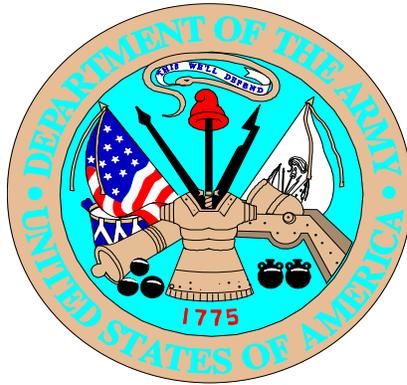


**Appendix F**  
**Biological and Essential**  
**Fish Habitat Assessment**



## Department of the Army

Fort Lewis, Washington

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### Final Biological and Essential Fish Habitat Assessment

### Army Growth and Force Structure Realignment (Grow-the-Army or GTA) at Fort Lewis and Yakima Training Center, Washington

May 2010





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Final Biological and Essential  
Fish Habitat Assessment

**Army Growth and Force Structure Realignment  
(Grow-the-Army or GTA) at Fort Lewis and  
Yakima Training Center, Washington**

Prepared for  
**U.S. Army Public Works**

May 2010

AECOM Environment  
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## EXECUTIVE SUMMARY

This Biological Assessment (BA) analyzes the potential effects to federally listed threatened and endangered species, species proposed for listing, and a candidate species, and their critical habitats, as a result of the Army's proposal to implement actions needed to support growth and realignment at Fort Lewis and Yakima Training Center (YTC), Washington. These actions would allow the Army to better meet national security and defense requirements, modify the force in accordance with Army Transformation, sustain unit equipment and training readiness, and preserve quality of life for soldiers and their families.

Section 7 of the Endangered Species Act (ESA) requires that federal agencies take the necessary steps to ensure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of listed or proposed species, or result in the destruction or modification of critical habitat of such species. As part of this process, federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) to determine if a federal action is likely to affect a listed endangered or threatened species. The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) is consulted when marine or anadromous fish or mammal species may be affected by the federal action. This BA has been prepared as part of the consultation process. In addition, an Essential Fish Habitat (EFH) assessment was prepared to comply with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. All federal agencies are required to consult with NMFS on current or proposed actions that could impact EFH.

This BA will address the effects of all types of training that could potentially be conducted on Fort Lewis and YTC under the proposed action, as well as the effects of the construction of facilities for the new units.

Specifically, the proposed action includes:

- training of three Stryker Brigade Combat Teams (SBCTs) simultaneously with other currently stationed major subordinate units at Fort Lewis and YTC,
- stationing approximately 1,900 additional soldiers associated with existing units and new units,
- upgrading infrastructure in the cantonment area for the third SBCT and other new units so that it meets current standards,
- updating the Fort Lewis and YTC Area Development Plans to accommodate these defined and potential stationing actions,
- potentially stationing Combat Support Service (CSS) units at Fort Lewis and YTC with up to 1,000 soldiers, and
- potentially stationing a medium Combat Aviation Brigade at Fort Lewis and YTC with up to 2,800 soldiers.

The proposed action would result in:

- Troop-level Increase of approximately 5,700 soldiers.
- Facility Construction, Renovation, and Demolition projects at Fort Lewis and YTC.
- Increased Live-fire Training and Maneuvers at both Fort Lewis and YTC.



Future training activities would occur on Fort Lewis in Pierce and Thurston counties, and on YTC in Kittitas and Yakima counties. Fort Lewis is an 86,176-acre (34,874-hectare; [ha]) military reservation located in western Washington. Yakima Training Center is a subinstallation of Fort Lewis located in south central Washington. It covers approximately 327,242 acres (132,433 ha). Although the vast majority of project components and their effects would fall within the boundaries of these two installations, some components (e.g., noise from training, air quality emissions, discharges from the Solo Point wastewater treatment plant [WWTP]) could extend further and potentially affect listed species in the surrounding areas.

The following species have been addressed in this BA:

### **Fort Lewis**

Golden paintbrush (*Castilleja levisecta*, threatened)  
 Marsh sandwort (*Arenaria paludicola*, endangered)  
 Water howellia (*Howellia aquatilis*, threatened)  
 Leatherback turtle (*Dermochelys coriacea*, endangered)  
 Loggerhead turtle (*Caretta caretta*, threatened)  
 Green turtle (*Chelonia mydas*, endangered)  
 Olive ridley turtle (*Lepidochelys olivacea*, endangered)  
 Coastal/Puget Sound bull trout Distinct Population Segment (*Salvelinus confluentus*, threatened)  
 Puget Sound Chinook salmon Evolutionary Significant Unit (ESU; *Oncorhynchus tshawytscha*, threatened)  
 Puget Sound steelhead salmon ESU (*Oncorhynchus mykiss*; threatened)  
 Georgia Basin bocaccio Distinct Population Segment (*Sebastes paucispinus*; endangered)  
 Georgia Basin yelloweye rockfish Distinct Population Segment (*Sebastes ruberrimus*; threatened)  
 Georgia Basin canary rockfish Distinct Population Segment (*Sebastes pinniger*; threatened)  
 Marbled murrelet (*Brachyramphus marmoratus*, threatened)  
 Northern spotted owl (*Strix occidentalis caurina*, threatened)  
 Canada lynx (*Lynx canadensis*, threatened)  
 Grizzly bear (*Ursus arctos horribilis*, threatened)  
 Gray wolf (*Canis lupus*, endangered)  
 Humpback whale (*Megaptera novaeangliae*, endangered)  
 Southern Resident killer whale (*Orcinus orca*, endangered)  
 Steller sea lion (*Eumetopias jubatus*, threatened)

### **Yakima Training Center**

Ute ladies'-tresses (*Spiranthes diluvialis*, threatened)  
 Columbia River bull trout Distinct Population Segment (threatened)  
 Upper Columbia River spring-run Chinook salmon ESU (endangered)  
 Upper Columbia River steelhead ESU (endangered)  
 Mid-Columbia River steelhead ESU (threatened)  
 Greater sage-grouse (*Centrocercus urophasianus phaios*; a candidate for federal listing that receives special consideration by YTC)  
 Marbled murrelet  
 Northern spotted owl  
 Canada lynx  
 Grizzly bear  
 Gray wolf

### **Fort Lewis Area Species and Findings**

Although Fort Lewis has been surveyed for the golden paintbrush and marsh sandwort, these species are not known to occur on Fort Lewis. Therefore, future military training actions would have **no effect** on them.



Water howellia occurs in 22 wetlands on Fort Lewis, with the only other occurrences of the species in the Puget Sound lowlands occurring on adjacent McChord Air Force Base. Critical habitat has not been designated for this species. The populations on Fort Lewis are located more than 1 mile from proposed construction sites. Additionally, they are protected from destructive forms of training by regulations prohibiting off-road driving, digging, and other ground-disturbing activities within 164 feet (50 meters) of wetlands. Despite increases in training under the proposed action, the existing wetland buffers would be adequate to minimize effects to water howellia populations. Therefore, the proposed action **may effect, but is not likely to adversely affect** water howellia on Fort Lewis. No critical habitat has been designated for water howellia on Fort Lewis.

Bull trout, Chinook salmon, and steelhead could be found on or near Fort Lewis. Bull trout were historically present in the Nisqually River and are occasionally seen foraging in the river. Chinook salmon and steelhead use streams on and near Fort Lewis for spawning, rearing, and/or migration, including the Nisqually River and Muck Creek. Activities under the proposed action would have the potential to impact fish habitat in these streams, as well as in the Puget Sound. Releases from construction sites would be minimized through best management practices (BMPs), Stormwater Pollution Prevention Plans (SWPPPs), and spill prevention control and countermeasures plans (SPCCPs). Releases from training areas would be minimized through protective buffers around streams and wetlands. Increases in discharges from the WWTP would be mitigated for through the construction of a new WWTP. Therefore, the proposed action **may affect, but is not likely to adversely affect** bull trout, Chinook salmon, or steelhead or their critical habitat in the vicinity of Fort Lewis.

Bocaccio, yelloweye rockfish, and canary rockfish occur in the Puget Sound adjacent to Fort Lewis. Proposed construction and training activities occurring on Fort Lewis under the proposed action would be unlikely to have an impact on these rockfish or their habitat. However, population increases associated with stationing could impact rockfish by causing an increase in discharges from the Solo Point WWTP, which is already close to its design capacity for biological oxygen demand (BOD). Given that low dissolved oxygen is a threat to all three rockfish species, increased BOD releases under the proposed action could adversely impact these species. The Army proposes to mitigate for these impacts by constructing a new WWTP that will accommodate planned population increases while still meeting the more stringent effluent limits required by both the 2010 and 2015 permits. Should bocaccio, yelloweye rockfish, or canary rockfish be listed, the proposed action **may effect, but is not likely to adversely affect** these species, provided the new WWTP is built.

Marbled murrelets are uncommon near Fort Lewis, but have been observed near Fort Lewis on the Nisqually River, and in the Puget Sound near Solo Point. No critical habitat occurs on Fort Lewis or the immediate vicinity, and no nesting murrelets have been found on Fort Lewis, despite numerous surveys. Proposed training activities could disturb murrelets, although most activities would occur a mile or more from Puget Sound and most maximum noise levels would be the same as at present. Murrelet habitat would not be physically altered or disturbed by construction or training activities under the proposed action. Increases in discharges to Puget Sound from the WWTP would not be large enough to adversely affect marbled murrelets or their prey. Thus, the proposed action **may affect, but is not likely to adversely affect** marbled murrelets or their critical habitat.

Northern spotted owls have not been observed on Fort Lewis since surveys for this species began in 1991, although it is possible that this species was present on the installation's forests in the past and could potentially inhabit them in the future. Proposed construction activities would occur within or immediately adjacent to the cantonment area, or at the edges of already disturbed openings at existing ranges, in areas that are not being managed for habitat characteristics suitable for the species. Proposed increases in military training are not likely to impact potential habitat and would predominantly occur outside of forested habitats. Ground activities would be located sufficient distances from areas that are managed to mimic the structural and species-component characteristics of late-successional forests to minimize risks to potential habitat. With



existing fire management in place, the risk of forest fires on Fort Lewis would remain low. No spotted owl critical habitat is found on Fort Lewis. Effects would be limited to increases in noise and disturbance that could potentially reduce the suitability of nearby forests to support owls in the future. Overall, the proposed activities **may affect, but are not likely to adversely affect** this species or its critical habitat.

Canada lynx, gray wolf, and grizzly bear are not known to occur in the vicinity of Fort Lewis, although they have been placed on species lists for the region because they may be expected to occur in appropriate habitat throughout Washington. There is no evidence that these species utilize habitats on Fort Lewis or in the surrounding areas, and it is not reasonably foreseeable that these species would use these areas in the future. Therefore, the proposed action would have **no effect** on Canada lynx, grizzly bears, or gray wolf.

All three listed marine mammals (Southern Resident killer whale, humpback whale, and Steller sea lion) occur in the Puget Sound, but utilize the south Puget Sound area near Fort Lewis rarely or only occasionally. Critical habitat for the Southern Resident killer whale has been designated in most of Puget Sound, including along Fort Lewis. Occasional sightings of Puget Sound pods are made in this area. Humpback whales are infrequent visitors to waters near the Nisqually National Wildlife Refuge and are considered an accidental migrant to the Puget Sound. Puget Sound is not a high-density Steller sea lion area, with less than 50 lions seen each year, and no haulout sites in the vicinity of the project area. Although noise from live-fire training and aircraft would increase as a result of the proposed action, these increases would have a limited effect on any listed marine mammals in the area. Increased discharges from the WWTP would be mitigated for by the construction of a new WWTP. Therefore, the proposed action **may affect, but is unlikely to adversely affect** Southern Resident killer whales or their critical habitat, humpback whales, or Steller sea lions.

The leatherback turtle, loggerhead turtle, green turtle, and olive ridley turtle are very rare in the Pacific Northwest, and there are no beaches used for breeding in the region. Although it is possible that one or more of these turtles could make their way into the Puget Sound area near Fort Lewis, it is not reasonably foreseeable. Therefore, the proposed action would have **no effect** on listed marine turtles.

### **YTC Area Species**

The Ute ladies'-tresses is unlikely to be found on YTC or near where training activities would occur. Thus, proposed actions would have **no effect** on this species.

Bull trout, Chinook salmon, and steelhead occur in the Yakima and Columbia rivers adjacent to and downstream from YTC. One or more of these species may use the lower reaches of Johnson Creek and other streams on YTC, although based on past surveys use is likely infrequent. No suitable spawning or rearing habitat has been identified. Hardened stream crossings on streams with potential listed fish habitat would help prevent direct impacts to streambeds and any fish that may be present. Proposed training increases under the proposed action are likely to contribute to sediment discharges into the habitat of listed fish species in Johnson Creek and the Yakima and Columbia rivers. Releases to the Yakima and Columbia rivers would be cumulative to those from other sources in the region. Fires and maneuver training would be most likely to causes of sedimentation into streams, although buffers between riparian areas and vehicle maneuvers would help limit the amount of sediment reaching aquatic habitat. It is expected that the amount of sediment reaching listed fish species habitat would be greater than at present. However, new conservation measures to minimize fire and transport of sediment, as well as ongoing erosion control practices, would minimize erosion and sediment transport off of YTC. With these measures in place, degradation of listed species habitat would be minimized, and the proposed action **may affect, but is not likely to adversely affect** Chinook salmon, steelhead trout, or bull trout populations or critical habitat.

YTC provides habitat for one of two populations of greater sage-grouse in Washington. Eighteen known leks occur on the installation. Results of monitoring show that the estimated population size continues to show a declining trend. Some construction activities would occur within the Sage-Grouse Protection Area, in the



footprint of an active range, but would be subject to review by a wildlife biologist to ensure that construction-related disturbance is minimized and habitat protection maintained. Under the proposed action training increases and associated increases in fire risk would have the potential to disturb sage-grouse and result in long-term degradation of shrub-steppe habitat on YTC, potentially resulting in adverse effects to sage-grouse populations on YTC. The Army has proposed an extensive list of conservation measures to minimize fire risk and impacts to sage-grouse and shrub-steppe habitat from proposed training increases. These measures would include extensive fire management to contain and minimize the size of fires, and to prevent loss of sage-grouse habitat to fire. Conservation measures would also include increased sage-grouse management on post (such as increasing the size of the Sage-Grouse Protection Area and increasing the amount of habitat restoration), as well as regional management to help conserve populations and habitats off-post. These measures are intended to preclude the need to list the greater sage-grouse in the future.

Although marbled murrelet and northern spotted owl are listed by the USFWS as occurring on or near YTC, the shrub-steppe environments on the installation and in the surrounding areas do not provide suitable habitat for these forest-dependent species, and they have not been documented as occurring on the installation. There is no critical habitat for either species on the installation or in the immediate vicinity. Therefore, proposed military training actions would have **no effect** on northern spotted owls or marbled murrelets or their critical habitat.

Although the Canada lynx, gray wolf, and grizzly bear have been listed by the USFWS as occurring on or near YTC, the shrub-steppe environments at YTC and in the surrounding area do not provide suitable habitat for these species. None of these species have been documented on the installation, and critical habitat does not occur in the region. Therefore, the proposed action would have **no effect** on Canada lynx, gray wolf, or grizzly bears.

#### **Essential Fish Habitat**

EFH species that potentially occur within the project area include three salmon species, four pelagic species, and 43 groundfish species. With ongoing and proposed conservation measures in place, activities under the proposed action would not adversely affect habitats used by these species on Fort Lewis, in the Puget Sound, on YTC, or in aquatic habitats near YTC. Therefore, proposed training activities would not result in a loss of freshwater, estuarine, or nearshore habitats valuable as EFH to salmonid, pelagic, or groundfish populations.





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## 1.0 INTRODUCTION

### 1.1 Background

The Army proposes to implement actions that are needed to support the Army's recent decisions on growth and realignment at Fort Lewis and Yakima Training Center (YTC)<sup>1</sup>, Washington. These actions would be implemented from Fiscal Year (FY) 2010 through 2015 and would allow the Army to achieve a size and composition that is better able to meet national security and defense requirements, modify the force in accordance with Army Transformation, sustain unit equipment and training readiness, and preserve quality of life for the soldiers and their families.

Section 7 of the Endangered Species Act (ESA) requires that federal agencies take the necessary steps to ensure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of listed or proposed species, or result in the destruction or modification of critical habitat of such species. As part of this process, federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) to determine if a federal action is likely to affect a listed endangered or threatened species or their critical habitat. The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) is consulted when marine or anadromous species may be affected by the federal action. This Biological Assessment (BA) has been prepared as part of the consultation process. In addition, an Essential Fish Habitat (EFH) assessment has been prepared to comply with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. All federal agencies are required to consult with NMFS on current or proposed actions that could impact EFH.

### 1.2 Purpose and Need for the Proposed Action

The purpose of the proposed action is to implement the decisions made in the Record of Decision (ROD) for the 2007 Army Growth and Force Structure Realignment (Grow-the-Army or GTA) Programmatic Environmental Impact Statement (EIS). Fort Lewis must provide for the training, readiness, deployments, administrative functions, and soldier and family quality of life elements for those soldiers stationed at or slated for stationing at Fort Lewis. These measures reflect the need to balance training readiness with mission requirements while allowing the Army to improve soldier and family quality of life and meet other goals defined in the ROD for the GTA Programmatic EIS. In addition, the growth of the installation may include the stationing of Combat Service Support (CSS) units and a medium Combat Aviation Brigade (CAB). These units would support operations at Fort Lewis and YTC. In order to meet the mission needs of the new units that would be stationed at Fort Lewis, both installations would be required to support greater training levels than at present.

Implementing these requirements would involve constructing new facilities to support additional soldiers and their families, upgrading existing training ranges, and constructing new training ranges. Facilities for training, garrison operations, and housing are critical for supporting the operations of the new units that would be stationed at Fort Lewis, as well as units already at Fort Lewis that are undergoing troop strength increases from GTA-directed augmentations. Adequate facilities do not currently exist at Fort Lewis or YTC to accommodate the new units.

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<sup>1</sup> On February 1, 2010, Fort Lewis, the Yakima Training Center, and McChord Air Force Base were designated a joint base and renamed "Joint Base Lewis-McChord" (JBLM). Because the BA process began prior to the Consolidation, and earlier BA versions used the former installation names, the terms "Fort Lewis," "Yakima Training Center," and "YTC" are retained in this document and will be used until the BA is completed.



### 1.3 Army Training Strategy and Doctrine

Current training needs have been shaped by the Army Modular Force and Army Transformation, operational experience in Afghanistan and Iraq, and the capabilities of new equipment. Training in the current operational environment requires large maneuver or training areas of varying characteristics with complex terrain. The Army also has an increased need to conduct urban training operations. Trends toward greater urbanization in operational theaters across the globe require the Army to provide security, stability, and counterinsurgency operations in populated urban environments. The military's experiences from Iraq and Afghanistan have demonstrated that Special Forces operations, intelligence gathering, and the use of joint multi-service and multinational (sister service and coalition) assets are also critical to mission success and defeat of a dispersed and poorly defined enemy force.

Training that prepares soldiers for the operational environment is essential to ensuring the success of the nation's strategic defense objectives, national security, and the safety of soldiers. Home stations, such as Fort Lewis, must prepare soldiers for operational deployments and missions. This preparation includes live-fire mission support and maneuver training.

### 1.4 Purpose and Need for a Biological Assessment

In accordance with Section 7 of the federal ESA of 1973, as amended (19 United States Code [U.S.C.] 1536 [c], 50 Code of Federal Regulations (CFR) 402.14[c]), federal agencies must "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species." The purpose of the ESA is to provide a means for conserving the ecosystems upon which endangered species and threatened species depend, and to provide a program for protecting these species.

Under Section 7 of the ESA, federal agencies are required to consult with the USFWS and/or NMFS (collectively the Services) to: 1) determine what species and critical habitats could be affected by the action; 2) determine what effect the action may have on these species or critical habitats; 3) explore ways to modify the action to reduce or remove adverse effects to the species or critical habitats; 4) determine the need to enter into formal consultation for listed species or designated critical habitats, or conference for species proposed for listing or proposed critical habitats; and 5) explore the design or modification of an action to benefit the species.

As part of this process, federal agencies are required to prepare a BA for major federal actions that modify the physical environment. Because the proposed training activities have the potential to modify the physical environment, this BA was prepared to analyze the potential effects of these activities on federally listed threatened and endangered species, and species proposed for listing, and their critical habitats. This BA will be used by the Services to facilitate compliance with the requirements of Section 7(c) of the ESA.

The ESA defines an endangered species as a species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. In addition to listed species, this BA addresses species that have been proposed for listing as either threatened or endangered, but for which a final determination has not been made. Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the Services under the ESA.

This BA also relates to other rules and regulations that govern listed species:

- The Fish and Wildlife Conservation Act of 1980 encourages federal agencies to conserve and promote the conservation of non-game fish and wildlife species and their habitats.



- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires that federal agencies that have, or are likely to have, a measurable negative effect on migratory birds develop a Memorandum of Understanding with the USFWS that will promote the conservation of migratory bird populations. If the USFWS determines that migratory birds could be harmed by the proposed off-post aviation operations, the Army and USFWS would develop appropriate mitigation.
- The 2003 National Defense Authorization Act that exempts the military from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the military department concerned. The Armed Forces must confer and cooperate with the USFWS if a proposed or ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species (Federal Register 2007).
- The Sikes Act authorizes the U.S. Department of Interior to plan, develop, maintain, and coordinate programs with state agencies for the conservation and rehabilitation of wildlife, fish, and game on public lands. The Sikes Act requires preparation of an Integrated Natural Resources Management Plan (INRMP), in cooperation with USFWS and state wildlife agencies, authorizes multipurpose use of resources, ensures no net loss of the military mission, and ensures that professionally trained natural resource management and law enforcement personnel manage conservation activities (16 USC 670e-2).
- Army guidance on implementing the requirements of the ESA is provided in Army Regulation 200-1 (*Environmental Quality – Environmental Protection and Enhancement*). This regulation discusses the Army's primary ESA requirements, including conserving listed species, not jeopardizing listed species, not taking listed species, consulting with the Services, and conducting BAs for major activities.
- Procedures for the protection of state and federally listed species, candidate species, species of concern, and designated critical habitat are provided in Fort Lewis Regulation (FL Reg) 420-5 (*Federally Listed Endangered, Threatened, and Candidate Species*). This regulation covers compliance with the ESA.

The intent of this BA is to:

- Evaluate the effects of the proposed training on listed species, species proposed for listing, and/or their critical habitat that are known to be, or could be present within the project area.
- Determine the need for consultation and conference with the Services.
- Meet the requirements of the ESA and the National Environmental Policy Act (NEPA).
- As applicable, outline conservation measures to minimize or eliminate effects to listed species associated with the proposed action.

#### **1.4.1 Consultation and Selection of Species**

The consultation process is designed to assist federal agencies in complying with the ESA. Authority of consultation has been delegated by the Secretaries of the Interior or Commerce to the Directors of the USFWS and NMFS. The consultation process involves several phases. During informal consultation, the Army (or its consultant) obtains a list of threatened, endangered, and proposed species and critical habitat that could potentially be affected by the proposed action from the appropriate regional USFWS and NMFS websites.

The Army then prepares a BA, which describes the project, describes the biology of listed and proposed species, and analyzes the potential effects of the proposed project on these species. The BA also determines whether there is likely to be an effect (either beneficial or adverse) on any listed or proposed species or critical habitat. If the BA determines that the proposed action may affect, but is not likely to adversely affect these species or critical habitat, the Army will request concurrence from the Services. Consultation is complete if a concurrence letter is obtained from the Services.



If modifications to the project cannot be made and the proposed action is likely to adversely affect listed or proposed species or critical habitat, if there are undetermined effects, or if the Army's determination of not likely to adversely affect does not have written concurrence from the Services, the Army will initiate formal Section 7 consultation. Formal consultations determine whether a proposed agency action is likely to jeopardize the continued existence of a listed or proposed species (jeopardy), or destroy or adversely modify critical habitat (adverse modification). A formal conference would be required if the action agency determines that an action may likely jeopardize the continued existence of a proposed species. Formal consultations also determine the amount and extent of anticipated incidental take in an incidental take statement.

