (*Rosa woodsii*). Common herbaceous plants include species of rush (*Juncus* spp.), sedge (*Carex* spp.), bulrush (*Schoenoplectus* sp.), bluegrass (*Poa* sp.), wildrye (*Elymus* sp.), cattail (*Typha* sp.), and goldenrod (*Solidago* sp.), among others.

Both build alternatives are located within the Hanson Creek watershed complex. Upland vegetation communities in this watershed are dominated by various sagebrush-bunchgrass assemblages, with big sagebrush located on more gentle slopes where deeper, loamy soils prevail, and stiff sagebrush (*Artemisia rigida*) on rockier, shallower soils. Common bunchgrasses include bluebunch wheatgrass, Sandberg's bluegrass (*Poa secunda*), needle and thread grass (*Hesperostipa comata*), Cusick's bluegrass (*Poa cusickii*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*) and Thurber's ricegrass (*Achnatherum thurberianum*). Cheatgrass (*Bromus tectorum*), a nonnative weedy grass, is present in areas where past disturbance has occurred (e.g., fire, roadsides). Small areas of riparian habitat occur within the Hanson Creek floodplain and its tributaries.

The Alternative 2 site is located at a historic military training site (Firing Point 2783) where artillery is placed for live-fire exercises. After a fire burned the site in the early 1980s, it was reseeded using a rangeland drill with an erosion control/wildlife seed mix. Most of the site (28.68 acres, 96%) is mapped as a sparse big sagebrush/crested wheatgrass (*Agropyron cristatum*) cheatgrass plant community (Figure 3-3), reflecting the past history of disturbance at the site. The predominant vegetation consists of crested wheatgrass, which was seeded onto the site in the early 1980s, as well as a non-native mix of cheatgrass and Russian thistle (*Salsola kali*). Sandberg's bluegrass is a common native component, with bluebunch wheatgrass widely scattered in occurrence. Very little big sagebrush (1 to 5% cover) is present on the site. Also present are small areas of Sandberg's bluegrass/cheatgrass (0.89 acre, 3%) and sparse big sagebrush/Sandberg's bluegrass/cheatgrass

(0.2 acre, 1%) communities. The entire Alternative 3 site (29.77 acres) lies within a big sagebrush/spiny hopsage (*Grayia spinosum*)/bluebunch wheatgrass community (Figure 3-3). A dirt road bisects the site, with past damage to vegetation from off road vehicle disturbance from training exercises evident. Scattered big sagebrush, gray rabbitbrush (*Ericameria nauseousus*), and spiny hopsage comprise the shrub layer. Abundant weedy grasses and forbs are present in the understory, including non-native cheatgrass, Russian thistle, and tall tumble mustard (*Sisymbrium altissimum*). Native species noted included Sandberg's bluegrass, bluebunch wheatgrass, and arrowleaf balsamroot (*Balsamorhiza sagittata*). Disturbance from past artillery exercises, fire, and subsequent replanting with non-native mixes has resulted in an altered vegetation community that is degraded from the big sagebrush/bunchgrass community that would have been historically present.

Neither of the build alternative sites contains riparian or wetland habitat. Hanson Creek is the closest location where riparian/wetland vegetation may be found. Alternative 2 lies on a flat ridge top projection about 0.26 mile south of Hanson Creek, while Alternative 3 is located on gently sloped terrain about 1 mile north of Hanson Creek. Dry washes supporting upland plant communities that drain toward Hanson Creek do lie closer to the alternative sites. These dry washes may carry ephemeral flow during storm events.

3.2.2 Noxious Weeds

Noxious weed species can pose a threat to the ecological integrity of YTC, contributing to an increase in soil loss and a decrease in upland vegetative cover, surface water quality, and wildlife habitat. In addition, noxious weeds may pose an economic threat by spreading off the installation to surrounding agricultural lands and native habitats. Noxious weed control at YTC is accomplished through Integrated Pest Management (IPM). The IPM strategy focuses on long-term prevention or suppression of noxious weeds using techniques that have a limited impact on the environment including natural biological control, low-toxicity pesticides, and mechanical control (U.S. Army 2002). As part of its pest management program, YTC controls noxious weeds in training areas, with a primary focus on knapweed (*Centaurea* spp.) and kochia (*Kochia scoparia*) control, and a lesser focus on musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthum*), Russian thistle, and purple loosestrife (*Ammania robusta*). With the exception of purple loosestrife, these species typically invade upland sites or establish themselves along intermittent drainages following a disturbance. Purple loosestrife, which is found in wetland and riparian areas, is particularly difficult to control because the Columbia River provides a continual seed source for this species. Best management practices (BMPs) to control weeds and invasive vegetation include site restoration to prevent reinvasion by these species.

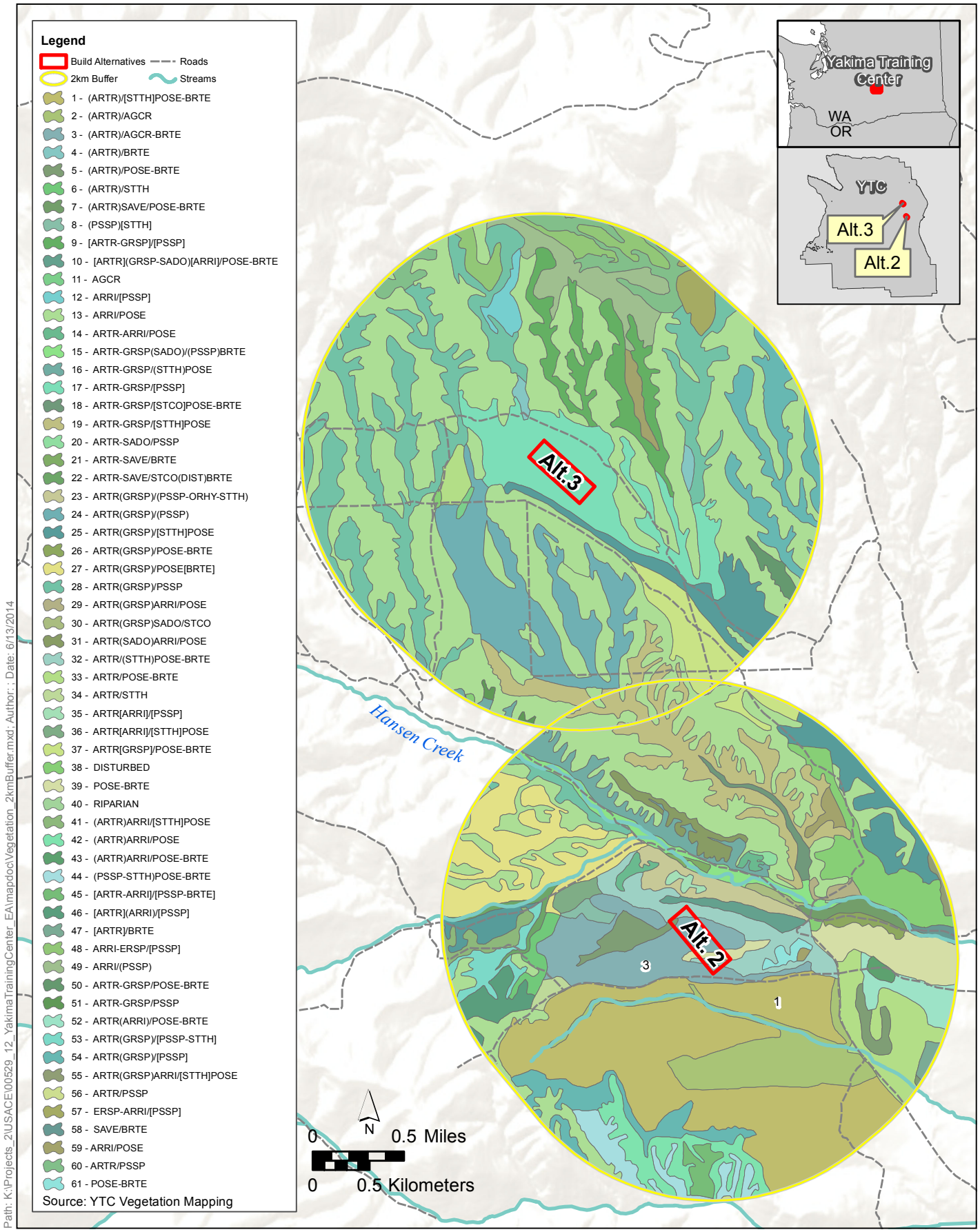


Figure 3-3: Vegetation within 1km of the Shadow UAS alternative sites
Yakima Training Center

3.3 Fish and Wildlife

At YTC, the semi-arid climate and adjacent large river systems are the predominant factors influencing the diversity of plant and animal life. As previously stated in Section 3.2, Vegetation, YTC is best characterized as a shrub-steppe ecosystem drained by small perennial and nonperennial streams that flow to the Columbia and Yakima Rivers. Wildlife habitats of YTC include the shrub and grassland communities that dominate the upland landscape, as well as cliffs and talus slopes along portions of the Columbia River and Selah Canyon, and narrow stringers of wetland/riparian habitat around perennial streams, seeps and springs. These habitats support numerous fish, mammal, bird, reptile, and amphibian species. Several fish, wildlife, and plant species on YTC are classified as special federal status species (either candidate, threatened, or endangered) under the Federal Endangered Species Act (ESA). Fort Lewis Regulation 420-5 (U.S. Army 2004a) outlines the procedures for the protection of sensitive biological resources on YTC. These species are addressed in Section 3.4, Threatened and Endangered Species.

3.3.1 Fish

Portions of the Columbia and Yakima River watersheds occur on YTC. The Columbia and Yakima River systems support anadromous and resident salmonids, as well as numerous other cold water and warm water fish species, such as walleye, various sunfish, minnows, and suckers. YTC lies near the west bank of the Columbia River, from Getty's Cove to Priest Rapids Dam. This reach of the Columbia River provides limited spawning habitat for anadromous salmonids, although significant spawning by fall Chinook (*Oncorhynchus tshawytscha*) occurs approximately 4 miles downstream from the Priest Rapids Dam (U.S. Army 2010a). The reach of the Yakima River adjacent to YTC supports a substantial recreational fishery for resident rainbow trout (*Oncorhynchus mykiss*), and is primary rearing habitat for spring Chinook salmon juveniles originating from upper Yakima River spawning areas (Northwest Power Planning Council 1990).

Within the YTC, fish occur in both perennial and nonperennial streams. Four of the six streams with perennial flow support fish populations (Johnson, Hanson, Alkali, and Lmuma Creeks), and two of 14 intermittent streams (Middle and Corral) also seasonally support fish. Fish species documented during YTC stream inventories have included threespine stickleback (*Gasterosteus aculaties*), mountain sucker (*Catostomus platyrhynchus*), longnose dace (*Rhinichthys cataractae*), rainbow trout and its anadromous form, steelhead, fall chinook fry, coho salmon (*Oncorhynchus kisutch*), brown trout (*Salmo trutta*), chiselmouth (*Acrocheilus alutaceus*), prickly sculpin (*Cottus asper*), largescale sucker (*C. macrocheilus*), redside shiner (*Richardsonius balteatus*), and the nonnative Eastern brook trout (*Salvelinus fontinalis*) (U.S. Army 2002).

Both build alternative sites lie within the Hanson Creek drainage, one of five subdrainage systems on YTC that are tributaries to the Columbia River (others include Alkali Canyon, Corral Canyon, Johnson Creek, and Middle Creek). Although intermittent within its headwaters, the lower reach of Hanson Creek is perennial. Fish were inventoried in Hanson Creek in 1991 (U.S. Army 2002). Fall Chinook salmon fry were observed using the lower reach for early rearing; however, the creek is too small for Chinook salmon to use for spawning. Other fish species documented in Hanson Creek include coho salmon, and the nonnative eastern brook trout.

3.3.2 Wildlife

Wildlife at YTC generally use three predominant habitat types in accordance with their specific life-history needs: shrub-steppe uplands, cliffs and talus slopes, and riparian areas associated with waterbodies and springs. Shrub-steppe uplands account for more than 95% of the land coverage at YTC, and provide life requisites for the majority of wildlife species that permanently or seasonally inhabit the installation (U.S. Army 2002). The open, shrubby vegetation support numerous shrub- and ground-nesting birds, as well as abundant populations of small and mid-sized mammals. Reptiles and raptors feed on the diversity of small mammals and invertebrates found throughout the sagebrush complexes of YTC. Cliffs and talus slope habitats provide shade, cover, and rearing sites. Riparian habitats support a wide variety of wildlife by providing drinking water, as well as vegetation and structure used for foraging, cover, nesting and rearing opportunities.

A total of 246 wildlife species occur or are likely to occur on YTC: 8 amphibians, 14 reptiles, 174 birds, and 50 mammals (U.S. Army 2002; Johnson and O'Neil 2001). Occurrence information including habitat preferences, breeding status, and season of use is summarized in Appendix A. Expanded discussion is provided below for many of the more common and noteworthy species and wildlife groups. Only those species usually associated with shrub-steppe uplands would be expected to occur at the two build alternative sites. Sparse big sagebrush/crested wheatgrass/cheatgrass is the predominant plant community found at the Alternative 2 site, along with small areas of Sandberg's bluegrass/cheatgrass and sparse big sagebrush/Sandberg's bluegrass/cheatgrass (Section 3.2, Vegetation). The entire Alternative 3 site lies within a big sagebrush/spiny hopsage/bluebunch wheatgrass community.

Amphibians and Reptiles

Of the 22 species of amphibians and reptiles thought to be present at YTC, four typically inhabit sagebrush and cliff and talus slope habitats: side-blotched lizard, sagebrush lizard, western fence lizard, and striped whipsnake. The most common species found in riparian habitats include Pacific treefrogs and long-toed salamanders. Other species, such as short-horned lizards, gopher snakes, and western rattlesnakes, are more evenly distributed across the YTC landscape.

Birds

The most common avian species found on YTC are the western meadowlark, Brewer's sparrow, vesper sparrow, horned lark, and sage thrasher. Birds commonly associated with sagebrush habitat year-round include the greater sage-grouse, golden eagle, prairie falcon, common raven, rock wren, and horned lark. Summer residents of YTC include Swainson's and red-tailed hawks, American kestrel, burrowing and short-eared owls, mourning dove, common nighthawk, sage thrasher, and sage sparrow. Winter residents include the rough-legged hawk, rosy finch, northern shrike, and bald eagle. Upland game birds include chukar, California quail, ring-necked pheasant, and Hungarian partridge. Riparian habitats provide some permanent water supplies for waterfowl (such as mallard, gadwall, cinnamon teal, blue-winged teal, wood duck, and shoveler) and a variety of songbirds. Additionally, bald eagles and osprey can be observed along river corridors. Cliff swallows are most commonly associated with cliffs, talus slopes, and riparian habitats, and may occur at the periphery of sage habitat.

Although some of these bird species are resident year-round on YTC, many are migratory birds that spend only a portion of the year on YTC. Migratory birds may winter or breed on YTC, or may just

use the installation for short periods while migrating between their breeding grounds to the north and wintering grounds to the south. Migratory birds are protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, which provides protections to reduce the risk of harm to migratory birds or their habitats from Army or other federal actions.

Mammals

Five small mammals represent 98% of all species identified during 1990 monitoring surveys: deer mouse, sagebrush vole, Great Basin pocket mouse, least chipmunk, and northern pocket gopher. Additional small and mid-sized mammal species typically found on YTC include black-tailed jackrabbit, Townsend's ground squirrel, Merriam's shrew, badger, porcupine, harvest mouse, and long-tailed vole. Large mammals found at YTC include cougar, coyote, mule deer, and elk. Mule deer are the predominant large mammal found at YTC, while coyote primarily use shrub habitats for hunting small mammals. A small number of elk are year-round residents on YTC.

Bats, including the western small-footed bat, little brown bat, and big brown bat, may roost in the cliffs and talus slopes and feed along the riparian drainages by night (ENSR International 1995a). Other bat species known or likely to use habitats on YTC include the pallid bat, spotted bat, and canyon bat.

Six species of mammal are typically found in riparian areas: raccoon, porcupine, mink, muskrat, beaver, and montane vole. Bushy-tailed woodrats and bighorn sheep occasionally use the cliffs and talus slopes.

3.4 Threatened and Endangered Species

A number of fish, wildlife, or plant species that may be present on YTC are subject to special management action because of their current or potential status under the ESA (Table 3-2), Bald and Golden Eagle Protection Act, MBTA, or Washington State designations. A detailed evaluation of these species is presented in the *Fort Lewis Army Growth and Force Structure Realignment Final Environmental Impact Statement* (U.S. Army 2010a), which analyzes the potential environmental and socioeconomic impacts of implementing the decisions of the 2007 "Grow the Army" Programmatic EIS applicable to Fort Lewis and YTC. Additional evaluation of these species is presented in Fort Lewis Regulation 420-5 (U.S. Army 2004a), which describes the procedures established to protect and sustain threatened and endangered species, and their habitat, on Fort Lewis and YTC. A description of those sensitive species known or suspected at times to occur in the general vicinity of the alternative sites is provided below.

3.4.1 Salmonid Fish

YTC is within the range of four sensitive salmonid species:

- Upper Columbia Spring Chinook Salmon, *Oncorhynchus tshawytscha* – Federal endangered, State candidate;
- Upper Columbia Steelhead Trout, *Oncorhynchus mykiss*, – Federal threatened, State candidate;
- Mid-Columbia Steelhead Trout - Federal threatened, State candidate; and
- Columbia River Bull Trout (*Salvelinus confluentus*), Federal threatened, State candidate.

None of these species is known to use rivers and streams on YTC. Although upper Columbia steelhead may be present in Johnson Creek downstream of the installation, there is no contiguous flow between this area and YTC. Recent fish inventory surveys, including steelhead spawning surveys, have not documented the presence of these species (adult or any other life stage) on YTC (Yakima Training Center's Environment and Natural Resources Division 2007, 2008). Critical habitat has been designated in the vicinity of YTC for these salmonids, but YTC is excluded from the designation. Currently, protection measures in place for riparian areas on YTC provide direct protection for these species, and protect habitat that may be occupied on YTC (U.S. Army 2004a).

There is no suitable habitat for these listed salmonids within the build alternative sites. Both sites are in upland areas on relatively level to gently sloping terrain that support scrub-shrub vegetative communities. Both build alternative sites lie within the Hanson Creek watershed, which drains to the Columbia River about 3 miles away. The lower portion of Hanson Creek is perennial; however, there is no continuous flow in the creek reach adjacent to these two build alternative sites and the lower perennial reach, or the Columbia River off the installation where these species may be present.

3.4.1.1 Bull Trout

The Columbia River bull trout distinct population segment (DPS) consists of all populations in the Columbia Basin, which includes four major stocks: the Yakima, Wenatchee, Entiat, and Methow Rivers. Bull trout in the Columbia Basin DPS spawn in September and sometimes into mid-October, depending on the subpopulation. Variations in timing likely follow temperature patterns in the various tributaries. Movement into spawning areas is not well documented, but likely varies among 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 YTC (Bottorff and Swanson 1993), this is highly unlikely. Streams on 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 could be spawning or migrating to spawn. However, bull trout could forage in streams on 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. Because of the lack of suitable habitat on YTC, bull trout have not specifically been targeted in fish surveys on the installation. Suitable habitat downstream of YTC is used for spawning bull trout, while any areas that are used by bull trout upstream of YTC (i.e., Yakima River) are used for migration and adult holding areas, and include deep pools where bull trout stay prior to downriver migration to spawn (Cummins pers. comm.). Portions of the Columbia and Yakima rivers adjacent to YTC provide migration habitat for bull trout.

USFWS (2010a) has designated approximately 765 miles of streams in the Columbia River Basin, including approximately 557 miles of the Yakima River, as critical habitat for bull trout. This designation encompasses reaches of the Yakima River and Columbia River adjacent to YTC but does not include any stream reaches on YTC. Bull trout is federally listed as a threatened species and is a candidate for listing at the state level.

3.4.1.2 Chinook Salmon

Included in the Upper Columbia evolutionary significant unit (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. 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 because of 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 (National Marine Fisheries Service 2009).

Upper Columbia spring-run Chinook salmon migrate past YTC through the Yakima River drainage. This area also serves as an over-wintering area for spring-run Chinook. All streams and drainages on YTC are located outside this ESU. The reach of Columbia River adjacent to YTC is a migratory corridor for these fish and individual residence times can be measured in days rather than weeks. Upriver runs start passing YTC in early May and extend through August based on counts at Priest Rapids Dam. Spawning occurs from late August to mid-September, and all documented spawning areas in this ESU are upstream of YTC (Cummins pers. comm.; U.S. Army 2002).

YTC is excluded from critical habitat designation for Upper Columbia spring-run Chinook salmon (pursuant to the National Defense Authorization Act for Fiscal Year 2004). However, the Columbia River immediately adjacent to the installation is designated critical habitat for this ESU. The Upper Columbia Spring-run ESU is federally listed as endangered and is a candidate for listing at the state level.

3.4.1.3 Steelhead

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. Similar to 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.

The Mid-Columbia River 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 located adjacent to the installation's western boundary, and flows into the Columbia River downstream of YTC.

Of the streams on YTC, Johnson Creek contains both resident (rainbow trout) and anadromous steelhead (Rogers et al. 1989; U.S. Army 1994; Cummins pers. comm.), and is considered part of the threatened Upper Columbia ESU. Several adults have been observed in the lower portions of this creek. Upper Columbia River ESU steelhead are not known to use streams on YTC.

Habitat on YTC is excluded from critical habitat designation for Upper Columbia River steelhead (pursuant the National Defense Authorization Act for Fiscal Year 2004). However, the Columbia River immediately adjacent to the installation is designated critical habitat for this ESU.

Critical habitat for the Mid-Columbia steelhead ESU has been determined to include all tributaries known to support steelhead within the ESU boundary, the main body of the Columbia River downstream of the Yakima River, and the Columbia River estuary. Habitat on YTC is excluded from

critical habitat designation for Mid-Columbia River steelhead (pursuant to the National Defense Authorization Act for Fiscal Year 2004). However, the Yakima River immediately adjacent to the installation is designated critical habitat for this ESU.

3.4.2 Wildlife

A number of special status wildlife species are present on or near YTC, as shown in Table 3–2. Occurrence information including habitat preferences, breeding status and season of use is provided in Appendix A. Federal endangered, threatened, and candidate wildlife species, as well as other sensitive species that receive special management or could be affected by the proposed action are discussed in more detail below.

Table 3-2. Special Status Wildlife Species Found on or near the Yakima Training Center

Common Name	Scientific Name	Federal Status	Washington State Status
Birds			
Greater sage-grouse	*Centrocercus urophasianus*	Candidate	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	Proposed Threatened	Candidate
Bald eagle	*Haliaeetus leucocephalus*	Species of Concern	Sensitive
Golden eagle	*Aquila chrysaetos*		Candidate
Burrowing owl	*Athene cunicularia*	Species of Concern	Candidate
Ferruginous hawk	*Buteo regalis*	Species of Concern	Threatened
Loggerhead shrike	*Lanius ludovicianus*	Species of Concern	Candidate
Northern goshawk	*Accipiter gentilis*	Species of Concern	Candidate
Olive-sided flycatcher	*Contopus cooperi*	Species of Concern	
Peregrine falcon	*Falco peregrinus*	Species of Concern	Sensitive
Sage sparrow	*Amphispiza belli*		Candidate
Sage thrasher	*Oreoscoptes montanus*		Candidate
Sandhill crane	*Grus canadensis*		Endangered
Western grebe	*Aechmophorus occidentalis*		Candidate
American white pelican	*Pelecanus erythrorhynchos*		Endangered
Common loon	*Gavia immer*		Sensitive
Mammals			
Long-eared myotis	*Myotis evotis*	Species of Concern	
Townsend's big-eared bat	*Corynorhinus townsendii*	Species of Concern	Candidate
Townsend’s ground squirrel	*Spermophilis townsendii*	Species of Concern	Candidate
Black-tailed jackrabbit	*Lepus californicus*		Candidate
White-tailed jackrabbit	*Lepus townsendii*		Candidate
Merriam’s shrew	*Sorex merriami*		Candidate
Amphibians and Reptiles			
Columbia spotted frog	*Rana luteiventris*		Candidate
Northern leopard frog	*Lithobates pipiens*	Species of Concern	Endangered

Common Name	Scientific Name	Federal Status	Washington State Status
Sagebrush lizard	*Sceloporus graciosus*	Species of Concern	Candidate
Sharptail snake	*Contia tenius*	Species of Concern	Candidate
Striped whipsnake	*Masticophis taeniatus taeniatus*		Candidate

Sources: U.S. Army 2002, 2010; Washington Department of Fish and Wildlife 2012; U.S. Fish and Wildlife Service 2012a.

3.4.2.1 Greater Sage-Grouse

The greater sage-grouse (*Certrocercus urophasianus*) is a Washington State threatened species and a federal candidate species under the ESA. The U.S. Fish and Wildlife Service (USFWS) (2010a, 2013a) recently determined that listing the greater sage-grouse as threatened or endangered is warranted, but has delayed developing a proposed rule to list the species because of higher priority listing actions. Federal listing is warranted because present or threatened destruction, modification, or curtailment of the habitat or range of the greater sage-grouse represents a significant threat to the species. Sagebrush habitats upon which the species depends are becoming increasingly degraded and fragmented due to the impacts of multiple threats, including direct conversion, urbanization, infrastructure such as roads and powerlines, wildfire and the change in wildfire frequency, incursion of invasive plants, grazing, and nonrenewable and renewable energy development. Pursuant to the *Listing Work Plan Stipulated Settlement Agreement with Wild Earth Guardians* (Case 1:10-mc-00377-EGS Document 31-1, filed May 10, 2011), USFWS shall either propose to list the greater sage-grouse or reach a not-warranted finding no later than the end of Fiscal Year 2015.

Sage-grouse on YTC tend to use habitat with slopes of less than 15% in areas where Wyoming big sagebrush (*Artemesia tridentata* ssp. *wyomingensis*), three-tipped sagebrush (*A. tridentata)*, and bluebunch wheatgrass dominate (Livingston 1998). Sagebrush comprises 60 to 80% of the species' diet (Remington and Braun 1985), with shrubs sheltering nests from avian predators and inclement weather, and grasses providing shelter from ground predators as well as favorable nesting microclimate (Washington Department of Fish and Wildlife 1995). Critical periods of sage-grouse life history include lek (communal mating ground) 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 5 miles) to leks when suitable habitat exists.

YTC supports one of two distinct populations of sage-grouse that remain in Washington, and the largest and only population occurring primarily on federally owned land (U.S. Army 2002). These two populations are isolated from each other, and from other larger populations located throughout the species' range. Populations of sage-grouse on YTC have been characterized by short-term fluctuations and have exhibited trends similar to those of statewide populations, with male sage-grouse numbers per lek decreasing over time (Livingston 1998). Annual surveys for leks and lek bird counts have been conducted on YTC since 1989 to monitor trends and assess population status. In 2013, all known leks were monitored twice weekly from 1 March to 29 March, and nine were found to be active (White 2013). Three of the active leks were classified as major leks (i.e., ten or more male sage-grouse observed at least once during the season). The majority of all sightings were over 7 miles from the proposed alternatives, concentrated in the south and west of YTC. The closest sighting to the proposed action was one hen that was seen approximately 5 miles to the southwest

of the Alternative 2 site. The 2013 YTC sage-grouse population was estimate to be 221, a 42% increase from the 2012 population estimate of 146 adult birds (White 2013). The 2012 population estimate was down 38% from the 2011 estimate of 213. The 2013 estimate represents the second time in the last seven years that the sage-grouse population on YTC has surpassed the management goal of 200 (Livingston 1998). Habitat loss resulting from fires (2006-2009) potentially had a severe negative impact on sage-grouse demographics, as evidenced by the -13% average rate of population change over those years. The current population increase may be a response to restoration efforts that occurred within the fire footprints which has increased forage opportunities in the area (White 2012).

Population declines in greater sage-grouse throughout Washington have resulted from large-scale removal of native vegetation for agricultural development, combined with reduced habitat quality caused by intensive livestock grazing (Washington Department of Fish and Wildlife 1997). Sagebrush removal using herbicides and fire have also contributed to this decline (Washington Department of Fish and Wildlife 1995). From 1960 to 1995, land on YTC was used for livestock grazing, which likely contributed to a decrease in habitat quality for sage-grouse. Indirect threats to greater sage-grouse are generally habitat related and are primarily from fire and military training activities. Fire is a threat because it kills big sagebrush, and repeated fires can 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, on the order of 20 to 30 years (Britton and Clark 1985). With the loss and fragmentation of shrub-steppe, fire poses a significant threat to remaining greater sage-grouse habitat in Washington. Furthermore, damage to soil and vegetation from vehicles and foot traffic associated with military training is a concern for sage-grouse and other wildlife.

Suitable sage-grouse habitat on YTC consists of medium to dense sagebrush stands exhibiting a range of heights, as well as a variety of forbs and grasses (U.S. Army 2010a). Potentially suitable habitat occurs in the vicinity of the build alternative sites. Alternative 2 is located 1.14 miles from the Borden lek, while Alternative 3 lies 3.37 miles from this lek (Figure 3-4). The Borden lek was discovered in 1998 and monitoring indicated a low level of annual use by sage-grouse (less than 5 adult males) through 2002 (White 2012). However, annual monitoring has not detected any activity at the lek since 2002. The Borden lek was visited three times during monitoring conducted in 2012 and four times in 2013. Observers searching the lek on foot found no evidence of sage-grouse, and no grouse were observed during lek counts or during aerial surveys of the lek site (White 2013). As the Borden lek has been inactive for over 10 years, it is now considered to be historic. As a consequence of the 2011 Grow The Army Environmental Impact Statement Record of Decision (76 FR 10889) it was decided that the Borden lek and two others would not be subject to current sage-grouse protection measures but rather managed to the land allocations that they are located in.

The Range 15 lek is approximately 0.4 miles (600 m) from the Selah Airstrip, where the current UAS training is occurring. This is also a historic lek, with no observed activity since 2004. Observation of several (3-5) displaying males was reported somewhere near the Selah Airstrip spring of 2012; however, attempts to relocate those grouse were unsuccessful. The constant human activity at Range 15 and Selah Airstrip may have led to the abandonment of the lek (White 2013). The Beller DZ lek is 2 miles (3.2 km) from the Selah Airstrip. This lek was inactive from 1998 to 2010. In 2011, seven male sage-grouse were observed displaying in the area. The male attendance at this lek was six in 2012 and four in 2013.

YTC developed a Sage-grouse Management Plan for the installation in 1998. This plan is being revised as part of the installation's Integrated Natural Resources Management Plan (INRMP) revision. New protection measures for this species will be based on both current and anticipated training requirements, in concert with species and habitat conservation practices intended to preclude the need for federally listing the species (Leingang 2011).

3.4.2.2 Bald Eagle

In 2007, USFWS delisted bald eagles that inhabit the lower 48 states because the species was meeting or exceeding established recovery goals throughout its range. However, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act and MBTA. YTC manages bald eagles under an Endangered Species Management Plan that provides spatial and temporal protection measures for populations of wintering bald eagles and existing habitat, as well as restoration efforts for future habitat. This includes restricting military activity around winter roost sites as described in Fort Lewis Regulation 420–5 (U.S. Army 2004a).

On YTC, bald eagles are winter migrants that arrive between early October and late November, departing by the end of March (Stalmaster 1992). Birds forage along the Columbia River at the installation's eastern boundary (at the Priest Rapids Reservoir) and have roosted at three sites along Hanson Creek and one site (Borden Springs) along the Columbia River (U.S. Army 2002). Approximately 25 bald eagles feed on the Columbia River near YTC during the peak of the wintering season (February); about half of these eagles use roosts on YTC (U.S. Army 2010a). Fires burned the Borden Springs site in 1996 and 2003, and during 2006 bald eagles used the site only during the day. Alkali Canyon, a historic roost site, burned in 1996 and has not been used since by bald eagles. The three Hanson Creek roost sites are all in the general vicinity of both build alternative sites (Figure 3-4). These nocturnal roosts consist of individual trees and small stands of mature cottonwood trees.

Military restrictions in place to protect the Hanson Creek roosts include flight restrictions in a buffer along the creek and Columbia River during winter (December 8 to March 24), as shown in Figure 3-4; restrictions on vehicle use in Hanson Creek riparian areas; and seasonal traffic control along portions of Hanson Creek Road during winter (December 8 to March 24) (U.S. Army 2004a).

No known nesting by bald eagles occurs on YTC. However, bald eagles have recently nested adjacent to the installation along the Yakima and Columbia Rivers. These nesting sites range from 3.5 to 6 kilometers outside of YTC's boundary (Washington Army National Guard 2012). Nesting by bald eagles in this region occurs from December to March.

3.4.2.3 Golden Eagle

The golden eagle is afforded protection under the Bald and Golden Eagle Protection Act and the MBTA, and is a candidate for listing at the state level. Golden eagles are commonly present in open areas such as shrub-steppe and grassland habitat, open forests, and alpine parkland, and nest on cliffs or large trees (Watson and Whalen 2004; Seattle Audubon Society 2008). Both migratory and resident golden eagles occur on YTC (U.S. Army 2002), and four historic nest sites have been identified at cliff sites on the installation (U.S. Army 2004a). The build alternative sites and adjacent areas do not provide golden eagle nesting habitat (i.e., cliffs, large trees), but may be used as foraging habitat. The closest historic nest site is 4.9 miles from the Alternative 2 site and 4.2 miles from the Alternative 3 site. All other golden eagle nest sites are more than 14 miles from the

alternative sites. To protect golden eagles from human activity during the nesting season, nest buffers and overflight restrictions are in place, as described in Fort Lewis Regulation 420–5 (U.S. Army 2004a).

3.4.2.4 Ferruginous Hawk

The ferruginous hawk is listed as a threatened species in Washington State, and is a federal species of concern. Ferruginous hawks breed in the Lower Columbia Basin of southeast Washington, and the surrounding arid lands (Richardson et al. 2004). They are obligate grassland or desert shrubland nesters, and prefer sparse, short vegetation in steppe and shrub-steppe habitats. In Washington, most ferruginous hawk nests are built on top of rocks, cliffs, and trees and most occur in rock outcroppings. The species has been extremely rare on YTC since 1993, although multiple historic nest sites have been located (U.S. Army 2002). However, no ferruginous hawks have been documented nesting at YTC since 1993, and sightings of the species have been infrequent.

Ferruginous hawks are sensitive to human disturbance and require isolation from military activity during the nesting season. Protective measures restricting military activity around active nests are listed in Fort Lewis Regulation 420–5 (U.S. Army 2004a).

3.4.2.5 Burrowing Owl

The burrowing owl is a federal species of concern and a candidate for listing at the state level. Burrowing owls are found in shrub-steppe habitat in eastern Washington during the breeding season (Nordstrom 2004; Seattle Audubon Society 2008). They inhabit open, dry areas with soft soil and short grass, and use burrows for protection from predators and temperature extremes (Seattle Audubon Society 2008). Typically, they use abandoned burrows excavated by burrowing rodents or larger mammals (often unoccupied badger dens in the Pacific Northwest), although they are capable of digging their own burrows (Nordstrom 2004). The major factor contributing to the decline of burrowing owls has been habitat loss. Forty-four historic burrowing owl burrow nests have been documented on YTC per Fort Lewis Regulation 420–5 (U.S. Army 2004a), and potentially suitable nesting habitat occurs in the vicinity of the build alternative sites. The Alternative 2 site is located 0.5 mile from Burrow 218, the closest burrow site, while the Alternative 3 site lies 3.1 miles from this historic burrow (Figure 3-4). Burrow 218 was last reported active in 2004 and 2005. The closest active burrow (Burrow 455, active in 2011 and 2012) lies 4.0 miles from the Alternative 2 site and 6.5 miles from the Alternative 3 site.

3.4.2.6 Yellow-billed Cuckoo

The western DPS of the yellow-billed cuckoo is proposed for listing as threatened at the federal level, and is a candidate for listing at the state level. The western yellow-billed cuckoo is a neotropical migrant bird that winters in South America and breeds in western North America. Historically, yellow-billed cuckoos nested in riparian woodlands along rivers in eastern Washington, as well as in various locations in western Washington. The last confirmed breeding records for the species in the state are from the 1930s, and it is likely the species is extirpated as a breeder (U.S. Fish and Wildlife Service 2013b). Although several recent surveys have been conducted in Okanogan and Yakima Counties to check locations of previous sightings (Okanogan County) and potential habitat (Yakima County), no cuckoos were detected, despite a small number of statewide accounts in recent years (U.S. Fish and Wildlife Service 2013b). The species has not been seen on YTC, nor have there been any recent sightings of the species near the installation.

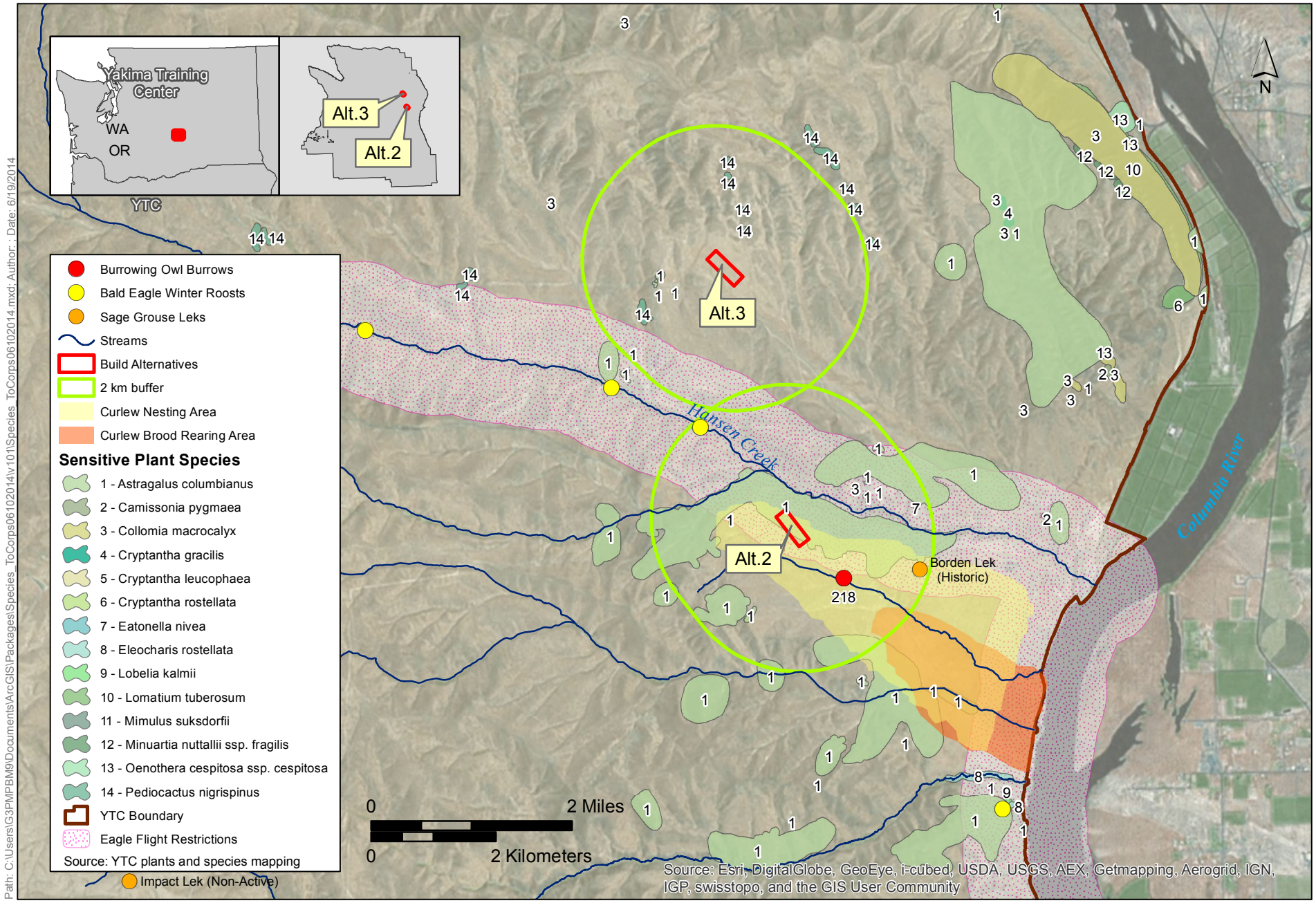


Figure 3-4: Sensitive plant and animal resources near the Shadow UAS alternative sites Yakima Training Center

3.4.2.7 Sandhill Crane

The state-endangered sandhill crane occupies wet meadows and grasslands, feeding in grain fields and pastures (Seattle Audubon Society 2008). In Washington, they nest during the summer in wetlands with emergent vegetation. During migration and in the winter, they inhabit more open areas, requiring good visibility at their surroundings. There are no nesting areas for this species on YTC, although sandhill cranes are occasionally observed on and near the installation during their seasonal migrations.

3.4.2.8 Other Sensitive Bird Species

Several sensitive bird species that are candidates for listing at the state level also occur on YTC. Loggerhead shrikes, sage sparrows, and sage thrashers are all summer residents of shrub-steppe habitats. These state candidates nest in or beneath shrubs, and sage sparrow and sage thrashers are closely associated with sagebrush communities (Larsen et al. 2004). Olive-sided flycatchers sometimes use riparian habitats on the YTC, and peregrine falcons migrate along the Columbia River and nest near Sentinel Gap.

3.4.2.9 Migratory Birds

In addition to resident bird populations, YTC provides habitat for a wide variety of birds that migrate annually within and beyond the installation's boundary and North America. Although many of these species use YTC as a stop-over site during their seasonal migration, some use the installation as breeding habitat. Their presence serves an important ecological function and is an important indicator of ecosystem health. Recognition of YTC's significant role in providing for migratory birds is evident in its designation as an Important Bird Area by the American Bird Conservancy and National Audubon Society. While this recognition entails no legal or management requirements, it does highlight YTC's important role in providing for large concentrations and an exceptional diversity of birds, rare and endangered species, and unique and imperiled habitats. Continental and local declines in numerous bird populations have led to concern for the future of migratory birds. The primary cause of declines is thought to be habitat loss and fragmentation in the nesting, wintering, and migratory stop-over habitats used by birds on their long journeys. Even where habitat remains, it is often fragmented into small patches that cannot support healthy populations of birds. Military lands, such as YTC frequently provide some of the best remaining habitat for migratory bird species of concern because of their large, contiguous, open acreages.

Primary considerations regarding migratory bird management are implementation of migratory bird management actions in accordance with Executive Order 13186,Responsibilities of Federal Agencies to Protect Migratory Birds and compliance with the MBTA; National Defense Act 2003, Final Rule 70, 8931-8950; Migratory Bird Permit: Take of Migratory Birds by the Armed Forces Rule, February 28, 2007; Memorandum of Understanding between the U.S. Department of Defense (DoD) and USFWS, Promote the Conservation of Migratory Birds, Final Rule 71, 51580-51585, August 30, 2006; and all Army issued policies and guidance subsequent to all other acts, laws, and regulations pertaining to the management of migratory birds. Additional management considerations include supporting and contributing to compatible goals and efforts of numerous regional migratory and game bird conservation programs.

Appendix B provides information on migratory birds known to occur on YTC. A total of 161 bird species listed as migratory by the U.S. Fish and Wildlife Service have been documented on the

installation. Of these, 36 are known to breed within the predominant shrub-steppe habitat found on YTC. Potentially suitable breeding habitat may occur at the build alternative sites for 21 of these species (Appendix B).

Included with the breeding migratory species is the long-billed curlew (*Numenius americanus*), also classified as a Washington State monitor species. State monitor species are managed by the Washington Department of Fish and Wildlife, as needed, to prevent them from becoming endangered, threatened, or sensitive. Long-billed curlews arrive on the YTC from mid to late March, nesting in open annual or perennial grasslands comprising Sandberg's bluegrass, cheatgrass, and bluebunch wheatgrass (Hand et al. 1994; Hand and Cadwell 1994). Brood rearing occurs in shrublands adjacent to nest sites. Curlews depart the YTC by late June or early July. Nesting and brood rearing have been documented in the Borden Springs area near the build alternative sites (Hand et al. 1994; Hand and Cadwell 1994). The Alternative 2 site is located along the northern perimeter the Borden Springs nesting area, while the Alternative 3 site lies 2.2 miles from this area (Figure 3-4).

3.4.2.10 Mammals

Four mammal species that are state candidates for listing occur on YTC: black-tailed and white-tailed jackrabbits, Merriam's shrew, Townsend's ground squirrel, and Townsend's big-eared bat. All of these species occur in sagebrush and/or grassland habitats where they occupy burrows or shallow depressions (black-tailed jackrabbit). The Townsend's big-eared bat, also a state candidate, has not been documented on YTC. However, the species could forage in scrub-shrub habitats if suitable roosting sites (caves, mines, abandoned buildings) are nearby.

3.4.2.11 Reptiles and Amphibians

Columbia spotted frogs (state candidate) are associated with a variety of aquatic habitats, including still water habitats, streams, and creeks (Hallock and McAllister 2005a). Breeding occurs predominantly in unshaded areas in the flooded margins of wetlands, ponds, and lakes. Small, scattered populations occur throughout the Columbia Basin. The Columbia spotted frog has been found on YTC in the Lmuma Creek basin, thoughnot within the action area.

The northern leopard frog (federal species of concern, state endangered) requires deep permanent water for overwintering, in proximity to seasonal ponds for breeding (Washington Department of Fish and Wildlife 2012). During summer, leopard frogs often occupy a variety of habitats, including grassy woodlands and hay fields. Although once widely scattered across eastern Washington, recent surveys have detected the species only at Potholes Reservoir south of Moses Lake in Grant County (Washington Department of Fish and Wildlife 2012).

Sagebrush lizards and striped whipsnakes, both candidates for state listing, typically inhabit sagebrush, cliff, and talus slope habitats (U.S. Army 2002). Surveys of potentially suitable habitat for striped whipsnakes over 4 years have failed to detect this species at YTC (U.S. Army 2010b). All documented occurrences of this species in Washington have been below 460 meters in elevation (Hallock 2006). Sharptail snakes are usually found in or under decaying woody debris or rocks in seasonally moist habitats, typically near lakes, ponds, creeks, or rivers (Hallock and McAllister 2005b).

3.4.3 Invertebrates

A single special status invertebrate is found near YTC. The mardon skipper (*Polites mardon*) is a Federal candidate species and has a state status of endangered.

The mardon skipper (*Polites mardon*) is a tawny-orange butterfly with a stout, hairy body that is less than 1 inch wide (U.S. Fish and Wildlife Service 2005). It spends its entire life cycle in one location (i.e., is nonmigratory). The species is known from four widely separated locations in the Pacific Northwest, and is strongly associated with early seral, semimesic grasslands (U.S. Fish and Wildlife Service 2012b). Habitat requirements include food resources for adults (flower nectar), larval host plants (grasses and sedges), and environmental and structural conditions that support successful reproduction and survival. Suitable habitat for the mardon skipper is not known to occur on YTC. Closest known populations are found to the west in open grasslands and small montane meadows of the southern Washington Cascades (U.S. Fish and Wildlife Service 2012b).

3.4.4 Plants

Federal and state plant species of concern that may occur on YTC are presented in Table 3-3. Included are species not known to occur on the installation, but for which suitable habitat may be present. Special status plant species have been designated as such because their populations are declining or their habitat is threatened. No plant species that are listed under the ESA (i.e., Ute ladies'-tresses, Umtanum desert buckwheat), or are candidates for ESA listing (i.e., northern wormwood) are known to occur on YTC, although suitable habitat may exist on the installation. Sensitive plants documented on or near the Alternative 2 site include Columbia milk-vetch and bristle-flowered collomia; sensitive plants found near the Alternative 3 site include Columbia milk-vetch and snowball cactus (Figure 3-4).Fort Lewis Regulation 420–5 (U.S. Army 2004a) provides protective measures for populations of sensitive plant species that have the potential to be damaged by military training activities on YTC. Designated populations of Columbia milk-vetch, dwarf evening-primrose, Hoover's tauschia, Kalm's lobelia, and white eatonella are protected through Seibert (Siber) staking.

Special status plants documented near the build alternative sites, or that occur within shrub-steppe habitat such as that found at the alternative sites, are describe in the following sections.

3.4.4.1 Bristle-flowered Collomia

Bristle-flowered collomia (state sensitive) is a winter annual known from Kittitas and Yakima Counties in the Columbia Basin physiographic province (Washington Natural Heritage Program 2012a). This species is endemic to Oregon and Washington, with all known occurrences in Washington being found on 58 acres of YTC (JBLM 2012). This species has been found in dry, open habitats east of the Cascade Mountains specifically on talus, rock outcrops and lithosols. Vegetation in these habitats is generally sparse and species diversity is usually low. The density and size of populations varies widely from year to year, presumably due to differences in yearly weather patterns. On YTC, populations of bristle-flowered collomia occur in the eastern portion of the installation. The species has been documented in a small area 0.5 miles to the northeast of site 3 and a small area that is 1.7 miles northeast of site 1. Neither site provides suitable habitat for this species.

3.4.4.2 Columbia Milk-vetch

Columbia milk-vetch (federal species of concern, state sensitive) is the most abundant sensitive plant found on YTC. It occurs only in a 125-square-mile area along the west side of the Columbia River near Priest Rapids, in Kittitas, Yakima, and Benton Counties (JBLM 2012; Mastrogiuseppe and Gill 1988; Washington Natural Heritage Program 2012b). It is found on approximately 6800 acres of YTC. Columbia milk-vetch is found in sagebrush habitat at elevations from 425 to 1,300 feet. It grows on a variety of substrates, from water-washed cobbles and gravels near the Columbia River to deep sandy-loam soils on moderate slopes and in valleys. On YTC, this species has been found at more than 16 locations (U.S. Army 2004a). Most of these occurrences are on the eastern portion of the installation, within several miles of the Columbia River

As the Alternative 2 site overlaps with historic Columbia milk-vetch habitat, a survey was conducted of the location in April 2013. The survey found the species in five locations within the vicinity of the proposed project area. A total of least 1200 individuals were documented at these sites which encompassed roughly 60 acres.

Columbia milk-vetch is tolerant of mild disturbances, such as light grazing, moderate amounts of foot-traffic, and limited off-road vehicle traffic (U.S. Army 2001). However, frequent disturbances to the soil can adversely affect this species by facilitating the invasion of nonnative annuals, such as cheatgrass, which prevent the recolonization of the milk-vetch (Mastrogiuseppe and Gill 1988).

3.4.4.3 Hoover's Desert-parsley

Hoover's desert-parsley is endemic to Washington and is limited to the Columbia Basin, occurring only in Yakima County and adjacent portions of Benton, Grant, and Kittitas Counties (Washington Natural Heritage Program 2012c). The species is found on loose talus, within the big sagebrush/bluebunch wheatgrass vegetation zone, typically on east- to north-facing slopes. It is also found in drainage channels of open ridgetops and talus on south to southwest facing slopes. Hoover's desert-parsley occurs at elevations from 600 to 2,300 feet, and has few competitors because of the harsh, rocky, and often unstable environment in which it occurs. On YTC, the species occurs in three areas including Selah Canyon and two areas within 0.5 mile of the Columbia River that are outside designated maneuver corridors (Sentinel Gap and Umptanum Ridge)(Downs et al. 1992). Neither site provides potential habitat for this species due to unsuitable soils.

3.4.4.4 Hoover's Tauschia

A regional endemic of the Columbia Basin, Hoover's tauschia (federal species of concern, state threatened) occurs from Toppenish Ridge in south central Yakima County, northward to the southeastern foothills of the Wenatchee Mountains in east-central Kittitas County (Washington Natural Heritage Program 2012d). The species is found on basalt lithosols in sagebrush habitats, at elevations of 1,400 to 3,000 feet. On YTC, Hoover's tauschia occurs on 523 acres, including the south slopes of Yakima Ridge in Selah Canyon and at several sites in the northern portion of YTC (U.S. Army 2004a). One population of this species is protected on the installation. This species is not historically known to occur within 5 miles of either of the proposed sites and suitable habitat does not exist at either site.

Table 3-3 Special Status Plant Species Found On or Near the Yakima Training Center

Common Name	Scientific Name	Federal Status	Washington State Status	Documented on YTC
Basalt daisy	*Erigeron basalticus*		Threatened	Yes
Beaked cryptantha	*Cryptantha rostellata*		Threatened	Yes
Beaked spike-rush	*Eleocharis rostellata*		Sensitive	Yes
Bristle-flowered collomia	*Collomia macrocalyx*		Sensitive	Yes
Cespitose evening-primrose	*Oenothera caespitosa ssp. caespitosa*		Sensitive	Yes
Columbia milk-vetch	*Astragalus columbianus*	Species of Concern	Sensitive	Yes
Coyote tobacco	*Nicotiana attenuata*		Sensitive	Yes
Dwarf evening-primrose	*Camissonia pygmaea*		Sensitive	Yes
Gray cryptantha	*Cryptantha leucophaea*	Species of Concern	Sensitive	Yes
Hoover's desert-parsley	*Lomatium tuberosum*	Species of Concern	Sensitive	Yes
Hoover's tauschia	*Tauschia hooveri*	Species of Concern	Threatened	Yes
Kalm's lobelia	*Lobelia kalmii*		Endangered	Yes
Miner's candle	*Cryptantha scoparia*		Sensitive	Yes
Narrow-stem cryptantha	*Cryptantha gracilis*		Sensitive	Yes
Northern wormwood	*Artemisia borealis var. wormskioldii*	Candidate	Endangered	No
Nuttall's sandwort	*Minuartia muttallii ssp. fragilis*		Threatened	Yes
Paiute suncup	*Camissonia scapoidea ssp. scapoidea*		Sensitive	Yes
Pauper milk-vetch	*Astragalus misellus var. pauper*		Sensitive	Yes
Snowball cactus	*Pediocactus nigrispinus*		Sensitive	Yes
Suksdorf's monkey-flower	*Mimulus suksdorfii*		Sensitive	Yes
Umtanum desert buckwheat	*Eriogonum codium*	Threatened	Endangered	No
Ute ladies'-tresses	*Spiranthes diluvalis*	Threatened	Endangered	No
White eatonella	*Eatonella nivea*		Threatened	Yes

Sources: U.S. Army 2002, 2004, 2010; Washington Natural Heritage Program 2008; U.S. Fish and Wildlife Service 2012a

3.4.4.5 Snowball Cactus

Snowball cactus (state sensitive) is the only pincushion cactus found in Washington, documented to occur in Yakima, Kittitas, Chelan, Douglas, and Grant counties (Washington Natural Heritage Program 2012e). This species can be found in Washington, Oregon, Idaho, and Nevada. Although it can be locally abundant, it is limited to fewer than 20 sites in Washington. The name *Pediocactus simpsoni*i var. *robustior* is often misapplied to this species (Weinmann et al. 2012). This species may be found in thin, rocky soil on ridge tops, desert valleys and low mountains, at elevations from 1,000 to 4,000 feet. Snowball cactus primarily occurs in the north-central portion of the YTC. Snowball cactus have been found on approximately 247 acres of YTC, of which one area is 0.3 miles to the northeast of Site 1 and 2.5 miles to the northwest of Site 3. Neither site provides potential habitat due to unsuitable soils.

3.4.4.6 White Eatonella

White eatonella is an ephemeral annual that occurs on poorly developed soils in dry, sandy or volcanic desert areas between 2,500 and 6,230 feet in elevation (Washington Natural Heritage Program 2012f). Sites that support the taxon are rather sparsely vegetated, usually with no apparent cryptogram layer. Known Washington occurrences are from Grant and Kittitas Counties in fine, pea-sized gravel that is derived from basalt. The species is also found in southeast Oregon and western Nevada. Approximately 3.9 acres of YTC are occupied by this species (JBLM 2012). Designated sensitive plant sites are protected through siber staking. One population of the species has been found approximately 1 mile east of Alternative 2 (2.9 miles south east of Alternative 3). Both sites are found at unsuitable elevations for this species.