When formal consultation is requested by the agency, the Services prepare and issue a Biological Opinion (BO), which completes the consultation. Using information provided in the BA, the Services present an opinion in the BO: 1) "likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat" (a jeopardy biological opinion), or 2) "not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat" (a no jeopardy biological opinion). A jeopardy opinion must include reasonable and prudent alternatives, if any, to the project that would avoid jeopardy. A Biological Opinion may include discretionary conservation recommendations, which are steps the respective agency believes could be taken to further minimize potential effects to listed or proposed species and critical habitat.

Lists of endangered and threatened species, candidate species, and species proposed for listing that potentially occur within Thurston and Pierce counties (in which Fort Lewis is located) and within Yakima and Kittitas counties (in which YTC is located), were retrieved from the USFWS website (updated versions of these lists are provided in Appendix C; U.S. Fish and Wildlife Service 2009a, b). For marine fish and mammals, lists of threatened and endangered species, species proposed for listing, and critical habitat were obtained from the NMFS Northwest Regional Office web page (see Appendix C; National Marine Fisheries Service 2009a). These species are listed in Table 1-1.

According to the USFWS, nine listed species may occur on Fort Lewis: golden paintbrush (*Castilleja levisecta*; threatened); marsh sandwort (*Arenaria paludicola*, endangered); water howellia (*Howellia aquatilis*, threatened); marbled murrelet (*Brachyramphus marmoratus*, threatened); northern spotted owl (*Strix occidentalis caurina*, threatened); Canada lynx (*Lynx canadensis*; threatened); gray wolf (*Canis lupus*, endangered); grizzly bear (*Ursus arctos horribilis*, threatened); and the Coastal/Puget Sound Distinct Population Segment (DPS) of bull trout (*Salvelinus confluentus*, threatened). The USFWS uses the DPS system for the purposes of listing, delisting, and reclassifying vertebrates. This system is based on the Evolutionary Significant Unit (ESU) system established by NMFS for salmonid populations. It is unlikely that golden paintbrush, marsh sandwort, Canada lynx, gray wolf, or grizzly bear would be found on Fort Lewis.

According to the USFWS, seven listed species may occur within the vicinity of YTC: Ute ladies'-tresses (*Spiranthes diluvialis*, threatened); marbled murrelet (threatened); northern spotted owl (threatened); Columbia River DPS of bull trout (threatened); Canada lynx (threatened); gray wolf (endangered); and grizzly bear (threatened). Although Ute ladies'-tresses, bull trout, grizzly bear, Canada lynx, gray wolf, marbled murrelet, and northern spotted owl are listed by USFWS as potentially occurring in either Kittitas or Yakima counties, it is unlikely that these species would be found on YTC. The greater sage-grouse, a federal candidate species afforded special protection on YTC, is discussed in this BA. Candidate species are species whose listing as threatened or endangered is warranted, but precluded by other higher priority listing activities. Since discussion of candidate species is not required under ESA, no other candidate species are considered.



A list of endangered and threatened marine species (including anadromous fish species), and species proposed for listing that may potentially occur within the project area, was obtained from the NMFS website (Appendix C; National Marine Fisheries Service 2009a). These species are listed in Table 1-1.

**TABLE 1-1  
Species Evaluated in this Biological Assessment**

Species	Scientific Name	Federal Status	Critical Habitat	Occurrence on Installation <sup>1</sup>
<b>PLANTS</b>				
Golden paintbrush	<i>Castilleja levisecta</i>	T	No	No
Marsh sandwort	<i>Arenaria paludicola</i>	E	No	No
Ute ladies' -tresses	<i>Spiranthes diluvialis</i>	T	No	No
Water howellia	<i>Howellia aquatilis</i>	T	No	Fort Lewis
<b>FISH</b>				
Bull trout	<i>Salvelinus confluentus</i>			
Coastal-Puget Sound DPS		T	Yes <sup>2</sup>	No
Columbia River DPS		T	Yes <sup>2</sup>	No
Chinook salmon	<i>Oncorhynchus tshawytscha</i>			
Puget Sound ESU		T	Yes <sup>2</sup>	Fort Lewis
Upper Columbia River Spring-Run ESU		E	Yes <sup>2</sup>	No
Steelhead	<i>Oncorhynchus mykiss</i>			
Puget Sound ESU		T	No	No
Upper Columbia River ESU		E	Yes <sup>2</sup>	No
Middle Columbia River ESU		T	Yes <sup>2</sup>	No
Bocaccio (Georgia Basin DPS)	<i>Sebastes paucispinus</i>	E	No	No
Yelloweye rockfish (Georgia Basin DPS)	<i>Sebastes ruberrimus</i>	T	No	No
Canary rockfish (Georgia Basin DPS)	<i>Sebastes pinniger</i>	T	No	No
<b>REPTILES AND AMPHIBIANS</b>				
Leatherback turtle	<i>Dermochelys coriacea</i>	E	Yes <sup>3</sup>	No
Loggerhead turtle	<i>Caretta caretta</i>	T	No	No
Green turtle	<i>Chelonia mydas</i>	E	Yes <sup>3</sup>	No
Olive ridley turtle	<i>Lepidochelys olivacea</i>	E	No	No
<b>BIRDS</b>				
Marbled murrelet	<i>Brachyramphus marmoratus</i>	T	Yes <sup>2</sup>	No
Northern spotted owl	<i>Strix occidentalis caurina</i>	T	Yes <sup>2</sup>	No
Greater sage-grouse <sup>4</sup>	<i>Centrocercus urophasianus</i>	C	No	YTC
<b>MAMMALS</b>				
Canada lynx	<i>Lynx canadensis</i>	T	Yes <sup>3</sup>	No
Gray wolf	<i>Canis lupus</i>	E	Yes <sup>3</sup>	No
Grizzly bear	<i>Ursus arctos horribilis</i>	T	No	No
Killer whale	<i>Orcinus orca</i>	E	Yes <sup>2</sup>	No
Humpback whale	<i>Megaptera novaeangliae</i>	E	No	No
Steller (=northern) sea lion	<i>Eumetopias jubatus</i>	T	Yes <sup>3</sup>	No
E = Endangered; T = Threatened; PE = Proposed for listing as Endangered; PT = Proposed for listing as Threatened; and C = Candidate.				
<sup>1</sup> Species that are not known to occur on either installation may still have the potential to be affected by activities on the installations.				
<sup>2</sup> Critical habitat does not occur on either installation, but does occur within the action area of the proposed project.				
<sup>3</sup> Critical habitat has been designated for the species, but does not occur within the project area.				
<sup>4</sup> Although only a candidate for listing, the greater sage-grouse has been included because it is afforded special protection on YTC.				



According to the NMFS website, the BA must address the potential effects of proposed Fort Lewis activities on the Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*; threatened) ESU; Puget Sound steelhead (*O. mykiss*; threatened); the Georgia Basin DPS of bocaccio (*Sebastes paucispinus*; endangered), the Georgia Basin DPS of yelloweye rockfish (*Sebastes ruberrimus*; threatened), and the Georgia Basin DPS of canary rockfish (*Sebastes pinniger*; threatened). The BA also must address the potential effects of proposed YTC activities on the Upper Columbia River spring-run Chinook salmon (endangered), Upper Columbia River steelhead (endangered), and Mid-Columbia River steelhead (threatened) ESUs. The term ESU is used by NMFS to refer to any distinct group of salmon populations, and to further clarify the meaning of subspecies under the ESA. Each salmonid species under the jurisdiction of NMFS is divided into several ESUs for the purposes of management, protection, and listing under the ESA. Leatherback turtle (*Dermochelys coriacea*; endangered), loggerhead turtle (*Caretta caretta*; threatened), green turtle (*Chelonia mydas*; endangered), olive ridley turtle (*Lepidochelys olivacea*; endangered), Steller sea lion (*Eumetopias jubatus*; threatened), Southern Resident killer whale (*Orcinus orca*; endangered), and humpback whale (*Megaptera novaeangliae*; endangered) are listed by NMFS and could be found near Fort Lewis, but are rare in the South Puget Sound and the chance of encountering one during ongoing or proposed military training activities is very low.

### 1.5 Purpose and Need for the Essential Fish Habitat Assessment

Information on EFH is provided in Chapter 6. In 1976, Congress passed into law what is currently known as the Magnuson-Stevens Fishery Conservation and Management Act. This law authorized the U.S. to manage its fishery resources to a distance of 200 miles (322 kilometers [km]) off the coast. Under this law, all federal agencies are required to consult with NMFS on all actions or proposed actions that are permitted, funded, or undertaken by the agency and that may adversely affect EFH. Essential fish habitat is defined by Congress as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” For the purpose of interpreting the definition of EFH, “waters” include aquatic areas and their associated physical, chemical, and biological properties; “substrate” includes sediment underlying the waters; “necessary” refers to the habitat required to support a sustainable fishery and to manage the species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types utilized by a species throughout its life cycle.

There are four components of an EFH consultation:

1. **Notification** – the federal agency (in this case, the Army) provides notification of an activity that “may adversely affect” EFH to NMFS;
2. **EFH Assessment** – the federal agency provides a description of the proposed action, an analysis, and effects determination to NMFS;
3. **Conservation Recommendations** – NMFS is required to provide EFH conservation and enhancement recommendations to the federal agency for actions that may adversely affect EFH. In turn, NMFS will discuss EFH conservation recommendations with the federal agency and provide these recommendations to the federal agency, pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act; and
4. **Federal Agency Response** – the federal agency provides written responses to NMFS and the appropriate Council within 30 days after receiving the conservation recommendations.

The objective of the EFH assessment is to describe potential adverse effects of ongoing and future military training activities on areas designated as EFH for the federally managed fisheries of the Pacific Coast. In addition, this assessment will include conservation measures proposed to avoid, minimize, or otherwise offset



potential adverse effects resulting from the proposed action in the designated EFH. The EFH assessment is provided in Chapter 6.

The scope and requirements of EFH and ESA consultations differ in that an EFH consultation is required for listed and non-listed, federally managed fishery species, while an ESA consultation only addresses federally listed species, and species proposed for listing, within the action area.

For the Pacific Coast (excluding Alaska), the Pacific Fishery Management Council (Pacific Council) manages federal fisheries for Washington, Oregon, Idaho, and California under three Fishery Management Plans. These Fishery Management Plans are the Pacific Coast Groundfish Management Plan (82 species), the Coastal Pelagic Species Fishery Management Plan (5 species), and the Pacific Coast Salmon Plan (3 species: Chinook, coho (*Oncorhynchus kisutch*), and Puget Sound pink salmon (*Oncorhynchus gorbuscha*).

All three salmon species overseen by the Pacific Council are reviewed in the EFH assessment. For the Pacific Coast salmon fishery, EFH includes those waters and substrates that are necessary for salmon production, and that are capable of supporting a long-term, sustainable salmon fishery and salmon contributions to a healthy ecosystem. To achieve this level of production, EFH includes all streams, lakes, ponds, wetlands, and other viable water bodies that are accessible to salmon, as well as most of the habitat that was historically accessible (excluding areas upstream of longstanding naturally impassable barriers) in Washington, Oregon, Idaho, and California. In estuarine and marine areas, salmon EFH extends out from the nearshore and tidal submerged environments within state territorial waters, to the full extent of the Exclusive Economic Zone offshore of Washington, Oregon, and California, north of Point Conception (Pacific Fishery Management Council 1999).

A total of four flatfish, of the 82 managed groundfish species that may occur within the area surrounding the Nisqually Reach, are reviewed in the EFH assessment. According to the composite EFHs of these four flatfish species, at least one stage of each species' life history utilizes the upriver extent of saltwater intrusion in rivers such as the Nisqually River (Pacific Fishery Management Council 1998).

Pelagic species occupy deeper ocean waters and are not included in this EFH.

## **1.6 Document Organization**

Chapter 2 of this BA provides a description of the action area and the current conditions. Chapter 3 provides a description of the proposed action. Chapter 4 provides the methodology used to develop this BA. Chapter 5 includes background information and an analysis of the effects of the proposed action on the species addressed by this BA. Chapter 6 includes the EFH assessment. Appendix A provides a list of acronyms and abbreviations. Appendix B includes Fort Lewis Regulation 420-5. Appendix C includes species lists from USFWS and NMFS.

## **1.7 Relationship to Other Ongoing Consultation**

The proposed action (discussed in more detail in Chapter 3 of this BA) entails an increase in the military strength at Fort Lewis, and in the on-post population. These increases will result in an increase in the influent loading at the Solo Point Wastewater Treatment Plant (WWTP), owned and operated by Fort Lewis, and therefore effluent discharges in the Puget Sound, which is used by several listed anadromous and marine species. The potential effects of increased discharges from the Solo Point WWTP on listed species have been addressed in a separate Biological Evaluation (BE), and subsequent addendum, associated with the reissuance of the National Pollution Discharge Elimination System (NPDES) Permit for the treatment plant (collectively referred to as the BE; U.S. Environmental Protection Agency 2009, U.S. Environmental Protection Agency 2010). The effects analysis presented in this BA utilizes information presented in that BE, as well as the addendum prepared in response to a request for additional information by NMFS. In particular, this BA



references information presented in toxicity analyses in the BE. This BA assumes that the general chemical and physical makeup of WWTP discharges would be similar to what is analyzed in the BE. However, the amount of effluent released would increase, and the amount of dilution would likely be reduced. The USFWS has written a Biological Opinion stating that the NPDES renewal would not directly or adversely modify designated bull trout critical habitat, and would not result in incidental take of bull trout (U.S. Fish and Wildlife Service 2010a). Fort Lewis is in ongoing formal consultation with NMFS about potential adverse effects to listed marine fish species and critical habitat, and to EFH, associated with the proposed NPDES permit reissuance. Provided the effluent under the proposed action meets the limits imposed by the NPDES permit, the findings of the BE should apply to this BA as well.



## 2.0 PROJECT LOCATION AND CURRENT CONDITIONS

The primary action area for the proposed project is the area within the Fort Lewis and YTC installation boundaries. This area is described in Sections 2.1 and 2.2 below, and visually represented in many of the figures found in this chapter. The vast majority of project components and their effects fall within this action area. However, some components of the project could extend outside of the installation boundaries and potentially affect listed species in the surrounding areas, if present. These components include noise (associated with artillery and aircraft), air quality emissions (associated with training activities and commuting), activities with the potential to result in sedimentation into streams (which could affect downstream habitats off the installations), discharges from the Solo Point WWTP, and activities with the potential to cause fires (which could travel outside the installation boundaries). For project components that extend off the installations, the effects analyses provided in Chapter 5 will more specifically document the area of potential effect.

### 2.1 Fort Lewis

#### 2.1.1 General Description

Fort Lewis is an 86,176-acre (34,874-hectare [ha]) military reservation located in western Washington, in Pierce and Thurston counties, approximately 35 miles (56 km) south of Seattle and 7 miles (11 km) northeast of Olympia (Figure 2-1). It is bordered on the north by McChord Air Force Base (AFB) and suburban and commercial development; on the east and south by rural areas, forested land, and several small communities; and on the west by Puget Sound, the Nisqually Indian Reservation, and rural areas that surround Olympia (CH2M HILL 1994).

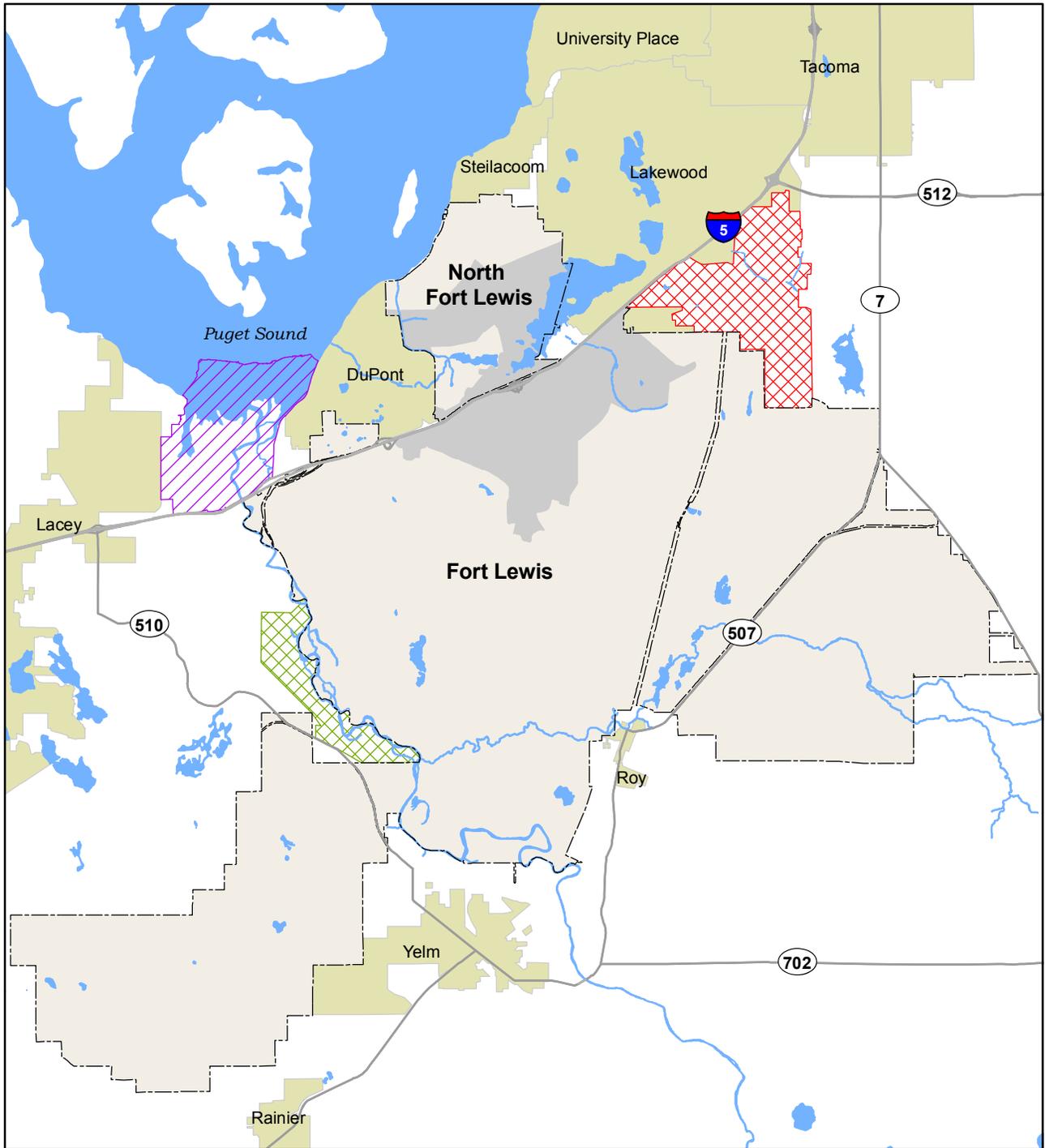
Fort Lewis lies in an upland glacial plain at the southern end of the Puget Sound lowland, and is typified by flat, gently rolling terrain. The elevation throughout most of the installation ranges between 250 and 400 feet (76 to 122 meters [m]) above sea level. However, topography varies from sea level at Puget Sound, to 567 feet (173 m) in the extreme southwest portion of Fort Lewis at the Rainier Training Area.

The surface water resources at Fort Lewis include rivers, streams, lakes, wetlands, and marine areas. There are four major source water drainage basins: the Nisqually River, Sequelitchew Creek (including American Lake), Deschutes River, and Chambers Creek basins (by means of Clover Creek, which drains into it). Approximately 56 percent of Fort Lewis (48,500 acres [19,628 ha]) falls within the Nisqually River Basin. Because of the gentle topography and generally permeable soils, surface water runoff is very low, with few perennial streams, and poorly defined surface water sub-basins. Approximately 5 percent (4,500 acres [1,821 ha]) of Fort Lewis can be classified as wetlands, including emergent marshes, scrub-shrub swamps, and forested wetlands.

Soils on Fort Lewis are predominantly composed of excessively drained, gravelly, sandy loams that are up to 2 feet (61 centimeters [cm]) thick. A soil survey of the Puget Sound lowlands, including Fort Lewis, identifies a predominance of glacial deposits, such as till and outwash (Zulauf 1979, Pringle 1990). Soils on the installation have been formed from these parent materials since they were deposited around 13,500 years ago, through physical disintegration and chemical decomposition of material exposed to the weather. Because soil fertility is low to moderate within the area, the agricultural potential is very limited.

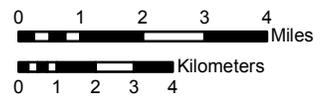
#### 2.1.2 Population and Military Strength

The current military strength (as of FY 2009) at Fort Lewis is 31,350. The on-post resident population of military personnel and military dependents is approximately 24,500. Approximately 57,000 military



**Figure 2-1. Fort Lewis Vicinity Map**

- |   |  |
|---|--|
|  Fort Lewis Boundary |  McChord Air Force Base             |
|  Cantonment Area     |  Nisqually Indian Reservation       |
|  City Boundary       |  Nisqually National Wildlife Refuge |





personnel assigned to Fort Lewis and family members live off post in nearby communities. It is estimated that 54 percent live in Pierce County, 45 percent live in Thurston County, and 1 percent live in other counties. The civilian workforce at Fort Lewis includes approximately 11,000 people, who live off-post in Pierce, Thurston, King, and other counties.

The total estimated Fort Lewis-related population (civilian and military, including families) in FY 2009 was approximately 104,000 (26,500 civilian, 77,500 military; Piek 2009). The total population of Pierce and Thurston counties was 1,050,700 in April 2008 (Washington Office of Financial Management 2008).

### 2.1.3 Facilities

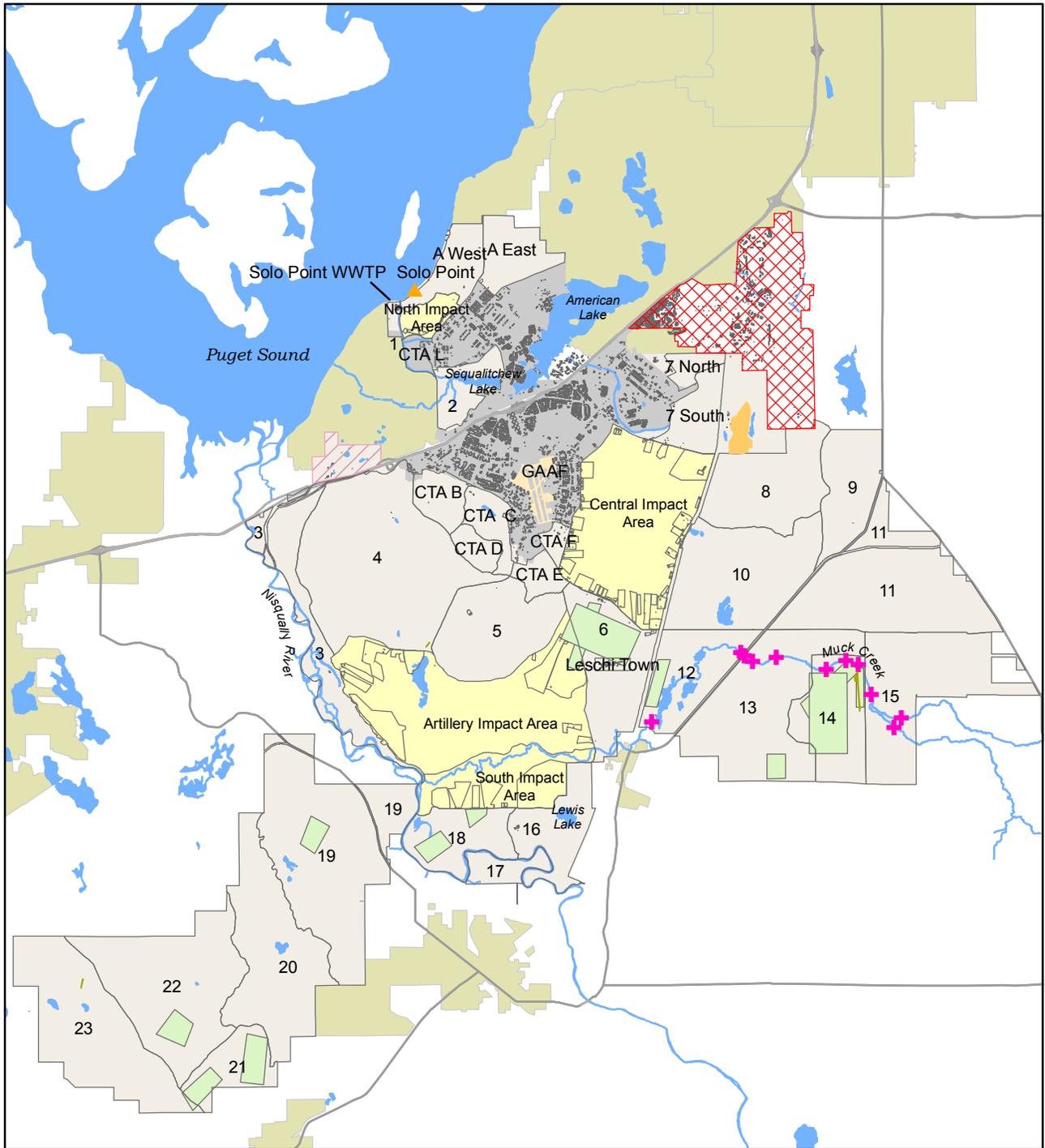
**Training Areas (TAs).** Training areas on Fort Lewis include forest, wetland, prairie, brush, and marine environments, and cover approximately 75,570 acres (30,600 ha; Department of the Army 2007a). They consist of ranges, impact areas, drop zones, and maneuver areas (Figure 2-2), and are used 325 days per year, and support military training. The TAs include direct and indirect fire ranges to support weapons qualification, artillery and mortar firing, and other live fire training requirements. There are 80 firing ranges that support weapons qualification activities, which are located in four impact areas on Fort Lewis. Additionally, TAs include ammunition storage areas, urban combat areas, landing strips, and amphibious training sites. They are available for off-road vehicle movement, gunnery practice, digging (vehicle positions and foxholes), unit assembly areas, and unit deployment exercises. Dense forest covering much of the installation is ideal for light infantry maneuvers, which are primarily conducted on foot. Open areas in grassland habitats provide adequate space for vehicle maneuver training.

**Cantonment Area.** The cantonment area (see Figure 2-2) is the developed portion of the installation. It serves as the center for most activities on Fort Lewis apart from field training. Land uses in the cantonment area include family and troop housing, administrative uses, commercial uses (e.g., shops and medical services), industrial uses (maintenance, logistics, and transportation), and open space maintained as green belts and recreational use areas. Gray Army Airfield (GAAF) supports rotary- and fixed-wing aircraft operations. The airfield consists of a 6,125-foot (1,867-m) runway, aircraft hangers, airfield operations facilities, and a simulator facility. In FY 2008, there was approximately 18.1 million square feet of building space at Fort Lewis (Waehling 2009). Of the approximately 4,000 buildings on the installation, about half are used for housing (Department of the Army 2007b).

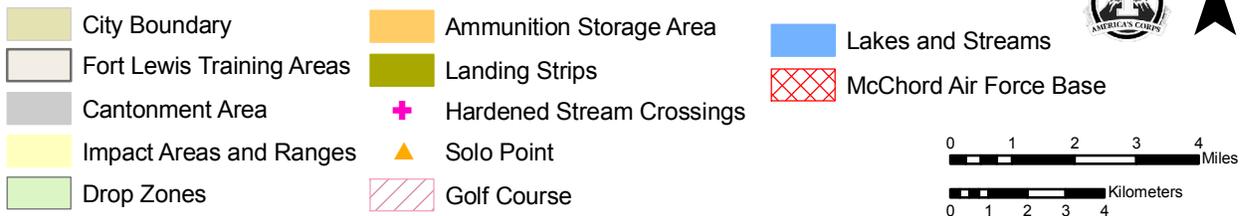
Stormwater from the cantonment area is conveyed through surface water drainage systems to Puget Sound and other surface waters. Most flow passes under Sequelitchew Creek in culverts and then continues in a constructed storm drainage channel that discharges to the Puget Sound near the Solo Point WWTP at the northwest corner of the installation. Stormwater from commercial and industrial portions of the cantonment area is routed through oil/water separators before being released into wetlands or the constructed conveyance channel to the Puget Sound. Stormwater from motor pools is routed through oil/water separators and discharged to the sanitary sewer system for further treatment.

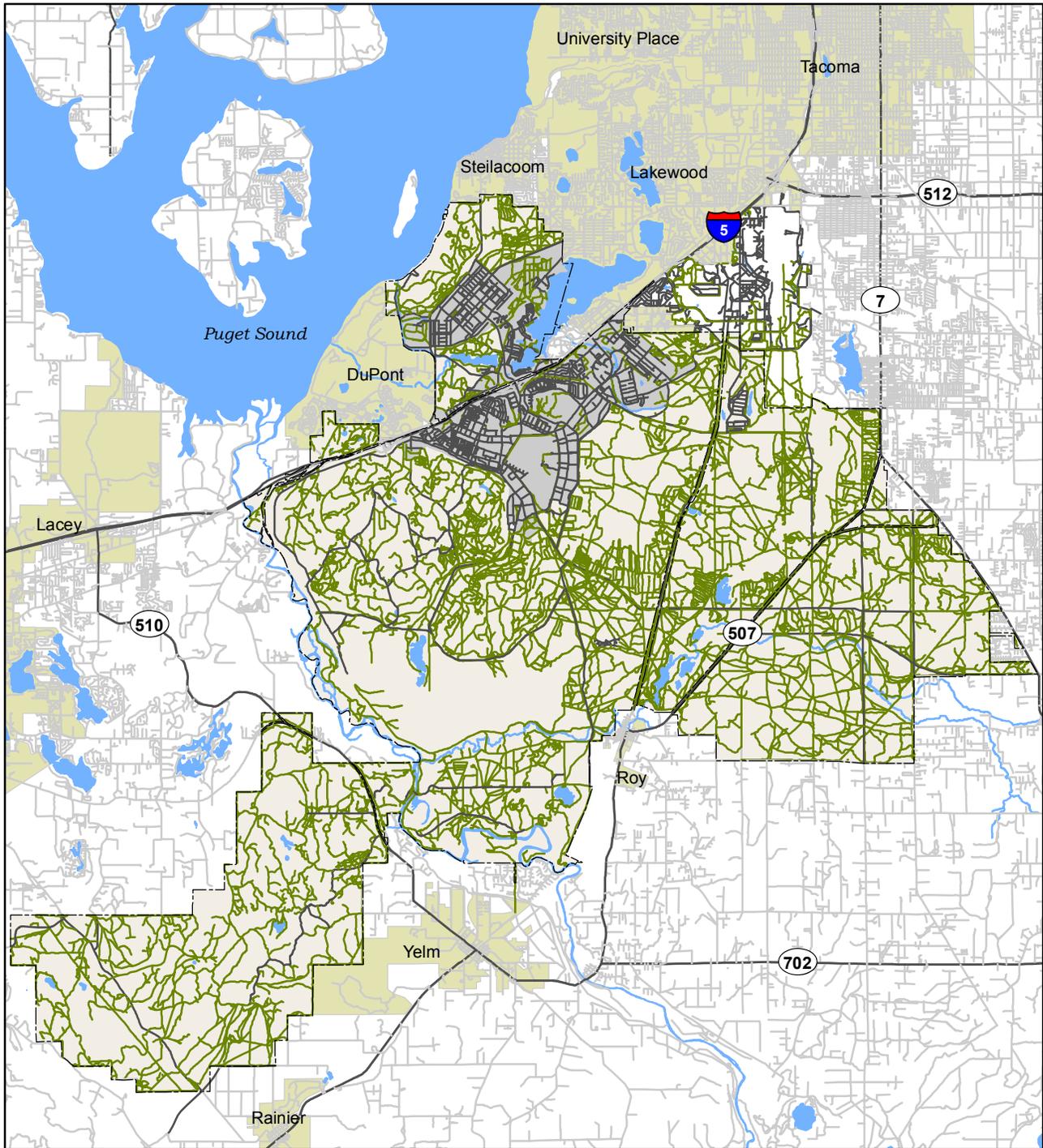
### 2.1.4 Roads and Stream Crossings

**Roads.** Fort Lewis supports an extensive network of paved and unpaved roads (Figure 2-3). The majority of these roads are unpaved roads in training areas, with paved roads concentrated in the cantonment area. The paved roadway system consists of primary roadways or arterials; secondary roadways or collectors, which distribute traffic between local streets and primary roadways; and tertiary roadways or local streets, which provide direct access to properties, primarily in residential neighborhoods (The Transpo Group, Inc. 2008). The Combat Vehicle Trail is a series of paved roads that have been reinforced to withstand the weight of combat vehicles. These roads run around the edges of the main post area and then head into the North Fort.



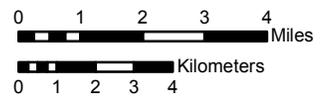
**Figure 2-2. Fort Lewis Facilities**





**Figure 2-3. Roads in the Fort Lewis Region**

- |   |   |
|---|---|
|  Fort Lewis Boundary |  Fort Lewis Paved Road   |
|  Cantonment Area     |  Fort Lewis Unpaved Road |
|  City Boundary       |  Off-Post Road           |





Road systems are classified on a five-point scale that describes their level of development (Table 2-1). This classification system is used to define established roads on the installation. These roads are mapped and maintained as Geographic Information System (GIS) layers for use in environmental coordination and other planning activities. Although some maintenance of roads does occur, it does not occur regularly or extensively.

**TABLE 2-1**  
**Road Classifications**

<b>Road Classification</b>	<b>Description</b>
MIL-CLASS 1 and 2	All-weather, hardened, or improved surfaces; range from state highways to gravel roads.
MIL-CLASS 3	Secondary roads within range areas that have been upgraded to a width of 14 feet (4 m), with a minimum 10 inches (25 centimeters) of crushed rock.
MIL-CLASS 4	Secondary roads that are seasonally accessible; width varies from single-lane to multiple-lane.
MIL-CLASS 5	Faint trails in the landscape where a few vehicles pass, or similar to MIL-CLASS 4 roads but found on steep slopes; road surfaces consist of natural soil and vegetation.

Drainage features, such as culverts, fords, drainage ditches, and water turnouts are associated with MIL-CLASS 1 through 3 roads. Use of MIL-CLASS 4 and 5 roads can lead to rutting and erosion during wet weather.

**Stream Crossings.** Stream crossing locations on Fort Lewis are shown in Figure 2-2. All ten of these stream crossings are on Muck Creek, and all are hardened to minimize vehicle impacts. Figure 2-4 shows an example of a hardened crossing on Fort Lewis. Hardened crossings are maintained on an as-needed basis, primarily by extending the hardened approaches if water is pooling outside the crossing and re-graveling approaches that are becoming rutted. Based on observations on use of stream crossings at Fort Lewis, most stream fording involves five to ten vehicles at any one time. Use of stream crossings is sporadic.

## **2.2 Yakima Training Center**

### **2.2.1 General Description**

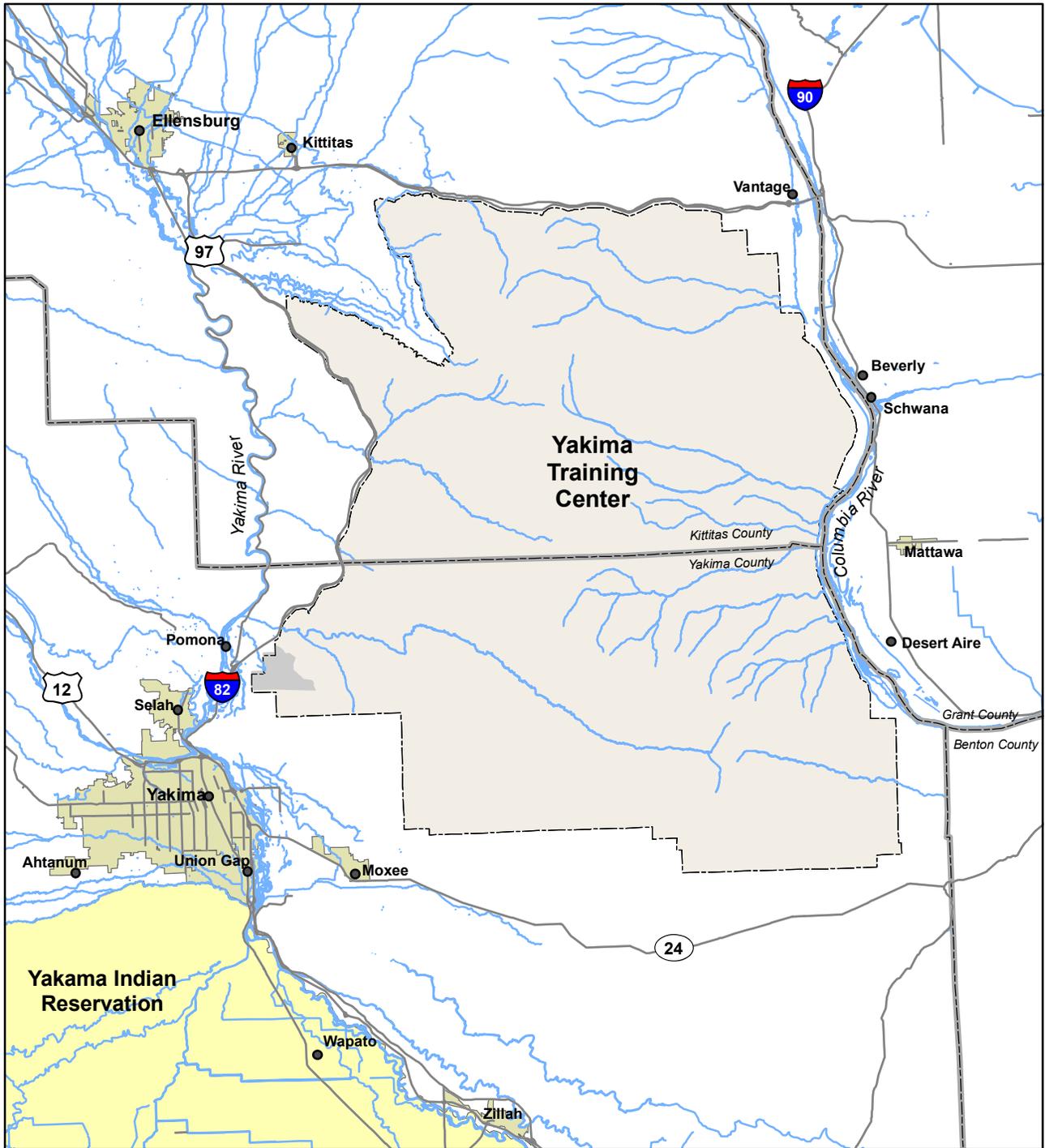
The YTC, a subinstallation of Fort Lewis, is located in south central Washington, in Kittitas and Yakima counties (Figure 2-5). The installation, which covers approximately 327,242 acres (132,433 ha), is 3 miles (5 km) northeast of the city of Yakima, 13 miles (21 km) southeast of the city of Ellensburg, and adjacent to and west of the Columbia River. Yakima Training Center is bounded on the north by Interstate 90 and Badger Pocket and on the east by the Columbia River. The southern boundary is south of Yakima Ridge, and most of the western boundary follows Interstate 82.

YTC is located in the rain shadow of the Cascade Range and can be described as open country with shrub-steppe-covered rolling hills and flats. Thin bands of trees and shrubs occur in the bottoms of canyons and along creeks. Rock outcrops, talus slopes, and cliffs are visible along the ridge tops, canyon walls, steep hills, and drainages. Land uses adjacent to YTC include rangeland, agriculture, urban uses, and state and federal wildlife and recreation areas.

All watersheds on YTC drain into one of two major basins: the Columbia River basin to the east, or the Yakima River basin to the west. The surface water resources at YTC include streams, seeps, springs, and ponds. Five of approximately 19 man-made ponds on YTC are artificially maintained, four to support fire fighting activities and wildlife habitat, and one for recreation. Major streams flowing into the Columbia River

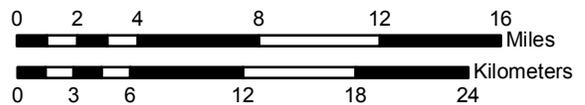


Figure 2-4. Hardened Stream Crossing at Fort Lewis



**Figure 2-5. Yakima Training Center Vicinity Map**

-  County Boundary
-  City Boundary
-  Yakima Training Center Boundary
-  Rivers





include Alkali, Corral Canyon, Hanson, Sourdough, and Johnson creeks. Many of the tributaries to the Columbia River discharge via subsurface flow when stream flows are low, particularly during the summer. Lmumma Creek flows year-round into the Yakima River. While several other streams have perennial flow in their upper reaches within YTC, they become intermittent or dry in their lower reaches on the installation. These include Selah, Middle Canyon, and Cold creeks. The remaining surface water drainages on YTC are intermittent and do not flow in the summer.

The dry environment of YTC limits wetland areas to the immediate vicinity of perennial streams, seeps, and springs. A total of 204 seeps and springs are known to occur within YTC, many associated with wetlands or riparian areas. Wetland vegetation primarily consists of cattails (*Typha* spp.), rushes (*Juncus* spp.), and sedges (*Carex* spp.), with occasional patches of scrub-shrub vegetation such as willows (*Salix* spp.). Many wetland and riparian areas have been disturbed by past land use practices including grazing.

The U.S. Department of Agriculture Natural Resources Conservation Service (USDANRCS) completed a soil survey of YTC in cooperation with the U.S. Department of the Army (USDANRCS 2006). A total of four major groupings of soils, comprised of 215 soil types, have been found within the installation. Soils at YTC formed in a variety of parent materials, including glacial outwash, loess, residuum, alluvium, and basaltic colluvium, and are found at several landscape positions, such as ridgetops, benches, and hill slopes. Soils are mostly shallow, light, silt loams. They are characteristic of arid to semiarid climates and are fragile and easily eroded. There are some major areas of bottomland or alluvial soils, primarily along the eastern boundary near the Columbia River and in the cantonment area.

### **2.2.2 Population and Military Strength**

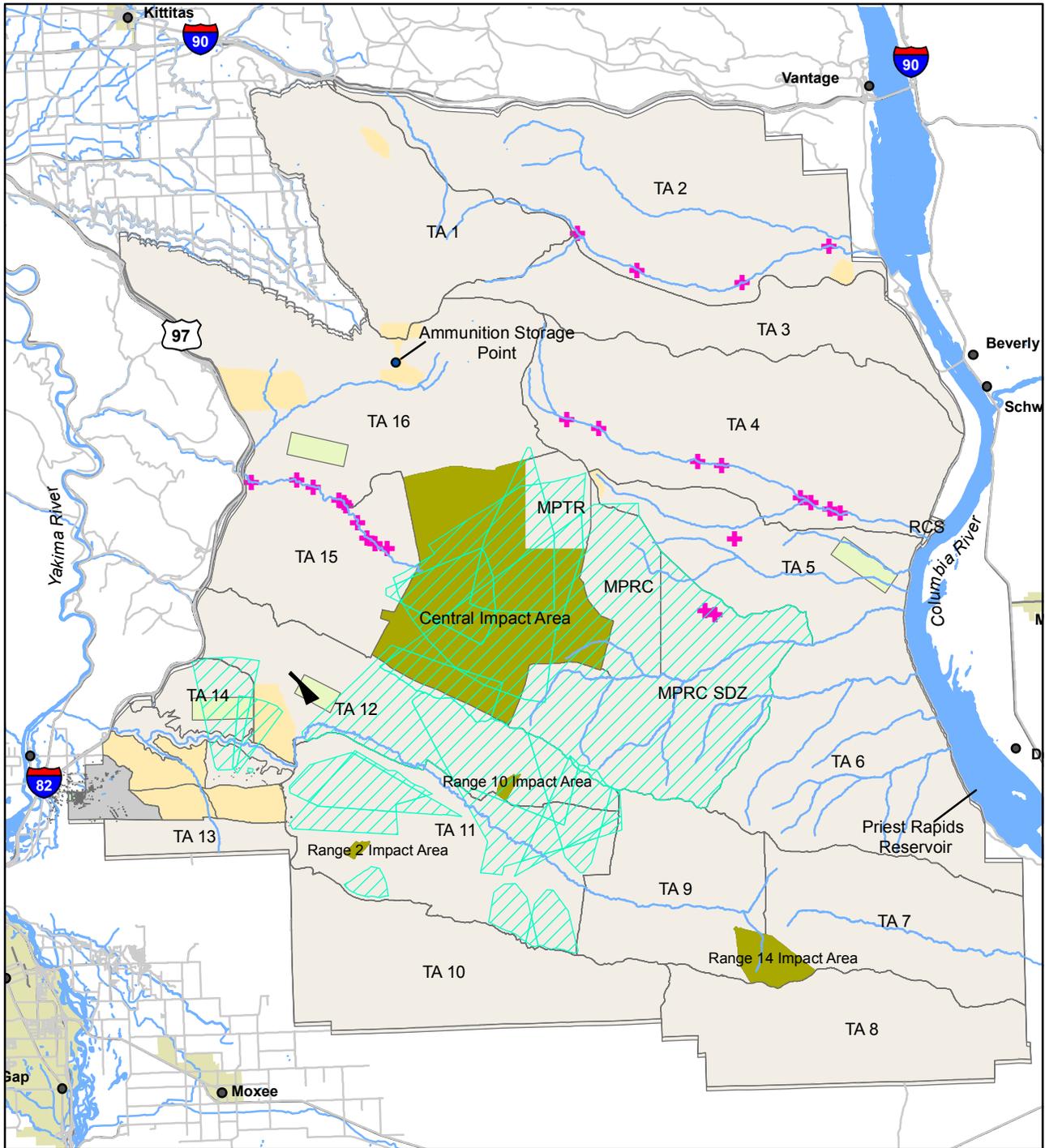
A total of 124 active duty military personnel are employed at YTC, and are accompanied by approximately 188 family members. The civilian work force at YTC totals 320 (Department of the Army 2008a), and associated family members are estimated at 832. Therefore, the total population associated with YTC is approximately 1,144. Because YTC does not have on-post housing for military personnel, the entire population associated with the installation resides off-post in the surrounding communities. The total population in Kittitas and Yakima counties was 275,300 in April 2008 (Washington Office of Financial Management 2008). YTC has approximately 2,500 barracks spaces that are available to temporarily house soldiers during training exercises (Morey 2008).

### **2.2.3 Facilities**

Yakima Training Center provides training facilities, logistical support, and operational live-fire training, primarily for units stationed out of Fort Lewis. The terrain at YTC is well suited for desert and hill/submountainous area training.

The cantonment area of YTC is very small (approximately 1,700 acres), with the remainder of the installation consisting of training areas (Figure 2-6). A total of 77 permanent structures occur within the cantonment area (Department of the Army 1999). Additionally, Vagabond Army Helipad, used for rotary-wing aircraft, is located in the cantonment area. Training facilities at YTC include the Central Impact Area (CIA) and a Multi-Purpose Range Complex (MPRC) that provides state-of-the-art live-fire training for infantry, tanks, aircraft, and helicopters (ENSR 1998b). There are 26 developed ranges at YTC (Pacific Northwest National Laboratory 2006). The training facilities support a wide range of gunnery and maneuver training, and include maneuver corridors, impact areas, ranges, drop zones, and bivouac areas.

The stormwater drainage system serving the cantonment area at YTC consists of three detention basins, several oil/water separators, and open ditches. The drainage system discharges into an intermittent stream that then enters the Yakima River, downstream of Selah Creek. Because of the low hydraulic gradient of vegetated



**Figure 2-6. Yakima Training Center Facilities**





channels of the drainage systems and long distances to receiving waters, storm drainage does not have significant effects on the Yakima River.

#### 2.2.4 Roads and Stream Crossings

**Roads.** Like Fort Lewis, YTC supports an extensive network of paved and unpaved roads, the majority of which are unpaved roads in training areas (Figure 2-7). Roads are defined and classified according to the MIL-CLASS system presented in Table 2-1. Roads at YTC are mapped and maintained as a spatial database for use in environmental coordination and other planning activities. The data set is periodically reviewed and updated to capture new roads that develop over time (e.g., new MIL-CLASS 4 and 5 roads). Because of the large number of roads on the installation and the large land area they cover, regular maintenance addresses only the most frequently used roads, as well as roads that have been identified as needing specific maintenance to improve their functionality and/or prevent impacts to surrounding resources.