3.5 Historic and Cultural Resources

For the purposes of this EA, historic and cultural resources include historic properties, cultural items, archaeological resources, and sacred sites. Definitions used in the analysis for this EA include those provided by the National Historic Preservation Act for historic properties, Native American Graves and Repatriation Act for cultural items, Archaeological Resources Protection Act for archaeological resources, and Executive Order 13007 for sacred sites. Access to sacred sites is afforded under the American Indian Religious Freedom Act and collections and associated records as defined in 36 CFR 79. The Army, via the Corps, will comply with the provisions of the DoD Interactions with Federally Recognized Tribes (DoDI 4710.02) and will involve concerned tribal governments early in the planning process for construction and operation of the proposed action.

YTC contains numerous archaeological, historic, and traditional Native American cultural resources with importance to neighboring Native American tribes, such as the Yakama Nation and Wanapum Band. Native American traditional cultural resources on YTC are places and resources that are important in the ongoing traditional or spiritual practices of the Yakama Nation and Wanapum Band, and other area tribes (Joint Base Lewis-McChord 2010). Such resources include specific plant and animal habitats, natural features of the landscape, and places where past important rituals were carried out that continue to be used for such purposes today. The resources may not have specific geographic boundaries that can be drawn on a map, and may be known only to tribal members who wish to keep their locations and nature of use confidential.

Approximately 1,800 archaeological sites have been inventoried, the vast majority of which date to the prehistoric period. Historic sites are related to homesteading, agriculture, livestock raising, transportation, mining, and military activity. Prehistoric archaeological resources are generally found near watercourses, at the bases of cliffs, and in upland areas where valued plants or exposures of stone for tool making were located. Prehistoric sites most commonly consist of concentrations of stone tool-making debris; seasonal camps or habitation sites are the second most common type of prehistoric site.

YTC is part of lands ceded by the Yakama Nation as part of the Treaty of 1855. The Yakamas reserve the right to conduct traditional subsistence and ceremonial practices at all "usual and accustomed places" within these ceded lands. Protecting historic and cultural resources includes protecting the site itself, access to such sites, and the site's viewshed (including view of and view from the site). Without all three of these components intact the resource will have lost its intrinsic historical or cultural value.

Consultation will occur between YTC and the Washington State Historic Preservation Office (SHPO) to determine whether or not historic properties will be affected by the proposed project. YTC will also coordinate with the Yakama Nation and Wanapum Band to determine if the proposed action will affect these tribes' cultural and religious holdings on or near YTC. The build alternative sites and associated areas have been included in all, or in part of, three separate archaeological inventory surveys (Hartmann and Lindemann 1979; Boreson 1998; Carter and deBoer 2002).

No significant historic or prehistoric properties were revealed by these surveys or were observed the build alternative sites or area of potential effects during a site reconnaissance survey performed by YTC cultural resources staff.

3.6 Air Quality and Noise

3.6.1 Air Quality

EPA regulates the nation's air emissions through the Clean Air Act, as amended in 1990. The agency has divided the country into ten regions and has established standards, the National Ambient Air Quality Standards (NAAQS), regarding the amount of criteria pollutants that can be emitted into the air by stationary sources. The criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen oxide (NO), ozone, particulate matter (PM10/PM2.5), and sulfur dioxide (SO_2). These standards form a baseline from which to gage air pollutant emissions across the country in order to gain an understanding of current air quality and improve on it. YTC is under the authority of the Washington State Department of Ecology (Ecology), and air quality regulations are specifically carried out by the Yakima Regional Clean Air Agency (YRCAA) for Yakima County and the Ecology-Central Regional Office for Kittitas County.

EPA has designated 13 areas in Washington State as nonattainment areas (areas with air quality that does not meet the NAAQS). After air monitoring showed that a nonattainment area has consistently been meeting the NAAQS, EPA redesignated the areas as "maintenance areas." Portions of Yakima County are designated maintenance areas for particulate matter and carbon monoxide. The particulate matter maintenance area extends slightly into the YTC on the western portion of the Cantonment Area. Both build alternative sites are in attainment for all criteria pollutants.

3.6.2 Noise

Aircraft noise is measured so that its effects on people can be predicted and disclosed to the public, and so that the metrics can be used for noise/land use planning. The Noise Control Act of 1972 (Public Law 92-574) directs federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. Sound quality criteria disseminated by EPA, the U.S. Department of Housing and Urban Development (HUD), and DoD have identified noise levels to protect public health and welfare with an adequate margin of safety. Day-night noise levels below 65 decibels (dB) are normally considered acceptable in suitable living environments, and Washington State environmental noise regulations allow projects to cause 1-hour average nighttime community noise levels up to 50 dBA at residences. However, both build alternative sites are located in a remote part of YTC, many miles from any human residences. Further, this area is routinely used for live fire exercises and field maneuvering, which generates noise levels far in excess of those anticipated as part of this proposed action. Maximum Shadow UAS noise levels at various distances are shown in Table 3-4.

Table 3-4 Shadow Unmanned Aircraft System Estimated One Second Maximum Noise Levels

Distance (ft)	Noise (dBA)	Comparison
50	102.2	Power lawn mower
500	81.4	Garbage disposal
1,000	74.6	Freeway at 50 ft
2,500	64.2	A typical office
6,300	49.8	Conversation at home
10,000	39.6	A typical library
12,500	33.5	Quiet rural area

Source: United States Army. 2004b. Industrial Noise Control, Inc. 2010.

3.7 Land Use and Aesthetics

3.7.1 Land Use

The project area and vicinity, including the area over which Shadow UAS operations would occur under both build alternatives is under the jurisdiction of YTC for use as a military training and maneuvering area including use for live fire exercises.

3.7.2 Aesthetics

Both build alternative sites and the surrounding vicinity for several miles are primarily undeveloped land dominated by sagebrush, bitterbrush, and bunchgrass with the exception of several two lane gravel roads (Figure 3-5).

3.8 Recreation

YTC is open to the public for a variety of recreational activities including hunting, bird watching, mountain biking, horseback riding, and hiking. In addition, a 22-mile stretch of the John Wayne Trail—now known as Iron Horse State Park but once part of the path of the Chicago-Milwaukee-St. Paul-Pacific Railroad—traverses the northern portion of YTC and is owned and managed by YTC. The John Wayne Trail offers mountain biking, horseback riding, and hiking opportunities to visitors.

3.9 Hazardous and Toxic Materials

For the purpose of this analysis, the terms hazardous waste, hazardous materials, and toxic substances include those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), or Washington State's Model Toxics Control Act (MTCA). In general, these materials include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, might present substantial danger to public health or welfare of the environment if released.

Hazardous materials and wastes are managed at YTC according to federal, state, and local laws and regulations as directed by AR 200-1. In addition, the National Guard has a set of rules and regulations governing its hazardous materials and manages their own program separately from YTC's. Re-fueling operations could pose possible waste generation and management considerations. Typically, waste generated at a training range would become a YTC responsibility.

During a site visit made by the Corps and the preparer of this EA in September 2012, there was no visual or anecdotal evidence of areas filled or graded by anything other than natural means, or mounds or depressions suggesting burial of trash or other wastes at either of the build alternative sites. No hazardous substances or petroleum products were observed being stored at either site during the visit.

3.10 Global Climate Change

Internal combustion engines produce a variety of gasses including water vapor, carbon dioxide, methane, and nitrous oxide—the greenhouse gasses (GHGs) considered to be the main contributors to global climate change. Water vapor and carbon dioxide are also produced through transpiration and respiration of plants, however, at much lower rates as compared to internal combustion engines, particularly in dry climates such as at YTC. Plants also act as carbon sinks since they take in carbon dioxide during photosynthesis and release oxygen, holding the carbon in the cells of the plant itself. Since no development, sporadic human activity involving the operation of vehicles, and sparse vegetation is present at both of the build alternative sites, emissions contributing to global climate change are extremely low. The sparse, slow-growing vegetation present in the dry climate of the build alternative sites and YTC provides relatively low rates of carbon sequestration (incorporation of atmospheric carbon into plant biomass).

View of Alternative 2.

View of Alternative 3.

XXXXX-XX

Figure 3-5. Build Alternative Sites and the Surrounding Vicinity

Yakima Training Center

The federal Council for Environmental Quality (CEQ) issued draft guidance requiring all NEPA documents to evaluate the impacts from a project's GHG emissions, if the direct plus indirect emissions exceed a threshold of 25,000 metric tonnes per year (Council for Environmental Quality 2010). In 2013, YTC produced approximately 1,600 metric tonnes of GHG (Nissen pers. comm.), far below the threshold.

3.11 Local Economy and Socioeconomics

There are no developments, residents, or economic activities occurring in either of the build alternative sites.

3.12 Environmental Justice Communities

Environmental justice is mandated by Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, and was signed into law on February 11, 1994. The Executive Order is designed to focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities. Environmental justice analyses are performed to identify the disproportionate placement of high and adverse environmental or health impacts from proposed Federal actions on minority or low-income populations and to identify alternatives that could mitigate these impacts. There are no residents who live in either of the build alternative sites.

3.13 Indian Treaty Rights

The Yakama Nation signed a treaty with the U.S. government on the treaty ground at Camp Stevens in the Walla Walla Valley on June 9, 1855. The treaty was ratified on March 8, 1859, and proclaimed on April 18, 1859. In this treaty, the Yakama Nation ceded land it had claimed, approximately 12 million acres (Yakama Nation 2012), including the area now occupied by YTC, reserving less than 10% of its land for permanent settlement. The Yakama Nation also reserved the right to fish, hunt, and gather traditional foods on the ceded area and to continue to fish in its "Usual and Accustomed" fishing areas. Places important to the Yakama Nation may not have specific geographic boundaries that can be drawn on a map, and may be known only to tribal members who wish to keep their locations and natures confidential.

Consultation would occur between YTC, consulting parties such as the Wanapum and Yakama tribes, and the SHPO to determine whether or not historic properties or other cultural resources would be affected in the proposed action's region of influence. YTC would also coordinate with the Yakama Nation and the Wanapum Band to determine if the proposed action would affect places of cultural and religious importance on or near YTC.

3.14 Staging Area Environment

It is anticipated that the staging area for the proposed action would fall within the estimated footprint of the project area or the location of the materials source for both build alternatives, as described in Chapter 2, Proposed Action and Alternatives.

3.15 Materials Source Environment and Transport

Both build alternatives would use local rock from existing borrow sources owned and operated by YTC and transport would occur on existing roads. Rock would likely be drilled and blasted at these locations then crushed and stockpiled on site. A front-end loader would load the rock into dump trucks that would carry the rock to the construction location. This activity would be the same under both build alternatives. The materials source for Alternative 2 would be an existing borrow pit approximately 2 miles east of the alternative site. The materials source for Alternative 3 would be an existing borrow pit roughly 1.5 miles (by road) southwest of the alternative site.

Chapter 4
Environmental Consequences

Environmental consequences are those impacts that affect the environment as a result of the proposed action. Impacts can be direct or indirect and affect the environment over the long term or short term. The intensity of each impact is determined within the context of the affected environment by determining whether or not the impact exceeds significance thresholds established relative to each aspect of the environment analyzed in this chapter. The intensity of each impact is described by the significance ratings defined as follows:

- **No Impact:** No adverse changes to the environment are expected.
- **Insignificant Impact:** The impact would not exceed the threshold of significance and no substantial adverse change in the environment is reasonably anticipated.
- **Significant Impact:** The impact would exceed the threshold of significance and a substantial adverse change in the environment is reasonably anticipated.

The two components of the proposed action analyzed in this chapter for their potential to affect the environment are the construction of a UAS training facility and operation of Shadow UAS vehicles. Construction activities refer to all clearing, grading, materials transport, rock crushing, and paving activities described in the proposed action, while operation activities refer to all UAS training activities.

4.1 Geomorphology and Hydrology

Impacts on geomorphology would be considered significant if the proposed action would result in excessive soil loss through increased erosion (loss beyond a soil's calculated T-value), leading to a scenario where the soil can no longer be maintained as a medium for plant growth.

Impacts on hydrology would be considered significant if the proposed action were to:

- Degrade surface or groundwater resources in a manner that would reduce the existing or potential beneficial uses of the water (WAC 173-201A);
- Be out of compliance with existing or proposed water quality standards or with other regulatory requirements related to protecting or managing water resources; or
- Be out of compliance with the Clean Water Act.

4.1.1 Alternative 1

Construction

Construction activities would not occur under No Action Alternative; therefore, no geomorphological or hydrological impacts would result.

Operation

No new operational activities would take place under this alternative; therefore, no new geomorphological or hydrological impacts would occur.

4.1.2 Alternative 2 and Alternative 3

Construction

Geomorphology

Common impacts on geomorphology from construction activities include soil compaction, disturbance of surface soil horizons, and removal of vegetation. Each of these impacts affects soils by limiting their overall ability to support plant growth, which can lead to areas of barren land that are more exposed and, therefore, more prone to erosion.

Construction activities under either build alternative are similar and would have insignificant impacts on soils. The area of land surface to be disturbed during construction is small (about 6.5 acres), and each site has been previously disturbed by other training activities in the past. High volume, infrequent runoff events typical of YTC can produce high erosion rates. However, considering that both build alternative sites are predominantly level to gently sloped and vegetated, the potential for severe erosion is diminished. Compaction of soils would occur from construction activities within and adjacent to the project area. The negative effects of soil erosion and compaction would be limited by employing appropriate BMPs, such as silt fencing, limiting areas in which large construction equipment can operate, and revegetation of disturbed soils. The soil types present at both build alternative sites have high erodibility indices; however, the amount of soil loss expected from the proposed action is well within these soils' maximum T-value of 2 tons per year (Table 3-1). Revegetation would occur through seeding of Reliable Sandberg's bluegrass (*Poa sandbergii*), Secar Snake River wheatgrass (*Elymus Wawawaiensis*), Goldar Bluebunch wheatgrass (*Pseudoroegenari spicata*), and Canby bluegrass (*Poa canbyi*).

Hydrology

Typical impacts on water resources from construction activities can include increased turbidity due to soil disturbance at the construction site, and subsequent sediment runoff into nearby streams and surface water bodies. Excessive sedimentation can lead to changes in the water chemistry, oxygen content, clarity, and/or temperature. Spills or leaks from construction equipment could also affect water quality if these substances enter waterways.

Construction activities under either build alternative would be similar and would have insignificant impacts on hydrological resources including water quality. Both build alternative sites are characterized by predominantly level terrain, moderate vegetative cover and separation from Hanson Creek. No streams, washes or drainage ways would be filled or disturbed to grade and build the runway and associated parking lot. When considering the small area of land surface to be disturbed during construction (about 6.5 acres), the potential for runoff from either site to adversely affect Hanson Creek is low, although slightly greater for Alternative 2 because it is closer to Hanson Creek (0.26 mile verses 1 mile) and includes more earthwork at each end of the runway. Any impacts that do occur would be minor and insignificant for this resource. BMPs for sediment control, and spill prevention and control (Section4.9, Hazardous and Toxic Materials), would be

implemented to further reduce any negative impacts. Overall, the impacts on hydrology resulting from construction would be minor. Little to no impacts on water availability, quality, and quantity would be expected.

Operation

Geomorphology

Insignificant impacts on soils could occur as a result of UAS operations conducted at either build alternative site. All operations would be conducted on hardened surfaces and service members performing UAS training outside of the airstrip would use existing roads and scheduled training areas. There is potential for an increase in runoff due to the new hardened surfaces, which in turn, could mobilize adjacent soils, resulting in soil loss over time from erosion. Stormwater runoff would be managed via sheet flow dispersion to either side of the airstrip, using grass buffers or filter strips for water quality treatment (AHBL 2013). Any runoff from extreme events would collect in the access road ditches, which would provide additional infiltration capacity before any discharge to the existing gullies. In addition, the majority of both build alternative sites are level to gently sloped, and the surrounding landscape is vegetated, reducing the likelihood that stormwater runoff would be concentrated or that severe erosion would occur. AHBL (2013) has determined that velocity and depth of stormwater runoff is not expected to create any erosion impacts at either alternative site. Based on the amount of soil loss that can be tolerated (T-value) versus the amount of soil that may be lost cumulatively from wind and operational activities (Table 3-1), the threshold of significance would not be breached.

Hydrology

Insignificant impacts on water quality could occur as a result of UAS operations conducted at either build alternative site. A slight increase in runoff may occur due to the increase in hardened surfaces produced by proposed action. This increase in runoff could mobilize sediment surrounding the UAS training facility, as well as petroleum, oil, and lubricants from the new parking lot surfaces. However, the proposed hardened surfaces are less than 1% of the tributary area of the Hanson Creek watershed and would create no measurable difference in the runoff hydrograph of Hanson Creek. The likelihood of this runoff reaching Hanson Creek is low, although slightly greater for Alternative 2 because it is closer to Hanson Creek (0.26 mile verses 1 mile). The runoff accumulated from the new hardened surfaces would be treated via a drainage swale consisting of grass buffers or filter strips, and is expected to infiltrate into the ground before reaching the Hanson Creek drainage. Spills or leaks could occur from UAS refueling operations that could affect water quality. Site-specific BMPs would be implemented to address spill prevention and control measures during UAS operations (Section4.9, Hazardous and Toxic Materials). Consequently, any impacts on hydrology from operations are expected to be minor.

4.2 Vegetation

There is no riparian or wetland vegetation present on or adjacent to either of the build alternative sites. Consequently, there would be no construction impacts on these high-value plant communities, and these communities are not expected to be affected by the operations of unmanned aerial vehicles, as proposed. Since no direct, indirect, or cumulative impacts on riparian or wetland

vegetation would occur under either build alternative, these resource are not analyzed any further in this assessment.

Impacts on vegetation would be considered significant if the proposed action resulted in the long term loss, degradation, and/or measurable reduction in diversity of unique or high-value plant communities.

Unique vegetation communities are defined in this document as those communities with habitat characteristics that are distinct from nearby vegetation communities and that represent a minor fraction of the regional landscape. These communities may be intrinsically rare or have a limited range due to anthropomorphic degradation. High value communities are defined in this document as those vegetation communities with characteristics that are heavily relied upon by a species for reproduction and/or rearing. High value communities may also be vegetative communities that perform important ecological functions (e.g. wetlands have the ability to sequester contaminants resulting in improved water quality).

4.2.1 Alternative 1

Construction

Construction activities would not occur under the No Action Alternative; therefore, no impacts on vegetation communities would result.

Operation

No new operational activities would take place under this alternative; therefore, no new impacts on vegetation communities would occur.

4.2.2 Alternative 2 and Alternative 3

Construction

Construction activities under either build alternative would result in the permanent loss of about 6.5 acres of existing plant communities. Additional temporary impacts could occur on vegetation immediately adjacent to the constructed facilities. Temporary impacts would be limited and addressed through BMPs such as restricting the areas where vegetation removal and operation of equipment could occur, and restoring and revegetating disturbed areas with native vegetation following construction.

Vegetation to be affected by construction of Alternative 2 consists primarily of a sparse big sagebrush/crested wheatgrass/cheatgrass community, a degraded subset of big sagebrush/bunchgrass vegetation that is abundant on the YTC (U.S. Army 2002). Sagebrush dominated communities comprise more than 241,000 acres on the YTC (U.S. Army 2002). Construction activities at this site would have an insignificant impact on vegetation because this community is not considered to be a unique or high-value plant community. Species composition and diversity have been heavily influenced by past disturbance at the site, including its use as a military training site for artillery used in live fire exercises, its revegetation following a fire that burned the site in the early 1980s, and livestock grazing (terminated in 1995). Past disturbance and

revegetation efforts have contributed to a site lacking in native shrub structure and dominated by nonnative herbaceous species.

Vegetation affected by construction of Alternative 3 would be limited to a big sagebrush/spiny hopsage/bluebunch wheatgrass community. Although this plant community (a subset of the sagebrush/bunchgrass community) is not considered to be unique, it can be of high quality if not substantially altered. However, the proposed location for the UAS airstrip is in an area that has reduced cover of older age class sagebrush and other preferred native shrubs, and an abundance of weedy grasses and forbs in the herbaceous layer, (e.g. cheatgrass, Russian thistle, tall tumble mustard), a consequence of disturbance from training exercises.. Seeding with bluegrass and wheatgrass would also be completed to stabilize disturbed soils and create a grass buffer around the airstrip to act as a water quality filter. Seeding will create a change in plant community within the buffer area. Considering these factors along with the small area to be permanently removed (about 6.5 acres), construction activities under Alternative 2 or 3 would also have an insignificant impact on the overall vegetation community.

Operations

There would be no direct or indirect impacts on vegetation associated with the operation of aerial vehicles under either alternative. The Shadow UAS training facility would provide a hardened airstrip and a gravel parking lot that would encompass all training proposed at either site.

4.3 Fish and Wildlife

This section addresses impacts on fish and wildlife that would be expected to occur with implementation of the proposed action. A number of fish and wildlife species that may occur on YTC are subject to special management action because of their current or potential status under the ESA, the Bald and Golden Eagle Protection Act, the MBTA, or Washington State designations. An evaluation of impacts on these special status species is presented in Section 4.4, Threatened and Endangered Species.

Impacts on fish and wildlife would be considered significant if the proposed action resulted in:

- A long-term reduction in the quantity or quality of fish and wildlife habitat; or
- Injury or mortality to common fish and wildlife species, such that there would be an adverse population level effect.

4.3.1 Alternative 1

Construction

Construction activities would not occur under the No Action Alternative; therefore, no impact on fish and wildlife would result.

Operation

No new operational activities would take place under this alternative; therefore, no new impacts on fish and wildlife would occur.

4.3.2 Alternative 2 and Alternative 3

Construction

Fish

Construction activities under either alternative would be similar, and are expected to have no impact on fish resources. There is no suitable habitat for fish in either build alternative site. Both build alternatives lie in upland areas on relatively level to gently sloping terrain within the Hanson Creek watershed, which drains to the Columbia River. The lower portion of Hanson Creek is perennial and supports fish populations. However, there is no continuous flow in the creek reach adjacent to these two alternative sites and the lower perennial reach, or the Columbia River off the YTC, where fish may be present. Surface runoff from each site could travel within ephemeral washes and channels toward Hanson Creek. However, the likelihood that construction would adversely affect water quality in Hanson Creek, which in turn could affect fish in the lower perennial reach, is low (Section 4.1, Geomorphology and Hydrology). Furthermore, BMPs addressing sediment control, and spill prevention and control (Section4.9, Hazardous and Toxic Materials), would be in place to limit potential water quality impacts.

Wildlife

Construction-related impacts on wildlife include the potential for injury or mortality during land clearing and grading (direct impact), disturbance or displacement of individuals resulting from noise and human presence (indirect impact), and the permanent removal or alteration of habitat (direct impact). Direct mortality or injury could take place during land clearing and earthwork. This is often an unavoidable impact for those species and individuals with small home ranges or a reduced capacity to flee, such as some small mammals, amphibians and reptiles, particularly the fossorial (burrowing) species. If land clearing takes place during the spring and early summer when most birds nest, eggs and nestlings could be lost, or nests could be abandoned. More mobile species (e.g., fledged and adult birds, medium and large mammals) would be displaced to adjacent habitat during land clearing. These displaced species would compete with other wildlife for finite resources which could result in increased stress, declines in reproductive success, or greater susceptibility to predation. Increased levels of noise and human presence associated with construction could also temporarily displace wildlife from nearby habitats.

Construction activities under either alternative would be similar, and are expected to have an insignificant impact on wildlife resources. Construction impacts on vegetation resources, described in Section 4.2, Vegetation, would result in the permanent loss of a small amount of upland habitat (about 6.5 acres) used by shrub-steppe-associated wildlife. However, existing wildlife habitat quality at both build alternative sites is suboptimal, due to past disturbances that have reduced the native shrub component and contributed to an abundance of weedy grasses and forbs in the herbaceous layer. These construction-associated impacts are not expected to affect population levels of wildlife common to shrub-steppe habitat because these species are generally abundant and well distributed across the YTC, and the construction footprint is very small in comparison to available habitat across the installation (sagebrush dominated communities comprise more than 241,000 acres on the YTC [U.S. Army 2002]). Indirect impacts from disturbance and displacement are considered minor due to the short duration of the construction activities. These disturbance impacts

could occur at the selected alternative site as well as the existing borrow site where construction aggregate would be sourced.

Operation

Fish

No impacts on fish resources are expected to occur as a result of UAS operations at either alternative site. Both build alternative sites lie in upland areas on predominately level to gently sloping terrain that lack suitable habitat for fish. Surface runoff from the build alternative sites is not expected to adversely affect water quality in lower Hanson Creek, where perennial flow and fish populations are present (Section 4.1, Geomorphology and Hydrology). Stormwater runoff would be managed via sheet flow dispersion to either side of the airstrip, using grass buffers or filter strips for water quality treatment (AHBL 2013). Any runoff from extreme events would collect in the access road ditches, which would provide additional infiltration capacity before any discharge to the existing gullies. Site-specific BMPs addressing spill prevention and control (Section4.9, Hazardous and Toxic Materials) would be in place to limit potential impacts on water quality.

Wildlife

Impacts from aircraft on wildlife include acoustic and visual impacts. Impacts from noise can include physical effects, such as hearing damage or increased stress. Behavioral effects from both noise and visual disturbance include such things as retreating from favorable habitat or reduction of time spent feeding (Blickley et al. 2010).

Noise studies have shown considerable variability in noise-induced hearing loss, even in a single species in the laboratory (Hamernik et al. 1980 in Larkin 1996). Risk of hearing damage from military training on wildlife is probably greater from exposure to nearby blast noise from bombs and large weapons than from long-lasting exposure to continuous noise (Larkin 1996). Potential direct physiological effects of noise on wildlife are difficult to measure and effects such as decreased reproductive success have been inconclusive.

Behavioral responses to noise on mammals can vary widely. Klein (1973 in Larkin 1996) reviewed the reactions of several northern mammals to aircrafts. Moose showed a much greater indifference to aircraft than caribou both in the open and in partial cover. Grizzly bears reacted very strongly, often starting to run while the aircraft was still some distance away. Wolves appeared least disturbed by low-flying aircraft despite the fact that they were legally hunted from aircraft only four years earlier.

Bird species also elicit varying responses to noise. Wilson et al. (1991 in Larkin 1996) found that aircraft caused Adelie penguin to panic at distances greater than 0.5 miles and 3 days exposure to a helicopter inhibited birds from returning to their nests. Alternatively, Awbrey and Bowles (1990 in Larson 1996) found that raptors did not leave their nests for more than 10 minutes after flushing in response to an overflight. Whereas some medium-sized raptors flee from approaching helicopters (Larkin 1996), others refuse to be flushed from the nest (Poole 1989), and larger ones sometimes attack helicopters, presumably in defense against a flying intruder (Mooney 1986, Watson 1993). Blickley et al. (2010) found that sage-grouse males avoided leks near anthropogenic noise, with discontinuous noise causing the greatest avoidance. However, the noise used was road noise which the birds may have also associated with the dangers of a roadway.

Changes in home range size or shape in response to noise generation can be difficult to quantify. Teasing out the changes to home ranges from any one particular stimulus (such as military training) can be very difficult given the wide variety of stimuli that determine an individual's home range (such as food availability, competition, etc.). For example, although Gese et al. (1989) found that coyotes' home ranges were affected by military training activity, they were unable to quantify the amount of change in light of the wide variety of overall home range changes seen (expansion, retraction, abandonment). Apparent abnormalities in use of habitat by sage-grouse were also found to be difficult to substantiate without long-term comparison data in similar conditions (Eberhardt and Hofmann 1991 in Larkin 1996). Such difficulties are amplified when dealing with large, mobile animals (as in Andersen, et al. 1990).