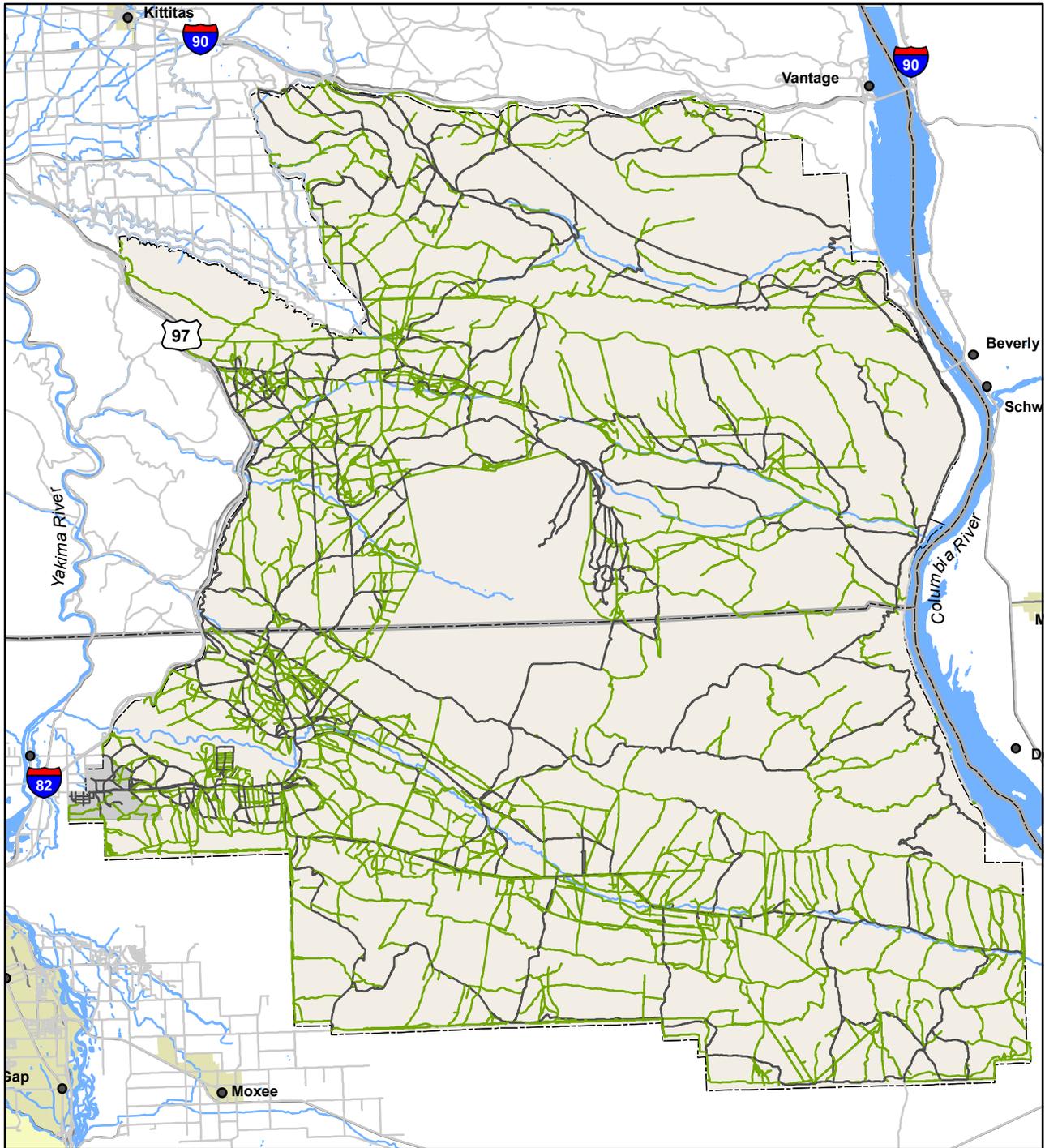
The ROD for the EIS to station mechanized or armored combat forces (Department of the Army 1994), required YTC to upgrade 300 miles of existing roads, realign poorly located roads, and to continue erosion control efforts. YTC has completed these road upgrades, has relocated roads that were previously located in riparian areas, and has closed and rehabilitated deteriorated or poorly located roads. Additionally, numerous erosion control features have been installed. As stated in the Cultural and Natural Resources Management Plan (CNRMP; YTC Environment and Natural Resources Division 2002), road upgrades are part of ongoing management for soil, vegetation, water quality, and other resources. Management actions identified in the CNRMP include (but are not limited to) upgrading heavily used unimproved roads and bivouac areas, as well as other established roads; performing road maintenance on unimproved roads following large maneuver events; and continuing closures of steep roads, roads adjacent to streams, non-maintained roads, and other unnecessary roads that are potential sources of fine sediment into streams.

**Stream Crossings.** There are 679 stream crossing features on the installation, which predominantly consist of culverts. Most crossing features have been installed at intermittent or seasonal drainages, as opposed to perennial streams. During the planning process for these projects, appropriate permitting actions were taken to ensure proper design criteria were applied, including requirements for fish passage. For concrete ford features specifically designed for fish passage, a low flow “trough” was included in the design to support fish passage during low-flow conditions. General observations during low flow conditions indicate that concentrated flow does occur within the troughs as designed. The Army has no information on how frequently stream crossings are used.

Out of the stream crossings on YTC, 25 occur on fish-bearing streams (Alkali, Hanson, Johnson, and Lmumma creeks), as shown in Figure 2-6. Many of the roads crossing these four fish-bearing streams have been improved with one of five types of erosional control: concrete slab fords, cable concrete block fords, geocell fords, vented fords with a small single or multiple culverts, and vented fords with a large open-bottom arch culvert (YTC Environment and Natural Resources Division 2009a). However, eight crossings have not been improved, one of which was recently identified for removal as a crossing based on site conditions. Pictures showing examples of these stream crossings are provided in Figures 2-8 through 2-12. In a recent inventory of stream crossings on fish-bearing streams, one was identified as likely to act as a fish passage barrier (YTC Environment and Natural Resources Division 2009a). This steel culvert occurs outside the YTC boundary, and is clogged with a large rock and debris. None of the stream crossings on YTC were identified as acting as fish passage barriers, although four were identified as needing some maintenance.

### 2.3 Military Mission

The military mission is to operate a state-of-the-art power projection and sustainment platform for warfighters by providing them with superior training support and infrastructure; support the transformation of 1<sup>st</sup> Corps



**Figure 2-7. Roads in the Yakima Training Center Region**

- Yakima Training Center Boundary
- Cantonment Area
- City Boundary
- County Boundary
- YTC Road MIL-CLASS 1/2/3
- YTC Road MIL-CLASS 4/5
- Off-Post Road

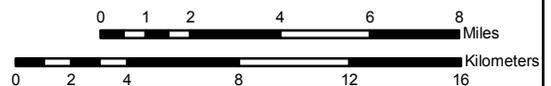




Figure 2-8. Example Concrete Slab Ford at Yakima Training Center



Figure 2-9. Example Cable Concrete Block Ford at Yakima Training Center



Figure 2-10. Example Vented Fords with Multiple Culverts at Yakima Training Center



Figure 2-11. Example Vented Ford with a Large Open Bottom Arch Culvert at Yakima Training Center



Figure 2-12. Example Unimproved Stream Crossing at Yakima Training Center



and Fort Lewis; support the well-being of its soldiers, civilians, retirees, and their families; and demonstrate leadership and innovation in environmental stewardship.

Fort Lewis is the home of 1<sup>st</sup> Corps, whose primary focus is the Pacific Rim. As a result, 1<sup>st</sup> Corps has a close, ongoing relationship with Pacific Command. The principal Fort Lewis maneuver units are Stryker Brigade Combat Teams (SBCTs).

The Army is currently involved in a worldwide reorganization to meet the needs of combatant commanders, and to make the Army more strategically responsive and dominant at every point along the spectrum of military operations. This restructuring will support the global war on terrorism and ongoing military needs. As a result of Army restructuring, which began in 2002, Fort Lewis and YTC have been tasked with supporting the training needs of several units that have, or are in the process of, relocating to Fort Lewis.

## **2.4 Current Military Training at Fort Lewis and YTC**

The major types of training that currently occur at Fort Lewis and YTC are discussed in the sections that follow. These types of training will be ongoing, regardless of whether the proposed action (discussed in Chapter 3) is implemented.

### **2.4.1 Maneuver Training**

Maneuver training is a critical component of the SBCT collective training plan. At present, three SBCTs are stationed at Fort Lewis, although only one or two SBCTs have been training at a time since the stationing of the third SBCT in 2007. Large-scale maneuver training events (battalion and brigade levels) are often the capstone training exercises that are used to test and certify units for operational deployments abroad. Field training exercises emphasize maneuver training using Stryker vehicles; however, other wheeled vehicles are used during the exercises as well. During maneuver training, vehicles travel on improved and unimproved roads, as well as off-road. Additionally, other activities can occur during maneuver training exercises, including dismounted training, bivouac activities, urban combat training, refueling, rearming, and digging (individual and vehicle positions). Some of the components of maneuver training are discussed in more detail in later sections.

Vehicle maneuvers typically occur in large open areas. Most driving during maneuver training is on existing roads. On YTC, most of the available training lands are suitable for vehicle maneuvers. On Fort Lewis, primary maneuver areas are located on grasslands, which provide open habitat for these activities. Based on the land use designations described in Section 2.6, off-road maneuver training is not authorized in certain areas on the installations. Fort Lewis Regulation 420-5 restricts vehicle travel on Fort Lewis to established roads within 164-foot (50-m) buffers around all wetlands on the installation, and restricts water crossings by vehicles to authorized fords. On YTC, vehicles are not authorized in riparian buffers along streams (discussed in more detail in Section 2.6.2). Ford locations at Fort Lewis are shown in Figure 2-2, and ford locations at YTC are shown in Figure 2-6. A typical stream crossing at Fort Lewis is shown in Figure 2-4, and example stream crossings at YTC are shown in Figures 2-8 through 2-12.

At present, the maximum amount of SBCT off-road vehicle training that occurs annually is approximately 156,000 off-road miles (251,058 km) on Fort Lewis and 370,000 miles (595,457 km) on YTC. Tables 2-2 and 2-3 summarize maneuver miles on paved and unpaved roads by the SBCTs.

In addition to training by the SBCTs, National Guard units utilize YTC for large-scale maneuver training events once a year. These events last for a 2- to 3-week period, and involve the use of heavy mechanized forces. National Guard units also train at Fort Lewis, but use tracked vehicles on a very limited basis.



**Table 2-2  
Current SBCT Mileage Levels on Fort Lewis**

Vehicle Type	Miles on MIL-CLASS 1, 2, and 3 Roads	Miles on MIL-CLASS 4 and 5 Roads	Off-Road Miles	Total Miles
<b>Strykers</b>	1,000,000	84,000	66,000	1,150,000
<b>HMMWVs<sup>1</sup></b>	903,000	75,000	60,000	1,038,000
<b>Medium Weight Trucks</b>	452,000	38,000	30,000	520,000
<b>Combined</b>	<b>2,360,000</b>	<b>197,000</b>	<b>156,000</b>	<b>2,710,000</b>

<sup>1</sup>HMMWV = High Mobility Multipurpose Wheeled Vehicle

**Table 2-3  
Current SBCT Mileage Levels on Yakima Training Center**

Vehicle Type	Miles on MIL-CLASS 1, 2, and 3 Roads	Miles on MIL-CLASS 4 and 5 Roads	Off-Road Miles	Total Miles
<b>Strykers</b>	410,000	200,000	160,000	770,000
<b>HMWWVs</b>	370,000	180,000	140,000	690,000
<b>Medium Weight Trucks</b>	190,000	90,000	69,000	350,000
<b>Combined</b>	<b>970,000</b>	<b>470,000</b>	<b>370,000</b>	<b>1,810,000</b>

#### 2.4.2 Weapons Qualification and Gunnery Training

All live fire military training occurs at established firing ranges. On Fort Lewis, the effects of ammunition are concentrated at four impact areas (Figure 2-2): the North Impact Area (small arms only, with 14 firing ranges), the Central Impact Area (small arms only, with 48 separately scheduled ranges), the Artillery Impact Area (AIA; with 13 separately scheduled small arms and live fire maneuver/combined arms live fire exercise ranges; also serves 37 artillery firing points), and the South Impact Area (with eight separately scheduled small arms and live fire maneuver/combined arms live fire exercise ranges and one mortar firing point). The vast majority of artillery training at Fort Lewis occurs to the north and east of the AIA, in training areas 3, 4, 5, 6, and 12, with rounds fired into the AIA. Ranges on Fort Lewis are used for artillery training on a daily or near-daily basis.

On YTC, firing ranges are located in the MPRC, adjacent to ground maneuver corridors, in the Multi-Purpose Training Range (MPTR), in and other portions of the installation (Figure 2-6). The effects of ammunition are concentrated at the Central Impact Area, Range 7 Impact Area, Range 10 Impact Area, and the Range 14 Impact Area. The majority of field artillery training occurs in TA 16, with rounds fired into the CIA. The frequency and intensity of artillery training varies depending on when units are scheduled to train at YTC, which may be dictated by such factors as training schedules at Fort Lewis and deployment schedules. During periods of heavy training, numerous ranges on YTC may be in use simultaneously on a daily basis. Between training events, ranges may receive little to no use.

Fire risk and fire management are discussed in more detail in Section 2.5.



### 2.4.3 Aviation Training

On Fort Lewis, aviation training involves predominantly rotary-wing aircraft (helicopters), but some fixed-wing aircraft and unmanned aerial vehicles (UAVs) as well. Most rotary-wing operations, including the CAB, operate out of GAAF, and most fixed-wing operations operate out of McChord AFB, located adjacent to Fort Lewis. The only defined flight corridors at Fort Lewis are associated with take-off and landing at GAAF. These flight paths extend to the west and south of the airfield. Otherwise, helicopters can fly anywhere in Fort Lewis airspace, subject to the restrictions to protect bald eagles listed in Fort Lewis Regulation 420-5 (see Table 2-4). Off-post aviation activities are limited to traveling to and from YTC (approximately once a month), which does not follow a prescribed flight path but involves “flying friendly” at altitudes well above 2,000 feet Above Ground Level (AGL). Additionally, the Army is currently in consultation with the agencies for proposed off-post training along routes in Washington and Oregon, and in a low-level training area in Washington.

Aviation training activities that utilize the Fort Lewis airspace include artillery and mortar firing from helicopters, close air support, joint air-ground training, aircraft reconnaissance, parachute drops and low altitude parachute extraction system operations, field and assault airstrip operations, helicopter air-to-air combat training, aviation unit field training exercises from a ground base in a training area, and UAV operations. Helicopter training occurs during daytime and nighttime hours, and includes low level flying.

The majority of fixed-wing aircraft support activities conducted at Fort Lewis involve troop transport missions, transport of very important persons, operational support airlift, or low-level flights over the various drop zones for airborne training.

On YTC, aviation training involves predominantly rotary-wing aircraft (helicopters), fixed-wing aircraft, and UAVs. The UAVs operate within the installation boundaries, and must remain at least 2.4 miles (3.9 km) from the boundary of YTC. They have a preferred flight altitude of 10,000 to 13,000 feet (3,050 to 3,960 m), and are especially quiet to avoid detection. The only defined flight corridor on YTC is associated with take-off and landing at Vagabond Army Helipoint. This flight path extends northeast of the helipoint. Otherwise, helicopters can fly anywhere in YTC airspace, subject to the restrictions to protect bald eagles and sage-grouse listed in Fort Lewis Regulations 420-5 (see Table 2-5). Off-post aviation activities are limited to traveling to and from Fort Lewis, as well use of the Yakima Air Terminal in Yakima. Travel between installation by aviation units occurs approximately once per month, and when aviation units are visiting YTC, they use the Yakima Air Terminal for various purposes.

Aviation training activities that utilize the YTC airspace include close air support, joint anti-armor training, aircraft reconnaissance, field and assault airstrip operations, helicopter air-to-air combat training, aviation unit field training exercises from a ground base in a training area, and UAV operations. Helicopter training occurs during daytime and nighttime hours, and includes low level flying.

### 2.4.4 Mechanical Digging

Various excavation activities take place during training exercises. Earth moving is required for excavation of vehicle positions; berming for fire bases, tactical operation centers, and hasty one-man, two-man, and crew-served weapons systems; and construction of integrated trenches for laying pipeline. At Fort Lewis, excavations are refilled and reseeded, with the exception of individual fighting positions, which are refilled but not reseeded. At YTC, individual fighting positions are refilled, and if multiple excavations occur in the same location they are reseeded.

On both Fort Lewis and YTC, digging activities are not authorized in certain areas to protect natural and cultural resources, as discussed in Sections 2.6.1 and 2.6.2. In addition, units are encouraged to excavate in



areas where ground-disturbance has occurred previously. The dig permit process requires trainers to obtain a permit prior to conducting digging activities. This process helps prevent excavations from occurring in environmentally sensitive areas.

At present, a total of approximately 5 acres are impacted annually by digging at Fort Lewis, and approximately 50 acres are impacted annually by digging at YTC. This acreage consists largely of areas where past ground-disturbing activities have taken place and soil and vegetation have been repeatedly disturbed in the past. After digging exercises are completed, most excavations are refilled and reseeded to encourage revegetation of the site.

#### **2.4.5 Bivouacking and Assembly Areas**

Some aspects of training require soldiers, vehicles, and equipment to gather in one area. For example, training exercises may require tactical assembly areas, temporary arming and refueling facilities, or bivouac sites for establishing command and control areas. Because of the concentrated activity, bivouacking is not authorized in certain locations, as indicated in Sections 2.6.1 and 2.6.2. On Fort Lewis, bivouacking occurs in most training areas, with large units usually directed to the most disturbed locations. On YTC, bivouacking is limited to the bivouac locations shown in Figure 2-6.

#### **2.4.6 Urban Combat Training**

During urban combat training, units take part in exercises that mimic conflict scenarios in urban settings and Forward Operating Bases, including urban unrest and operations other than war. Urban combat training occurs in special training facilities on Fort Lewis and YTC that mimic urban settings. On Fort Lewis, these facilities include the Leschi Town Combined Arms Collective Training Facility, the Regenburg/Al-Regen site, and temporary shanty towns emplaced in maneuver areas. These urban combat sites are generally used daily. At YTC, urban combat training takes place at a Shoot House and Urban Assault Course (SHUAC). The Shoot House is located at Range 24 and the Urban Assault Course is located at Range 25. Training activities that take place at the SHUAC include use of small arms, pyrotechnics such as flares and smoke devices, explosives for live breaches, tactical and non-tactical vehicles, and occasionally helicopters. The frequency and intensity of urban combat training is similar to the description of live-fire training in Section 2.4.2. When units come to YTC for training, they use urban combat training facilities extensively, with scheduled use of YTC by troops dependent on deployment schedules and other factors.

#### **2.4.7 Pyrotechnics and Tracers**

Use of these incendiary devices is minimal. Some use of tracers is required for nighttime firing. Pyrotechnics are occasionally used for scenarios involving perimeter defense during battery and battalion training.

#### **2.4.8 Amphibious Operations**

Waterborne operations occur at the Nisqually River, Sequelitchew Lake, Lewis Lake, and Solo Point (see Figure 2-2) on Fort Lewis. In addition, Chambers Lake is available for dismounted waterborne operations only, while American Lake is used for paratrooper training.

The Solo Point Amphibious Site is used for over-the-shore and diving operations, engineer bridging, small boat operations, infantry beach assault, and as a ground base for water drops (parachuting) into Puget Sound. Diving entails day and night surface swims, to a maximum depth of 110 feet (33.5 meters). Bridging activities, carried out by engineering units, entail construction of floating bridges to assist in amphibious and military operations. Specific activities involve launching bridge bays into a water body, and then maneuvering



them together, using bridge erection boats, to assemble a consolidated bridge or raft. Infantry beach assault consists of landing boats, hiding boats, conducting a mission, retrieving boats, and returning to Solo Point.

Restrictions on training at Solo point, as listed in Fort Lewis Regulation 420-5, include limiting off-loading and deployment of floating bridges and support vessels to the existing boat ramp between March 1 and June 30 each year; prohibiting deployment from the native beach and alteration of native beach material; limiting near-shore activities on each of the 8 days of launch activity training scheduled between March 1 and June 30 to 3 hours or less; and prohibiting driving on the native beach substrate between March 1 and June 30. The intent of this timing restriction is to avoid impacting near-shore migration of salmon fry.

Amphibious sites at Sequalitchew Lake and Lewis Lake are used for vehicle swimming, engineer bridging, and rafting operations. Underwater pipe is installed in Sequalitchew Lake. During vehicle swims, vehicles are only authorized to enter and exit the water at prepared beaches. A bridge site at the Nisqually River is used for engineer bridging and rafting operations. Vehicle water crossings are only authorized at designated fording locations. Although there is a designated fording site on the Nisqually River, it has not been used in at least 5 years, and it is not anticipated to be used between now and 2015. The preferred water crossing location is Sequalitchew Lake, with Lewis Lake also used.

Water drops from aircraft occur at the American Lake Drop Zone and the Puget Sound Drop Zone. Water drops entail use of inflatable, motorized boats to clear the drop area and retrieve paratroopers from the water. Helicopters used during drops fly at approximately 1,000 feet (305 meters) above the drop zone, at a speed of less than 12 miles per hour (19 km per hour).

Amphibious training at YTC consists of river crossing activities on leased land along the Columbia River. Activities consist of fixed, floating, and rafting operations. These activities must be planned in coordination with the Grant County Public Utility District, Washington State Department of Energy, and Washington Department of Fish and Wildlife (WDFW), and only occur during July through November. Training activity is limited to 10 days per training event, and the total amount of training does not exceed 120 days per year.

#### **2.4.9 Smoke Training**

Smoke obscurant training involves that use of smoke generating equipment and munitions that are designed to produce smoke, including grenades, smoke pots, artillery shells, and mortars. This type of training presently occurs very infrequently at Fort Lewis and YTC.

Smoke generators produce fog oil smoke to visually obscure troops and equipment, and graphite flake smoke to prevent detection by infrared. A typical training exercise with these generators normally lasts from 2 to 4 hours, with fog oil smoke generated the entire time, and graphite flake smoke generated for a small portion of the time. Smoke generators may generate smoke from fixed locations or during mobile operations, and the smoke may cover up to several hundred acres. Smoke producing munitions produce white and colored smoke for screening troops and communicating during combat maneuvers. Use of these munitions is typically incorporated into larger training exercises.

Fort Lewis Regulation 350-30 includes restrictions on training with smoke. These restrictions include buffers to prevent smoke from entering the cantonment area or crossing the boundary of either installation. Furthermore, there are annual limits on smoke usage, which were developed to protect human health, wildlife, air quality, and other resources (see ENSR 1999, ENSR 2001). At YTC, additional restrictions pertain to buffer distances and maximum numbers of munitions released from a single source.



## 2.5 Fire Risk and Fire Management

### 2.5.1 Fort Lewis

The risk of fire at Fort Lewis depends on several factors, including weather conditions; fuel availability (vegetation); frequency, type, and intensity of military training activities; and location in relation to fire suppression resources (i.e., water and fire fighting personnel). The combination of climate (relatively mild) and vegetation at Fort Lewis contribute to a low to moderate fire danger at the installation for the majority of the year. For most of the year, precipitation maintains a high-moisture content in the installation's vegetation and reduces its ability to burn. However, the warmer, drier summer months (between June and October) can create a high fire danger (Department of the Army 2001).

From 1988 to 2000, the Fort Lewis Forestry Section conducted 1,492 fire runs (responses to fires), with a high of 156 runs in one year and a low of 76 in another year. The sizes of these wildfires ranged from campfire size to 160 acres; however, most were small in size (Department of the Army 2000). Between 2001 and 2008, the Forestry Section conducted 615 fire runs, with a high of 149 runs in one year, and a low of 19 in another year. The total number of acres burned by wildfires during these years was 7,861 acres (3,181 ha). However, acreages were not reported for fires less than 1 acre in size or for every fire that occurred in the AIA because these fires are allowed to burn for safety reasons (e.g., unexploded ordnance concerns) and to reduce fire intensity in the AIA in future years. The sizes of the reported fires occurring between 2001 and 2008 ranged from less than 1 acre (0.4 ha) to 650 acres (260 ha), though most were 10 acres (4 ha) or less in size. Although 2008 experienced the greatest number of reported acres burned (3,487 acres [1,411 ha]) during the past 8 years, it should be noted that 2008 was the only year for which wildfires in the AIA were consistently reported. Wildfires in the AIA accounted for approximately 2,145 acres (868 ha) of the 3,487 acres (1,411 ha) burned during 2008, including the 650-acre (260-ha) wildfire noted above (Leeper 2009). Although data on past fires are lacking, there is no indication that more than a few very small fires (a few acres or less) have burned off post. In the past 5 years, the only recorded fire burning off Fort Lewis property was a small fire that burned onto Weyerhaeuser inholdings in July of 2006 (Derrickson 2010). However, this fire did not go beyond the installation boundary shown in the figures provided in this BA.