Decreased responsiveness after repeated noises is frequently observed and usually attributed to habituation. Habituation is well-known throughout the animal kingdom (Peeke and Petrinovich 1984 in Larkin 1996). Military training situations in which similar noise-producing exercises are carried out in the same habitat at frequent intervals may affect local wildlife less than infrequent or less-predictable activities (Larkin 1996).

Seasons and the reproductive cycle also affect noise related behavioral responses in wildlife. Field experiments by Platt (1977) found that Gyrfalcons flee from helicopter overflights much more readily when nesting than during winter, although this is potentially due to the energy cost of flight during the extreme Yukon winter. For red-tailed Hawks, Andersen et al. (1989) found diminished tendency to flee from a helicopter at later stages as opposed to earlier in the nesting cycle. Alaskan caribou also showed some seasonal differences to overflights (Klein 1973 in Larkin 1996), with decreased responses in summer, potentially due to "preoccupation of the animals with [biting] insects." Similarly, desert bighorn sheep reacted to overflights by recreational helicopters differently in different seasons (Stockwell and Bateman 1987, Stockwell, et al. 1991).

Impacts from the operation of Shadow aerial vehicles would include disturbance and possibly displacement of wildlife from habitats adjacent to the UAS airstrip during training events. High-decibel noise of short duration would be generated on and around the airstrip by the aerial vehicles during takeoffs and landings. Each takeoff or landing lasts for less than 20 minutes. These vehicles are expected to ascend and descend in a radial fashion within an approximate 2-kilometer zone around the airstrip. Consequently, wildlife residing in and around this 2-kilometer zone would be periodically subjected to high-decibel, short-duration noise events during takeoffs and landings, as well as disturbance from support personnel at the airstrip.

With the exception of takeoffs and landings, little wildlife disturbance is anticipated by the flight of aerial vehicles given the altitude at which the vehicles operate. The normal vertical range of operation for the Shadow UAS is from 3,000 feet above ground level to 15,000 feet above mean sea level, with a standard operational altitude for training of 6,000 feet for night operations and 8,000 feet for day operations. These operating ranges are above the typical nonmigratory flight altitude for most birds (below 500 feet). During migration, some shorebirds may reach altitudes of 13,000 feet, although most birds fly below 6,000 feet (Smithsonian Migratory Bird Center 2012). Although there is potential for wildlife-aerial vehicles collisions, risk is thought to be minimal due to the small size of unmanned aerial vehicles, the elevations used for flight, and a lack of reported avian collisions from UAS operations at the Selah Airstrip in the southwestern portion of the YTC (Washington Army National Guard 2012). Collision risk would also be greatest during takeoffs and landings when the aerial vehicle is at lower altitudes and within the nonmigratory flight altitude of most birds. The noise generated by these vehicles during takeoffs and landings may act to forewarn and displace

some birds from the area around the airstrip, minimizing the potential for collisions. Collision risk could increase during periods of bird migration when many species fly at higher altitudes.

Operational activities under either alternative would be similar, and are expected to have an insignificant impact on wildlife resources. Responses of animals to overflights vary widely by species and by season. Wildlife common to the predominant shrub-steppe habitat found around both build alternative sites would be subject to periodic disturbances due to increased human presence and noise (predominantly during takeoff and landings) that could temporarily displace wildlife into nearby areas. Wildlife populations at both of the build alternative sites are already subjected to noise and disturbance from live fire exercises, training maneuvers, and other military field exercises that generate periodic noise and disturbance levels at or in excess of those anticipated under the proposed action. With the initial use of the airstrip, wildlife could show more effects. The continued use of the new airstrip would be expected to habituate local wildlife such that impacts would be diminished over time. A low bird-aerial vehicle collision risk would exist during takeoffs and landings, and during overflights when training exercises coincide with seasonal bird migrations. Nevertheless, this potential effect is not expected to adversely affect population levels of wildlife common to shrub-steppe habitat because the UAS training events and their associated disturbances are of short duration(during take-off and landings only), the area of disturbance impact (a 2-kilometer zone around the airstrip) is very small in comparison to available shrub-steppe habitat across the installation (sagebrush dominated communities comprise more than 241,000 acres on the YTC [U.S. Army 2002]),and wildlife common to shrub-steppe are generally abundant and well distributed across the YTC.

4.4 Threatened and Endangered Species

A number of fish, wildlife, and plant species occur on YTC that are subject to special management action because of their current or potential status under the ESA, the Bald and Golden Eagle Protection Act, the MBTA, or Washington State designations. Impacts on special status fish, wildlife, and plants would be considered significant if the proposed action resulted in:

- Mortality that would result in “take” under the ESA;
- A reduction in population, habitat, or viability of a federal or state species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing; or
- Loss of federally designated critical habitat, or nesting habitat critical to birds under the MBTA.

4.4.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no impacts on special status fish, wildlife or plants would result.

Operation

No new operational activities would take place under this alternative; therefore, no new impacts on special status fish, wildlife or plants would occur.

4.4.2 Alternative 2 and Alternative 3

Construction

Listed Fish Species

Construction activities under either alternative would be similar, and would have no direct or indirect impacts on federally listed Upper Columbia spring Chinook salmon, Upper Columbia steelhead trout, Mid-Columbia steelhead trout, or bull trout. None of these species are known to use rivers and streams on YTC. Critical habitat has been designated in the vicinity of YTC for these salmonids, but YTC is excluded from the designation. Both build alternative sites lie in upland areas on predominantly level to gently sloping terrain within the Hanson Creek watershed, which drains to the Columbia River. The lower portion of Hanson Creek is perennial; however, there is no continuous flow in the creek reach adjacent to the two build alternative sites and the lower perennial reach, or the Columbia River off the installation where these listed species may be present. The likelihood that construction would adversely affect water quality in Hanson Creek, which in turn could affect fish in the Columbia River, is low given the distance to the Columbia River (3 miles), low gradients, and application of construction-related BMPs to address stormwater runoff (Section 4.1, Geomorphology and Hydrology). BMPs addressing sediment control, and spill prevention and control (Section4.9, Hazardous Toxic Materials), would be in place to limit potential water quality impacts.

Listed Wildlife Species

Construction activities would be similar under either alternative, and would have no impacts on federally listed wildlife species. No federally listed wildlife or their habitats are known or suspected to occur on YTC. The western DPS of the yellow-billed cuckoo was recently proposed for listing under the ESA (U.S. Fish and Wildlife Service 2013b). This neotropical migrant breeds in riparian woodlands along rivers and streams. The species has not been observed on YTC, nor have there been any recent sightings near the installation. It is likely extirpated as a breeder in Washington; vagrant birds are very rarely seen in the state. No riparian habitat that could support this species would be impacted by either build alternative.

Greater Sage-grouse

The greater sage-grouse is a Washington State threatened species and a federal candidate species under the ESA. USFWS (2010a, 2013a) recently determined that listing the greater sage-grouse as threatened or endangered is warranted, but has delayed developing a proposed rule to list the species because of higher priority listing actions. Pursuant to the *Listing Work Plan Stipulated Settlement Agreement with Wild Earth Guardians* (Case 1:10-mc-00377-EGS Document 31-1, filed May 10, 2011), USFWS shall either propose to list the greater sage-grouse or reach a not-warranted finding no later than the end of Fiscal Year 2015.

Construction activities would be similar for both build alternatives, and are expected to have insignificant impacts on greater sage-grouse. One sage-grouse lek (communal mating ground) is known from the general vicinity of the build alternative sites. The Borden Lek is located 1.14 miles from Alternative 2 and 3.37 miles from Alternative 3 (Figure 3-4). However, annual monitoring has not detected any activity at the lek since 2002, and it is now considered to be historic due to long-term inactivity. The closest active leks to the build alternative sites are more than 10 miles away.

The historic nature of the Borden lek and the distance to active leks suggest that the sage-grouse population in the vicinity of the build alternative sites is small. Nesting and brood-rearing generally occur in relatively close proximity to leks (within 5 miles) when suitable habitat exists. Construction impacts would result in a small permanent loss (about 6.5 acres) of sparse big sagebrush/crested wheatgrass/cheatgrass habitat under Alternative 2, and big sagebrush/spiny hopsage/bluebunch wheatgrass under Alternative 3. Both sites have experienced a substantial loss in cover of big sagebrush and an increase in weedy, nonnative grasses and forbs, reducing their value as nesting and brood-rearing habitat for sage-grouse. Noise and human presence associated with construction could disturb sage-grouse if birds reside near the sites for Alternatives 2 and 3, or the existing borrow sites where construction aggregate would be acquired, but these indirect impacts are considered minor because of the short duration of construction. These small losses of low-quality sage-grouse habitat and limited disturbance impacts would not adversely affect sage-grouse populations or contribute toward endangerment or the need for federal listing.

Bald Eagle

Construction activities would be similar under both build alternatives, and would have no impact on the bald eagle. Three bald eagle roost sites occur along Hanson Creek, ranging from about 1.2 to 4.5 miles from the build alternative sites (Figure 3-4). These roost sites are used by bald eagles during the winter months (November to April). Construction of the airstrip and parking lot is expected to be completed outside of the bald eagle winter roost period.

Migratory Birds

Migratory bird species associated with shrub-steppe habitat may occur on and around both alternative sites. As many as 21 migratory bird species could nest at the build alternative sites (Appendix B). Direct and indirect construction impacts on migratory birds and their habitat would be similar to those discussed in Section 4.3.2, Fish and Wildlife. Construction-related impacts could include nest destruction and mortality of eggs and young if land clearing and grading occurs during the spring/early summer nesting season(direct impact); disturbance or displacement of individuals due to noise and human presence (indirect impact); and the permanent removal or alteration of habitat (direct impact).

Construction activities would be similar under either build alternative, and are expected to have an insignificant impact on migratory birds. An analysis of the potential impacts on each of the 21 migratory bird species that could nest on the alternative sites is presented in Appendix B, Table 2. The potential loss or unintentional take of active nests for these species would be minimal, and would not significantly affect regional population levels. Construction would result in the permanent loss of a small amount of shrub-steppe habitat (about 6.5 acres), habitat that is suboptimal at both alternative sites due to past disturbances that have reduced the native shrub cover and increased the abundance of weedy grasses and forbs (Section 4.2.2, Vegetation). Indirect impacts from disturbance and displacement would be minor because of the short duration of construction activities. Impacts on long-billed curlew would likely be greater under Alternative 2 due to the alternative's proximity to known curlew nesting and brood rearing areas. These construction-associated impacts are not expected to affect critical nesting habitat for migratory birds, or adversely affect their populations such that a trend toward endangerment or the need for federal listing would result. Shrub-steppe habitat used by migratory birds is abundant and well distributed across the YTC, and the construction footprint is very small relative to available habitat across the

installation (sagebrush dominated communities comprise more than 241,000 acres on YTC [U.S. Army 2002]).

Other Special Status Wildlife Species

Direct and indirect construction impacts on other special status wildlife that use shrub-steppe habitats of the Hanson Creek watershed area would be similar to those described in Section 4.3.2, Fish and Wildlife. These impacts could involve injury or mortality to less-mobile species or those with small home ranges during land clearing and grading, temporary disturbance or displacement of individuals from habitats adjacent to the UAS airstrip, and the permanent loss of a small amount of shrub-steppe habitat (6.5 acres) that may be used for foraging, cover, or other life-history needs.

Construction activities would be similar under either build alternative, and are expected to have an insignificant impact on other special status wildlife. Injury or mortality would likely be limited to ground dwelling or burrowing small mammals such as Merriam's shrew or Townsend's ground squirrel. Should clearing occur during the spring and early summer, nest and young of sensitive birds could be destroyed (e.g., sage sparrow, sage thrasher). Temporary disturbance impacts and the loss of a small amount of degraded habitat could occur for species such as the black-tailed jackrabbit, loggerhead shrike, sage thrasher, sagebrush lizard, and striped whipsnake. These species would likely be displaced to adjacent shrub-steppe habitat. Displaced species would compete with other wildlife for finite resources, which could result in increased stress, declines in reproductive success, or greater susceptibility to predation. Losses of foraging habitat to wide ranging raptors such as the golden eagle and ferruginous hawk would be inconsequential.

These construction-associated impacts are not expected to adversely affect populations or habitats of sensitive wildlife at levels that would trend toward endangerment or the need for federal listing. Shrub-steppe habitat is abundant and well distributed across the YTC, and the proposed action would remove a very small amount (6.5 acres) relative to available habitat on the installation (sagebrush dominated communities comprise more than 241,000 acres on YTC [U.S. Army 2002]).

Listed Plant Species

Construction activities under either build alternative would be similar, and would have no impact on federally listed plant species. No federally listed plants are known to occur within the boundaries of YTC. Ute ladies'-tresses (*Spiranthes diluvalis*, threatened) and Umtanum desert buckwheat (*Eriogonum codium*, threatened) have been documented near the YTC, but neither build alternative supports suitable habitat for these species (Ute ladies'-tresses: wet meadows and gravel bars along moderate to large streams and rivers; Umtanum desert buckwheat: basalt ridge tops along the Columbia River). Consequently, no direct or indirect impacts on federally listed plant species or their habitat would occur.

Other Special Status Plant Species

A number of other sensitive plant populations are known to occur near (within 2 kilometers of) the build alternatives, including large populations of Columbia milk-vetch (one large population overlaps with the Alternative 2 site) and smaller populations of snowball cactus, bristle-flowered collomia and white eatonella (Figure 3-4). Construction activities would be similar under either build alternative, and are expected to have an insignificant impact on sensitive plants. The proposed action would result in a small permanent loss of existing habitat under either build alternative

(about 6.5 acres), and additional temporary impacts could occur immediately adjacent to the constructed facility. Both sites have been subjected to prior disturbances that have reduced the cover of native shrubs and increased the abundance of weedy grasses and forbs (Section 3.2, Vegetation). These actions reduce the likelihood that sensitive plant population would be present. Nevertheless, considering the abundance of Columbia milk-vetch near the build alternative sites, it is possible that this species could occur on the sites, particularly the Alternative 2 site. To ensure that potential impacts on Columbia milk-vetch are minimized, a program of milk-vetch seed collection, propagation, plant salvage and offsite planting would be implemented for this species. With this mitigation, construction effects would not adversely affect populations or habitats of these species or contribute toward endangerment or the need for federal listing.

Operation

Listed Fish Species

No direct or indirect impacts on listed fish species or their habitats are expected to occur as a result of UAS operations at either build alternative site. No listed fish species are known to use rivers and streams within the boundaries of YTC. Both alternatives lie in upland areas within the Hanson Creek watershed, which drains to the Columbia River. The lower portion of Hanson Creek is perennial; however, there is no continuous flow in the creek reach adjacent to these two alternative sites and the lower perennial reach, or the Columbia River off the installation where these listed species may be present. Stormwater runoff from the alternative sites is not expected to affect water quality in lower Hanson Creek, or the Columbia River where these listed fish species may be present (Section 4.1, Geomorphology and Hydrology). Stormwater runoff would be managed via sheet flow dispersion to either side of the airstrip, using grass buffers or filter strips for water quality treatment (AHBL 2013). Any runoff from extreme events would collect in the access road ditches, which would provide additional infiltration capacity before any discharge to the existing gullies. Site-specific BMPs addressing spill prevention and control (Section4.9, Hazardous and Toxic Materials) would be in place to limit potential impacts on water quality.

Listed Wildlife Species

Operational activities under either build alternative would be similar, and would have no impact on federally listed wildlife species. No federally listed wildlife or their habitats are known or suspected to occur on the YTC. The yellow-billed cuckoo, recently proposed for listing as threatened, is likely extirpated as a breeder in Washington; vagrant birds are very rarely seen in the state. There is little likelihood that operational activities would affect this species.

Greater Sage-grouse

Operational activities would be similar for each build alternative, and are expected to have an insignificant impact on sage-grouse. No above ground structures, lighting, or transmission lines would be included with any of the alternatives, such that there would be no overhead perching structures added for avian predators. There would also be no increased risk of fire with either alternative. As discussed previously, the historic nature of the Borden lek and the distance to active leks (more than 10 miles) suggest that the sage-grouse population in the vicinity of Alternatives 2 and 3 is small. Should a small number of sage-grouse reside in these areas, birds would be subject to periodic, short-term disturbances that could temporarily displace birds into nearby areas. This includes high-decibel noise of short duration generated by aerial vehicles during takeoffs and

landings, as well as disturbance from support personnel at the airstrip. These disturbances could affect sage-grouse within about a 2-kilometer zone around the airstrip (Section 4.3.2, Fish and Wildlife). The historic Borden lek is 1.14 miles (1.8 km) from Alternative 2, which is within the 2-kilometer zone where it would be subjected to an increase in noise during takeoffs and landings. Sage-grouse in the project area are already subjected to noise and disturbance from live fire exercises, training maneuvers, and other military field exercises that generate periodic noise and disturbance levels at or in excess of those anticipated under the proposed action. Sage-grouse lekking season (late winter through mid-May) would overlap slightly with the UAS airstrip usage (which is weather dependent, generally beginning in April or May and lasting through November). The added noise and disturbance associated with the UAS training events, in light of the minimal overlap with the lekking season and the ongoing usage for other training efforts, would not be expected to further reduce the potential for future reoccupation of the Borden lek by sage-grouse. Annual monitoring of this lek, typically beginning in March, would allow for adaptive management as needed.

No disturbance is anticipated by the aerial vehicles during flight since the standard operational altitude for Shadow UAS training (6,000 feet for night operations, 8,000 feet for day operations) is well above low-flight patterns of sage-grouse. Sage-grouse could also be subjected to injury or mortality from collisions with unmanned aerial vehicles during takeoffs and landings. However, this risk is thought to be minimal because of the small size of unmanned aerial vehicles, limited periods of potential avian-UAS aerial vehicle use of the same airspace (i.e., take offs and landings), and a lack of reported avian collisions from UAS operations at the Selah Airstrip in the southwestern portion of the YTC (Washington Army National Guard 2012). The noise generated by these vehicles during takeoffs and landings may also cause sage-grouse to flee from the area around the airstrip, minimizing the potential for collisions.

In summary, these operational effects are not expected to adversely affect sage-grouse populations or contribute toward endangerment or the need for federal listing for the following reasons:

- Both alternatives are outside of the YTC's designated Sage-Grouse Protection Areas;
- the sage-grouse population in the vicinity of the alternative sites is small, which contributed to the Army's decision to manage the historic Borden lek to the land allocation standards (i.e., Zone 3 General Use, Zone 4 Bivouwak Area) in which it is contained (U.S. Army 2011);
- the UAS training events and their associated disturbances are of short duration (during takeoffs and landings only) and are largely offset from the lekking season and would not be expected to prevent future reoccupation of the Borden lek by sage-grouse;
- the area of disturbance impact (about a 2-kilometer zone around the airstrip) is very small in comparison to the amount of sagebrush (the habitat preferred by sage-grouse) distributed across the installation (sagebrush dominated communities comprise more than 241,000 acres on the YTC [U.S. Army 2002]); and
- injury or mortality from collisions with aerial vehicles is expected to be uncommon based on the small size of unmanned aerial vehicles, limited periods of potential avian-UAS aerial vehicle use of the same airspace, and a lack of reported avian collisions from UAS operations at the Selah Airstrip.

The Army is developing a process for establishing protection of newly discovered active leks as part of a sage-grouse management plan (U.S. Army 2011). If the Borden lek were to become active in the

future, the lek and adjacent sage-grouse habitat may be subject to seasonal protective measures under this management plan.

Bald Eagle

Operational activities would be similar for each build alternative, and are expected to have an insignificant impact on bald eagle. Three bald eagle roost sites occur along Hanson Creek in the general vicinity of the Shadow UAS alternative sites (Figure 3-4). These roosts are typically used by bald eagles at night and in the early morning hours during winter months (November to April). Shadow UAS training events are not typically conducted during those months. Use of the UAS airstrip when bald eagles are present on the YTC would present a disturbance impact on roosting bald eagles, particularly training exercises conducted at night or in early morning hours. The Shadow aerial vehicles ascend and descend in a radial fashion within about a 2-kilometer zone around the airstrip to access operating altitude. Bald eagle roosts which lie within or near the flight zone could be periodically subjected to short-duration, high-decibel noise events during vehicle takeoffs and landings. The Alternative 2 site lies about 1.9 kilometers from Lower Hanson Creek roost, while Alternative 3 is about 2.32 kilometers from Lower Hanson Creek roost and 2.53 kilometers from Middle Hanson Creek roost. These potential noise disturbances would be minimized to protect the Hanson Creek roosts, including flight restrictions in a 2-kilometer buffer zone along the creek during winter (December 8 to March 24), as shown in Figure 3-4. A minimum flight level of 300 feet above ground level must be maintained within these flight restriction zones. Since the Alternative 2 site lies entirely within the bald eagle flight restriction zone, use of this site for UAS training events would be precluded for a majority of the winter roosting season. However, use of the Alternative 3 site could occur during the entire winter roost season. No disturbance to roosting eagles is anticipated after the aerial vehicles achieve operating altitude since the standard operational altitude for Shadow UAS training is 6,000 feet for night operations and 8,000 feet for day operations. With the military flight restrictions in place and the expected lack of usage of the airstrip during the winter months, operational disturbances are expected to represent a minor impact on winter roosting bald eagles under either alternative..

Similar to that described in Section 4.3.2, Fish and Wildlife, the unmanned aerial vehicles pose a low risk of injury or mortality to wintering bald eagles from collisions with unmanned aerial vehicles. Collision risk would be greatest during takeoffs and landings when the aerial vehicle is at lower altitudes and within the typical flight altitude for bald eagles. The collision risk would be less under Alternative 2 because the site lies within the bald eagle flight restriction zone and could not be used for UAS training events for most of the winter roosting season. Little collision risk to bald eagles is expected during the migration season because the aerial vehicles operate at altitudes (6,000 feet for night operations, 8,000 feet for day operations) that are above the typical migratory altitudes of raptors (700 to 4,000 feet) (Smithsonian Migratory Bird Center 2012)

In summary, these minor disturbance and collision risks are not expected to adversely affect bald eagle populations or contribute toward endangerment or the need for federal listing for the following reasons:

- bald eagles use the YTC only during the winter months when USA trainings are not expected to occur;
- potential disturbance impact on bald eagles using the Hanson Creek roosts is minimized by military flight restrictions around these roosts during winter, these restrictions would preclude use of the Alternative 2 site for UAS training events from December 8 to March 24;

- the UAS training events and their associated disturbances are of short duration (during takeoff and landing); and
- injury or mortality from collisions with aerial vehicles is expected to be uncommon based on the small size of unmanned aerial vehicles, limited periods of potential avian-UAS aerial vehicle use of the same airspace (i.e., take offs and landings; flight restrictions during most of the bald eagle winter roost season), and a lack of reported avian collisions from UAS operations at the Selah Airstrip in the southwestern portion of YTC (Washington Army National Guard 2012).

Migratory Birds

Direct and indirect operational impacts on migratory birds would be similar to those described in Section 4.3.2, Fish and Wildlife. These impacts could involve disturbance and possibly displacement of migratory birds from habitats adjacent to the UAS airstrip during training events, and the potential for bird collisions with the aerial vehicles. As many as 21 migratory bird species could nest at the build alternative sites (Appendix B).

Operational activities would be similar for each build alternative, and are expected to have an insignificant impact on migratory birds. An analysis of the potential impacts on each of the 21 migratory bird species that could nest on the alternative sites is presented in Appendix B, Table 2. The potential loss or unintentional take of active nests for these species would be minimal, and would not significantly affect regional population levels. Migratory birds that occupy the predominant shrub-steppe habitat found around both alternative sites would be subject to periodic, short-term disturbances that could temporarily displace birds into nearby areas. This includes high-decibel noise of short duration generated by aerial vehicles during take offs and landings, as well as disturbance from support personnel at the airstrip. These disturbances are expected to affect migratory birds residing in about a 2-kilometer zone around the airstrip (Section 4.3.2, Fish and Wildlife). Impacts on long-billed curlew would likely be greater under Alternative 2 due to the alternative site's proximity to known curlew nesting and brood rearing areas. Migratory bird populations at the alternative sites are already subjected to noise and disturbance from live fire exercises, training maneuvers, and other military field exercises that generate periodic noise and disturbance levels at or in excess of those anticipated under the proposed action. Migratory birds would also be subjected to a low bird-aerial vehicle collision risk during takeoffs and landings, and during overflights when training exercises coincide with seasonal bird migrations (Section 4.3.2, Fish and Wildlife). The standard operational altitude for Shadow UAS training (6,000 feet for night operations, 8,000 feet for day operations) is above the typical nonmigratory flight altitude for most birds (below 500 feet). However, during migration, some shorebirds may reach altitudes of 13,000 feet, although most birds fly below 6,000 feet (Smithsonian Migratory Bird Center 2012).

These operational impacts are not expected to significantly affect critical nesting habitat for migratory birds, or adversely affect their populations such that a trend toward endangerment or the need for federal listing would arise, for the following reasons:

- the UAS training events and their associated disturbances are of short duration (predominantly during takeoff and landing);
- the area of disturbance impact (about a 2-kilometer zone around the airstrip) is very small in comparison to available shrub-steppe habitat across the installation (sagebrush dominated communities comprise more than 241,000 acres on the YTC [U.S. Army 2002]); and

- bird injury or mortality from collisions with aerial vehicles is expected to be uncommon, based on the small size of unmanned aerial vehicles, limited periods of potential avian-UAS aerial vehicle use of the same airspace (i.e., take offs and landings; seasonal bird migrations), and a lack of reported avian collisions from UAS operations at the Selah Airstrip in the southwestern portion of YTC (Washington Army National Guard 2012).

Other Special Status Wildlife Species

Direct and indirect operational impacts on other special status wildlife would be similar to those described in Section 4.3.2, Fish and Wildlife. These impacts could involve temporary disturbance and possibly displacement of special status wildlife from habitats adjacent to the UAS airstrip during training events, and injury or mortality of bird species resulting from collisions with aerial vehicles. Operational activities would be similar under either build alternative, and are expected to have an insignificant impact on special status wildlife. Temporary disturbance and displacement into adjacent habitats could occur for species such as the black-tailed jackrabbit, loggerhead shrike, sage thrasher, and age sparrow, particularly during aerial vehicle takeoffs and landings when high-decibel noise of short duration is generated. Avian species would also be subjected to a low aerial vehicle collision risk during takeoffs and landings, especially for species that soar such as the golden eagle and ferruginous hawk. These operational impacts are not expected to adversely affect populations or habitats of sensitive wildlife at levels that would trend toward endangerment or the need for federal listing.

Listed Plant Species

Operational activities under either build alternative would be similar, and would have no direct or indirect impacts on federally listed plant species. Neither build alternative would support suitable habitat for Ute ladies'-tresses (wet meadows and gravel bars along moderate to large streams and rivers) or Umtanum desert buckwheat (basalt ridge tops along the Columbia River). A hardened airstrip and a gravel parking lot would encompass all training at the Shadow UAS training facility. No ground-disturbing activities are expected to occur under either build alternative that could affect vegetation.

Other Special Status Plant Species

Operational activities under either build alternative would be similar, and would have no direct or indirect impacts on other special status plant species. A hardened airstrip and a gravel parking lot would encompass all training at the Shadow UAS training facility. No ground-disturbing activities are expected to occur under either build alternative that could affect special status plants.

4.5 Historic and Cultural Resources

Impacts on historic and cultural resources would be considered significant if Army actions:

- permanently restricted access of tribal members to traditional cultural properties;
- appreciably increased safety risks to tribal members using traditional cultural properties;
- resulted in a long-term loss or degradation of plant or animal populations of traditional cultural importance to Native Americans; or

- 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 .

4.5.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no impacts on historic or cultural resources would result. Known historic and cultural sites are protected from training activities through existing management policies. Training operations would not change in areas with known historic or cultural resources.

Operation

No new operational activities would occur under this alternative; therefore, no impacts on historic or cultural or historic resources would result. Known historic and cultural sites are protected from training activities through existing management policies. Training operations would not change in areas with known historic or cultural resources.

4.5.2 Alternative 2 and Alternative 3

Construction

Direct impacts on cultural resources would be attributed to any new construction and any access restrictions to areas that contain or have potential to contain traditional foodstuffs, sacred places, and traditional cultural properties. All proposed new construction would be located in areas that have been surveyed for cultural manifestations. No known archaeological sites would be affected by construction within the footprint of the proposed action. It is possible that subsurface archaeological deposits may be present despite shallow soil depth. Procedures would be in place for mitigating impacts on inadvertent archaeological discoveries found during construction.

For Alternative 2, seven archaeological sites were identified within 1 kilometer of the alternative site. Of those seven sites all are prehistoric and only one is eligible for listing in the NRHP. For Alternative 3, 14 sites were identified within 1 kilometer of the alternative site. Of those 14 sites, all are prehistoric and only two are eligible for listing in the NRHP.

Overall, because there are no known sites within the construction footprint for both alternatives and Native American access would continue, direct and indirect impacts would be negligible under either alternative.

Operation

Although there are numerous cultural resources present throughout YTC that may experience flyovers from Shadow UAS vehicles operated from the new facility constructed under either alternative, these resources already have the same potential to experience flyovers from UAS vehicles operated from the Selah Airstrip to the southwest. In addition, no impacts are anticipated while the aerial vehicle is in flight at operating altitude over the greater YTC area because the aircraft would not be visible or audible at its normal operational altitude. No impacts are anticipated

during aerial vehicle takeoffs and landings under either alternative because no historic or cultural resources are present in the path of ascent or descent at either build alternative site.

4.6 Air Quality and Noise

Impacts on air quality would be considered significant if the proposed action resulted in an increase in air pollution that would cause YTC to be out of compliance with existing NAAQS.

Noise impacts resulting from the proposed action would be considered significant if noise levels at sensitive noise receptors increased to unacceptable levels as a result of construction or operational activities.

4.6.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no air quality or noise impacts would result from construction.

Operation

No new operational activities would occur under this alternative; therefore, no new air quality or noise impacts would result from operational activities.

4.6.2 Alternative 2 and Alternative 3

Construction

Construction activities under either build alternative would have insignificant impacts on air quality. Potential impacts associated with construction activities are predominantly the mobilization of fugitive dust, emissions from construction equipment and rock crushing. These impacts would be minimal because the construction activity associated with the proposed action would be minor, primarily consisting of minimal clearing and grading over a predominantly flat area of roughly 6.5 acres and paving a portion of that area with asphalt. The construction contractor would be required to contact the Washington State Department of Ecology concerning possible submittal of a dust control plan and completion of an application for an Order of Approval for rock crushing operations. The approved dust control plan, if needed, and the rock crushing permit would be submitted to the YTC Public Works-Environmental Division prior to construction. Overall, impacts on air quality from construction would be insignificant.

Construction of the proposed action under either build alternative would produce no noise impacts on human receptors (for discussion of noise in relation to wildlife see Section 4.2, Vegetation and Section 4.3, Fish and Wildlife). The sites for both build alternatives are located in a remote part of YTC, many miles from any human residential area. Further, these areas are routinely used for live-fire exercises and field maneuvering, which generates noise levels far in excess of those anticipated as part of this proposed action.

Operation

Operation of Shadow UAS aerial vehicles under either build alternative would produce insignificant impacts on air quality. Aerial vehicle emissions are minimal given the size and weight of the aircraft. The Shadow UAS has a fuel economy of approximately 1.4-1.8 gallons of fuel per hour of normal flight. Shadow UAS operations are anticipated to include up to 10 Humvees and one 5-ton truck, a relatively small number of vehicles. The impact from the combined emissions from aerial vehicles and ground support vehicles would be insignificant under either build alternative because of the small number of ground vehicles involved and the low rate of aircraft fuel consumption.

If an aerial vehicle crash were to ignite a wildland fire, significant emissions would be possible; however, the probability that an aerial vehicle would crash with the intensity to ignite a fire is so low that the risk level of this activity, as well as its impact on air quality, is considered insignificant. Out of all Shadow UAS training operations in a 5-year period (2005 through 2009), there have been no accidents that have resulted in a fire (Doyle pers. comm.). All combined, potential emissions associated with the operation of the proposed action would be well below the levels that could conceivably jeopardize YTC's attainment of NAAQS.

Operation of Shadow UAS aerial vehicles under either build alternative would produce insignificant noise impacts. The sites for both build alternatives are located in a remote part of YTC, many miles from any human living environment. There are no human noise sensitive receptors within detection range of noise that would be produced during takeoffs and landings. Although some disturbance to wildlife during takeoffs and landings may occur (Section 4.3 Fish and Wildlife, and Section 4.4, Threatened and Endangered Species), this area is routinely used for live fire exercises and field maneuvering, which generates noise levels far in excess of those anticipated as part of the proposed action. Shadow UAS flyovers currently occur over the greater YTC but are fairly quiet as heard from the ground when at operating altitude. There would be no new noise impacts from flyovers of the greater YTC as a result of basing operations at either of the build alternative sites.

4.7 Land Use and Aesthetics

Potential land use impacts of the proposed action would be considered significant if construction or operation of the new facility directly caused a change in land use at the location of the new facility, indirectly caused a change in land use in the surrounding area, or was incompatible with land uses in the surrounding area.

Potential aesthetics impacts of the proposed action would be considered significant if construction or operation of the new facility were visually incompatible with the existing character of the surrounding viewshed to sensitive viewers, people who would be concerned about the quality of the aesthetics of their view.

4.7.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no land use or aesthetic impacts would result from construction.

Operation

No new operational activities would occur under this alternative; therefore, no land use or aesthetic impacts would result from operational activities.

4.7.2 Alternative 2 and Alternative 3

Construction

Constructing the proposed action would have an insignificant impact on land use under either build alternative. Construction activity would not cause any change in overall land use as military training or be incompatible with any surrounding land use under either build alternative but live fire exercises would need to be restricted at and near these sites during construction. Live fire exercises are controlled by YTC Range Operations and could be redirected away from this 6.5-acre area to other live fire areas on the 327,000-acre training center. Alternative 3 is located at Firing Point 2783, a location where artillery rounds are fired from and directed toward a designated down-range impact area. This firing point would need to be decommissioned at the time construction would commence under this alternative but Range Operations would be able to accommodate permanently shifting activities to other firing points on YTC. Use of the nearby Borden Springs Drop Zone would also be impacted during construction.

Constructing the proposed action would have an insignificant impact on recreational and tribal visitors, those who are most likely to be concerned about the aesthetic quality of their views while on YTC, while within the viewshed of the project area under either build alternative. Those engaged in recreational or hunting and gathering activities are likely to desire uninterrupted views of a shrub-steppe landscape. Construction equipment and activities may be perceived as out of character with the landscape, but the disruption resulting from the proposed action would be small at 6.5 acres in the context of a 327,000-acre active military installation. The disturbed area would be situated in an open landscape with expansive views of undeveloped shrub-steppe habitat from many vantage points. Visitors to the John Wayne Trail would be protected from any aesthetic impacts because neither build alternative will be visible due to the proximity of Saddle Mountain. In addition, military training always has priority (32 CFR 552).

Operation

Shadow UAS operations would have an insignificant impact on land use under either build alternative. Flight activity would not cause any change in overall land use as military training or be incompatible with any surrounding land use under either build alternative, but live fire exercises at and near these locations and use of the Borden Springs Drop Zone would need to be restricted during aerial vehicle operations. Live fire exercises are controlled by YTC Range Operations and could be redirected away from this 6.5-acre area to other live fire areas on the 327,000-acre training center.

Operating Shadow UAS aerial vehicles would have an insignificant impact on aesthetics under either build alternative. Those engaged in recreational or hunting and gathering activities are likely to desire uninterrupted views of a shrub-steppe landscape and the presence of a new Shadow UAS training facility consisting of a runway and a parking lot may be perceived as out of character with the with the landscape. The disruption resulting from the proposed action would be small at 6.5 acres in the context of a 327,000-acre active military installation situated in an open landscape with

expansive views of undeveloped shrub-steppe habitat from many vantage points. These visitors would not be present within the viewshed of either build alternative during Shadow UAS operations. Visitors to the John Wayne Trail would be protected from any aesthetic impacts because neither build alternative would be visible due to the proximity of Manastash Ridge. Visitors outside the viewshed of either build alternative would experience no impact on aesthetics because, as with current operations of Shadow UAS aerial vehicles, the aircraft are not visible or audible from the ground at operating altitude. In addition, military training always has priority (32 CFR 552).

4.8 Recreation

Potential impacts on recreation would be considered significant if access to portions of YTC now accessible to recreational users becomes prohibited without the availability of a comparable alternative location on YTC or if the proposed action would degrade the experience of users of the John Wayne Trail. Potential aesthetic- and viewshed-related impacts are discussed in Section 4.8, Land Use and Aesthetics.

4.8.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, recreation impacts would result from construction.

Operation

No new operational activities would occur under this alternative; therefore, no recreation impacts would result from operational activities.

4.8.2 Alternative 2 and Alternative 3

Construction

Constructing the proposed action would have an insignificant impact on recreation under either build alternative. The construction footprint of the proposed action is small (6.5 acres) and while recreation opportunities in and around this area would be restricted during construction, comparable opportunities are likely to be available simultaneously in other areas of YTC. In addition, the primary function of YTC is to provide military training with recreation access only available on an opportunistic basis when no military activities are occurring in those areas. Military training always has priority (32 CFR 552).

Operation

Operation of the proposed action would have an insignificant impact on recreation under either build alternative. While recreation opportunities would be restricted in and around the project area during construction, comparable opportunities are likely to be available simultaneously in other areas of YTC. In addition, the primary function of YTC is to provide military training with recreation

access only available on an opportunistic basis when no military activities are occurring in those areas. Military training always has priority (32 CFR 552).

4.9 Hazardous and Toxic Materials

Impacts associated with hazardous materials and waste in relation to the proposed action would be considered significant if they resulted in:

- Violations of federal or state environmental rules, regulations;
- Unacceptable levels of human exposure to contaminated materials; or
- A spill or release of a hazardous substance beyond the ability of a spill kit to contain (as defined by Title 40, CFR Part 302 [CERCLA], WAC 173-340 (Washington MTCA), or Parts 110, 112, 116 and 117 [CWA])

4.9.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no impacts with respect to hazardous and toxic materials would result.

Operation

No new operational activities would occur under this alternative; therefore, no impacts with respect to hazardous and toxic materials would result.

4.9.2 Alternative 2 and Alternative 3

Construction

Past land use of both build alternative sites has been either agricultural (most likely grazing) or military training since it was settled. No visual or anecdotal evidence exists of areas filled or graded by anything other than natural means, or mounds or depressions suggesting burial of trash or other wastes at either of the build alternative sites. No storage of hazardous substances or petroleum products was observed at either site during a site visit by YTC, the Corps and preparer of this EA on September 11, 2012. It is unlikely that the project area would be contaminated under either alternative and, given this low risk, any risk of impacts resulting from exposing or mobilizing existing hazardous and toxic materials would be insignificant.

Several common construction materials are toxic and hazardous materials, including asphalt, paint, and petroleum products, and would be used in connection with the proposed action. Handled properly, these materials would not have an adverse impact on the surrounding environment. Typical BMPs would be implemented during construction to control and contain hazardous materials that pose a risk to the environment. BMPs could include, but would not be limited to:

- Dedicated fueling and lubing area for construction vehicles and equipment,
- Fueling area liners and raised berms to capture spills and deter runoff to adjacent soils,

- On site spill absorption supplies and disposal containers (spill kits),
- Dust control,
- Straw wattles and bales as perimeter controls, including demarking fueling and maintenance areas.

A spill prevention, control, and countermeasures plan (SPCCP) would be in effect during construction activities to detail practices that would be followed to reduce the risk of a hazardous materials release and manage the extent of exposure in the event that one does occur, potential impacts from hazardous and toxic materials would be insignificant.

Operation

Aerial vehicles would be refueled from a truck-mounted tank and pump unit and no on-site storage of fuel or vehicle would occur between training sessions. Common petroleum products would be used in connection with operation activities under both build alternatives. In addition to ground vehicles, which run on gasoline or diesel fuel, the aerial vehicle runs on 100 low lead (LL) fuel and its engine requires oil and other petroleum products to function properly. Fuel dams are used during re-fueling and typically synthetic vegetable based lubricating oils are used. An SPCCP would be in effect during operations, which would employ BMPs similar to those implemented for construction activities to reduce the risk of a hazardous materials release and keep any potential resulting impacts to a minimum. Measures included in the SPCCP may include such items as keeping equipment well maintained, watching for leaks, and having necessary spill kits readily available. In the event that a spill should occur en route to or from the new facility, cleanup would be subject to the YTC SPCCP and Contingency Plan. In the unlikely event of an aerial vehicle crash and spilled fuel on the ground, soil contaminated with petroleum compounds would be cleaned up and disposed of. Any wastes produced from the spill and subsequent cleanup would be taken to the YTC One Stop Yard for disposal. Potential impacts on the environment related to hazardous and toxic materials would be insignificant.

4.10 Global Climate Change

Under EPA's Mandatory Reporting of Greenhouse Gases rule, which became effective on January 2, 2011, large stationary GHG emission sources in the U.S. are required to report GHG emissions data. Codified in 40 CFR Part 98, the rule generally requires facilities that emit 25,000 tonnes (27,500 tons) or more per year of GHGs to submit annual reports to EPA. That same 25,000-tonne action level is specified by CEQ's draft NEPA guidance for GHG emissions, indicating the emission level that warrants a detailed GHG impact assessment. In general, only large industrial emission sources are capable of emitting 25,000 tonnes of GHGs. For example, a facility would have to burn roughly 2.5 million gallons per year of diesel fuel or 2.7 million gallons per year of aviation gasoline to emit that much GHG (Chicago Climate Exchange 2012). No thresholds have been established for mobile sources. Contributions to the effects of global climate change would be considered significant if total GHG emissions from the proposed action were anticipated to exceed 25,000 tonnes per year.

4.10.1 Alternative 1

Construction

Construction activities would not occur under this alternative; therefore, no contributions to the effects of global climate change would result.

Operation

No new operational activities would occur under this alternative; therefore, no contributions to the effects of global climate change would result.

4.10.2 Alternative 2 and Alternative 3

Construction

Construction activities under either build alternative would have insignificant effects on global climate change. These impacts would be minimal because the construction activity associated with the proposed action is minor, primarily consisting of minimal clearing and grading over a predominantly flat area of roughly 6.5 acres and paving most of that area with asphalt.

Operation

Operation of Shadow UAS aerial vehicles under either build alternative would result in insignificant effects on global climate change. Aerial vehicle emissions would be minimal given the size and weight of the aircraft. The Shadow UAS has a fuel economy of approximately 1.4 to 1.8 gallons of fuel per hour of normal flight. Shadow UAS operations at YTC are anticipated to include up to 10 Humvees and one 5-ton truck, a relatively small number of vehicles, compared to the total number of vehicles typically used on YTC during daily operations. The impact from the combined emissions from aerial vehicles and ground-support vehicles would be insignificant under either build alternative due to the small number of ground vehicles involved and the low rate of aircraft fuel consumption.

If an aerial vehicle crash were to ignite a wildland fire, significant GHG emissions would be possible; however, the probability of an aerial vehicle crash with the intensity to ignite a fire is very low, and the risk level of this activity, as well as its effect on global climate change, is considered insignificant. Out of all Shadow UAS training operations in a 5-year period (2005 through 2009), there have been no accidents that have resulted in a fire (Doyle pers. comm.).

4.11 Local Economy and Socioeconomics

There are no developments, no residents, and no economic activities within the construction or operation areas of either of the proposed build alternatives and no construction or operational activities would occur under the No Action Alternative; therefore, none of the alternatives under consideration would have any impacts with respect to the local economy and socioeconomics.

4.12 Environmental Justice Communities

There are no developments, no residents, and no environmental justice communities within the construction or operation areas of either of the proposed build alternatives and no construction or operational activities would occur under the No Action Alternative; therefore, none of the alternatives under consideration would have any impacts with respect to environmental justice communities.

4.13 Indian Treaty Rights

Impacts on Indian treaty rights would be considered significant if implementing the proposed action resulted in a change to YTC's access policy or substantially change the land and resources available to tribal access.

4.13.1 Alternative 1

Construction

Construction activities would not occur under this alternative and there would be no change to YTC's access policy associated with this alternative; therefore, no impacts with respect to Indian treaty rights would result.

Operation

No new operational activities would occur under this alternative and there would be no change to YTC's access policy associated with this alternative; therefore, no impacts with respect to Indian treaty rights would result.

4.13.2 Alternative 2 and Alternative 3

Construction

Constructing the proposed action under either build alternative would not result in a change to YTC's access policy or substantially change the land and resources available to tribal access. The construction footprint would be small, roughly 6.5 acres, surrounded by 327,000 acres of similar landscape and construction would proceed quickly because of the simplicity of the infrastructure proposed. Consultation would occur between YTC and consulting parties such as the Wanapum Band and Yakama Nation and SHPO to determine if historic properties or other cultural resources would be affected by operational activities under either of the build alternatives. YTC would also coordinate with the Yakama Nation and the Wanapum Band to determine if the proposed action would affect places of cultural and religious importance on or near YTC and determine appropriate mitigation.

Operation

Operations under either build alternatives would not result in a change to YTC's access policy or substantially change the land and resources available to tribal access. Consultation would occur

between YTC and consulting parties such as the Wanapum Band and Yakama Tribe and SHPO to determine if historic properties or other cultural resources would be affected by operational activities under either of the build alternatives. YTC would also coordinate with the Yakama Nation and the Wanapum Band to determine if the proposed action would affect places of cultural and religious importance on or near YTC and determine appropriate mitigation.

4.14 Staging Area Environment

It is anticipated that the staging area would fall within the estimated footprint of the project area or the location of the materials source for both build alternatives; therefore, impacts on the staging area environment have been discussed under the construction-related impacts of all alternatives.

4.15 Materials Source Environment and Transport Effects

Potential impacts related to the materials source environment and transport of construction materials would be considered significant if proposed action needs necessitate the development of new aggregate sources, require construction of new roads, or result in damage to existing roads beyond normal wear and tear to the point of requiring substantial repairs.

4.15.1 Alternative 1

No construction would take place under this alternative; therefore, there would be no impacts on materials source environments or related to transport of materials.

4.15.2 Alternative 2 and Alternative 3

Both build alternatives would use local rock from existing borrow sources owned and operated by YTC and transport would occur over existing roads. The materials source for Alternative 2 would be an existing borrow pit roughly 2 miles east of the project area. The materials source for Alternative 3 would be an existing borrow pit roughly 1.5 miles (by road) southwest of the project area. Aggregate needs for either build alternative could be met by either of these existing sources. Given the relatively small amount of rock needed to construct either build alternative, existing roads would be adequate for delivering construction materials without substantial degradation to the current condition of the build alternative sites. Materials source environment and transport impacts related to construction of either build alternative would be insignificant.

4.16 Cumulative Effects

Cumulative effects are the combination of impacts of the proposed action, when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes those other actions (40 CEQ 1508.7). Cumulative effects can result from actions occurring over a period of time that are minor when each is considered individually, but that are significant when viewed collectively.

4.16.1 Actions Considered

YTC is used for multiple types of training including gunnery, demolition, construction, off-road maneuvering and aviation-related operations. The land surrounding YTC is used mostly for agricultural and livestock purposes. Reasonably foreseeable future actions that are expected to take place on or around YTC, or to have an effect on the proposed action included in this analysis are:

- Construct (proposed) an additional set of high voltage power lines by PacifiCorps (estimated date: Fiscal Year 2013–2015).
- Conduct UAS training at YTC's Selah Airstrip by as many as nine UAS platoons within the next few years. Currently, there are four active Army UAS platoons using the airstrip with the possibility of four more and a National Guard platoon equaling a total of nine.
- Construct the Convoy Live Fire Range (estimated date: Fiscal Year 2014).
- Implementation of *Grow the Army Environmental Impact Statement* (U.S. Army 2010a):
    - Increase overall troop strength and, therefore, increase training/range land use.
    - Construct a Multi-Purpose Machine Gun Range, southeast of Selah Airstrip (estimated date: Fiscal Year 2014).
    - Construct a Sniper Field Fire Range, southwest of Selah Airstrip (estimated date: Fiscal Year 2014).
    - Construct a Combined Arms Collective Training Facility (estimated date: Fiscal Year 2018).
- Construct a Tactical Unmanned Aircraft Systems (TUAS) Facility at the Selah Airstrip and train a Washington Army National Guard TUAS platoon at YTC.

4.16.2 Cumulative Effects Discussion

Both YTC and JBLM-Main are undergoing substantial growth as analyzed in the *Grow the Army Environmental Impact Statement* (U.S. Army 2010a). This increase in overall troop strength would affect both YTC's and JBLM's infrastructure by increasing the demand for training lands, barracks and other support facilities, as well as their treatment of wastewater and disposal of solid waste. The No Action Alternative would not contribute toward cumulative impacts. Implementing this proposed action could contribute by roughly the same minor amounts under either of the build alternatives, considered in combination with the listed actions of Section 4.16.1, Actions Considered, to cumulative impacts on the following list of environmental resources, resulting from its relatively small incremental increase in use of YTC:

- Geomorphology and Hydrology
- Vegetation
- Fish and Wildlife
- Threatened and Endangered Species
- Air Quality
- Aesthetics
- Recreation

- Hazardous and Toxic Materials
- Global Climate Change
- Indian Treaty Rights
- Materials Source Environment and Transport Effects

Geomorphology and Hydrology

The use of YTC as a military training facility since 1941 has created local changes in topography or soils, however the overall geomorphology of the area remains unchanged. Historic land use activities (including grazing), military training, and disturbance have resulted in degradation of many streams at YTC (U.S. Army 2002). YTC has completed improvements in road structure, road closure and realignments, and channel crossings, and ceased domestic livestock grazing (mid 1990s) to improve past sedimentation concerns with local streams. Suspended solids discharged from YTC contribute to the sediment load discharged into the Columbia and Yakima Rivers, though the magnitude of the contribution is very small compared to other sources (U.S. Army 2010a). The construction of the Shadow UAS training facility and the training activities associated with its operation could result in a small incremental local increase in soil erosion, and the potential for mobilization of sediments and contaminants in surface runoff from the facility. Site-specific BMPs to address sediment control, as well as spill prevention and control measures would limit potential water quality impacts. Considering the upland location of the build alternative sites and the application of appropriate BMPs, impacts on soils and hydrology are expected to be small and minor. Consequently, the proposed action would not lead to a significant cumulative impact on geomorphology or hydrology.

Vegetation

Historic and present-day causes of disturbance to upland vegetation on YTC include conversion of land to agricultural uses, grazing, fire, construction, road building, the deliberate and inadvertent introduction of nonnative species, and maneuver training exercises. Such disturbance has reduced native plant species cover and diversity, changed species composition and structure, and allowed invasion by nonnative species. Although training efforts on YTC are expected to increase, land management plans and protection efforts for sensitive plant species and communities are expected to largely maintain the status quo. The construction of the UAS training facility would result in a small incremental loss of shrub-steppe vegetation from YTC. However as the proposed action would have a small footprint (6.5 acres) in plant communities that have been previously disturbed. Overall the proposed project would not lead to a significant cumulative impact on vegetation.

Fish and Wildlife

As noted above, historic land use has lead to the degradation of water quality and vegetation communities on YTC. Improvements to infrastructure have decreased sedimentation and improved the conditions of streams. The increase in infrastructure and training activity on YTC as a result of this proposed action would not affect fishery resources. Consequently there would be no cumulative impacts on fish.

Historic use of YTC has favored terrestrial species that can tolerate human presence and noise. Continued land management on YTC is expected to maintain habitats of similar quality and quantity. Construction of the Shadow UAS training facility and the training activities associated with its

operation would result in a small incremental impact on wildlife populations that occupy shrub-steppe habitats. However, wildlife common to shrub-steppe habitats are abundant and well distributed across YTC. The proposed action would remove a very small amount of previously altered habitat (6.5 acres), contribute to localized, short-duration noise disturbance to wildlife, and present a low mortality risk to wildlife during construction and operation. These impacts would not adversely affect population levels of wildlife common to shrub-steppe habitats. Consequently, the proposed action would not lead to a significant cumulative impact on wildlife.

Threatened and Endangered Species

A number of fish, wildlife, and plant species that may be present on YTC are subject to special management action because of their current or potential status under the ESA, Bald and Golden Eagle Protection Act, MBTA, or Washington State designations. Changes around the region, such as loss or degradation of habitat, increased predation/competition by non-native species, and past management practices, have lead to the decline of these species. Regulations to protect and restore these species would be expected to continue to be considered in all future projects on YTC and in the region.

The increase in infrastructure and training activity on YTC resulting from the proposed action would not affect any federally listed fish, wildlife, or plant species. No federally listed species are known to occur on the installation. The yellow-billed cuckoo, recently proposed for listing as threatened, is likely extirpated as a breeder in Washington; there is little likelihood this species would be affected by the proposed action. Consequently there would be no cumulative impacts on federally listed or proposed species.

Construction of the Shadow UAS training facility and the training activities associated with its operation could result in small incremental impacts on other special status wildlife and plants that occupy shrub-steppe habitats. Shrub-steppe habitats are abundant and well distributed across YTC. The proposed action would remove a very small amount of previously altered shrub-steppe habitat (6.5 acres), contribute to localized, short-duration noise disturbances during takeoff and landing around the training facility, and present a low mortality risk to wildlife during construction and operation. BMPs and mitigation would be implemented to reduce potential impacts on sensitive species, such as flight restrictions around the Hanson Creek bald eagle winter roost sites and a Columbia milk-vetch mitigation program that includes seed collection, propagation, plant salvage and offsite planting. Continued monitoring of the historic Borden lek would allow for adaptive management of the UAS airstrip if needed. With BMPs and mitigation in place, the proposed action would not adversely affect populations or habitats of sensitive species at levels that would trend toward endangerment or the need for federal listing. Consequently, the proposed action would not lead to a significant cumulative impact on other special status wildlife and plants.

Air Quality

Air quality in the area was designated as not attaining national standards in 1990 for particulate matter and carbon monoxide. By 2005, the area was in compliance with the standards, but is still carefully monitored. The largest concern is the area is wood-fueled home heating (Yakima Regional Clean Air Agency 2008). The increased UAS training activity on YTC would result in a small increase in air pollutant emissions. More aerial vehicles and ground support vehicles would produce more emissions on YTC as a whole. However, given the high fuel economy of the Shadow and the small number of ground vehicles involved in operations, potential emissions associated with the operation

of the proposed new UAS training facility are minimal. Due to the location of the new facility and where the UAVs would be operating, there are no anticipated cumulative effects expected to occur that would impact the existing PM-10 Non-Attainment Maintenance Area located in and around the city of Yakima, and where it extends onto the western portion the YTC Cantonment Area.

Aesthetics

Historic and present-day use of YTC has changed the character of the land. Degradation of vegetation through conversion of land to agricultural uses, grazing, fire, construction, road building, introduction of nonnative species, and maneuver training exercises has changed the aesthetics of the area. The increase in infrastructure and training activity on YTC as a result of this proposed action would result in a very small yet incremental increase in disruption to views of relatively undisturbed shrub-steppe landscape dominant over most of YTC. However, because the proposed action would have a small footprint and affect few viewsheds relative to similar opportunities available across the larger YTC and the proposed action would not affect views from the John Wayne Trail; therefore, the proposed action would not lead to a significant cumulative impact on aesthetics.

Recreation

YTC is open to the public for a variety of recreational activities including hunting, bird watching, mountain biking, horseback riding, and hiking. The increase in infrastructure and training activity on YTC as a result of this proposed action would result in an incremental increase in the amount of time that this part of YTC is closed to recreational uses while military activities are occurring. However, the primary function of YTC is to provide military training with recreation access only available on an opportunistic basis when no military activities are occurring in those areas. Therefore, the proposed action would not result in a significant cumulative impact regarding recreation. In addition, military training always has priority (32 CFR 552).