Approximately 80 percent of the fires on Fort Lewis are a result of military training exercises and result from the use of pyrotechnics and tracers and ignitions from campfires and vehicles. Such fires vary in size and location, but are predominately small and limited to impact areas where gunnery training is conducted (Department of the Army 2007c). On Fort Lewis, the effects of ammunition are concentrated at the four impact areas. The remaining 20 percent of fires on Fort Lewis are caused by activities other than training and typically occur in the cantonment area. In forests on the installation, numerous small fires occur annually and are extinguished quickly, with an annual burned area of less than 500 acres (200 ha); (Department of the Army 2007b).

While wildfire suppression is a management approach used over most of the installation, many accidental ignitions in prairie habitats on Fort Lewis are allowed to burn. In the AIA, ignitions caused by exploding shells occur regularly. These fires are not extinguished and burn approximately 2,470 to 3,000 acres (1,000 to 1,200 ha) of predominantly prairie habitat annually (Department of the Army 2007c).

The Forestry Section establishes a fire danger level at the installation depending on the climate and fuel moisture conditions (Department of the Army 2005a). With the exception of within the AIA, including Ranges 52 through 79 and Mortar Points 1 through 14, seasonal fire hazards on Fort Lewis (between June 1 and October 31) restrict the use of tracers and other potentially incendiary ammunition (Department of the Army 2000, 2006a). Fire hazard levels are posted daily, with the following associated restrictions to ignition sources:



- Level I – Tracers, pyrotechnics, troop fires, and smoking are authorized.
- Level II – Pyrotechnics, troop fires, and smoking allowed on roads, gravels, or other cleared surfaces (no tracers).
- Level III – Pyrotechnics, troop fires, and tracers prohibited. Smoking is allowed on roads, gravels, or specially prepared areas free of flammable materials (Department of the Army 2006b).

Although most wildfires occurring on Fort Lewis are suppressed, no fire suppression activities occur within the AIA, the South Small Arms Impact Area, the buffer zone in between these areas, or other areas of known explosive contamination. These fires are monitored to ensure no catastrophic events develop. On occasion, burning out from firebreaks ahead of the fires in these areas is conducted. To reduce the risk of wildfires occurring and spreading in TAs, early detection, firebreaks, and prescribed burning for fuels reduction are used. Early detection is usually made by military troops or people with area access permits, and fires are reported to the Fort Lewis Fire Department dispatcher, Fort Lewis Fire Alarm Central, Range Control, or nearby municipal fire departments (Department of the Army 2000, 2007b). Firebreaks are located along the perimeter of the installation, around the AIA, and around some of the ranges in the AIA. Firebreaks are maintained on an as-needed basis.

### **2.5.2 Yakima Training Center**

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

Wildfires have burned an average of approximately 9,000 acres (3,600 ha) annually for the past 25 years; however, annual burn acreages are highly variable and have ranged from 50 acres (20 ha) in 1991 to 63,296 acres (25,600 ha) in 1996 (this figure includes approximately 15,000 acres [6,100 ha] that burned off-post). High fire loss years have occurred in the last 25 years. These include 1984 (27,921 acres [11,300 ha]), 1987 (28,070 acres [11,360 ha], of which approximately 4,011 acres [1,600 ha] burned off-post), 1996, and 2003 (34,827 acres [14,100 ha], of which 146 acres [59 ha] burned off-post). Large fire loss years appear to be cyclical; during most years, between 1,500 and 6,000 acres (600 and 2,400 ha) are burned (Department of the Army 2002, McDonald 2009).

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

- Weather conditions (both seasonal weather and weather at the time of ignition). Fire risk at YTC is very responsive to the combined effects of fuel loading and moisture, temperature, humidity, and wind speed. Generally, the most extreme conditions occur between mid-day and early evening due to higher temperatures, lower humidity, and irregular afternoon winds.
- The frequency, intensity, and type of military training exercises. Pyrotechnic devices and tracers have been shown to be the most likely to ignite fires on the installation.
- The specific locations in which fires are ignited, including vegetation, terrain, and fuel loadings. On YTC, the shrub-steppe communities consist of fuel types ranging from 1- to 10-hour fuels. These are light fuels that are easily ignited and burn rapidly due to their small diameter (less than 0.5 inch [1.3 cm]). As a result, fire spreads quickly. In areas of higher disturbance, such as repeated fires and mechanical disturbance, native species have been largely out-competed by nonnative species like cheatgrass. This shift in plant communities has resulted in the development of a more fire-prone system.



- Level of response and capability of fire suppression resources to effectively attack and contain fires quickly (Department of the Army 2002, Nissen and Melcher 2004).

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

It is YTC's policy to suppress all wildfires on the installation, with the exceptions of those that occur in impact or dud areas and those that occur within the limits of established ranges where prior management actions have been implemented to contain fires, such as pre-burn areas. Fires occurring in impact areas are only suppressed when they threaten to escape the impact area boundary, and are only suppressed via aerial assets. However, ground suppression personnel are allowed to conduct operations along the outer perimeters of impact areas.

YTC has a current mutual aid agreement with all local upper valley fire department jurisdictions and Hanford Fire to assist with wildfire suppression requirements (ground and aerial), as well as structural fires. With this mutual aid agreement, YTC has more than 15 separate Fire Protection Districts and Municipalities that can be called upon during emergency operations (McDonald 2009).

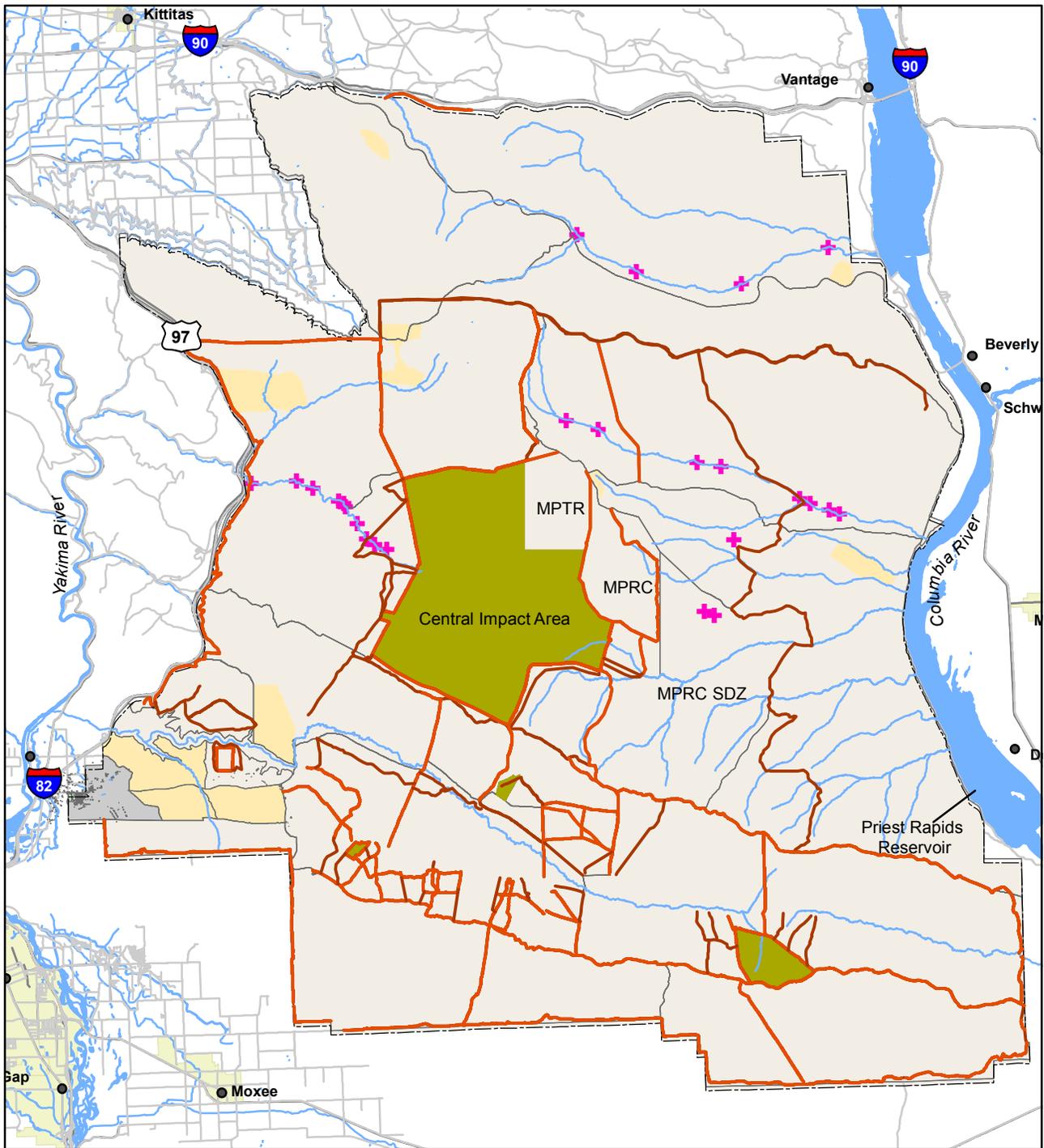
YTC has adopted a Fire Risk Management Assessment to evaluate the risk of starting uncontrolled fires from training activities during the fire danger season (May 15 through October 31). This assessment calculates fire risk at YTC based on values assigned to four areas:

- fire danger rating,
- military activity (i.e., the types of munitions and/or pyrotechnic devices intended for use on a given day),
- the availability and locations of fire fighting assets, and
- special considerations (e.g., status of pre-burn activities, proximity to sage-grouse habitat, time of day of the proposed training).

The fire danger rating is determined by the YTC Range Division staff, based on meteorological information collected from a weather station located near Range Control. When the risk becomes too high, military training is curtailed or postponed until the risk of uncontrolled fire is reduced.

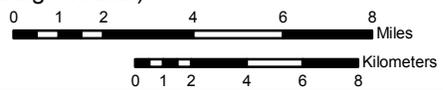
In addition, due to the severity and extent of the 1996 fire, YTC has developed a Pre-Incident Plan for the CIA and MPRC, which prescribes a series of actions to be followed to contain fires within a pre-determined fire management boundary. This plan also sets forth an annual prescribed burn plan (Nissen and Melcher 2004).

YTC conducts annual maintenance of 189 miles (304 km) of firebreaks to ensure fuel breaks are strategically located to compartmentalize fires, particularly in areas where fire hazards are high (such as along the CIA boundary) and along the installation boundary. Figure 2-13 shows the location of firebreaks currently maintained on YTC. The majority are maintained by residual herbicides that maintain bare ground. Herbicides are applied either using rotor wing aircraft at a height of 15 feet (4.6 meters) above the ground surface or using ground equipment. Herbicide applications occur in the fall or spring, depending on predicted soil moisture. Additionally, firebreaks may be prepared with mechanical equipment such as a motor grader, and periodic mechanical maintenance of these firebreaks is required every 4 to 5 years. Mechanical control of plants is done on firebreaks where sensitive plants may be found, off-post drift may occur on roadways or



**Figure 2-13. Location of Firebreaks on Yakima Training Center**

- Yakima Training Center Boundary
- Cantonment Area
- City Boundary
- Impact Areas
- Currently Maintained Firebreaks
- Other Firebreaks
- + Stream Crossings (fish-bearing streams)
- Bivouac Locations





vehicles, water erosion has occurred, and where vehicle traffic breaks down the chemical barrier in the soil (Figure 2-13). Mechanical maintenance is done using motor graders or angle blade bulldozers.

Additionally, YTC conducts prescribed burning in areas where fires tend to recur due to training activities, and in areas with a potential for fire escape. Prescribed burns are implemented in late spring through late summer, depending on the objectives of the burn. (Nissen and Melcher 2004).

## 2.6 Land Use Designations

Fort Lewis and YTC have training land designations that indicate the types of activities that are authorized in various locations. These land use designations would be applicable to training by any new units stationed at Fort Lewis/YTC in the next 5 years.

### 2.6.1 Fort Lewis

Portions of Fort Lewis have been designated as Controlled Use Areas (CUAs), in which certain land use activities are restricted either seasonally or year-round. Most CUAs are environmentally sensitive areas in which land use restrictions are necessary to protect natural resources. In some cases, restrictions are associated with regulatory compliance (e.g., bald eagle nest and roost site buffers), and in other cases, restrictions have been put in place to prevent additional future restrictions on training (e.g., areas of high quality prairie that provide habitat for candidate species). Figure 2-14 shows the locations of CUAs on Fort Lewis. Areas designated as CUAs include wetlands and streams and their associated buffers, cultural sites, areas previously designated as Research Natural Areas, buffers for listed species, and environmental hazards such as landfills. Because identification of cultural sites is a violation of federal law, these CUAs are not shown in Figure 2-14.

There are four restriction levels for CUAs, each of which corresponds to a different color on the map:

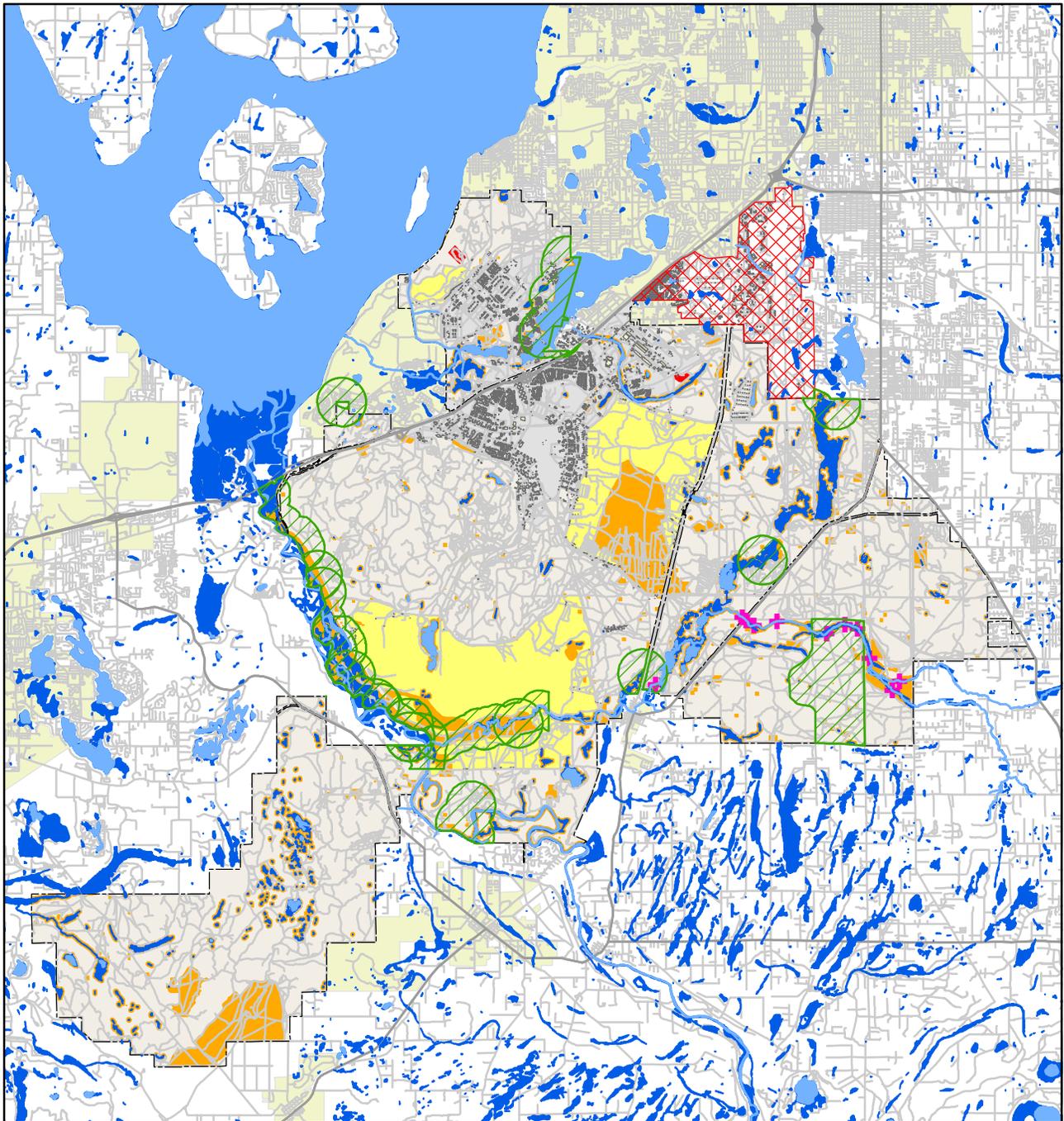
1. Red – Access is prohibited; a safety and/or human health risk is present.
2. Orange – Digging, bivouacking, assembly areas, and/or off-road vehicle activities are not authorized. Dismounted activities are allowed.
3. Yellow – No digging or bivouacking authorized. (Currently, there are no yellow CUAs on Fort Lewis)
4. Blue – No digging authorized. (Currently, there are no blue CUAs on Fort Lewis)

### 2.6.2 Yakima Training Center

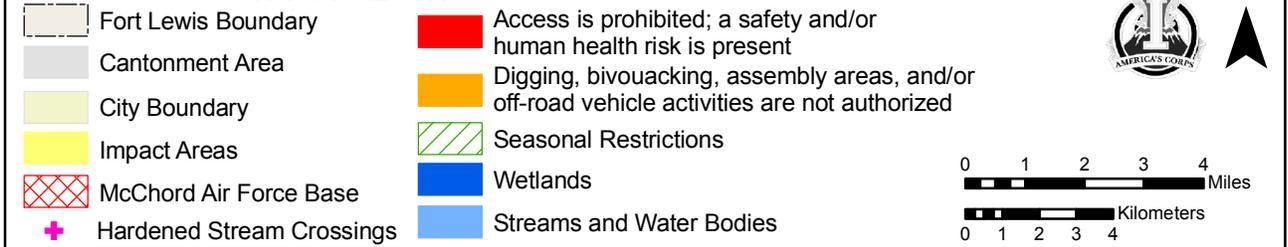
Yakima Training Center is divided into five land use zones that identify allowable military training activities and acceptable levels of impact to resources (Figure 2-15). These land use designations maximize military training opportunities while simultaneously safeguarding resources.

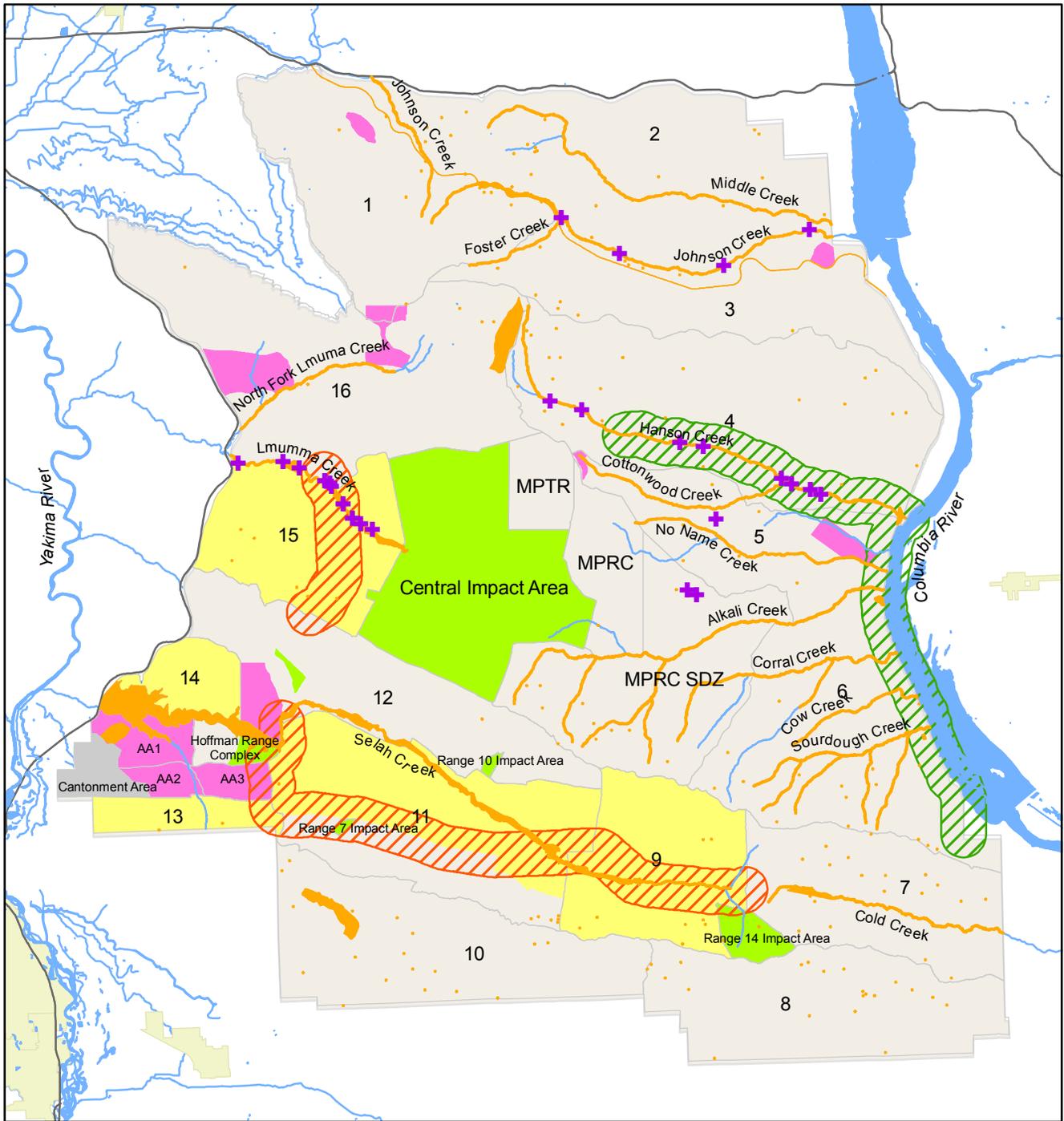
**Zone 1 (Land Bank).** This zone, covering approximately 10,000 acres (4,050 ha), is managed for significant and sensitive natural and/or cultural resources (e.g., wetlands, riparian areas, archeological sites). Most forms of training, including all tracked and wheeled vehicle use, digging, and bivouacking, are prohibited. Protection and restoration of these sites are primary objectives.

**Zone 2 (Conservation).** This zone, covering approximately 44,320 acres (17,935 ha), is the Sage-grouse Protection Area. Most forms of training are permitted within areas in this zone, but are highly controlled. The Sage-Grouse Management Plan provides a detailed description of protection and management measures that apply to these areas (Livingston 1998). Digging and bivouacking activities are not permitted within this zone.



**Figure 2-14. Controlled Use Areas and Seasonal Restrictions on Fort Lewis**





**Figure 2-15. Existing Land Use Zones and Flight Restriction Areas on Yakima Training Center**

- Zone 1 - No Vehicles or Digging
- Zone 2 - Sage Grouse Protection Area
- Zone 3 - General Use Area
- Zone 4 - Bivouac Locations (BSA)
- Zone 5 - Off Limits Area

- Stream Crossings (fish-bearing streams)
- Bald Eagle Restrictions
- Sage-Grouse Aircraft No Fly Zone



N



0 1 2 4 6 8 Miles

0 1 2 4 6 8 Kilometers



Army rest/rotation training regimes and restoration or rehabilitation activities are designed to maintain or enhance these areas.

**Zone 3 (General Use).** This zone, covering approximately 245,915 acres (99,520 ha), includes the MPRC, MPTR, cantonment area, and all the primary training and vehicle maneuver areas. With the exception of the cantonment area and portions of the MPRC and MPTR, all forms of training are permitted, including bivouacking and digging, as long as surface water quality, soil stabilization, and potential long-term habitat reservoirs are maintained.

**Zone 4 (High Use).** This zone, covering approximately 7,740 acres (3,130 ha), accommodates heavy use and high-impact activities, such as Brigade Support Areas and gravel pits. Reclamation or remediation activities are used to ensure protection of soil and water resources.

**Zone 5 (Impact Areas).** This zone, covering approximately 19,125 acres (7,740 ha), includes impact and dud areas and the Selah Airstrip. Due to unexploded ordnance in impact and dud areas, these sites are off limits. Given the hazardous nature of these areas, on-the-ground management of these sites is not feasible beyond protection of soil and water resources. However, these sites are included in remotely sensed data collection efforts, including satellite imagery and aerial photographs.