Hazardous and Toxic Materials

The proposed sites have no known history of hazardous or toxic substance storage. The construction of the proposed UAS training facility and training activity associated with its operation would result in an incremental increase in risk of hazardous materials release but would not contribute significantly to additional waste generation. Handled properly, these materials will not have an adverse impact on the surrounding environment. An SPCCP would be in effect during construction activities to detail practices that would be followed to reduce the risk that a hazardous materials release would occur and in the event that one does occur, any cumulative impact would be insignificant. In the unlikely event of an aerial vehicle crash that spilled fuel onto the ground, soil contaminated with petroleum compounds would be cleaned up and disposed of. Any wastes produced from the spill and subsequent clean-up would be taken to the YTC One Stop Yard for disposal. The potential for proposed action-related flight operations to result in cumulative impacts on the environment related to hazardous and toxic materials is insignificant.

Global Climate Change

Many aspects of the global climate are changing rapidly, and the primary drivers of that change are human in origin (U.S. Global Change Research Program 2014). Particularly, those drivers include emissions from burning fossil fuels (coal, oil, and natural gas) and from deforestation (U.S. Global Change Research Program 2014). The potential for the proposed action to result in cumulative

global climate change impacts is insignificant. The proposed action's contribution to global climate change would be minimal because the construction activity and contributions from training facility operations would be minimal. As the emissions of the entire YTC were far below the CEQ's annual threshold, the additive emissions from the small and light-weight Shadow UAS aerial vehicle and their ground support vehicles would be minimal.

If an aerial vehicle crash were to ignite a wildland fire, greenhouse gas emissions at rates potentially contributing to a significant cumulative impact would be possible; however, the probability that an aerial vehicle would crash with the intensity to ignite a fire is so low that the risk level of this activity, as well as its potential impact on global climate change is considered insignificant. Out of all Shadow UAS training operations in a five year period (2005 through 2009) there have been no accidents that have resulted in a fire (Doyle pers. comm.).

Indian Treaty Rights

The Yakama Nation signed a treaty with the U.S. Government on the treaty ground at Camp Stevens in the Walla Walla Valley on June 9, 1855. The treaty was ratified on March 8, 1859, and proclaimed on April 18, 1859. The Yakama Nation reserved the right to fish, hunt, and gather traditional foods on the ceded lands and to continue to fish in its "Usual and Accustomed" fishing areas. Consultation will continue between YTC and the Yakama Nation, as well as the Wanapum Band,to determine whether or not cultural resources would be affected by construction of either of the build alternatives. YTC will also coordinate with the Yakama Nation and the Wanapum Band to determine if the proposed action will affect places of cultural and religious importance on or near YTC. While the project may restrict access to the proposed action's anticipated construction and operation area, given the limited scale of the proposed action, any no cumulative impacts on Indian treaty rights are expected.

Materials Source Environment and Transport Effects

Both build alternatives would utilize local rock from existing borrow sources owned and operated by YTC and transport would occur over existing roads. The materials source for Alternative 2 would be an existing borrow pit roughly 2 miles east of the project area. The materials source for Alternative 3 would be an existing borrow pit roughly 1.5 miles (by road) southwest of the project area. Aggregate needs for either build alternative could be met by either of these existing sources. Given the relatively small amount of rock needed to construct either build alternative, existing roads would be adequate for delivering construction materials to either build alternative site without substantial degradation to their current condition. Constructing the proposed action under either build alternative would not be expected to result in significant cumulative materials source environment or transport impacts.

Cumulative Effects Conclusion

Although minor local changes have occurred to geomorphology, hydrology, vegetation, fish and wildlife, air quality, and aesthetics, the overall integrity of these resources will be unchanged by the proposed action or other foreseeable future actions in the area. Threatened and endangered species will continue to be protected, ensuring that these resources are maintained. No impact to recreation, hazardous and toxic materials, or Indian treaty rights are expected. Impacts on the surrounding environment from the proposed action and associated mitigation when observed cumulatively with past, present, and future actions will remain below the established significance thresholds for each resource area. No proposed actions outside of the installation are likely to add any appreciable cumulative impacts on this proposed action.

Chapter 5
Public Involvement, Coordination and EA Review Process

No public involvement or coordination related to the proposed action has yet occurred. This draft EA will be made available for public review and comment for a 30-day period. Comments received will be reviewed and addressed in a final EA.

Chapter 6
Environmental Compliance

Pursuing the proposed action under either of the two build alternatives considered in this EA would require compliance with the following federal regulations, treaties, and executive orders:

- National Environmental Policy Act
- Bald and Golden Eagle Protection Act
- Endangered Species Act
- Clean Water Act
- National Historic Preservation Act
- Clean Air Act
- Fish and Wildlife Coordination Act
- Migratory Bird Treaty Act
- Tribal Treaty Obligations
- Executive Order 12898, Environmental Justice
- Executive Order 11988, Floodplain Management
- Executive Order 11990, Protection of Wetlands

6.1 National Environmental Policy Act

NEPA (42 U.S.C. 4321, 40 CFR 1500.1), signed in 1970, requires federal agencies to evaluate the potential impacts of their actions on the environment prior to making decisions. To comply with NEPA, a federal agency considering action usually prepares either an EA followed by a Finding of No Significant Impact (FONSI) for proposals not anticipated to significantly affect the environment, or an EIS followed by a Record of Decision (ROD) for proposals anticipated to significantly affect the environment. The preparation of this EA serves as the first phase of compliance with NEPA for this proposed action. Following the preparation of this EA, it is anticipated that a FONSI will be prepared to complete the level of documentation necessary for this proposed action under NEPA.

6.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." For purposes of these guidelines, "disturb" means “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering

behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." As discussed in Chapter 4 of this EA, implementing the proposed action under either of the build alternatives is not anticipated to result in take of bald or golden eagles. Consequently, a permit under the Bald and Golden Eagle Protection Act is not expected to be required for the proposed action.

6.3 Endangered Species Act

The Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA) was passed to protect and recover imperiled species and the ecosystems upon which they depend. Under ESA, species may be listed as either endangered, in danger of extinction in all or a significant portion of its range, or threatened, likely to become endangered within the foreseeable future. As discussed in Chapter 4, Environmental Consequences, of this EA, implementing the proposed action under either of the build alternatives is not anticipated to result in take of any listed or proposed species or significantly affect their critical habitats. . A no effect determination has been made and documented by the agency in compliance with the Endangered Species Act.

6.4 Clean Water Act

The Clean Water Act (CWA) and amendments (33 U.S.C. §1251 et seq.) enacted in 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and regulating quality standards for surface waters. As discussed in Chapter 4, Environmental Consequences, of this EA, implementing the proposed action under either of the build alternatives is not anticipated to generate runoff that would affect waters of the U.S. or result in fill being placed in waters of the U.S. Construction activities associated with either build alternative would result in more than 1 acre of ground disturbance and would not require permitting under CWA.

6.5 National Historic Preservation Act

The National Historic Preservation Act (NHPA) enacted in 1966 (16 U.S.C 470) establishes government Policy and procedures regarding historic properties, districts, sites, buildings, structures, and objects included in or eligible for inclusion in the NRHP. Section 106 of the NHPA requires federal agencies to consider the effects of their actions on places listed or eligible for listing in the NRHP. As discussed in Chapter 4, Environmental Consequences, of this EA, the Corps, in consultation with the SHPO and potentially affected tribal nations, has determined that no places listed or eligible for listing in the NRHP would be affected by implementing the proposed action under either of the build alternatives.

6.6 Clean Air Act

The Clean Air Act (CAA) (42 U.S.C. Section 7401 et seq.) enacted in 1970 regulates air emissions from stationary and mobile sources of air emissions and authorizes EPA to establish NAAQS to protect public health and public welfare and to regulate emissions of hazardous air pollutants. As discussed in Chapter 4 of this EA, implementing the proposed action under either of the build

alternatives is not anticipated to generate substantial amounts of hazardous air pollutants or generate emissions that would result NAAQS exceedances.

6.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) was enacted in 1934 and amended through 1965, and requires consultation with USFWS and state fish and wildlife agencies on projects where "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified" under federal authority. The proposed action would not impound or divert water from any water body and would, therefore, not require consultation under this act.

6.8 Migratory Bird Treaty Act

The MBTA (16 U.S.C. 703-712) prohibits the take of migratory birds without a permit or other authorization promulgated by the U.S. Department of Interior. Take under the MBTA is defined as the action of or attempt to “pursue, hunt, shoot, capture, collect, or kill”. The proposed action is a military readiness activity (MRA) that could result in the incidental take of migratory birds. The proposed action would be carried out in accordance with the terms and conditions defined in Migratory Bird Permit: Take of Migratory Birds by the Armed Forces Rule, Final rule (Federal Register 72: 8931-8950, February 28, 2007), allowing the unintentional take of migratory birds for an MRA.

6.9 Tribal Treaty Obligations

The Yakama Nation signed a treaty with the U.S. government on the treaty ground at Camp Stevens in the Walla Walla Valley on June 9, 1855. The treaty was ratified on March 8, 1859 and proclaimed on April 18, 1859. In this treaty, the Yakama Nation ceded land claimed by them, approximately 12 million acres (Yakama Nation 2012), including the area now occupied by YTC, reserving less than 10% of their land for permanent settlement. The Yakama Nation also reserved the right to fish, hunt and gather traditional foods on the ceded area and to continue to fish in their “Usual and Accustomed” fishing areas. Neither build alternative would be located in or would potentially affect the Yakama Nation’s Usual and Accustomed fishing areas but because YTC is located on its ceded land, tribal members may access the property by permission of YTC to exercise their treaty rights. The proposed action would not change YTC’s access policy or substantially change the land and resources available to tribal access.

6.10 Executive Order 12898, Environmental Justice

Executive Order 12898, issued in 1994, established environmental justice as a federal agency priority to ensure that minority and low-income groups are not disproportionately affected by federal actions. As discussed in Chapter 4, Environmental Consequences, no low-income and minority groups would be disproportionately affected by the proposed action under either of the build alternatives.

6.11 Executive Order 11988, Floodplain Management

Executive Order 11988, issued in 1977, requires federal agencies "to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." Neither of the two build alternative sites under consideration for the proposed action are located on floodplains or would affect floodplains.

6.12 Executive Order 11990, Protection of Wetlands

Executive Order 11990, issued in 1977, requires federal agencies "to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." The proposed action would not affect wetlands under either of the build alternatives.

Chapter 7
Conclusion

The No Action Alternative and two build alternatives have been analyzed for their potential to affect the environment. The results of these analyses have been discussed in the earlier chapters of this document and are summarized by alternative in Table 7-1.

The preferred alternative is to implement the proposed action, construct a UAS training facility on the northern portion of YTC, under Alternative 2. While the potential environmental impacts of Alternative 2 are very similar to those of Alternative 3, Alternative 2 offers operational advantages over Alternative 3 because the terrain profile in the vicinity of Alternative 2 offers total control of UASs operating in the northern training areas by allowing a direct line of sight across the training area. Implementing Alternative 2 would also require less grading and fill because the topography of the site is much flatter. Based on the analysis discussed in this EA, the Corps has determined that preparation of an EIS for this proposed action is not necessary and that adoption of a FONSI is appropriate.

Table 7-1. Comparison of Alternatives for a Shadow Unmanned Aircraft Systems Training Facility at the Yakima Training Center

Resource Area	Activity	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Geomorphology	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Hydrology	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Vegetation	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	No Impact	No Impact
Fish	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Wildlife	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Threatened and Endangered Species	Construction	No Impact	No Impact or Insignificant Impact	No Impact or Insignificant Impact
	Operation	No Impact	No Impact or Insignificant Impact	No Impact or Insignificant Impact
Historic and	Construction	No Impact	No Impact	No Impact

Resource Area	Activity	Alternative 1	Alternative 2 (Preferred)	Alternative 3
Cultural Resources	Operation	No Impact	No Impact	No Impact
Air Quality	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Noise	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Land Use	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Aesthetics	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Recreation	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Hazardous and Toxic Materials	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Global Climate Change	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Local Economy and Socioeconomics	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Environmental Justice	Construction	No Impact	No Impact	No Impact
	Operation	No Impact	No Impact	No Impact
Indian Treaty Rights	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Materials Source Environment & Transport	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact
Cumulative Effects	Construction	No Impact	Insignificant Impact	Insignificant Impact
	Operation	No Impact	Insignificant Impact	Insignificant Impact

Chapter 8
List of Preparers

Daniel W. (Bill) Baber
Senior Wildlife Biologist
PhD Wildlife Ecology, Oregon State University, Corvallis
MS, Biology (Ecology emphasis), Florida Institute of Technology
BS, Biology (Marine emphasis), Florida Institute of Technology
27 years of experience

Bill Bumback
Natural Resources Planner
MS, Environmental Science, Washington State University
BS, Natural Resources, Humboldt State University
17 years of experience

J. Tait Elder
Archaeologist
MA, Archaeology, Portland State University
BA, Anthropology (Minor in Geology), Western Washington University
8 years of experience

Kristen Lundstrom
Technical Editor
BA, English Literature and Expository Writing, University of Washington
9 years of experience

Grant Novak
Fisheries Biologist and Natural Resources Planner
MS, Environmental Sustainability Management, University of Washington
BS, Biology (Fisheries emphasis), Florida Atlantic University
22 years of experience

Jim Wilder PE
Environmental Air and Noise Engineer
MS, Environmental Engineering, University of Washington
BS, Civil Engineering, University of California, Davis
37 years of experience

Chapter 9
References

9.1 Printed References

AHBL, Inc. 2013. Design narrative to construct unmanned aircraft systems (UAS) strip at YTC, Washington. W912DW-11-D-1014-0020. Design Package No. CE0121. 35% concept submittal. August 9.

Blickley, J.L., D. Blackwood and G.L. Patricelli. 2012. Experimental evidence for the effects of chronic anthropogenic noise on abundance of greater sage-grouse leks. Conservation Biology 26:461-471.

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

Boreson, K. 1998. A cultural resources study on the Yakima Training Center, Kittitas and Yakima Counties, Washington. U.S. Army Corps of Engineers, Seattle District, Seattle, Washington.

Bottorff, J. and D. Swanson. 1993. Biological Assessment for the Restationing of an Armored Division at Fort Lewis. DACA 88–93–M–0808.

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

Chicago Climate Exchange. 2012. Greenhouse Gas Emission Factors for Direct Emission Sources. Available: <https://www.theice.com/publicdocs/ccx/CCX_GHG_Factors.pdf>. Accessed: October 2012.

Council for Environmental Quality. 2010. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. February 18, 2010.

Daubenmire, R. 1970. Steppe Vegetation of Washington. Washington State University Agricultural Experiment Station Technical Bulletin 62. 131 pp.

Dobkin, S.D. and J.D. Sauder. 2004. Shrub-steppe landscapes in jeopardy. Distribution, abundances, and uncertain future of birds and small mammals in the Intermountain West. High Desert Ecological Institute, Bend, Oregon.

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

Downs, J.L., L.E. Eberhardt, and V.W. Meadow. 1992. Information on Hoover's Desert Parsley for base realignment. Draft Report. Battelle Pacific Northwest Labs, Richland, Washington.

ENSR International. 1995a. Ecology of Bats on the Yakima Training Center. ENSR. Redmond, Washington.

———. 1995b. Herpetofauna baseline assessment of the Yakima Training Center. ENSR. Redmond, Washington.

Environment and Natural Resources Division 2008. Cited in Washington Army National Guard. 2012. Draft Environmental Assessment for the Construction and Operation of a Washington Army National Guard (WA ARNG) Tactical Unmanned Aircraft System (TUAS) Facility, and Training of a WA ARNG TUAS Platoon at Yakima Training Center, Washington.

Franklin, J.F. and C.T. Dyrness. 1973. Natural Vegetation of Oregon and Washington. U.S. Department of Agriculture, Forest Service, General Technical Report PNW–8.

Hallock, L.A. and K.R. McAllister. 2005a. Columbia Spotted Frog. Washington Herp Atlas. Available: <http://www1.dnr.wa.gov/nhp/refdesk/herp/speciesmain.html>. Accessed: October 2012.

———. 2005b. Sharptail Snake. Washington Herp Atlas. Available: <http://www1.dnr.wa.gov/nhp/refdesk/herp/speciesmain.html>. Accessed: October 2012.

Hallock, L.A. 2006. Summary Report on the Striped Whipsnake (*Masticophis taeniatus*) in Washington. Washington State Department of Natural Resources. Natural Heritage Report 2006-05.

Hand, K.D. and L.L. Cadwell. 1994. 1993 Study of Long-billed Curlews on the Yakima Training Center. PNL-9465. Pacific Northwest Laboratory, Richland, Washington.

Hand, K.D. L.L. Cadwell and L.E. Eberhardt. 1994. Long-billed Curlews on the Yakima Training Center: Information for Base Realignment. PNL-9214. Pacific Northwest Laboratory, Richland, Washington.

Industrial Noise Control, Inc. 2010. Comparative Examples of Noise. <http://www.industrialnoisecontrol.com/comparative-noise-examples.htm>. Accessed June 2014.

Joint Base Lewis-McChord. 2012. Rare and Sensitive Plant Management Plan for Yakima Training Center. January 2012 – January 2017.

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

Larkin, R.P. 1996. Effects of military noise on wildlife: A literature review. U.S. Army Corps of Engineers Research Laboratory, Champaign, Illinois.

Larsen, E.M., J.M. Azerrad, and N. Nordstrom (eds). 2004. Management Recommendations for Washington's Priority Species – Volume IV: Birds. Washington Department of Fish and Wildlife. Olympia, Washington.

Leingang, C. 2011. Information paper on greater sage-grouse management at Yakima Training Center. August 9, 2011. Yakima, Washington.

Livingston, M. 1998. Western Sage-grouse Management Plan. Report Prepared for Directorate of Environment and Natural Resources, Yakima Training Center. Yakima, Washington.

Mastrogiuseppe, J. and S. Gill. 1988. Survey of Yakima Training Center proposed northern acquisition area and proposed eastern river crossing sites for *Astragulus columbianus*. Prepared for the U.S. Army Yakima Training Center, Washington. Yakima, Washington.

National Aeronautics and Space Administration. 2011. North Wallops Island Unmanned Aerial Systems Airstrip Draft Environmental Assessment

National Marine Fisheries Service (NMFS). 2009. Northwest Regional Office Species Lists. Last updated: January 29, 2010. Available: <http://www.nwr.noaa.gov/Species-Lists.cfm>.

Nordstrom, N. 2004. Burrowing owl, *Athene cunicularia*. Pages 23-1 to 23-7 in E. Larsen, J. M. Azerrad, and N. Nordstrom, technical editors. Management Recommendations for Washington's Priority Species – Volume IV: Birds. Washington Department of Fish and Wildlife. Olympia, Washington.

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

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

Richardson, S., M. Whalen, D. Demers, and R. Milner. 2004. Ferruginous hawk, *Buteo regalis*. Pages 7-1 to 7-6 in E. Larsen, J. M. Azerrad, and N. Nordstrom, technical editors. Management Recommendations for Washington's Priority Species – Volume IV: Birds. Washington Department of Fish and Wildlife. Olympia, Washington.

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

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

Seattle Audubon Society. 2008. BirdWeb: Seattle Audubon's Online Guide to the Birds of Washington State. Available: <http://www.seattleaudubon.org/birdweb/index.aspx>. Accessed: May 5, 2009.

Smithsonian Migratory Bird Center. 2012. Fact Sheet - Neotropical Migratory Bird Basics. Available: <http://nationalzoo.si.edu/scbi/migratorybirds/fact_sheets/default.cfm?fxsht=9>. Accessed: October 25, 2012.

Stalmaster, M.V. 1992. Status and ecology of wintering bald eagles on the Yakima Training Center, Washington. Stalmaster and Associates. Milton, Washington.

U.S. Army (Army). 1994. Final Environmental Impact Statement for the Stationing of Mechanized or Armored Combat Forces at Fort Lewis, Washington. U.S. Army Corps of Engineers. Mobile, Alabama.

———. 2002. Final Cultural and Natural Resources Management Plan for the Yakima Training Center, 2002-2006. Environment and Natural Resources Division, Yakima Training Center, Yakima, Washington.

———. 2004a. Procedures for the protection of state and federally listed threatened, endangered, candidate species, species of concern, and designated critical habitat. Fort Lewis Regulation No. 420-5. Fort Lewis, Washington.

———. 2004b. Final Environmental Impact Statement for the Transformation of the 2nd Brigade, 25th Infantry Division (L) to a Stryker Brigade Combat Team in Hawai'i. <http://www.garrison.hawaii.army.mil/sbcteis/feis/>. Accessed June 2014.

———. 2010a. Final EIS for the Fort Lewis Army Growth and Force Structure Realignment. Joint Base Lewis-McChord. Fort Lewis, Washington.

———. 2010b. 2007-2010 Striped Whipsnake (*Masticophis taeniatus*) Survey, Yakima Training Center. Memorandum for Record IMWE-YTC-PWE. December 13, 2010.

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

U.S. Department of Agriculture-Natural Resource Conservation Service (USDA-NRCS). 2006. Soil Survey of Yakima Training Center, Parts of Kittitas and Yakima Counties, Washington. In cooperation with United States Department of the Army, Yakima Training Center; U.S. Army Corps of Engineers; and Washington State University Agricultural Research Center.

U.S. Fish and Wildlife Service (USFWS). 2005. Species Assessment and Listing Priority Assignment Form: *Polites mardon*. Available: <http://www.fws.gov/arcata/es/inverts/mardonSkipper/documents/mardonSkipper_candidateListing.pdf>. Accessed: October 17, 2011.

———. 2010a. Endangered and threatened wildlife and plants: Revised designation of critical habitat for bull trout in the coterminous United States. Final rule. Federal Register 70:63898-64070. October 18, 2010.

———. 2010b. Endangered and threatened wildlife and plants: 12-Month finding for petitions to list the greater sage-grouse (*Centrocercus urophasianus*) as threatened or endangered. Proposed rule. Federal Register 75:13910-14014. March 23, 2010.

———. 2012a. Washington Fish and Wildlife Office Endangered Species Web Page (with links to Kittitas and Yakima county species lists). Updated: March 15, 2012. Available: <http://www.fws.gov/wafwo/species_new.html>.

———. 2012b. Endangered and threatened wildlife and plants: 12-Month finding for petitions to list the mardon skipper as threatened or endangered. Proposed rule. Federal Register 77:54332-54352. September 4, 2012.

———. 2013a. Endangered and threatened wildlife and plants: Review of native species that are candidates for listing as endangered or threatened; Annual notice of findings on resubmitted petitions; Annual description of progress on listing actions. Federal Register 78: 70104-70162. November 22, 2013.

———. 2013b. Proposed threatened status for the western distinct population segment of the yellow-billed cuckoo (*Coccyzus americanus*). Federal Register 78: 78321-8322. December 26, 2013.

U.S. Global Change Research Program. 2014. National Climate Assessment. Available: http://nca2014.globalchange.gov/. Accessed June 20, 2014.

Washington Army National Guard. 2012. Draft Environmental Assessment for the Construction and Operation of a Washington Army National Guard (WA ARNG) Tactical Unmanned Aircraft

System (TUAS) Facility, and Training of a WA ARNG TUAS Platoon at Yakima Training Center, Washington.

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

———. 1997. Wildlife Research Prairie Grouse. Olympia, Washington.

———. 2012. Threatened and Endangered Wildlife in Washington: 2011 Annual Report. Endangered Species Section, Wildlife Program. Washington Department of Fish and Wildlife, Olympia, Washington. 180 pp.

Washington Natural Heritage Program (WNHP). 2008. Statewide GIS Data Set Containing Information on Rare Plants and High Quality Ecosystems. Washington Natural Heritage Program, Olympia, Washington.

———. 2012a. *Collomia macrocalyx* Leiberg, Bristle-flowered Collomia, Polemoniaceae (Phlox Family). Available: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/coma.pdf>.

———. 2012b. *Astragalus columbianus* Barneby, Columbia Milk-vetch, Fabaceae (Pea Family). Available: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/asco.pdf>.

———. 2012c. *Lomatium tuberosum* Hoover, Hoover's Desert-parsley, Apiaceae (Parsley Family). Available: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/lotu.pdf>.

———. 2012d. *Tauschia hooveri* Math & Const, Hoover's Tauschia, Apiaceae (Parsley Family) [Web page]. Located at: http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/taho.pdf.

———. 2012e. *Pediocactus nigrispinus* Hochstätter, *Pediocactus simpsonii* Engelm. var. *robustior* Coult., Hedgehog Cactus, Cactaceae (Cactus Family). Available: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/pedsim.pdf>.

———. 2012f. *Eatonella nivea* Gray, White Eatonella. Asteraceae (Aster Family). Available: <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/eani.pdf>.

Watson, J. and M. Whalen. 2004. Golden eagle, *Aquila chrysaetos*. Pages 8-1 to 8-7 in E. Larsen, J. M. Azerrad, and N. Nordstrom, technical editors. Management Recommendations for Washington's Priority Species – Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, Washington.

Weinmann, F., P.F. Zika, D.E. Giblin, B. Legler. 2012. Checklist of the Vascular Plants of Washington State. University of Washington Herbarium. Available: <http://biology.burke.washington.edu/herbarium/waflora/checklist.php>.

White, K.R. 2013. Yakima Training Center sage-grouse lek monitoring for 2013. Report Prepared for Directorate of Environment and Natural Resources, Yakima Training Center. Yakima, Washington.

Yakama Nation. 2010. Yakama Nation website. Available: <http://www.yakamanation-nsn.gov/history2.php>. Accessed October 30, 2012.

Yakima Training Center Environment and Natural Resources Division. 2007. Steelhead Spawning Survey Summary 2007. Center Environment and Natural Resources Division, Yakima Training Center. Yakima, Washington.

———. 2008. Fish Monitoring Report 2008. Center Environment and Natural Resources Division, Yakima Training Center. Yakima, Washington.

Yakima Regional Clean Air Agency. 2008. Yakima Regional Clean Air Agency website. Available: http://www.yakimacleanair.org/index.html. Accessed June 20, 2014.

9.2 Personal Communications

Cummins, J. Fisheries Biologist. Washington Department of Fish and Wildlife, Yakima, Washington. December 6, 1999—Telephone conversation with K. Anderson, ENSR, Redmond, Washington.

Doyle, Arthur J. UAS Accident Data SME. U.S. Army Combat Readiness/Safety Center. February 23, 2010—Personal communication.

Kaul, Scott. Project Engineer. AHBL, Inc. January 31, 2014—Email correspondence with Jodie Ramsey, U.S. Army Corps of Engineers.

Nissen, Peter. Natural Resource Manager. March 20, 2014-Email correspondence with Pat Cagney, U.S. Army Corps of Engineers.