Stream buffers are included in the Zone 1 land use designation. Stream buffers apply to the mainstem drainages where perennial water is typically found, as well as some secondary and tertiary drainages where surface water or other resources require protection from land use buffers. Based on the mapped stream buffers shown on Figure 2-15, Zone 1 areas extend a minimum of 50 meters on each side of the stream channel, but may be much wider in riparian areas where additional protection is warranted. Although not all riparian buffers are Siber staked (i.e., marked with Siber stakes to prevent entry by vehicles), the areas that are readily accessible by vehicles have been marked to prevent unauthorized uses in these areas. Digging is prohibited within 328 feet (100 meters) of drainages (wet or dry), as stated in the YTC Training Unit Standard Operation Procedure (SOP).

## **2.7 Regulations and Management Pertaining to Listed Species and Greater Sage-Grouse**

### **2.7.1 Regulations**

Army regulations that involve restrictions on training for the protection of listed species are listed in Tables 2-4 and 2-5. These regulations will continue to be in place, regardless of whether the proposed action is implemented. The primary regulation for protecting endangered, threatened, and candidate species, species of concern, and the habitat components necessary to support them is Fort Lewis Regulation 420-5, which has been provided as Appendix B.

On Fort Lewis, Protection measures for water howellia involve analyzing proposed construction, management, and recreation activities for their potential to impact populations, and restricting or avoiding certain activities, as appropriate. Protection measures for Chinook salmon and bull trout include restrictions associated with Nisqually River crossings and Solo Point amphibious operations. At YTC protection measures for sage-grouse include seasonal restrictions on various training activities in and near sage-grouse leks, and in the sage-grouse protection area.

There is no set enforcement program for FL Reg 420-5; however, during monitoring and other field activities environmental staff observe how the units train and note and report any violations. For the most part, environmental awareness education and daily pre-training briefings are used to alert soldiers to environmentally sensitive areas and associated restrictions. Soldiers are provided with maps (environmental



coordination maps at Fort Lewis and land-use zone maps at YTC) for use in the field that identify these areas. Many areas with restrictions are also marked with Seibert (Siber) stakes and/or signs (Figures 2-16 and 2-17).

**TABLE 2-4  
Summary of Protection and Conservation Measures on Fort Lewis**

Species	Measures
Water howellia	<ul style="list-style-type: none"> <li>• No digging, bivouacking, assembly areas, or off-road vehicle activities authorized within 164 feet (50 m) of wetlands (Wetland CUA designation, FL Reg 420-5 and 200-1).</li> <li>• Locate assembly areas at least 328 feet (100 m) away from wetlands (FL Reg 200-1).</li> <li>• Locate hazardous material storage areas at least 328 feet (100 m) from wetlands (FL Reg 200-1).</li> <li>• Conduct refueling activities only at established refueling sites at least 328 feet (100 m) away from water bodies (FL Reg 200-1).</li> <li>• Prepare spill contingency plans for field training events; have the plan available and appropriate spill response supplies, tools, and equipment on site (FL Reg 200-1).</li> <li>• Locate smoke generators (point of smoke generation) at least 656 feet (200 m) from wetlands (FL Reg 350-30).</li> </ul>
Salmonids	<ul style="list-style-type: none"> <li>• No digging, bivouacking, assembly areas, or off-road vehicle activities authorized within 165 feet (50 m) of streams (CUA designation, FL Reg 420-5, and 200-1).</li> <li>• Vehicles must cross streams only at approved designated hardened crossing sites (FL Reg 200-1).</li> <li>• Locate smoke generators at least 656 feet (200 m) from water bodies (FL Reg 350-30).</li> <li>• Locate assembly areas at least 328 feet (100 m) away from all water bodies; select areas that do not drain into water bodies (FL Reg 200-1).</li> <li>• Conduct refueling activities only at established refueling sites at least 328 feet (100 m) away from water bodies; avoid drainage into water bodies (FL Reg 200-1).</li> <li>• Locate hazardous materials storage areas at least 328 feet (100 m) from water bodies (FL Reg 200-1).</li> <li>• Prepare spill contingency plans for field training events; have the plan available and appropriate spill response supplies, tools, and equipment on site (FL Reg 200-1).</li> <li>• Time river crossings at the Nisqually River crossing site to avoid spawning activities within the river; the Environmental Division must review and approve proposed river crossing activities (FL Reg 420-5; Note: River crossing activities do not currently occur on the Nisqually River).</li> <li>• Limit off-loading and deployment of floating bridge bays and support vessels at Solo Point between March 1 and June 30 to the existing boat ramp (FL Reg 420-5).</li> <li>• Do not deploy from the native beach, alter the native beach material at Solo Point, or drive on the native beach substrate between March 1 and June 30 (FL Reg 420-5).</li> <li>• During the 8 days of launch training activity scheduled between March and July of each year, limit nearshore activity to 3 hours each day (FL Reg 420-5).</li> </ul>
<p>Sources: Fort Lewis Regulation 420-5 (Department of the Army 2004a), Fort Lewis Regulation 200-1 (Department of the Army 2004b), and Fort Lewis Regulation 350-30 (Department of the Army 2004c).</p>	

**2.7.1 Additional Management for Listed Species and Greater Sage-Grouse**

Endangered Species Management Plans (ESMPs) have been prepared for Chinook salmon, steelhead trout, bull trout, water howellia, and greater sage-grouse. The management objectives of these ESMPs are focused on the protection and enhancement of these listed species. Species addressed in FL Reg 420-5 are monitored at varying frequencies, as warranted. Other management activities include habitat restoration projects and invasive species removal. Ongoing management for particular listed species is discussed in more detail in the species background sections in Chapter 5.



**TABLE 2-5  
Summary of Protection and Conservation Measures on Yakima Training Center**

Species	Measures
Bald eagle	<ul style="list-style-type: none"> <li>• During aircraft flights along the Hanson Creek Route (between coordinates GG190875 and GG280842) between December 8 and March 24, maintain a minimum flight level of 300 feet (91 m) above ground level (FL Reg 420-5).</li> <li>• During aircraft flights along the Hanson Creek Route (between coordinates GG190875 and GG280842) between December 8 and March 24, maintain a 0.6-mile (1-km) buffer to the north and south of Hanson Creek Road, with traffic moving west remaining 0.6 mile (1 km) north of Hanson Creek road (FL Reg 420-5).</li> <li>• During aircraft flights along the Columbia River Route (coordinates KB830 and KB690) maintain one-way traffic, with a minimum 0.6-mile (1-km) buffer to the west of the railroad right-of-way along the Columbia River (FL Reg 420-5).</li> <li>• Do not engage in river crossing exercises at the Priest Rapids Reservoir between December 8 and March 24 (FL Reg 420-5).</li> <li>• Install and maintain tree protectors on roost trees to prevent beaver damage (Department of the Army 1997a).</li> <li>• Continue implementing YTC Wildland Fire Management Plan (Department of the Army 1997a).</li> <li>• Do not travel off of established roads in the Hanson Creek riparian zones (FL Reg 420-5).</li> <li>• Prohibit military vehicle traffic within 164 feet (50 m) of Hanson Creek riparian zones (Department of the Army 1997a).</li> <li>• Do not operate vehicles within the enclosed Siber-staked area around roost trees (FL Reg 420-5).</li> <li>• During December 8 through March 24, significantly curtail traffic along Hanson Creek Road between 3:00 p.m. and 9:00 a.m. (between coordinates GG180875 and GG280842); use of this road during this time period requires prior approval by ENRD and Range Control (FL Reg 420-5).</li> </ul>
Greater sage-grouse	<ul style="list-style-type: none"> <li>• Follow restrictions on training between March 1 and May 15, between 12:00 a.m. and 9:00 a.m. daily, within a 0.6-mile (1-km) radius of each designated lek and Sage-Grouse Protection Area. If surveys reveal sage-grouse are attending leks prior to March 1, the restriction date is changed accordingly. During this period, access to ranges is restricted to Main Supply Routes and designated roads to ranges (FL Reg 420-5).</li> <li>• Do not fly aircraft within a 0.6-mile (1-km) radius of leks lower than 300 feet (91 m) above ground level between 12:00 a.m. and 9:00 a.m. during the lek protection period (FL Reg 420-5).</li> <li>• Do not bivouac in the Sage-Grouse Protection Area (FL Reg 420-5, Figure 2-15).</li> <li>• Within the Sage-Grouse Protection Area, dig only on existing firebreaks (all excavations must be coordinated through ENRD and carried out in accordance with the dig permit process) (FL Reg 420-5).</li> <li>• Do not drive off established roads within the Sage-Grouse Protection Area between March 1 and June 15. Exceptions include Firing Ranges 4, 5, 10, 10Z, 12, 14, 15, 16, 26, and 55 (vehicle travel is limited to Main Supply Routes and/or designated roads to these ranges) (FL Reg 420-5).</li> </ul>
Salmonids	<ul style="list-style-type: none"> <li>• Do not drive off-road, dig, or bivouacking within Zone 1 areas along water bodies (Figure 2-15).</li> <li>• Vehicle movement parallel to riparian drainages must remain 197 feet (60 m) from drainages that have not been Siber staked (FL Reg 200-1).</li> <li>• Vehicles must cross streams where roads cross streams, at concrete fords, or where marked by Siber stakes (FL Reg 200-1).</li> <li>• Locate assembly areas at least 328 feet (100 m) away from all water bodies; select areas that do not drain into water bodies (FL Reg 200-1).</li> <li>• Conduct refueling activities only at established refuel sites at least 328 feet (100 m) away from water bodies, and avoid drainage into water bodies (refueling must occur at least 656 feet [200 m] from any drainage, and bivouacking of refuelers must occur at least 328 feet [100 m] from any drainage) (FL Reg 200-1).</li> <li>• Locate hazardous materials storage areas at least 328 feet (100 m) from water bodies (FL Reg 200-1).</li> <li>• Prepare spill contingency plans for field training events; have the plan available and appropriate spill response supplies, tools, and equipment on site (FL Reg 200-1).</li> </ul>
<p>Source: Fort Lewis Regulation 420-5 (Department of the Army 2004a), Fort Lewis Regulation 200-1 (Department of the Army 2004b), and Department of the Army 2007a.</p>	



Figure 2-16. Example of a Seibert Staked Area at Fort Lewis



Figure 2-17. Example Signage Marking an Area with Training Restrictions





### 3.0 PROJECT DESCRIPTION

The Army's proposed action is to implement the actions from FY 2010 through FY 2015 needed to support the Army's decisions on growth and realignment at Fort Lewis and YTC. These actions include the following:

- training of three SBCTs simultaneously with other currently stationed major subordinate units at Fort Lewis and YTC,
- stationing approximately 1,900 additional soldiers associated with existing units and new GTA units, as identified in the programmatic GTA EIS.
- upgrading infrastructure in the cantonment area for the third SBCT and GTA units so that it meets current standards,
- updating the Fort Lewis and YTC Area Development Plans to accommodate these defined and potential stationing actions,
- potentially stationing CSS units at Fort Lewis and YTC with up to 1,000 soldiers, and
- potentially stationing a medium CAB at Fort Lewis and YTC with up to 2,800 soldiers.

Although the EIS for this action assesses stationing the CSS and the CAB as separate alternatives, this BA assumes that all proposed actions would be implemented. Therefore, it analyzes the effects of EIS Alternative 4, which is inclusive of all other alternatives.

The proposed action would result in:

- **Troop-level Increase** – A total increase the number of soldiers that train at Fort Lewis by approximately 5,700, from the current 31,350 to approximately 37,050.
- **Facility Construction, Renovation, and Demolition** – Remove facilities and infrastructure that are no longer needed, relocate facilities to support new construction, construct new facilities and infrastructure, and renovate existing facilities and infrastructure to support the new population and training activities. These activities would occur at Fort Lewis and YTC, and would be completed in phases contingent on funding availability and priorities.
- **Live-fire Training and Maneuvers** – Provide for training for units stationed at Fort Lewis while balancing the need for maneuver training and live-fire training, and environmental management to meet the Army's goals for maintaining military training readiness while sustaining lands for continued use.

#### 3.1 GTA Stationing Actions

The units and organizations at Fort Lewis and YTC support the three SBCTs. Unit augmentations under GTA include increases to the three SBCTs, as well as to support units. Because the three SBCTs are the primary Brigade Combat Teams (BCTs) present at Fort Lewis and YTC, it is useful to understand them. An SBCT has approximately 4,105 soldiers, 317 Stryker vehicles, 588 wheeled support vehicles, 18 155-mm howitzers, and numerous trailers and other pieces of equipment. SBCTs move mostly by road, with limited off-road or cross-country operations. The SBCT uses Stryker vehicles to traverse terrain and obstacles to ensure protected delivery of infantry squads to their dismount points. Although the Stryker can maneuver across slopes that are less than 30 percent in pitch, and up slopes that are less than 60 percent grade, most mounted movement occurs on roads on unrestricted terrain. This operation allows the SBCTs to take full advantage of the Stryker's speed. In addition, maximum road usage provides the best fuel efficiency (Taylor 2004).



The SBCT uses many of the weapon systems of traditional Army brigades. In addition to these systems, the SBCT incorporates upgraded technologies and more advanced systems, including the Mobile Gun System, the M777 lightweight howitzer, and reconnaissance and target acquisition systems.

### 3.2 Stationing of Combat Service Support Units at Fort Lewis

CSS Logistics (Sustainment) units include transportation, quartermaster, medical, and headquarters units and functions. CSS units are responsible for transporting fuel, munitions, parts, food, medical supplies, and battlefield casualties during training and operational scenarios. In addition, these units maintain vehicles, recover destroyed or damaged vehicles, and provide medical care to injured soldiers. CSS units primarily consist of transportation, quartermaster, medical, and headquarters units and functions. The number of soldiers in the CSS units varies with the function and mission of each unit. As many as 1,000 soldiers spread across these units may be stationed at Fort Lewis in the future. CSS units use a wide variety of vehicles. Vehicles assigned to each unit are based in part on the types of units they are supporting and the missions they need to accomplish. Wheeled vehicles are capable of on-road and off road maneuver, but will more often travel on-road. The following describes the mission, numbers of soldiers, and primary equipment for each of the four types of CSS units likely to train at Fort Lewis and YTC.

- **Transportation Units** transport, distribute, and issue general military supplies and equipment including: ammunition; fortification and construction materials; water, subsistence, and water purification equipment; petroleum products; repair parts and end items; and medical supplies. Transportation units typically consist of company-sized organizations of 100 to 200 soldiers. Transportation units primarily use High Mobility Multi-wheeled Vehicles (HMMWVs), other light trucks, cargo trucks with 5-ton or larger capacity, and fuel trucks (5,000 gallon). In addition, they may have Heavy Equipment Transport trucks, which they use for transporting armored combat vehicles.
- **Quartermaster Units** receive, store, and issue general military supplies and equipment. These supplies and equipment include fortification and construction material, water, subsistence, repair parts, and medical supplies. Quartermaster units typically consist of platoon- to company-sized organizations of 30 to 120 soldiers and use HMMWVs and cargo trucks with 5-ton capacity.
- **Medical Units** provide health care support during training and operational deployments. Medical units vary in size with the type of medical unit and function and use high Mobility Multi-wheeled Vehicles, some configured as medical evacuation vehicles, and cargo trucks with 5-ton capacities.
- **Headquarters Units** collect information, conduct planning and staffing, disseminate guidance to subordinate units, and oversee operations. Headquarters units are responsible for the command and control of units in the Garrison and during training and operational deployments. These units are typically co-located with combat maneuver units during maneuver rotations. Headquarters units vary in size with the mission and function of the headquarters. Typically, they range from 50 to 400 soldiers, depending on the span of operational control and number of subordinate units. Headquarters units use HMMWVs, other light trucks, and cargo trucks with 5-ton or larger capacities.

Area Development Plan Updates are long-range plans that identify various cantonment areas activities on Fort Lewis, many of which have not yet been defined. The actions themselves are not included in the proposed action, and would be subject to separate analysis for effects to listed species. Therefore, Area Development Plans are not discussed further in this BA.



### 3.3 Stationing of a Medium Combat Aviation Brigade at Fort Lewis

The Army is considering Fort Lewis and other locations for the restationing of a medium CAB in the FY 2010 to 2013 time frame. Restationing a medium CAB at Fort Lewis and YTC would support the three SBCTs and other units already stationed at Fort Lewis and YTC by supporting and enhancing integrated training. A decision to restation a medium CAB to Fort Lewis would result in an increase of approximately 2,800 soldiers.

A medium CAB plans, prepares, executes, and assesses aviation and combined arms operations to support division and maneuver brigades to find, fix, and destroy enemy forces at a decisive time and place. The structure of the medium CAB is tailored to the types of BCTs it supports. Each medium CAB can support up to five BCTs. They are organized into two attack/reconnaissance battalions, an assault battalion, a general support battalion, an aviation support battalion (medium), and an air traffic service company.

Medium CABs use a variety of equipment and are authorized about 110 helicopters. Each attack battalion has 24 attack helicopters (AHs). The assault battalion has 30 utility helicopters (UHs). In addition to 8 UHs, the general support battalion has 30 OH-58D Kiowa Warrior helicopters, 12 cargo helicopters (CHs) and, 12 medivac helicopters (MHs). Finally, a CAB is accompanied by approximately 700 tactical vehicles, including light trucks, fuelers, and transport vehicles.

### 3.4 Population

The number of active-duty soldiers stationed at Fort Lewis, and that train at Fort Lewis and YTC, would increase by approximately 5,700, over 6 years, under the proposed action. Additionally, most of the soldiers scheduled to be stationed at Fort Lewis would bring family members with them. An estimated 8,700 family members would be relocating to the region, resulting in a projected total regional population increase of 14,400. Table 3-1 summarizes regional population increases under the proposed action.

Given the limited supply of on-post housing, most of the relocated soldiers would live off-post. The estimated on-post population increase associated with unaccompanied soldiers living in barracks and families living in on-post housing is approximately 2,100. The estimated off-post population increase would be approximately 12,300.

**TABLE 3-1**  
**Estimated Population Increases under the Proposed Action**

	<b>Soldiers</b>	<b>Family Members</b>	<b>Total</b>
<b>On-Post</b>	1,600	500	2,100
<b>Off-Post</b>	4,100	8,200	12,300
<b>Total</b>	5,700	8,700	14,400

No civilian employees would be hired as part of the proposed action.

### 3.5 Construction

Fort Lewis would construct the facilities needed to support the additional Soldiers and to replace substandard facilities currently occupied by the third SBCT stationed at Fort Lewis with facilities meeting Army standards. Facilities and infrastructure that are no longer needed would be removed, facilities to support new construction would be relocated, new facilities and infrastructure would be constructed, and existing facilities



and infrastructure to support the new population and training activities would be renovated. No new roads would be constructed on Fort Lewis or YTC under the proposed action.

Most construction associated with the proposed action would occur inside the Fort Lewis cantonment area, with additional construction or range projects planned for both Fort Lewis and YTC. Figures 3-1 and 3-2 show the location of planned construction projects under the proposed action at Fort Lewis and YTC, respectively.

Construction of facilities would involve both permanent and temporary ground disturbances. Permanent ground disturbance would include the creation of new impervious areas, including buildings, sidewalks, and parking lots. Temporary disturbance would include areas likely to be affected by construction activities, such as staging and trenching areas. All utilities would be underground where possible and disturbed areas would be restored after completion of construction. The total area affected by construction activities at Fort Lewis would be approximately 340 acres (138 hectares). The total area affected by construction activities at YTC would be approximately 388 acres (157 hectares).

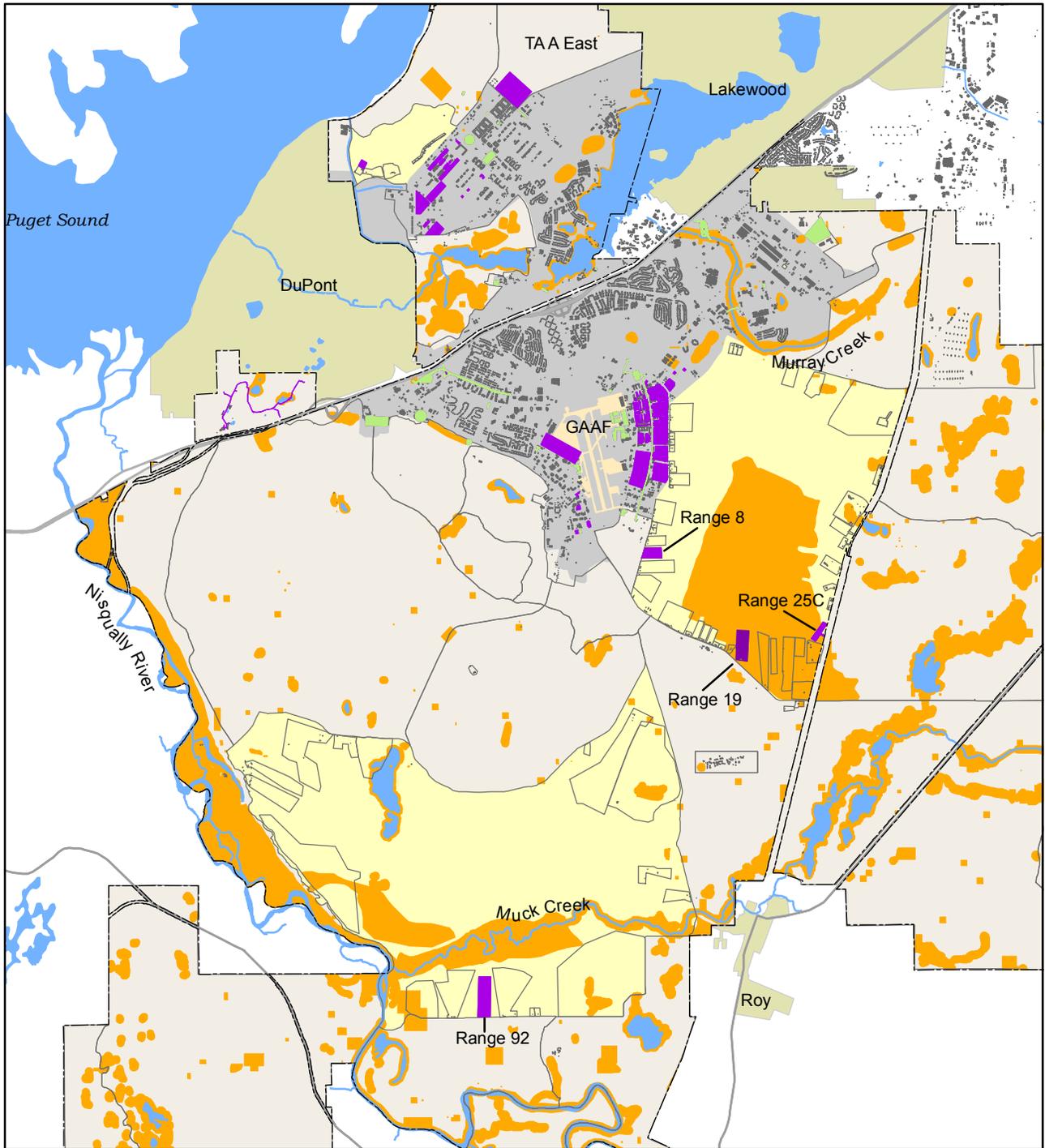
These activities would be done in phases contingent upon funding availability and priorities. Construction would be accomplished in phases throughout the implementation period. The timing of construction projects would be contingent upon funding availability and priorities.

### 3.5.1 Proposed Construction at Fort Lewis

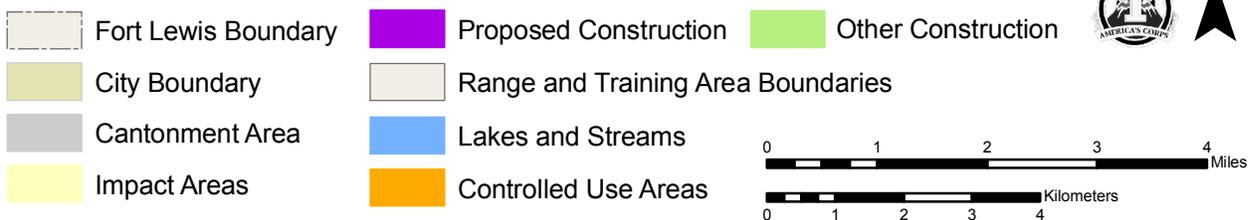
Proposed construction projects at Fort Lewis are listed in Table 3-2, with brief descriptions of some of the projects listed in the text that follows. In addition to construction projects associated with the proposed action, Fort Lewis has numerous additional construction projects that are associated with other actions, that would occur during the same time period as those under the proposed action. These projects are not discussed in detail, but are identified on Figure 3-1. These projects have been analyzed separately for impacts to listed species, but are considered in this BA as potential cumulative effects.