Appendix A

Terrestrial Vertebrate Species Occurring on Yakima Training Center

Terrestrial Vertebrate Species of YTC

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	For YTC Occurrences: RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency
	(In taxonomic order within major taxa)											
	Mammals	*(nomenclature follows Jones, J.K. et al., 1992)*										
	Sorex merriami	Merriam's shrew	SOME	1	SC		Permanent	x				
	Sorex vagrans	Vagrant shrew	SOVA	1	U		Permanent					
*	*Myotis californicus*	California myotis	MYCA	3,4	U		Undocumented					
	Myotis ciliolabrum	Western small-footed bat	MYCI	3,4	SM	SC	Permanent	?				
*	*Myotis evotis*	Long-eared myotis	MYEV	3,4	SM		Undocumented					
	Myotis lucifugus	Little brown bat	MYLU	3,4	U		Permanent	?				
	Myotis thysanodes	Fringed myotis	MYTH	3,4	SM	SC	Permanent	x				
	Myotis yumanensis	Yuma myotis	MYYU	3,4	U	SC	Peripheral					
	Lasionycteris noctivagans	Silver-haired bat	LANO		U		Summer					
	Lasiurus cinereus	Hoary bat	LACI	3,4	U		Summer	?				
*	*Pipistrellus hesperus*	Western pipistrelle	PIHE	3,4	SM		Undocumented					
	Eptesicus fuscus	Big brown bat	EPFU	3,4	U		Permanent	?				
*	*Plecotus townsendii*	Townsend's big-eared bat	PLTO	3,4	SC	SC	Undocumented					
	Antrozous pallidus	Pallid bat	ANPA	3,4	SM		Permanent					
*	*Brachylagus idahoensis*	Pygmy rabbit	BRID	1	SE	SC	Undocumented					
	Sylvilagus nuttallii	Nuttall's cottontail	SYNU	1,3	G		Permanent	x				
	Lepus californicus	Black-tailed jackrabbit	LECA	1	SC		Permanent	x				
	Lepus townsendii	White-tailed jackrabbit	LETO	1	SC		Permanent	x				
	Tamias minimus	Least chipmunk	TAMI	1	P		Permanent	x				
	Marmota flaviventris	Yellow-bellied marmot	MAFL	1,3,4	U		Permanent	x				
*	*Spermophilus washingtoni*	Washington ground squirrel	SPWA	1	SC	FC	Undocumented					
	Spermophilus townsendii	Townsend's ground squirrel	SPTO	1	U		Permanent	x				
	Thomomys talpoides	Northern pocket gopher	THTA	1,2	U		Permanent	x				
	Perognathus parvus	Great Basin pocket mouse	PEPA	1,2	U		Permanent	x				
	Dipodomys ordii	Ord's kangaroo rat	DIOR	1	SM		Permanent	x				
	Castor canadensis	American beaver	CACA	3	F		Permanent	x		x		
	Reithrodontomys megalotis	Western harvest mouse	REME	1,3	U		Permanent	x				
	Peromyscus maniculatus	Deer mouse	PEMA	1,2,3	U		Permanent	x				

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
*	*Onychomys leucogaster*	N. grasshopper mouse	ONLE	1	SM		Undocumented						
	Neotoma cinerea	Bushy-tailed woodrat	NECI	4	U		Permanent	x					
	Mus musculus	House mouse	MUMU	5	U		Permanent		x				
	Microtus longicaudus	Long-tailed vole	MILO	1,3	U		Permanent	x					
	Microtus montanus	Montane vole	MIMO	3	U		Permanent	x					
	Lemmiscus curtatus	Sagebrush vole	LECU	1	SM		Permanent	x					
	Ondatra zibethica	Common muskrat	ONZI	3	F		Permanent	?		x			
	Erethizon dorsatum	Common porcupine	ERDO	1,3	U		Permanent	x					
	Canis latrans	Coyote	CALA	1,3,4,2	U		Permanent	x					
	Vulpes fulva	Red fox	VUFU	1,3	F,G		Permanent	?					
	Procyon lotor	Common raccoon	PRLO	1,3	F,G		Permanent	?					
*	*Mustela erminea*	Ermine	MUER		F		Undocumented						
	Mustela frenata	Long-tailed weasel	MUFR	1,3	F		Permanent	x					
	Mustela vison	Mink	MUVI	3	F		Permanent	?					
	Taxidea taxus	American badger	TATA	1,2,4	F		Permanent	x					
*	*Spilogale gracilis*	Western spotted skunk	SPGR		U		Undocumented						
	Mephitis mephitis	Striped skunk	MEMEp	1,3	U		Permanent	x					
	Felis concolor	Mountain lion	FECO	1,3,4,2	G		Peripheral						
	Lynx rufus	Bobcat	LYRU	1,3,4,2	F,G		Permanent	?					
	Cervus elaphus	Elk	CEEL	1,3	G		Permanent	?					
	Odocoileus hemionus	Mule deer	ODHE	1,3,2	G		Permanent	x					
	Ovis canadensis californiana	California Bighorn Sheep	OVCA	2,4	G	SC	Peripheral						
	Birds	*(Nomenclature follows American Ornithologists' Union, 1983)*											
*	*Gavia immer*	Common loon	GAIM	3	S		Peripheral					x	
	Podilymbus podiceps	Pied-billed grebe	POPO	3	P		Permanent				x		
	Podiceps auritus	Horned grebe	POAU	3	SM		Migrant				x		
*	*Aechmophorus occidentalis*	Western grebe	AEOC	3	SC		Migrant						
*	*Pelecanus erythrorhynchos*	American white pelican	PEER	3	SE		Permanent?						
	Ardea herodias	Great blue heron	ARHE	3	SM		Permanent			x			
	Botaurus lentiginosus	American bittern	BOLE	3	P		Migrant			x			
	Nycticorax nycticorax	Black-crowned night heron	NYNY	3	SM		Peripheral			x			

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
*	*Grus canadensis*	Sandhill crane	GRCA	3	SE		Infreq. Migrant						
	Branta canadensis	Canada goose	BRCA	3	G		Permanent			x			
	Cygnus columbianus	Tundra Swan	CYCO	3	P		Migrant			x			
	Aix sponsa	Wood duck	AISP	3	G		Summer				x		
	Anas platyrhynchos	Mallard	ANPL	3	G		Permanent	x			x		
	Anas acuta	Northern pintail	ANAC	3	G		Permanent			x			
	Anas cyanoptera	Cinnamon teal	ANCY	3	G		Summer				x		
	Anas discors	Blue-winged teal	ANDI	3	G		Migrant			x			
	Anas crecca	Green-winged teal	ANCR	3	G		Summer			x			
	Anas clypeata	Northern Shoveler	ANCL	3	G		Migrant			x			
	Anas strepera	Gadwall	ANST	3	G		Migrant			x			
	Anas americana	American wigeon	ANAM	3	G		Permanent			x			
	Aythya valisineria	Canvasback	AYVA		G		Winter			x			
	Aythya americana	Redhead	AYAM	3	G		Summer			x			
	Aythya collaris	Ring-necked duck	AYCO	3	G		Permanent			x			
*	*Aythya marila*	Greater scaup	AYMA	3	G		Winter						
*	*Aythya affinis*	Lesser scaup	AYAF	3	G		Permanent						
	Bucephala albeola	Bufflehead	BUAL	3	G		Winter			x			
	Lophodytes cucullatus	Hooded merganser	LOCU	3	G		Permanent			x			
*	*Mergus merganser*	Common merganser	MEMEr	3	G		Summer						
	Rallus limicola	Virginia rail	RALI	3	G		Migrant	?		x			
	Porzana carolina	Sora	PORCA	3	G		Summer	x		x			
	Fulica americana	American coot	FUAM	3	G		Permanent						
	Charadrius vociferus	Killdeer	CHVO	1,3	P		Summer	x			x		
	Numenius americanus	Long-billed curlew	NUAM	1,3	SM		Summer	x			x		
	Actitis macularia	Spotted sandpiper	ACMA	3	P		Summer				x		
	Gallinago gallinago	Common snipe	GAGA	3	G		Summer	x			x		
	Larus delawarensis	Ring-billed gull	LADE	3	P		Permanent				x		
	Larus californicus	California gull	LACA		P		Permanent?					x	
*	*Sterna caspia*	Caspian tern	STCA	3	SM		Summer,Peripheral			x			
*	*Sterna forsteri*	Forster's tern	STFO	3	SM		Summer,Peripheral			x			
*	*Chlidonias niger*	Black tern	CHNI	3	SM	SC	Summer			x			

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Cathartes aura	Turkey vulture	CAAU	1,3,4,2	SM		Summer,Peripheral				x		
	Pandion haliaetus	Osprey	PAHA	3	SM		Peripheral			x			
	Haliaeetus leucocephalus	Bald eagle	HALE	3	ST	FT	Winter			x			
	Circus cyaneus	Northern harrier	CICY	1,3	P		Permanent	x			x		
	Accipiter striatus	Sharp-shinned hawk	ACST	3	P		Migrant				x		
	Accipiter cooperii	Cooper's hawk	ACCO	3	P		Summer	x		x			
	Accipiter gentilis	Northern goshawk	ACGE	3	SC	SC	Migrant				x		
	Buteo swainsoni	Swainson's hawk	BUSW	1,3,2	P		Summer	x			x		
	Buteo jamaicensis	Red-tailed hawk	BUJA	1,3,2	P		Permanent	x			x		
	Buteo regalis	Ferruginous hawk	BURE	1,2,4	ST	SC	Summer	x				x	
	Buteo lagopus	Rough-legged hawk	BULA	1,2	P		Winter					x	
	Aquila chrysaetos	Golden eagle	AQCH	1,4	SC		Permanent	x				x	
	Falco sparverius	American kestrel	FASP	1,3,4,2,5	P		Permanent	x			x		
	Falco columbiarus	Merlin	FACO	1,3,4	SC		Infreq. Migrant				x		
	Falco peregrinus	Peregrine falcon	FAPE	3	P		Infreq. Migrant					x	
	Falco rusticolus	Gyrfalcon	FARU		SM		Infreq. Migrant					x	
	Falco mexicanus	Prairie falcon	FAME	1,4	SM		Permanent	x				x	
	Perdix perdix	Gray partridge	PEPE	1,3,4,2	G		Permanent	x	x		x		
	Alectoris chukar	Chukar	ALCH	1,3,4,2	G		Permanent	x	x		x		
	Phasianus colchicus	Ring-necked pheasant	PHCO	3,5	G		Permanent	x	x		x		
	Centrocercus urophasianus	Sage grouse	CEUR	1,3,2	ST	FC	Permanent	x				x	
	Callipepla californica	California quail	CACAl	1,3,2,5	G		Permanent	x	x		x		
	Columba livia	Rock dove	COLI	3,4,5	U		Permanent	x				x	
	Zenaida macroura	Mourning dove	ZEMA	1,3,2,5	G		Summer	x			x		
	Tyto alba	Common barn-owl	TYAL	1,3,4,2	P		Permanent	x			x		
*	*Otus kennicottii*	Western screech-owl	OTKE	?	P		Undocmented						
	Glaucidium gnoma	Northern Pygmy-Owl	GLGN	3	P		Winter, Mig.				x		
	Bubo virginianus	Great-horned owl	BUVI	1,3,4,5	P		Permanent	x			x		
	Athene cunicularia	Burrowing owl	ATCU	1	SC	SC	Summer	x				x	
*	*Strix nebulosa*	Great gray owl	STNEb		SM		Undocumented						
	Nyctea scandiaca	Snowy owl	NTSC		SM		Winter					x	
	Asio otus	Long-eared owl	ASOT	1,3	P		Permanent	x			x		

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Asio flammeus	Short-eared owl	ASFL	1,3	P		Permanent	x			x		
	Aegolius acadicus	Northern saw-whet owl	AEAC	3	P		Infreq. Migrant						
	Chordeiles minor	Common nighthawk	CHMI	1,3,2	P		Summer	x				x	
	Phalaenoptilus nuttallii	Common poorwill	PHNU	1,3,2	P		Summer	x				x	
	Aeronautes saxatalis	White-throated swift	AESA		P		Summer	x				x	
	Stellula calliope	Calliope hummingbird	STELCA		P		Migrant				x		
	Selasphorus rufus	Rufous hummingbird	SERUF	3,5	P		Summer				x		
	Ceryle alcyon	Belted kingfisher	CEAL	3	P		Summer				x		
	Melanerpes lewis	Lewis' woodpecker	MELE	3	SC		Summer			x			
	Picoides villosus	Hairy woodpecker	PIVI	3,5	P		Permanent			x			
	Picoides pubescens	Downy woodpecker	PIPU	3, 5	P		Permanent	x		x			
	Colaptes auratus	Northern flicker	COAU	3,5	P		Permanent	x			x		
	Myiarchus cinerascens	Ash-throated flycatcher	MYCI		SM		Summer				x		
	Contopus borealis	Olive-sided flycatcher	COBO	3	P	SC	Migrant			x			
	Sayornis saya	Say's phoebe	SASA	3,5	P		Summer	x			x		
	Empidonax sp.	Flycatcher species	EM??	3	P		Summer						
	Tyrannus verticalis	Western kingbird	TYVE	1	P		Summer	x			x		
	Tyrannus tyrannus	Eastern kingbird	TYTY	3	P		Summer	x		x			
	Contopus sordidulus	Western Wood Pewee	COSO	3	P		Migrant (summer ?)			x			
	Empidonax difficilis	Western Flycatcher	EMDI	3	P		Migrant			x			
	Empidonax traillii	Willow flycatcher	EMTR	3	P	SC	Migrant			x			
	Eremophila alpestris	Horned lark	ERAL	1,2	P		Permanent	x				x	
	Tachycineta bicolor	Tree swallow	TABI	3	P		Migrant			x			
	Tachycineta thalassina	Violet-green swallow	TATH	3,4,5	P		Summer	x			x		
	Stelgidopteryx serripennis	N. rough-winged swallow	STSE	3,4,5	P		Summer	x		x			
	Riparia riparia	Bank swallow	RIRI		P		Summer	x		x			
	Hirundo pyrrhonota	Cliff swallow	HIPY	3,4	P		Summer	x			x		
	Hirundo rustica	Barn swallow	HIRU	3,4,5	P		Summer	x			x		
	Nucifraga columbiana	Clark's nutcracker	NUCO		P		Migrant						
	Pica pica	Black-billed magpie	PIPI	1,3,4,2,5	X		Permanent	x			x		
	Corvus brachyrhynchos	American crow	COBR	3,5	X		Peripheral				x		
	Corvus corax	Common raven	COCOR	1,3,4,2,5	P		Permanent	x				x	

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Parus gambeli	Mountain chickadee	PAGA	3	P		Winter			x			
	Parus atricapillus	Black-capped chickadee	PAAT	3	P		Permanent	x		x			
	Sitta canadensis	Red-breasted nuthatch	SICA	3,5	P		Winter, Mig.			x			
	Salpinctes obsoletus	Rock wren	SAOB	4	P		Permanent	x				x	
	Cistothorus palustris	Marsh Wren	CIPA	3	P		Migrant			x			
	Catherpes mexicanus	Canyon wren	CAMEx	4	P		Permanent	x				x	
	Thryomanes bewickii	Bewick's wren	THBE	1,3	P		Migrant			x			
	Troglodytes aedon	House wren	TRAE	3,5	P		Summer	x		x			
	Regulus satrapa	Golden-crowned kinglet	RESA	3	P		Winter, Mig.				x		
	Regulus calendula	Ruby-crowned kinglet	REGA	3	P		Winter, Mig.				x		
	Sialia mexicana	Western bluebird	SIME	1	P		Peripheral				x		
	Sialia currucoides	Mountain bluebird	SICU	1	P		Winter, Mig.				x		
	Myadestes townsendi	Townsend's solitaire	MYTO	1	P		Winter, Mig.				x		
	Turdus migratorius	American robin	TUMI	3,5	P		Summer	x			x		
	Catharus guttatus	Hermit thrush	CAGU		P		Migrant			x			
	Ixoreus naevius	Varied thrush	IXNA	3,5	P		Winter, Mig.						
	Lanius excubitor	Northern shrike	LAEX	3	P		Winter					x	
	Lanius ludovicianus	Loggerhead shrike	LALU	1,3	SC	SC	Permanent	x			x		
	Oreoscoptes montanus	Sage thrasher	ORMO	1,2	SC		Summer	x			x		
	Anthus spinoletta	Water pipit	ANSP	3	P		Migrant					x	
*	*Bombycilla garrulus*	Bohemian waxwing	BOGA		P		Undocumented						
	Bombycilla cedrorum	Cedar waxwing	BOCE	3	P		Migrant			x			
	Sturnus vulgaris	European starling	STVU	5	X		Permanent	x	x		x		
	Vireo solitarius	Solitary Vireo	VISO	3	P		Migrant			x			
	Vireo gilvus	Warbling Vireo	VIGI	3	P		Migrant			x			
	Vermivora ruficapilla	Nashville Warbler	VERU	3	P		Migrant			x			
	Parula americana	Northern parula	PAAM2		P		Accidental, Migrant				x		
	Dendroica petechia	Yellow warbler	DEPE	3,5	P		Summer			x			
	Dendroica coronata	Yellow-rumped warbler	DECO	3	P		Winter, Mig.				x		
	Dendroica townsendi	Townsend's Warbler	DETO	3	P		Migrant			x			
	Setophaga ruticilla	American redstart	SERU		P		Accidental, Migrant			x			
	Oporornis tolmiei	MacGillivray's warbler	OPTO	3	P		Migrant			x			

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Wilsonia pusilla	Wilson's warbler	WIPU	3	P		Migrant			x			
	Vermivora celata	Orange-crownd warbler	VECE	3	P		Migrant			x			
	Icteria virens	Yellow-breasted Chat	ICVI	3	P		Summer	x		x			
	Piranga ludoviciana	Western tanager	PILU	3	P		Migrant			x			
	Pheucticus melanocephalus	Black-headed grosbeak	PHME	3	P		Summer			x			
	Passerina amoena	Lazuli bunting	PAAM	3	P		Summer	x		x			
	Pipilo maculatus	Spotted Towhee	PIER	1,3,5	P		Permanent	x			x		
	Spizella passerina	Chipping Sparrow	SPPA	1,3	P		Migrant				x		
	Spizella breweri	Brewer's sparrow	SPBR	1,2	P		Summer	x				x	
	Pooecetes gramineus	Vesper sparrow	POGR	1,2	SC		Summer	x				x	
	Chondestes grammacus	Lark sparrow	CHGR	1	P		Summer	x				x	
	Passerculus sandwichensis	Savannah sparrow	PASA	1,3	P		Summer	x				x	
	Ammodramus savannarum	Grasshopper sparrow	AMSA	1,2	SM		Summer	x				x	
	Passerella iliaca	Fox sparrow	PAIL	3	P		Migrant			x			
	Melospiza melodia	Song sparrow	MEMEl	1,3,5	P		Permanent	x		x			
	Zonotrichia atricapilla	Golden-crowned sparrow	ZOAT	1,3,2,5	P		Winter, Mig.			x			
	Zonotrichia leucophrys	White-crowned sparrow	ZOLE	1,3,2,5	P		Winter, Mig.				x		
	Passer domesticus	House sparrow	PADO	5	X		Permanent	x				x	
	Melospiza georgiana	Swamp sparrow	MEGE		P		Migrant			x			
	Amphispiza belli	Sage sparrow	AMBE	1	SC		Summer	x				x	
	Junco hyemalis	Dark-eyed junco	JUHY	1,3	P		Winter, Mig.				x		
	Calcarius lapponicus	Lapland longspur	CALA	1,2	P		Migrant					x	
	Plectrophenax nivalis	Snow Bunting	PLNI	1,2,4	P		Winter					x	
	Agelaius phoeniceus	Red-winged blackbird	AGPH	3,5	P		Summer	x		x			
	Sturnella neglecta	Western meadowlark	STUNE	1,2	P		Summer	x				x	
	Xanthocephalus xanthocephalus	Yellow-headed blackbird	XAXA	3	P		Summer			x			
	Euphagus cyanocephalus	Brewer's blackbird	EUCY	3,5	P		Summer	x			x		
	Molothrus ater	Brown-headed cowbird	MOAT	1,3,2,5	P		Summer	x			x		
	Icterus galbula bullockii	Bullock's Oriole	ICGA	3	P		Summer	x		x			
	Carpodacus mexicanus	House finch	CAME	5	P		Permanent	x	x		x		
	Leucosticte arcota	Rosy finch	LEUAR	1,2,4	P		Winter					x	
	Carpodacus purpureus	Purple finch	CAPU		P		Winter			x			

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Carduelis tristis	American goldfinch	CATR	1,3,5	P		Permanent	x		x			
	Carduelis psaltria	Lesser goldfinch	CAPS	3	P		Accidental, Migrant				x		
	Carduelis pinus	Pine Siskin	CAPI	3	P		Migrant				x		
	Carduelis flammea	Common Redpoll	CAFL	3	P		Winter/Migrant				x		
	Loxia curvirostra	Red Crossbill	LOCU	3	P		Winter/Migrant			x			
	Coccothraustes vespertinus	Evening grosbeak	COVE	3	P		Migrant			x			
	Reptiles & Amphibians	*(nomenclature follows Nussbaum, et al., 1983)*											
	Ambystoma macrodactylum	Long-toed salamander	AMMA		U		Permanent						
	Ambystoma tigrinum	Tiger salamander	AMTI		SM		Permanent						
*	*Bufo woodhousei*	Woodhouse's toad	BUWO		SM		Undocumented				x		
	Hyla regilla	Pacific treefrog	HYRE	3	U		Permanent	x					
	Scaphiopus intermontanus	Great Basin spadefoot	SPIN	1,3,2,5	U		Permanent	x				x	
*	*Rana catesbeiana*	Bullfrog	RACA	3	G		Undocumented		x	x			
*	*Rana pipiens*	Northern leopard frog	RAPI		SE		Undocumented			x			
*	*Rana pretiosa*	Spotted frog	RAPR		SE	FC	Undocumented						
	Chrysemys picta	Painted turtle	CHPI	3	P		Permanent						
	Phyrnosoma douglassi	Short-horned lizard	PHDO	1,2	U		Permanent	x				x	
	Sceloporus graciosus	Sagebrush lizard	SCGR	1,2,4		SC	Permanent	x			x		
*	*Sceloporus occidentalis*	Western fence lizard	SCOC	1,2,4	U		Undocumented	x			x		
	Uta stansburiana	Side-blotched lizard	UTST	1,2,4	U		Permanent	x			x		
	Eumeces skiltonianus	Western skink	EUSK	3	U		Permanent				x		
	Charina bottae	Rubber boa	CHBO	1,3	U		Permanent				x		
	Coluber constrictor	Yellow-bellied racer	COLCO	1,3,4,2,5	U		Permanent	x			x		
*	*Hypsiglena torquata*	Night snake	HYTO	1,2,4	SM		Undocumented					x	
*	*Masticophis taeniatus*	Striped whipsnake	MATA	4	SC		Undocumented				x		
	Pituophis melanoleucus	Gopher snake	PIME	1,3,4,2,5	U		Permanent	x			x		
	Thamnophis elegans	Terrestrial garter snake	THEL	1,3,4,2,5	U		Permanent	x			x		
	Thamnophis sirtalis	Common garter snake	THSI	1,3,4,2,5	U		Permanent			x			
	Crotalus viridis	Western rattlesnake	CRVI	1,3,4	U		Permanent	x			x		
	Fish			RIVERS									

Undocumented	Scientific name	Common name	Code	Habitat	State Status	Federal Status	RESIDENCE	Breed on YTC	Exotic	Obligate riparian dependency	Facultative riparian dependency	No riparian dependency	
	Salvelinus fontinalis	Brook trout	SAFO	Ak,Hn	G								
	Salmo gairdneri	Rainbow trout	SAGA	Ak, Sq, Jn	G								
	Rhinichthys osculus	Speckled dace	RHOS	Sq	U								
	Catostomus platyrhynchus	Mountain sucker	CAPL	Sq	SC								
	Gasterosteus aculeatus	Three-spine stickleback	GAAC	Jn	U								
	Oncorhynchus tschawytscha	Chinook salmon	ONTS	Col	SC	FE							
	Micropterus dolomeiu	Small mouth bass	MIDO	Col	G								
	Micropterus salmoides	Large mouth bass	MISA	Col	G								
	Ptychocheilus oregonensis	Northern squawfish	PTOR	Col	U								
	Acrocheilus alutaceus	Chiselmouth	ACAL	Col	n/a								
	Prosopium williamsoni	Mountain white fish	PRWI	Col	G								
	Cyprinus carpio	Carp	CYCA	Col	FF								
	Richardsonius balteatus	Redside shiner	RIBA	Col	U								
	Cottus asper	Prickley sculpin	COAS	Col	U								
	Scientific name updated 10 September 1993, Common name updated 5 March 1996												
	STATE: G=Game; FF=Food Fish; U=Unclassified Wildlife; SE=State Endangered; ST=State Threatened; S=Sensitive; SC=State Candidate; SM=State Mo												
	FEDERAL: FE= Federal Endangered; FT=Federal Threatened: FC=Federal Candidate; SC = Species of Concern												
	RIVERS: Ak=Alkali Creek; Sq=Squaw Creek; Jn=Johnson Creek; Col=Columbia River												
*	UNDOCUMENTED: YTC may contain suitable habitat and falls near or within known range												
	MIGRANT: Uses YTC during migration												
	PERMANENT: Resides year-round on YTC												
	SUMMER: A migrant which uses YTC during spring, summer, or fall												
	WINTER: A migrant which uses YTC during winter												
	PERIPHERAL: Not known to reside on YTC but uses adjacent areas, occasionally seen on YTC												
	HABITAT: 1=big sage complex; 2= stiff sage complex; 3= riparian; 4= talus/cliff; 5= cantonment area												

Appendix B

Status of Migratory Birds on Yakima Training Center

Table B-1. Habitat, Season of Residence or Occurrence, and Migratory Status of Birds Occurring on JBLM YTC. [Shaded rows represent migratory species known to breed within shrub-steppe habitat.]