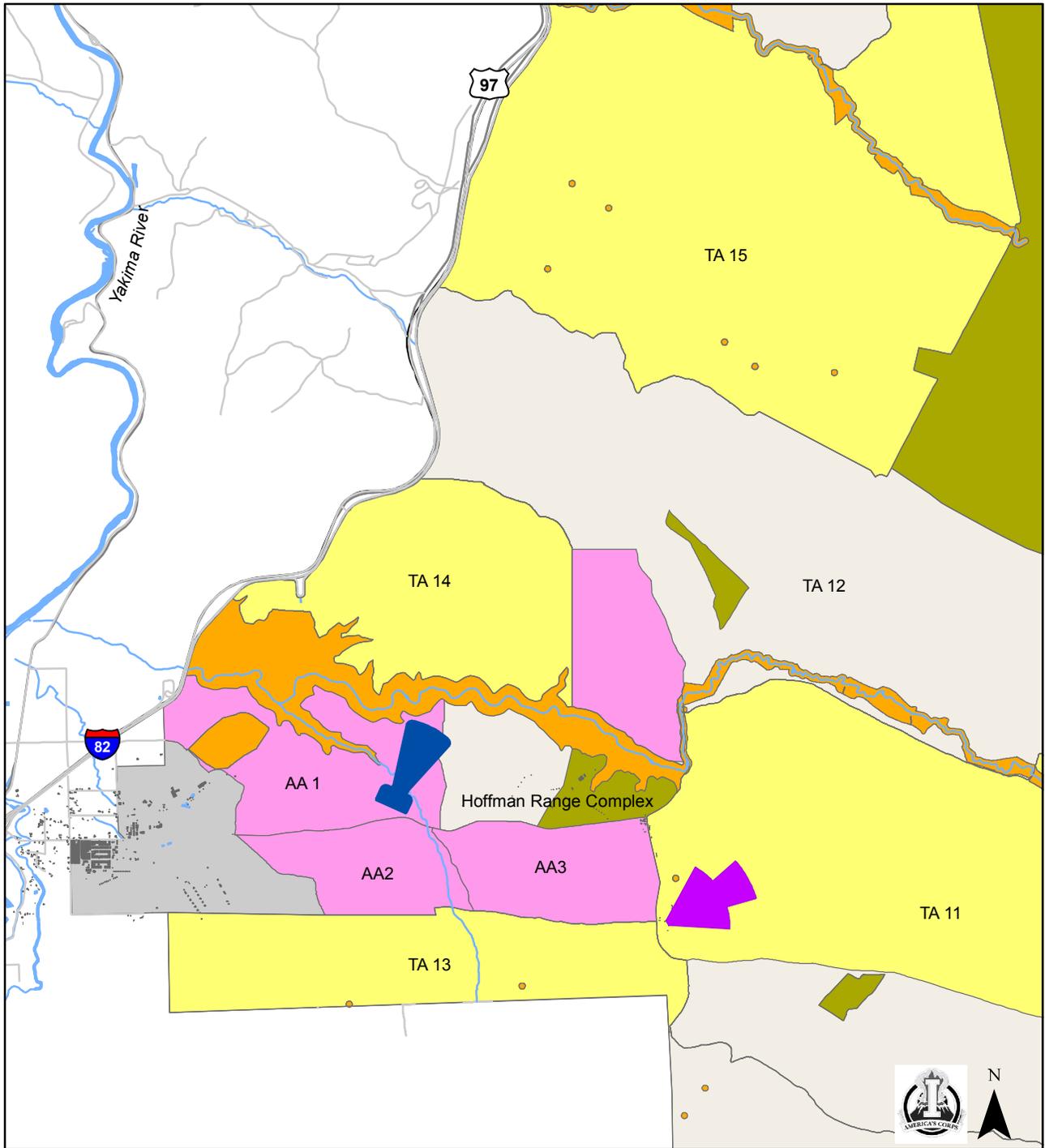
**TABLE 3-2**  
**Proposed Construction Projects at Fort Lewis**

<b>Project</b>	<b>Location</b>	<b>Planned Date (FY)</b>
Shoothouse	Range 25C	2010
Modified Record Fire Range	Range 92	2010
Modified Record Fire Range	Range 8	2012
Modified Record Fire Range – probably converted to shoothouse	To be determined	2013
Fast Rope Rappel Sniper Tower	Range 19	2013
17 <sup>th</sup> Fires Brigade Facilities	North Fort and East Division Area	2010-2015
3/2 SBCT Facilities	3 <sup>rd</sup> Brigade Area	2011
51 <sup>st</sup> Signal Battalion Facilities	Various	2011
3 <sup>rd</sup> Explosive Ordnance Disposal Battalion Facilities	Jackson Area	2011
201 <sup>st</sup> Battlefield Surveillance Brigade Facilities	East Division Area	2013
CSS Facilities	Training Area A East	2013
Medium CAB Facilities	GAAF and East Division Area	2013



**Figure 3-1. Proposed Construction on Fort Lewis**





**Figure 3-2. Proposed Construction on Yakima Training Center**





**Shoothouse.** The Live Fire Exercise Shoothouse provides the commander with a facility to train and evaluate units on their ability to move tactically (enter and clear a room, enter and clear a building), engage targets, conduct breaches, and practice target discrimination (Department of the Army 2004d). The shoothouse supports blank fire, Multiple Integrated Laser Engagement System/Tactical Engagement System, Special Effects Small-Arms Marketing System, and installation-approved small arms service ammunitions. The shoothouse would be located in the Central Small Arms Impact Area at Range 25C.

**Modified Record Fire (MRF) Range.** The MRF range is used to train and evaluate individual soldiers on the skills necessary to identify, engage, and defeat stationary infantry targets for day/night qualification requirements with M14 and M16 rifles. The proposed action includes the need for two MRF ranges, which would be constructed by upgrading the targetry at existing ranges. Range upgrades would include a range operation and control area, range control tower, range operations and storage building, classroom building, latrine, covered mess shelter, ammunition breakdown building, bleacher enclosure, and building information systems. One of the MRF ranges would be located at Range 92 in the South Small Arms Impact Area, and one would be located at Range 8 at the western edge of the Central Small Arms Impact Area.

**Combat Support Service Facilities.** The precise breakdown of CSS facilities cannot currently be determined because the precise distribution of units among transportation, quartermaster, medical, headquarters, or other CSS units is unknown. Facilities are likely to include brigade, battalion, and company offices, an organization classroom, ammunition storage, unit storage buildings, family housing, barracks space, military vehicle parking, and vehicle maintenance. Required facilities also include 151,660 gallons (574,100 liters) in vehicle fuel storage. Fort Lewis expects to construct any facilities required for these units on the north side of North Fort, in a 50-acre (20-ha) area in what is now Training Area A East, which is currently undeveloped. As these future units are defined, the Army would conduct site-specific ESA consultation before any construction would occur.

**Medium CAB Facilities.** An Army decision to station a medium CAB at Fort Lewis and YTC would require the construction of a complex of cantonment facilities for the unit. The medium CAB complex would include headquarters, barracks, and company operations, classrooms, vehicle maintenance facilities, and housing and dining facilities. Required facilities would also include 700,000+ gallons (2,600,000+ liters) in vehicle fuel storage. All cantonment facilities for the medium CAB would be sited on or near GAAF and the East Division Area, which are largely developed already. The total area affected by construction of these facilities would be approximately 108 acres (44 ha).

### 3.5.2 Proposed Construction at YTC

Proposed construction projects at YTC are listed in Table 3-3, and briefly described in the text that follows.

**TABLE 3-3**  
**Proposed Construction Projects at Yakima Training Center**

Project	Location	Planned Date (FY)
Sniper Field Fire Range	Training Assembly Area 1	2011
Multi-Purpose Machine Gun Range	Range 5	2014

**Sniper Field Fire (SFF) Range.** The SFF range would be a new range constructed in Training Assembly Area 1. This range would provide training that sniper teams need to build marksmanship skills in weapons use, and to detect, identify, engage, and defeat stationary and moving infantry targets in a tactical array. Figure 3-2 shows the general location of the SFF range, although it would cover a smaller area than that



shown on the figure: approximately 150 acres (61 ha). Construction would be limited to 40 stationary infantry targets, 8 moving infantry targets, and 4 firing positions, each of which would require limited soil disturbance during construction. Stationary infantry targets would each have a disturbance footprint of approximately 1 square meter. Moving infantry targets typically move along winch chain or chain-driven rail systems and require supports for the rails. Rail dimensions and disturbance footprints for moving infantry targets vary by manufacturer and type of system required. Dimensions of firing positions have not been specified. Targets and firing positions would be dispersed across the range.

**Multi-purpose Machine Gun (MPMG) Range.** The MPMG range would be an upgrade to Range 5 that includes site development, a general instruction building, ammunition breakdown building, bleacher enclosure, range operations tower, range operations and storage building, latrine, covered mess shelter, and building information systems. The construction area is smaller than that shown in Figure 3-2, requiring an area of about 238 acres (96 ha) in size. Construction would include 180 stationary infantry targets, 20 moving infantry targets, and 20 stationary armor targets. Stationary armor targets require disturbance footprints of approximately 1 square meter. Targets would be dispersed across the range.

### 3.6 Training

Under the proposed action, all three SBCTs stationed at Fort Lewis could potentially be training simultaneously, and the installations would also support the training needs of the CSS and medium CAB. Training increases would include increases in maneuver training (including digging, bivouacking and vehicle assembly, and urban combat training), live-fire training, and aviation training. These training increases would affect nearly all the training lands on Fort Lewis and YTC.

The major types of training that currently occur at Fort Lewis and YTC are discussed in Chapter 2. Additional training under the proposed action is discussed in the sections that follow.

#### 3.6.1 Maneuver Training

The Army estimates that maneuver training by the primary units stationed at Fort Lewis and YTC under the proposed action would involve approximately 7,700,000 total miles (12,392,000 km) of driving annually. Approximately 820,000 of these miles (1,319,700 km), or 11 percent, would be driven off-road, and 1,130,000 miles (1,818,600 km), or 15 percent would be driven on MIL-CLASS 4 and 5 roads. The three SBCTs would account for the majority of these miles. Approximately 60 percent of the total miles would be driven at Fort Lewis. Table 3-4 depicts the estimated increase in miles driven on Fort Lewis, and Table 3-5 depicts the estimated change in miles on YTC. Maneuver training would primarily involve traveling on roads from the assembly area to an objective, with a limited amount of off-road driving. The Army estimates that under the proposed action, maneuver training would occur somewhere on Fort Lewis nearly every day. On YTC, maneuver training would likely occur on approximately 220 days each year, which would be about 20 to 30 days more than at present.

The majority of maneuver miles would be driven by the SBCTs under the proposed action, as shown in Tables 3-4 and 3-5. Maneuver training by SBCTs entails training by platoons, companies, and battalions of the SBCT, as well as the entire SBCT to ensure unit proficiency at each successive level of command. Maneuver training at Fort Lewis typically includes small unit training at the platoon and company levels, as well as some battalion level training. Larger unit training at the battalion and brigade levels would typically occur at YTC, and would often incorporate company level training. Each platoon and company must train up to 5 weeks per year to meet maneuver-training requirements. In addition, each battalion must conduct semi-annual maneuvers that last approximately 4 to 6 weeks per year to certify its subordinate units, and each brigade must conduct maneuvers every 12 to 18 months and in advance of operational deployments, as required. Although three SBCTs are currently stationed at Fort Lewis, only one or two SBCTs have been



training at Fort Lewis and YTC because of deployments since the third of these brigades was stationed at Fort Lewis. However, it is reasonably foreseeable that all three brigades would be training simultaneously under the proposed action. Therefore, in addition to training by the CSS and CAB, the proposed action includes training increases by the SBCTs.

**TABLE 3-4**  
**Estimated Annual Vehicle Miles Driven on Fort Lewis under the Proposed Action**

	<b>Miles on MIL-CLASS 1/2/3 Roads</b>	<b>Miles on MIL-CLASS 4 and 5 Roads</b>	<b>Off-Road Miles</b>	<b>Total Miles<sup>1</sup></b>
Current Condition (Total)	2,360,000	197,000	156,000	2,710,000
Proposed Action Total	4,150,515	350,000	253,000	4,750,000
SBCT Stryker Vehicles	1,500,000	130,000	99,000	1,730,000
SBCT Support Vehicles	2,027,000	166,000	135,000	2,328,000
GTA Vehicles	83,000	6,800	1,100	91,000
CSS Vehicles	301,000	25,000	4,000	330,000
CAB Vehicles	230,000	21,000	14,000	270,000

<sup>1</sup> Note: Totals may not add up because of rounding.

**TABLE 3-5**  
**Estimated Annual Total Vehicle Miles Driven on Yakima Training Center under the Proposed Action**

	<b>Miles on MIL-CLASS 1/2/3 Roads</b>	<b>Miles on MIL-CLASS 4 and 5 Roads</b>	<b>Off-Road Miles</b>	<b>Total Miles<sup>1</sup></b>
Current Condition (Total)	970,000	470,000	370,000	1,810,000
Proposed Action Total	1,600,000	780,000	570,000	2,950,000
SBCT Stryker Vehicles	620,000	300,000	230,000	1,150,000
SBCT Support Vehicles	840,000	410,000	310,000	1,560,000
GTA Vehicles	34,000	17,000	2,700	53,000
CSS Vehicles	58,000	28,000	5,000	91,000
CAB Vehicles	46,000	21,000	17,500	84,000

<sup>1</sup> Totals may not add up because of rounding.

Maneuver training by CSS units consists of individual training and collective training at the platoon and company levels. Unit movements and logistical sites would be on roads, trails, and maneuver areas. Transportation and quartermaster units would conduct multi-day small unit (platoon and company) training exercises as often as five times per year at each echelon of training and would support combat maneuver elements and battalion and brigade training. Headquarters units would typically support from four to six maneuver rotations annually. Each of these rotations could involve 2- to 3-week deployments in support of joint training exercises, brigade training events, and battle command simulation exercises for command headquarters units.

The medium CAB would participate in some ground maneuver training, but would primarily conduct aviation training, as discussed in more detail in Section 3.6.3 below.



On Fort Lewis, maneuver training would potentially occur in any locations marked as training areas in Figure 2-2, excluding all areas marked as off-limits to this type of training (Figure 2-14). On YTC maneuver training could potentially occur in any locations marked as training areas, excluding areas that are marked as off limits. Additionally, training areas with steep slopes and other rugged terrain are not suitable for most types of maneuver training. It is estimated that the total acreage that is suitable for maneuver training by Strykers is 80,000 acres (32,375 hectares), with an additional 145,000 acres (58,700 hectares) suitable for training by support vehicles. Recent observations about the way that SBCTs train indicate that most maneuver training is concentrated into small areas (typically assembly areas and other heavily used areas), rather than widely spread out over the entire installation. Although all available maneuver areas would be available for maneuver training, it is likely that the training model of using small areas would continue into the foreseeable future.

### **3.6.2 Weapons Qualification and Gunnery Training**

Live-fire training is an essential component of Army training. Fort Lewis and YTC have approximately 80 ranges and facilities in their range inventory for use by all units that train there. The range types span from individual weapons qualifications to advanced combined arms events that include heavy artillery live-fire. Every range on which live-fire exercises are conducted has an associated surface danger zone (SDZ), also called a “range safety fan,” which is active whenever that range is in use. The SDZ comprises the entire surface area on which munitions could possibly land, taking into account the whole spectrum of stray rounds. When Fort Lewis and YTC ranges are in use, their SDZs often cause extensive maneuver areas to be unavailable. The proposed action would increase use of live-fire ranges, which would in turn increase the frequency of activation of SDZs. SDZs have not been shown in a figure because they overlap a great deal. However, SDZs cover much of the available training lands (although not all would be activated at any one time).

It is estimated that under the proposed action artillery ranges at Fort Lewis would be in use frequently, and that live-fire training would occur daily during non-holiday weekdays. At YTC there would continue to be periods of daily, high intensity use of firing ranges, followed by periods of infrequent use. With additional units training at YTC under the proposed action, there would be more high-use periods than at present. Table 3-6 provides an estimate of the increase in number of total rounds that would be fired on Fort Lewis and YTC, collectively, each year, based on the annual authorizations of the new units. It is expected that use of these munitions would be spread out over the year, with some periods of more frequent use during larger training events.

Live-fire training consists of individual weapons and crew-served weapons practice and qualification and convoy live-fire training. Individual and crew-served weapons training occurs on fixed ranges with firing points and targets contained within marked areas and boundaries. Soldiers and crews train and qualify on these weapons twice annually. Soldiers would also conduct convoy live-fire training and urban operations on an as-needed basis.

Live-fire training would occur at the ranges shown in Figures 2-2 and 2-6, as well as other firing points located throughout the training areas. All munitions would be fired to land into the impact areas.

### **3.6.3 Aviation Training**

Increases in aviation training under the proposed action would be associated with the medium CAB. Aviation training would occur at both Fort Lewis and YTC. The aviation units would conduct aviation gunnery tasks, support maneuver-training rotations at YTC, and support combined arms live-fire exercises at Fort Lewis and YTC.



**TABLE 3-6**  
**Annual Increases in Training Ammunition Use, Based on Annual Authorizations**

Training Ammunition	Approximate Number Authorized		
	SBCT	CSS Units <sup>1</sup>	Medium CAB
105MM (MGS)	3,186	0	0
120MM (mortar)	5,988	0	0
155MM (howitzer)	3,260	0	0
81MM (mortar)	2,040	0	0
60MM (mortar)	3,060	0	0
40MM (grenade)	213,152	51,925	39,022
50CAL	1,252,220	305,048	177,772
9MM	89,376	21,772	3,712
7.62MM	1,853,686	451,568	269,808
5.56MM	9,511,262	2,316,994	1,447,884
Boosters, Charges, Caps, Detonation cord	77,817	18,957	0
Grenades	51,309	12,499	22,139
Mines	465	0	50
Rocket, missile	133	0	8,006
Shotgun/rifle	12,222	2,977	0
Signal, smoke, flare, simulators	29,148	0	10,060
<b>Total</b>	<b>13,108,324</b>	<b>3,181,740</b>	<b>1,978,453</b>

<sup>1</sup> The annual authorization for training ammunition for the CSS is an approximation.  
Sources: Department of the Army 2008b, Ackerman 2009

Units perform primarily three modes of flight:

- Low-level flight is conducted at a selected altitude at which detection or observation of an aircraft is avoided or minimized. The route is preselected and conforms generally to a straight line and a constant air speed and indicated altitude.
- Terrain or Contour flight is at low altitude conforming generally to the contours of the Earth. This type of flight takes advantage of available cover and concealment in order to avoid observation or detection of the aircraft and/or its points of departure and landing.
- Nap-of-the-Earth (NOE) requires flight as close to the Earth's surface as vegetation or obstacles will permit. Air speed and altitude are varied as influenced by the terrain, weather, and enemy situation.

A typical medium CAB logs about 250 flight hours per aircraft per year, which equals about 29,000 flight hours annually for the entire brigade. Approximately 27,550 of these hours would be flown in training at Fort Lewis (Clayton 2009). The addition of these hours would approximately double the current flight training hours conducted at Fort Lewis (Rodriguez 2009).

Stationing a medium CAB at Fort Lewis also would increase the number of takeoffs and landings at GAAF. A typical medium CAB would perform approximately 55,100 takeoffs and landings annually. The addition of the medium CAB would increase the overall number of takeoffs and landings at GAAF by 344 percent (Clayton 2009b).



Training a medium CAB at YTC also would increase the number of takeoffs and landings at Vagabond Army Heliport (VAH). The addition of the medium CAB would double the overall number of takeoffs and landings at VAH from approximately 2,600 to 5,500 (Clayton 2009a).

#### **3.6.4 Mechanical Digging**

Under the proposed action, digging would impact an estimated 7 acres (3 ha) of land at Fort Lewis, as compared to 5 acres (2 ha) under current conditions. On YTC, the amount of digging would increase from about 50 acres to 75 acres (20 to 30 ha). The existing dig permit process, described in Section 2.4.4, would continue to be in place under the proposed action, and would require the trainers to avoid environmentally sensitive areas.

#### **3.6.5 Pyrotechnics and Tracers**

The use of pyrotechnics and tracers would increase in proportion to increases in maneuver and live-fire training.

#### **3.6.6 Amphibious Training**

The proposed action would not include any increases in amphibious training. However, because of increases in maneuver training, vehicles would drive across hardened crossings more frequently.

#### **3.6.7 Smoke Training**

Under the proposed action, smoke training by all units combined (to include the new units) would continue to follow the limits imposed by previous Environmental Assessment, in terms of amount used, spatial distribution, and weather limitations. Therefore, for the purposes of this BA, there would be no change from baseline conditions under the proposed action.



## 4.0 BIOLOGICAL ASSESSMENT METHODOLOGY

The procedures used to develop this BA were based on the *Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act*, developed by the USFWS and NMFS for conducting consultation and conference activities under Section 7 of the ESA (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998), and the *National Marine Fisheries Service Consultation Initiation Checklist* (National Marine Fisheries Service 2002).

### 4.1 Pre-Field Review

To obtain information about federally listed species and greater sage-grouse on Fort Lewis and YTC, installation surveys and reports, agency reports, WDFW Priority Species Habitat maps and databases (Washington Department of Fish and Wildlife 2008), and Washington Natural Heritage Program databases were reviewed. Agencies and individuals with knowledge of listed species and their habitat use near the project area were contacted for information, and have been listed in Section 8 (Agencies and Persons Consulted). The literature was reviewed for information on the occurrence, range, and habitat requirements of federally listed species and greater sage-grouse. In addition, species habitat requirements were compared to habitat features found in the project area to determine whether suitable habitats were present.

### 4.2 Field Studies

If no evidence of species occurrence or suitable habitat exists for a listed threatened or endangered species within the project area, a “no effect” determination can be made and the BA analysis is complete for the species. If a “no effect” determination cannot be made based on background information, field reconnaissance must be conducted to determine whether listed species or suitable habitats are present. Numerous field studies have been conducted on species reviewed in this BA by the Army and its consultants.

### 4.3 Determination of Effects

Chapter 5 includes background information and an analysis of the effects of the proposed action on the species covered by this BA. In the first part of each section, background information on species abundance and distribution, habitat requirements, reproductive biology and life history, and current status and presence/absence of designated critical habitat is provided. Potential beneficial, direct, indirect, interdependent, and interrelated threats to the species that are unrelated to the proposed actions, and that may result in cumulative effect as a result of the proposed action, are presented (for a more detailed discussion of types of effects, see U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). These effects are defined as follows:

- Beneficial – Effects of an action that are wholly positive, without any adverse effects, on a listed species or designated critical habitat. Determination that an action will have beneficial effects is a “may effect” situation.
- Direct – The direct or immediate effects of the project on the species or its habitat. Direct effects result from the agency action including the effects of interrelated actions and interdependent actions.
- Indirect – Effects caused by or resulting from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action.
- Interdependent – Effects that result from an activity that has no independent utility apart from the action under consideration.



- Interrelated – Effects that result from an activity that is part of the proposed action and depends on the proposed action for its justification.
- Cumulative – Include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

The effects assessment is based on the following factors:

the dependency of the species on specific habitat components;

habitat abundance;

population levels of the species;

the degree of habitat impact; and

the potential to mitigate for an adverse effect.

After evaluating the potential for effect, one of the following determinations is provided:

**No effect** – the proposed action will not affect listed species or critical habitat;

**Is not likely to adversely affect** – effects on listed species are expected to be discountable, or insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where a take occurs. A take includes harassing, harming, pursuing, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in such conduct. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur; or

**Is likely to adversely affect** – if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effects is not discountable, insignificant, or beneficial.



## 5.0 ANALYSIS AND DETERMINATION OF EFFECTS

This section contains background information on federally listed endangered and threatened species and their critical habitat, and a candidate species, that are likely to occur on or near Fort Lewis and YTC. This information was used to determine the effects of the proposed action on federally listed species, and on the greater sage-grouse (a federal candidate species), which is afforded special protection on YTC. In addition, conservation measures are recommended to reduce effects to species.