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority [1,2,a]
Accipiter cooperii	Cooper's hawk	Riparian	Summer	x	x	
Accipiter gentilis	Northern	Riparian	Migrant		x	SC/FC/IIc
Accipiter striatus	Sharp-shinned hawk	Riparian	Migrant		x	
Actitis macularius	Spotted sandpiper	Riparian	Summer		x	
Aechmophorus	Western grebe	Riparian	Migrant		x	SC
Aegolius acadicus	Northern saw-whet owl	Riparian	Infrequent Migrant		x	
Aeronautes saxatalis	White-throated swift	Talus/Cliff and Shrub-Steppe	Summer	x	x	I
Agelaius phoeniceus	Red-winged blackbird	Riparian, Urban/Industrial	Summer	x	x	
Aix sponsa	Wood duck	Riparian	Summer		x	
Alectoris chukar	Chukar	Shrub-Steppe and	Permanent	x		
Ammodramus savannarum	Grasshopper sparrow	Shrub-steppe and Steppe Grasslands	Summer	x	x	IIc
Amphispiza belli	Sage sparrow	Shrub-steppe and Steppe Grasslands	Summer	x	x	SC/IIa
Anas acuta	Northern pintail	Riparian	Permanent		x	
Anas americana	American wigeon	Riparian	Permanent		x	
Anas clypeata	Northern shoveler	Riparian	Migrant		x	
Anas crecca	Green-winged teal	Riparian	Summer		x	
Anas cyanoptera	Cinnamon teal	Riparian	Summer		x	
Anas discors	Blue-winged teal	Riparian	Migrant		x	
Anas platyrhynchos	Mallard	Riparian	Permanent	x	x	
Anas strepera	Gadwall	Riparian	Migrant		x	
Anthus rubescens	American pipit	Steppe and Riparian	Migrant		x	
Aquila chrysaetos	Golden eagle	Shrub-Steppe, Talus/Cliffs	Permanent	x	x	SC/IIa
Ardea herodias	Great blue heron	Riparian	Permanent		**x**	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority [1,2,a]
Asio flammeus	Short-eared owl	Shrub-Steppe and Riparian	Permanent	x	x	I
Asio otus	Long-eared owl	Shrub-Steppe and Riparian	Permanent	x	x	
Athene cunicularia	Burrowing owl	Shrub-steppe and Steppe Grasslands	Summer	x	x	SC/FC
Aythya affinis	Lesser scaup	Riparian	Permanent		x	
Aythya americana	Redhead	Riparian	Summer		x	
Aythya collaris	Ring-necked duck	Riparian	Permanent		x	
Aythya marila	Greater scaup	Riparian	Winter		x	
Aythya valisineria	Canvasback	Riparian	Winter		x	
Bombycilla cedrorum	Cedar waxwing	Riparian	Migrant		x	
Bombycilla garrulus	Bohemian waxwing	Riparian	Undocumented		x	
Botaurus lentiginosus	American bittern	Riparian	Migrant		x	
Branta canadensis	Canada goose	Riparian	Permanent		x	
Bubo virginianus	Great-horned owl	Shrub-Steppe, Riparian, Talus/Cliffs	Permanent	x	x	
Bucephala albeola	Bufflehead	Riparian	Winter		x	
Buteo jamaicensis	Red-tailed hawk	Shrub-Steppe and Riparian	Permanent	x	x	
Buteo lagopus	Rough-legged hawk	Shrub-steppe and Steppe Grasslands	Winter		x	
Buteo regalis	Ferruginous hawk	Shrub-Steppe, Talus/Cliffs	Summer	x	x	ST/FCo/IIa
Buteo swainsoni	Swainson's hawk	Shrub-Steppe and Riparian	Summer	x	x	I
Calcarius lapponicus	Lapland longspur	Shrub-steppe and Steppe Grasslands	Migrant		x	
Callipepla californica	California quail	Riparian	Permanent	x		IIa
Carduelis flammea	Common Redpoll	Riparian	Winter, Migrant		x	
Carduelis pinus	Pine Siskin	Riparian	Migrant		x	
Carduelis psaltria	Lesser goldfinch	Riparian	Accidental, Migrant		x	
Carduelis tristis	American goldfinch	Shrub-Steppe, Riparian, Urban/Industrial	Permanent	x	x	
Carpodacus mexicanus	House finch	Urban/Industrial	Permanent	x	x	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority 1,2,a
Carpodacus purpureus	Purple finch	Shrub-Steppe and Riparian	Winter		x	
Cathartes aura	Turkey vulture	All except Urban/Industrial	Summer, Peripheral		x	
Catharus guttatus	Hermit thrush		Migrant		x	
Catherpes mexicanus	Canyon wren	Talus/Cliff	Permanent	x	x	
Centrocercus urophasianus	Sage-grouse	Shrub-Steppe	Permanent	x		ST/FC/I
Charadrius vociferus	Killdeer	Shrub-Steppe and Riparian	Summer	x	x	IIa
Chlidonias niger	Black tern	Riparian	Summer		x	
Chondestes grammacus	Lark sparrow	Shrub-steppe and Steppe Grasslands	Summer	x	x	
Chordeiles minor	Common nighthawk	Shrub-Steppe and Riparian	Summer	x	x	
Circus cyaneus	Northern harrier	Shrub-Steppe and Riparian	Permanent	x	x	IIa
Cistothorus palustris	Marsh Wren	Riparian	Migrant		x	
Coccothraustes vespertinus	Evening grosbeak	Riparian	Migrant		x	
Colaptes auratus	Northern flicker	Riparian, Urban/Industrial	Permanent	x	x	
Columba livia	Rock dove	Urban/Industrial	Permanent	x		
Contopus cooperi	Olive-sided flycatcher	Riparian	Migrant		x	I
Contopus sordidulus	Western Wood-Pewee	Riparian	Migrant(summer?)		x	
Corvus brachyrhynchos	American crow	Riparian, Urban/Industrial	Peripheral		x	
Corvus corax	Common raven	All	Permanent	x	x	
Cygnus columbianus	Tundra Swan	Riparian	Migrant		x	
Dendroica coronata	Yellow-rumped warbler	Riparian	Winter, Migrant		x	
Dendroica petechia	Yellow warbler	Riparian, Urban/Industrial	Summer		x	
Dendroica townsendi	Townsend's warbler	Riparian	Migrant		x	
Empidonax difficilis	Western flycatcher	Riparian	Migrant		x	
Empidonax traillii	Willow flycatcher	Riparian	Migrant		x	I

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority 1,2,a
Eremophila alpestris	Horned lark	Shrub-steppe and Steppe Grasslands	Permanent	**x**	**x**	
Euphagus cyanocephalus	Brewer's blackbird	Riparian, Urban/Industrial	Summer	**x**	**x**	
Falco columbarius	Merlin	All	InfrequentMigrant		x	SC
Falco mexicanus	Prairie falcon	Shrub-steppe, Riparian, Talus/Cliffs	Permanent	**x**	**x**	SC
Falco peregrinus	Peregrine falcon	Riparian	InfrequentMigrant		**x**	SS/FCo/IIa
Falco sparverius	American kestrel	All	Permanent	**x**	**x**	
Fulica americana	American coot	Riparian	Permanent		**x**	
Gallinago gallinago	Common snipe	Riparian	Summer	**x**	**x**	
Gavia immer	Common loon	Riparian	Peripheral	**a**	**x**	SS
Glaucidium gnoma	Northern Pygmy-Owl	Riparian	Winter, Migrant		**x**	
Grus canadensis	Sandhill crane	Riparian	InfrequentMigrant		**x**	SE
Haliaeetus leucocephalus	Bald eagle	Riparian	Winter		**x**	SS/FCo
Hirundo rustica	Barn swallow	Riparian, Talus/Cliffs, Urban	Summer	**x**	**x**	
Hydroprogne caspia	Caspian tern	Riparian	Summer, Peripheral		**x**	
Icteria virens	Yellow-breasted chat	Riparian	Summer	**x**	**x**	
Icterus bullockii	Bullock's Oriole	Riparian	Summer	**x**	**x**	
Ixoreus naevius	Varied thrush	Riparian, Urban/Industrial	Winter, Migrant		**x**	
Junco hyemalis	Dark-eyed junco	Shrub-Steppe and Riparian	Winter, Migrant		**x**	
Lanius excubitor	Northern shrike	Riparian	Winter		**x**	SC/FCo
Lanius ludovicianus	Loggerhead shrike	Shrub-Steppe and Riparian	Permanent	**x**	**x**	IIc
Larus californicus	California gull	Riparian	Permanent		**x**	
Larus delawarensis	Ring-billed gull	Riparian	Permanent		**x**	
Leucosticte tephrocotis	Gray-crowned rosy finch	Shrub-Steppe, Talus/Cliffs	Winter		**x**	
Lophodytescucullatus	Hooded merganser	Riparian	Permanent		**x**	
Loxia curvirostra	Red crossbill	Riparian	Winter, Migrant		**x**	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority 1,2,a
Megaceryle alcyon	Belted kingfisher	Riparian	Summer		x	
Megascops kennicottii	Western screech-owl		Undocumented		x	
Melanerpes lewis	Lewis' woodpecker	Riparian	Summer		x	SC
Melospiza georgiana	Swamp sparrow		Migrant		x	
Melospiza melodia	Song sparrow	Shrub-Steppe, Riparian, Urban/Industrial	Permanent	x	x	
Mergus merganser	Common merganser	Shrub-Steppe and Riparian	Summer		x	
Molothrus ater	Brown-headed cowbird	Shrub-Steppe, Riparian, Urban/Industrial	Summer	x	x	
Myadestes townsendi	Townsend's solitaire	Shrub-steppe and Steppe Grasslands	Winter, Migrant		x	IIa
Myiarchus cinerascens	Ash-throated flycatcher	Riparian	Summer		x	
Nucifraga columbiana	Clark's nutcracker		Migrant		x	
Numenius americanus	Long-billed curlew	Shrub-Steppe and Riparian	Summer	x	x	
Nycticorax nycticorax	Black-crowned night heron	Riparian	Peripheral		x	
Oporornis tolmiei	MacGillivray's warbler	Riparian	Migrant		x	IIa
Oreoscoptes montanus	Sage thrasher	Shrub-steppe and Steppe Grasslands	Summer	x	x	SC/IIa
Pandion haliaetus	Osprey	Riparian	Peripheral		x	
Passer domesticus	House sparrow	Urban/Industrial	Permanent	x		
Passerculus sandwichensis	Savannah sparrow	Shrub-Steppe and Riparian	Summer	x	x	
Passerella iliaca	Fox sparrow	Riparian	Migrant		x	
Passerina amoena	Lazuli bunting	Riparian	Summer	x	x	IIa
Pelecanus erythrorhynchos	American white pelican	Riparian	Permanent?		x	SE
Perdix perdix	Grey partridge	Shrub-Steppe	Permanent	x		
Petrochelidon pyrrhonota	Cliff swallow	Riparian, Talus/Cliffs	Summer	x	x	
Phalaenoptilus nuttallii	Common poorwill	Shrub-Steppe and Riparian	Summer	x	x	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority 1,2,a
Phasianus colchicus	Ring-necked pheasant	Riparian	Permanent	x		
Pheucticus melanocephalus	Black-headed grosbeak	Riparian	Summer		x	
Pica hudsonia	Black-billed magpie	All	Permanent	x	x	IIa
Picoides pubescens	Downy woodpecker	Riparian	Permanent	x	x	
Picoides villosus	Hairy woodpecker	Riparian, Urban/Industrial	Permanent		x	
Pipilo maculatus	Spotted towhee	Shrub-Steppe, Riparian, Urban/Industrial	Permanent	x	x	
Piranga ludoviciana	Western tanager	Riparian	Migrant		x	
Plectrophenax nivalis	Snow Bunting	Shrub-Steppe, Talus/Cliffs	Winter		x	
Podiceps auritus	Horned grebe	Riparian	Migrant		x	
Podilymbus podiceps	Pied-billed grebe	Riparian	Permanent		x	
Poecile atricapillus	Black-capped chickadee	Riparian	Permanent	x	x	
Poecile gambeli	Mountain chickadee	Riparian	Winter		x	
Pooecetes gramineus	Vesper sparrow	Shrub-steppe and Steppe Grasslands	Summer	x	x	
Porzana carolina	Sora	Riparian	Summer	x	x	
Rallus limicola	Virginia rail	Riparian	Migrant	?	x	
Regulus calendula	Ruby-crowned kinglet	Riparian	Winter, Migrant		x	
Regulus satrapa	Golden-crowned kinglet	Riparian	Winter, Migrant.		x	
Riparia riparia	Bank swallow	Shrub-Steppe and Riparian	Summer	x	x	
Salpinctes obsoletus	Rock wren	Talus/Cliff	Permanent	x	x	
Sayornis saya	Say's phoebe	Riparian, Urban/Industrial	Summer	x	x	
Selasphorus rufus	Rufous hummingbird	Riparian, Urban/Industrial	Summer		x	I
Setophaga ruticilla	American redstart		Accidental, Migrant		x	
Sialia currucoides	Mountain bluebird	Shrub-steppe and Steppe Grasslands	Winter, Migrant.		x	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority 1,2,a
Sialia mexicana	Western bluebird	Shrub-steppe and Steppe Grasslands	Peripheral		x	
Sitta canadensis	Red-breasted nuthatch	Riparian, Urban/Industrial	Winter, Migrant		x	
Spizella breweri	Brewer's sparrow	Shrub-steppe and Steppe Grasslands	Summer	x	x	I
Spizella passerina	Chipping sparrow	Shrub-Steppe and Riparian	Migrant		x	
Stelgidopteryx serripennis	Northern rough-winged swallow	Riparian, Talus/Cliffs, Urban	Summer	x	x	
Stellula calliope	Calliope hummingbird	Riparian	Migrant		x	I
Sterna forsteri	Forster's tern	Riparian	Summer, Peripheral		x	
Sturnella neglecta	Western meadowlark	Shrub-steppe and Steppe Grasslands	Summer	x	x	IIa
Sturnus vulgaris	European starling	Urban/Industrial	Permanent	x		
Tachycineta bicolor	Tree swallow	Riparian	Migrant		x	
Tachycineta thalassina	Violet-green swallow	Riparian, Talus/Cliffs, Urban	Summer	x	x	
Thryomanes bewickii	Bewick's wren	Shrub-Steppe and Riparian	Migrant		x	
Troglodytes aedon	House wren	Riparian, Urban/Industrial	Summer	x	x	
Turdus migratorius	American robin	Riparian, Urban/Industrial	Summer	x	x	
Tyrannus tyrannus	Eastern kingbird	Riparian	Summer	x	x	
Tyrannus verticalis	Western kingbird	Shrub-steppe and Steppe grasslands	Summer	x	x	
Tyto alba	Barn owl	All except Urban/Industrial	Permanent	x	x	
Vermivora celata	Orange-crowned warbler	Riparian	Migrant		x	
Vermivora ruficapilla	Nashville Warbler	Riparian	Migrant		x	
Vireo gilvus	Warbling Vireo	Riparian	Migrant		x	
Vireo solitarius	Solitary Vireo	Riparian	Migrant		x	
Wilsonia pusilla	Wilson's warbler	Riparian	Migrant		x	
Xanthocephalus xanthocephalus	Yellow-headed blackbird	Riparian	Summer		x	

Scientific Name	Common Name	Habitat	Residence	Breeds on YTC	Listed as Migratory Species by USFWS	Status/PIF Priority [1,2,a]
Zenaida macroura	Mourning dove	Shrub-Steppe, Riparian, Urban/Industrial	Summer	x	x	
Zonotrichia atricapilla	Golden-crowned sparrow	Shrub-Steppe, Riparian, Urban/Industrial	Winter, Migrant		x	
Zonotrichia leucophrys	White-crowned sparrow	Shrub-Steppe, Riparian, Urban/Industrial	Winter, Migrant		x	

[1]SC = State Candidate, SS = State Sensitive, ST = State Threatened, SE = State Endangered, FC = Federal Candidate, FCo = Federal Species of Concern

[2]PIF Continental Priorities and Objectives Defined at the State and Bird Conservation Region Levels, Washington. Rosenberg, Kenneth V. Cornell Lab of Ornithology, Ithaca NY, May 2004. Tier I. High Continental Importance, Tier II. High Regional Priority, Tier IIa. High Regional Concern, Tier IIb. High Regional Responsibility, Tier IIc. High Regional Threats

[a] Source: Washington Department of Fish and Wildlife, Species of Concern Listing accessed on May 10, 2010 at http://wdfw.wa.gov/wlm/diversty/soc/soc.htm.

Table B-2. Summary of Potential Impacts to Nesting Migratory Birds that May Utilize Shrub-Steppe Habitat.
[Shaded rows represent species that may nest on or adjacent to the alternative sites.]

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall Effect of the Proposed Action on Species Populations [2, 3]
Aeronautes saxatalis	White-throated swift	Crevices in rock faces or on cliffs.	Unlikely; cliffs and rock face crevices are absent from both alternative sites and adjacent areas.	None.
Ammodramus savannarum	Grasshopper sparrow	Open grassy and weedy meadows, pastures and plains.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status, however, PIF ranking of "Tier IIc/High Regional Threats". Estimated population within CR 9/State of Washington is 140,000 or 0.9 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Amphispiza belli	Sage sparrow	Sites with sparse shrub cover, arranged in patches, with bare ground in between.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	State Candidate species and PIF ranking of "Tier IIa/High Regional Concern". Estimated population within BCR 9/State of Washington is 14,000 or 0.3 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Aquila chrysaetos	Golden eagle	Require open areas with large, rocky cliffs or large trees, such as Ponderosa pines.	Unlikely; cliffs and large trees are absent from both alternative sites and adjacent areas.	None.
Asio flammeus	Short-eared owl	Ground nester within open areas, on dry hummocks or ridges among tall grass or under shrubs.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status, however, PIF ranking of "Tier I/High Continental Importance". Estimated population within BCR 9/State of Washington is 14,000 or 0.6 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Asio otus	Long-eared owl	Abandoned stick nests within woodlands and trees. Occasionally nest in cavities or brushy tangles.	Unlikely; trees and brushy tangles are absent from both alternative sites and adjacent areas.	None.
Athene cunicularia	Burrowing owl	Nest in burrows, often using prairie dog towns and ground squirrel burrows when available.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	Federal and State Candidate species; no PIF ranking. Estimated population within BCR 9/State of Washington is 3,000 or 0.1 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Bubo virginianus	Great-horned owl	Most often nest in deciduous trees; sometimes nest in caves or on cliff ledges.	Unlikely; trees, cliffs, and caves, are absent from both alternative sites and adjacent areas..	None.
Buteo jamaicensis	Red-tailed hawk	Tall trees, often the tallest tree in a cluster; or on cliff ledges, towers, nest platforms, and occasionally buildings.	Unlikely; trees, cliffs, utility towers, nest platforms, and buildings are absent from both alternative sites and adjacent areas.	None.
Buteo regalis	Ferruginous hawk	Typically nest on utility towers, nest platforms, or cliff ledges.	Unlikely; cliffs, utility towers, and nest platforms are absent from both alternative sites and adjacent areas.	None.
Buteo swainsoni	Swainson's hawk	Typically nest in a tree or tall shrub from 15-30 feet off the ground, often on top of an old magpie or crow nest, or ledges.	Unlikely; trees, tall shrubs and ledges are absent from both alternative sites and adjacent areas.	None
Carduelis tristis	American goldfinch	Nest is located in an upright fork of a shrub, tree, or occasionally a dense weed.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. Estimated population within BCR 9/State of Washington is 530,000 or 2.3 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Charadrius vociferus	Killdeer	Require a sandy or gravelly substrate for nesting near a wet or muddy area where they can forage.	Possible; potential nesting habitat is present on or adjacent to both alternative sites; however, proximity to wet/muddy areas is limited.	No Federal/State Status, however, PIF ranking of "Tier IIa/High Concern". Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. These habitat and disturbance effects could result in a small local population decline.
Chondestes grammacus	Lark sparrow	On the ground near the base of a tall weed, or in a shrub or rocky crevice.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. Estimated population within BCR 9/State of Washington is 30,000 or 0.3 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Chordeiles minor	Common nighthawk	On open ground along rivers or other gravelly stretches.	Unlikely; gravelly stretches and riparian areas are absent from both alternative sites and adjacent areas.	None.
Circus cyaneus	Northern harrier	Nest on the ground in dense clumps of vegetation.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status, however, PIF ranking of "Tier IIa/High Concern". BCR 9/State of Washington is 14,000 or 1.1 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Corvus corax	Common raven	Cliffs and trees, as well as power poles, bridges, and other man- made structures.	Unlikely; cliffs, trees, and man-made structures are absent from both alternative sites and adjacent areas.	None.
Eremophila alpestris	Horned lark	Open ground with short grass or scattered bushes.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF Ranking. BCR 9/State of Washington is 1,100,000 or 0.8 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Falco mexicanus	Prairie falcon	Nest on basalt cliffs in recessed or otherwise protected spots. Occasionally on tall buildings or bridges.	Unlikely; cliffs and man-made structures are absent from both alternative sites and adjacent areas.	None.
Falco sparverius	American kestrel	Nest primarily in cavities, usually 10-30 feet off the ground. May use openings in man-made structures. Often use cliffs in eastern part of the state.	Unlikely; cliffs vegetation that could support cavities and structures are absent from both alternative sites and adjacent areas.	None.
Lanius ludovicianus	Loggerhead shrike	Prefer tall, dense shrubs, usually in ravines.	Possible; potential nesting habitat is present adjacent to both alternative sites, but, dense shrub is lacking on the sites.	No Federal/State Status, however, PIF ranking of "Tier IIa/High Concern". BCR 9/State of Washington is 14,000 or 0.3 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Melospiza melodia	Song sparrow	In eastern Washington, are restricted to shrubby habitats close to water. Nest may be on the ground, under a clump of grass, or in a shrub.	Possible; potential nesting habitat is present adjacent to both alternative sites, but lacking on the sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 890,000 or 1.6 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Molothrus ater	Brown-headed cowbird	Nest parasite. Lays eggs in nest of other birds	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 670,000 or 1.2 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Numenius americanus	Long-billed curlew	Nest is on the ground in the open, but is often located next to an object such a rock or a shrub.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. These habitat and disturbance effects could result in a small local population decline.
Oreoscoptes montanus	Sage thrasher	Nest is usually located in or under big sagebrush or three-tip sage plants.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	State Candidate species and PIF ranking of "Tier IIa/High Regional Concern". Estimated population within BCR 9/State of Washington is 60,000 or 0.7 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Passerculus sandwichensis	Savannah sparrow	Nest on the ground, usually in a depression and well hidden in thick grass or under matted-down plants.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 500,000 or 0.7 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Phalaenoptilus nuttallii	Common poorwill	Eggs laid on bare ground in dry, open areas.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 14,000 or 0.5 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the lower regional population level for this species, these habitat and disturbance effects could result in a small local population decline.
Pica hudsonia	Black-billed magpie	Large woody shrubs or trees.	Unlikely; large woody shrubs and trees are absent from both alternative sites and adjacent areas.	None.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Pipilo maculatus	Spotted towhee	In eastern Washington, they use shrub-steppe edges and riparian areas near shrub-steppe. Nest placed on or near the ground, adjacent to vegetation for concealment.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 940,000 or 6.8 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Pooecetes gramineus	Vesper sparrow	Nest placed on the ground in a small depression, often near the base of a grass clump, weed, or shrub.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 300,000 or 0.9 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Riparia riparia	Bank swallow	Dig burrows in sandy, vertical banks along rivers and lakes, or where a bank has been created by human activity.	Unlikely; riparian habitat and cut banks are absent from both alternative sites and adjacent areas.	None.
Spizella breweri	Brewer's sparrow	Preferred nesting areas contain abundant bluebunch wheatgrass and other native grasses, along with scattered threetip sage. Nests are well hidden in the shrub canopy, usually within four feet of the bare ground.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status, however, PIF ranking of "Tier I/High Continental Importance". Estimated population within BCR 9/State of Washington is 140,000 or 0.9 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.
Sturnella neglecta	Western meadowlark	Nest on the ground under dense vegetation.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status, however, PIF ranking of "Tier IIa/High Concern". Estimated population within BCR 9/State of Washington is 560,000 or 1.7 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.

Scientific Name	Common Name	Nesting Habitat[1]	Likelihood for Nesting Disturbance	Overall effect of Proposed Action on Species Populations [2, 3]
Tyrannus verticalis	Western kingbird	Trees (usually Ponderosa pine), utility poles, and building ledges.	Unlikely; trees and man- made structures are absent from both alternative sites and adjacent areas.	None.
Tyto alba	Barn owl	Nests are located on cliffs, in haystacks, hollow trees, burrows in irrigation canals, or in barns, old buildings, or other cavities.	Unlikely; trees, cliffs, and man-made structures are absent from both alternative sites and adjacent areas.	None.
Zenaida macroura	Mourning dove	Nest typically located in a tree or shrub, but may be on the ground, on a building ledge, or other structure.	Possible; potential nesting habitat is present on or adjacent to both alternative sites.	No Federal/State Status or PIF ranking. BCR 9/State of Washington is 760,000 or 0.6 percent of the global population. Construction would result in the permanent removal of a small amount of potential nesting habitat (about 6.5 acres). Operations could periodically disturb and possibly displace individuals from surrounding habitats during UAS training events, and aerial vehicles do pose a low risk collision potential. Due to the regional population abundance of this species, potential population effects from the proposed action would be negligible.

[1]Nesting habitat information obtained from BirdWeb: Seattle Audubon's Guide to the Birds of Washington State http://www.birdweb.org/birdweb/.[2] As available, population estimates were obtained from the PIF Landbird Population Estimates Database http://rmbo.org/pif_db/laped/PED3.aspx. Population estimates reflect the species abundance within that part of Bird Conservation Region (BCR) 9 that falls within the State of Washington. BCR 9 consists of the Great Basin, a large and complex region which includes the Northern Basin and Range, Columbia Plateau, and the eastern slope of the Cascade Range. This area is dry due to its position in the rain shadow of the Cascade Range and the Sierra Nevada. Grasslands, sagebrush, and other xeric shrubs dominate the flats and lowlands, with piñon-juniper woodlands and open ponderosa pine forests on higher slopes.[3] See Table B-1 regarding Federal/State status and PIF priorities.

Appendix C

Cultural Resources Appendix

Correspondence

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

January 28, 2014

Mr. Randy Korgel
Yakima Training Center
Department of the Army
970 Firing Center Road
Yakima, Washington 98901

Re: Shadow UAS Project
Log No.: 012814-09-USN

Dear Mr. Korgel:

Thank you for contacting our department. We have reviewed the materials you provided for the proposed Shadow UAS Project at the Yakima Training Center, Kittitas County, Washington.

We concur with your identification of the proposed Area of Potential Effect (APE).

We look forward to receiving the results of your consultation with the concerned tribes, professional cultural resources survey, your professional review, and determination of effect.

We would also appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

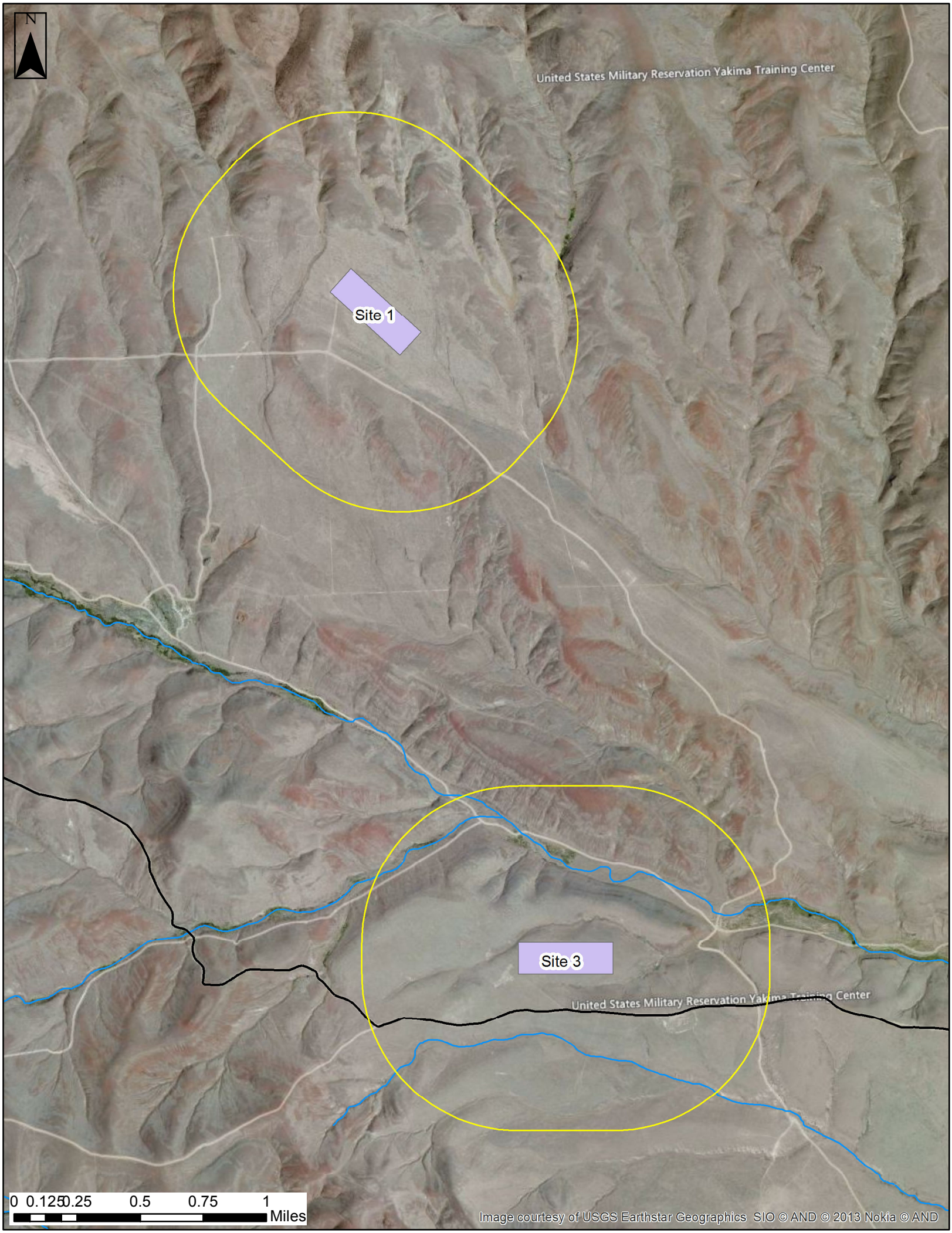
These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised.

.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: *rob.whitlam@dahp.wa.gov*

Area of Potential Effects


N
United States Military Reservation Yakima Training Center
Site 1
Site 3
United States Military Reservation Yakima Training Center
0 0.125 0.25 0.5 0.75 1
Miles
Image courtesy of USGS Earthstar Geographics SIO © AND © 2013 Nokia © AND