A note on some of the terminology used in this chapter:

Conservation Measures, as defined by the ESA, are “actions taken to promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action” that “serve to minimize or compensate for project effects on the species under review.” These include actions taken prior to the initiation of consultation, as well as future actions which are committed to in the BA. Mitigation measures, under NEPA, are measures that avoid, minimize, rectify, reduce, or compensate for impacts to resources. Protection measures, as defined by the Army, are policies or actions designed to reduce or eliminate threats/impacts to specific species and habitats to maintain species viability and habitat functionality.

Army protection measures are presented primarily in background information sections, or separate sections on current habitat use and protection measures, as appropriate. These protection measures are ongoing and would continue under the proposed action; therefore, they would be considered conservation measures under the ESA definition, although they are usually not repeated in the conservation measures sections in this chapter. In many cases, mitigation measures are also presented in this BA. In all instances, actions identified as mitigation measures were developed by the Army for the GTA EIS, and are presented as such in that document. They are included as conservation measures in this BA.

### 5.1 Fort Lewis

#### 5.1.1 Golden Paintbrush

The golden paintbrush is a perennial herb that occurs in open grasslands at elevations below 328 feet (100 m) around the periphery of the Puget Trough. Most populations occur on glacially-derived soils. Associated species include Roemer’s fescue (*Festuca roemerii*), red fescue (*F. rubra*), camas (*Camassia* spp.), common velvetgrass (*Holcus lanatus*), yarrow (*Achillea millefolium*), bracken fern (*Pteridium aquilinum*), vetch (*Vicia* spp.), and brome (*Bromus* spp.; Gamon 1995). Many populations of this species have been extirpated by conversion of habitat to agricultural, residential, and commercial development. In Oregon, the golden paintbrush historically occurred in the grasslands and prairie of the Willamette Valley, but has since been extirpated from all of these sites.

The golden paintbrush was federally listed as threatened on June 11, 1997. Critical habitat has not been designated. The species is threatened by habitat modification through succession of grassland to shrub and forest habitat. In addition, the potential for expansion and persistence of refugia (suitable habitat) is low due to reduction of habitat. Because the current distribution of the species has been greatly fragmented and reduced from the historic distribution, the species is vulnerable to other threats such as interspecific competition with native and non-native woody species, and reduced vigor and reproductive potential caused by trampling or collecting during public recreational use of sites. Sites zoned for residential development or commercial uses are particularly vulnerable.

The golden paintbrush was listed by the USFWS as a species that may occur on Fort Lewis. Fort Lewis contains suitable habitat for this species, but it has never been observed on the installation. A floristic



inventory of all prairies on Fort Lewis was conducted by the U.S. Forest Service Pacific Northwest Research Station in 1993. According to digital data from the Washington Natural Heritage Program, the Fort Lewis area provided historical habitat for the species. One current occurrence of golden paintbrush is mapped on Fort Lewis in TA 7N. However it has been determined that this occurrence is actually the non-listed harsh Indian paintbrush (*Castilleja hispida*); this population is not shown in the golden paintbrush recovery plan (U.S. Fish and Wildlife Service 2000a). Prairies on Fort Lewis are monitored annually for various projects (e.g., Integrated Training Area Management surveys of established transects, butterfly surveys, surveys of burn units prior to conducting prescribed fires, pocket gopher [*Thomomys mazama*] surveys, streaked horned lark [*Eremophila alpestris strigata*] surveys, and noxious weed inventory and treatment). Though not specifically surveys for golden paintbrush, they represent intensive on-the-ground coverage by personnel that have the expertise to detect the golden paintbrush and would report any sighting to the Natural Resources Branch of the Fort Lewis Environmental Division (Clouse 2009). No golden paintbrush populations have been found during these surveys. The nearest known population of this species is located south of Olympia in Thurston County. Actions occurring under the proposed action would not affect off-post populations of the species, since there would be no ground disturbances outside the installation boundary. Since golden paintbrush is not known to exist on Fort Lewis, the proposed project would have **no effect** on this species.

### 5.1.2 Marsh Sandwort

Marsh sandwort is a perennial herb that occurs in wetlands and freshwater marshes in Washington, Oregon, and California from sea level to over 1,400 feet (425 m; Federal Register 1993). However, as of May 14, 2001, the only remaining populations were located in California (U.S. Fish and Wildlife Service 2006). Populations occur in saturated acidic bog soils, predominantly sandy with a high organic content.

The marsh sandwort was federally listed as endangered on August 3, 1993. Critical habitat has not been designated. Many populations of this species have been extirpated by the elimination of wetlands in which the species grows and/or degraded through urban development, conversion of the habitat for agriculture and ranching activities, and off-road vehicle recreational use.

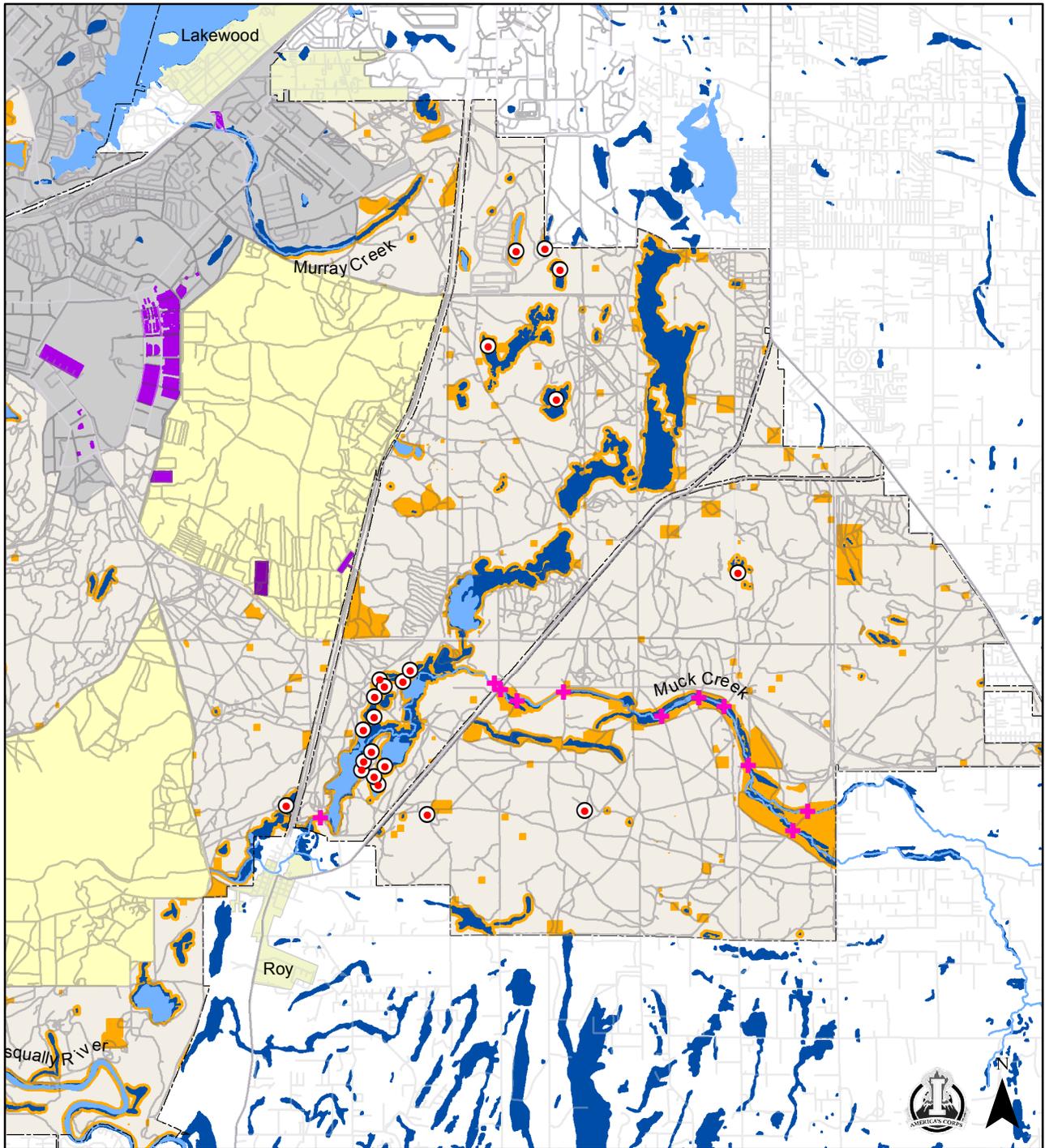
The marsh sandwort was listed by USFWS as a species that may occur on Fort Lewis. Fort Lewis contains suitable habitat for this species, but it has not been found on the installation. The Fort Lewis Land Condition Trend Analysis field crew surveyed McKay Marsh and Hamer Marsh for this species in 1997 (Department of the Army 1997b). Additionally, McKay Marsh was surveyed in 2009 (Eco-logic Botanical Consulting 2009). Neither survey located populations of this species. The Washington Natural Heritage Program lists this species as possibly extinct or extirpated from Washington, and it does not list it as present in Thurston or Pierce counties (Washington Natural Heritage Program 2009). Since marsh sandwort is not known to exist on Fort Lewis, the proposed project would have **no effect** on this species.

### 5.1.3 Water Howellia

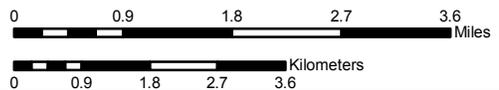
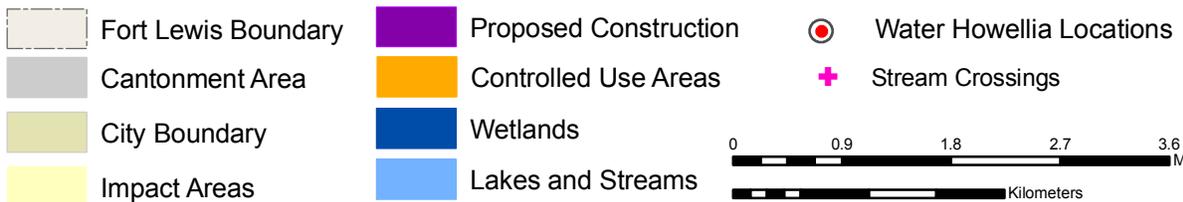
#### 5.1.3.1 Background Information

Water howellia is a self-pollinated, annual aquatic plant that was federally listed as a threatened species on July 14, 1994 (Federal Register 1994). Its historical range consisted of five states in the northwestern United States: California, Idaho, Montana, Oregon, and Washington. In Washington, it has been reported in Clark, Spokane, Pierce, and Thurston counties. The population has declined due to competition with introduced plants, loss of wetland habitat, and changes in habitat caused by timber harvesting, livestock grazing, and residential development. Critical habitat has not been designated for this species.

Water howellia was first discovered on Fort Lewis in 1994. During surveys in 2003 and 2004, 22 wetlands were identified as occupied by water howellia on the Main Post of Fort Lewis (Figure 5-1; Lynch 2005). The



**Figure 5-1. Water Howellia Locations on Fort Lewis**





wetlands on Fort Lewis that have populations of water howellia range from less than 1 acre to 40 acres (0.4 to 16 ha) in size, contain substrate of either Tanwax peat or Semiahmoo muck, and undergo significant annual fluctuations in water level (Gamon 1998). No water howellia sightings have been reported on North Fort Lewis. Water howellia grows in firm, consolidated clay and organic sediments, in freshwater wetlands that are filled by spring rains and snowmelt runoff, and that exhibit some drying during the growing season. The species' microhabitat consists of shallow water and the edges of deep ponds that are partially surrounded by broadleaf deciduous trees. One of the key habitat features necessary for water howellia survival is drying of wetlands during the autumn to allow seed germination, followed by submergence in the spring to permit growth and flowering. Water howellia is often found in relatively open wetlands with little surrounding deciduous forest (Kerschke 1997).

The primary threats to water howellia include encroachment of invasive plant species into wetlands, unauthorized use of wetlands by humans, altered hydrology, and plant succession (Gamon 1997). It is thought that water howellia on Fort Lewis represents a metapopulation, which must grow in several areas to maintain a viable population over time because of the potential for frequent local extinction (Shelly and Gamon 1996).

At present, all populations and potential habitat for the species on Fort Lewis are subject to the protective measures in Fort Lewis Regulation 420-5, which include reviewing all potential construction projects for their potential to affect water howellia or habitat, avoiding forest and wetland management actions that could potentially have adverse impacts on water howellia populations or habitat, restricting vehicular traffic within 164 feet (50 meters) of wetlands and streams to established roads, not allowing other ground-disturbing activities within the 50-meter buffer zone, and restricting recreational activities with the potential to adversely impact water howellia populations, as needed. Additionally, ongoing management for water howellia includes GPS mapping of populations on Fort Lewis, monitoring for impacts to existing populations, and controlling invasive species near existing populations.

Given the protection measures and other ongoing management described in the previous paragraph, existing populations on Fort Lewis are adequately protected. Additionally, all habitat and potential habitat is protected from activities with the potential to disturb water howellia populations, including the training activities discussed in Chapter 2. Wetlands on the installation are also protected from destructive forms of training by their Controlled Use Area designations and 50-meter buffers (see Section 2.6.1). Although most wetlands are not marked in the field, they are marked on the Fort Lewis Environmental Coordination Map, and prior to training in a given area, troops are briefed on environmental restrictions in that area, including wetland locations. Therefore, potential water howellia habitat on Fort Lewis is also well protected.

### **5.1.3.2 Analysis of Direct and Indirect Effects**

#### **Construction**

Figure 5-1 shows proposed construction on Fort Lewis in relation to water howellia populations. Most ongoing and proposed construction activities would occur in the North Fort and Main Post cantonment areas or near GAAF. The closest construction sites to a water howellia population would be over 1 mile (1.6 km) away, at Range 25C of the Central Small Arms Impact Area. It is not anticipated that construction activities at this distance would have an effect on water howellia populations. Therefore, impacts to the species from construction are unlikely. Of the proposed construction projects, only two would have the potential to affect streams or wetlands on Fort Lewis: the Madigan Gate expansion, and construction of a vehicle access bridge across Murray Creek. Both of these projects would occur in the cantonment area near Murray Creek in a developed area that does not provide suitable habitat for water howellia. Additionally, each project will require a Joint Aquatic Resources Permit Application for agency review, to ensure that construction is carried out to minimize impacts to wetlands and water bodies.



### **Ground Training**

Although the amount of ground training would increase substantially under the proposed action, populations of water howellia, and suitable habitat, would continue to be located in CUAs within which digging, bivouacking, and off-road vehicle activities are not authorized. In addition, there are no vehicle fording sites located immediately adjacent to known water howellia populations. Most maneuver training would continue to occur in open habitats on Fort Lewis, rather than the forested areas in which water howellia typically occurs. Therefore, direct effects to water howellia populations and habitat from these activities should not occur.

The proposed increase in training levels associated with maneuver training could potentially indirectly expose water howellia habitat to increased sedimentation and lead to an increase in the spread of non-native species. However, all off-road driving, digging, and other activities with the potential to disturb soil and lead to bare ground and erosion would occur at least 164 feet (50 meters) from wetland habitats. Additionally, the soils on Fort Lewis are gravelly soils with a low potential for erosion. The existing 164-foot (50-meter) buffers are considered adequate to minimize the risk for adverse effects to water howellia.

Fuel spills and leaks from vehicles present some risk to water howellia, primarily through contamination and modification of habitat. These risks would be minimal, however, since all vehicle activity within wetland CUAs would occur on established roads. Refueling sites and assembly areas would continue to be located at least 328 feet (100 m) away from wetlands to avoid adverse impacts to these habitats. In addition, spill contingency plans for training events would require immediate action in the field if a large spill were to occur. Actions would place emphasis on keeping the spill from entering or draining into water bodies. Water howellia populations and habitat should not be affected by ground training.

### **Live-Fire Training**

There are fire risks associated with gunnery training and other activities that use fire or incendiary devices (such as flares and camp fires). Since most fires attributable to training are contained in impact areas and other locations away from water howellia habitat, risks are minimal. Fires in wetlands are exceedingly rare, and populations of water howellia are not known to have burned (Clouse 2009). Fires that do escape open habitats are generally only a few acres in size and quickly controlled. Existing fire management practices would be adequate to minimize the risk of fires spreading into wetland habitats. Although the annual frequency and number of fires on Fort Lewis would likely increase as a result of training increases, existing fire management practices (including placing restrictions on where tracers, pyrotechnics, and troop fires are authorized during high fire risk conditions) would continue to be adequate for preventing the spread of fires into forested and wetland habitats. Therefore, water howellia populations should continue to be protected from fire.

### **Aviation Training**

Aviation training could occur anywhere in the Fort Lewis airspace, subject to the seasonal restrictions listed in Fort Lewis Reg 420-5 (see Table 2-4). Helicopters associated with the CAB could potentially fly over water howellia populations, but would not land in wetland habitats. Therefore, no direct disturbance to plants from proposed aviation activities would occur. Helicopters have the potential to cause rotor wash, a phenomenon in which the wind produced by helicopter rotors dislodges and moves soil from the ground, kicking up dust created during takeoff, landing, and hovering. Helicopters would not take off or land in wetlands, and the proposed training would not involve extended hovering. Additionally, the wet or moist muck soils in wetlands that support water howellia populations are unlikely to be much affected by wind from rotors if helicopters did fly close to the ground in these areas. It is expected that minimal, if any, sedimentation into water howellia habitat would occur.



### 5.1.3.3 Interrelated and Interdependent Effects

Some construction of new housing and services could occur as a result of the regional population increase, although this would be dependent on overall economic conditions. While the precise location of such construction is impossible to determine, it is most likely to occur in Pierce and Thurston counties, where the vast majority of soldiers and their families reside. All known occurrences of water howellia within the Puget Sound lowlands are on Fort Lewis and McChord AFB, where they are outside of areas of development. Furthermore, all major construction projects would require separate consultation under the ESA to ensure they would not affect listed species.

### 5.1.3.4 Cumulative Effects

No cumulative impacts to this species are expected from the proposed action because all known occurrences of water howellia within the Puget Sound lowlands are on Fort Lewis and McChord AFB. McChord AFB maintains an undeveloped area around water howellia populations on the base and restricts vehicular access to these areas (Gibbens 2006). These water howellia populations are unlikely to be impacted by future state, tribal, local, or private actions that are reasonably certain to occur within the project action area.

### 5.1.3.5 Conservation Measures to Reduce the Effects of the Action

No additional conservation measures are needed to reduce the effects of the proposed action on water howellia.

### 5.1.3.6 Determination of Effects

Despite the proposed increase in training, the conservation measures that are currently in place (see Table 2-4) would continue to protect wetland habitats and restrict destructive forms of training near water howellia populations. There would be few, if any, effects to water howellia. Therefore, the proposed actions **may affect, but are not likely to adversely affect** water howellia on Fort Lewis.

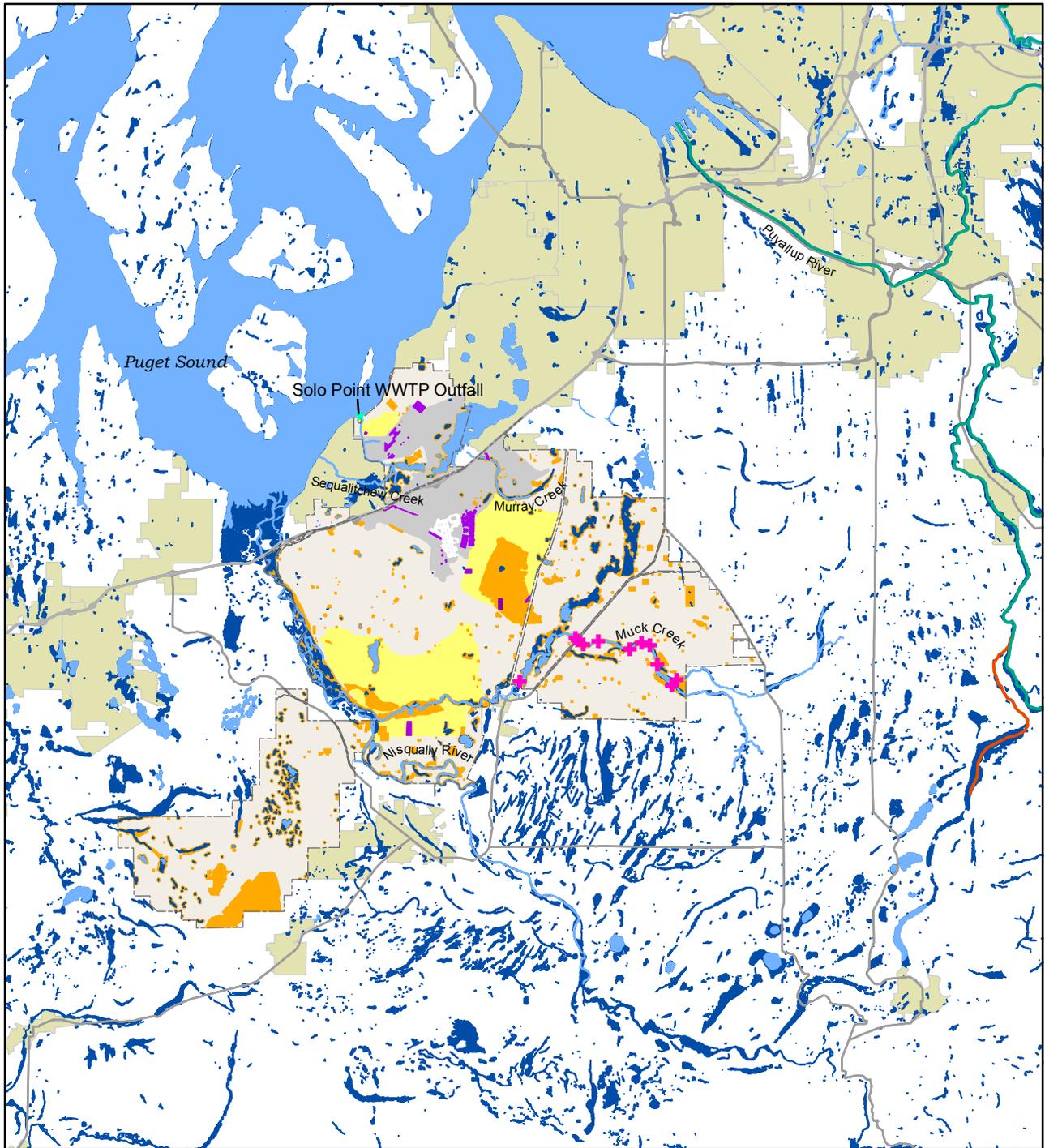
## 5.1.4 Salmonids

### 5.1.4.1 Background Information

Bull trout, Chinook salmon, and steelhead are three federally listed salmonid species that could be found on or near Fort Lewis. The distribution of these three species, based on digital data obtained from SalmonScape (Washington Department of Fish and Wildlife no date), is shown in Figures 5-2 through 5-5. The life cycles of salmonids vary widely. However, common habitat requirements exist for all species. Freshwater salmonid habitat consists of four major components: habitat for spawning and incubation, juvenile rearing habitat, juvenile and adult migration corridors, and adult holding habitat. Estuarine and marine nearshore areas provide habitats for estuarine and ocean rearing, and for juvenile and adult migration.

Two of the most important features of freshwater habitat for spawning, incubation, rearing, and migration are sufficient water quantity and good water quality. Salmon require cool, clean water that is of sufficient depth and velocity to allow passage, migration, and spawning, where floods do not scour channels. In addition, they seek out slow velocity areas adjacent to faster water for feeding, resting, and growing. Temperature affects growth rates and the timing of life history events, and turbidity and sediments can affect the abundance of food, as well as impact spawning and incubation habitats. Salmon require a high level of dissolved oxygen, and are affected by other chemical aspects of the water.

Salmonid life cycles are very sensitive to changes in stream flow, and have adapted over thousands of years to the natural flow regime in their individual watersheds. Natural low flows are important for the establishment



**Figure 5-2. Bull Trout Distribution in the Fort Lewis Region**

-  Fort Lewis Boundary
-  Cantonment Area
-  Impact Areas
-  Controlled Use Areas
-  City Boundary

-  Bull Trout Migration only
-  Bull Trout Use Not Specified
-  Lakes and Streams
-  Wetlands
-  Hardened Stream Crossings

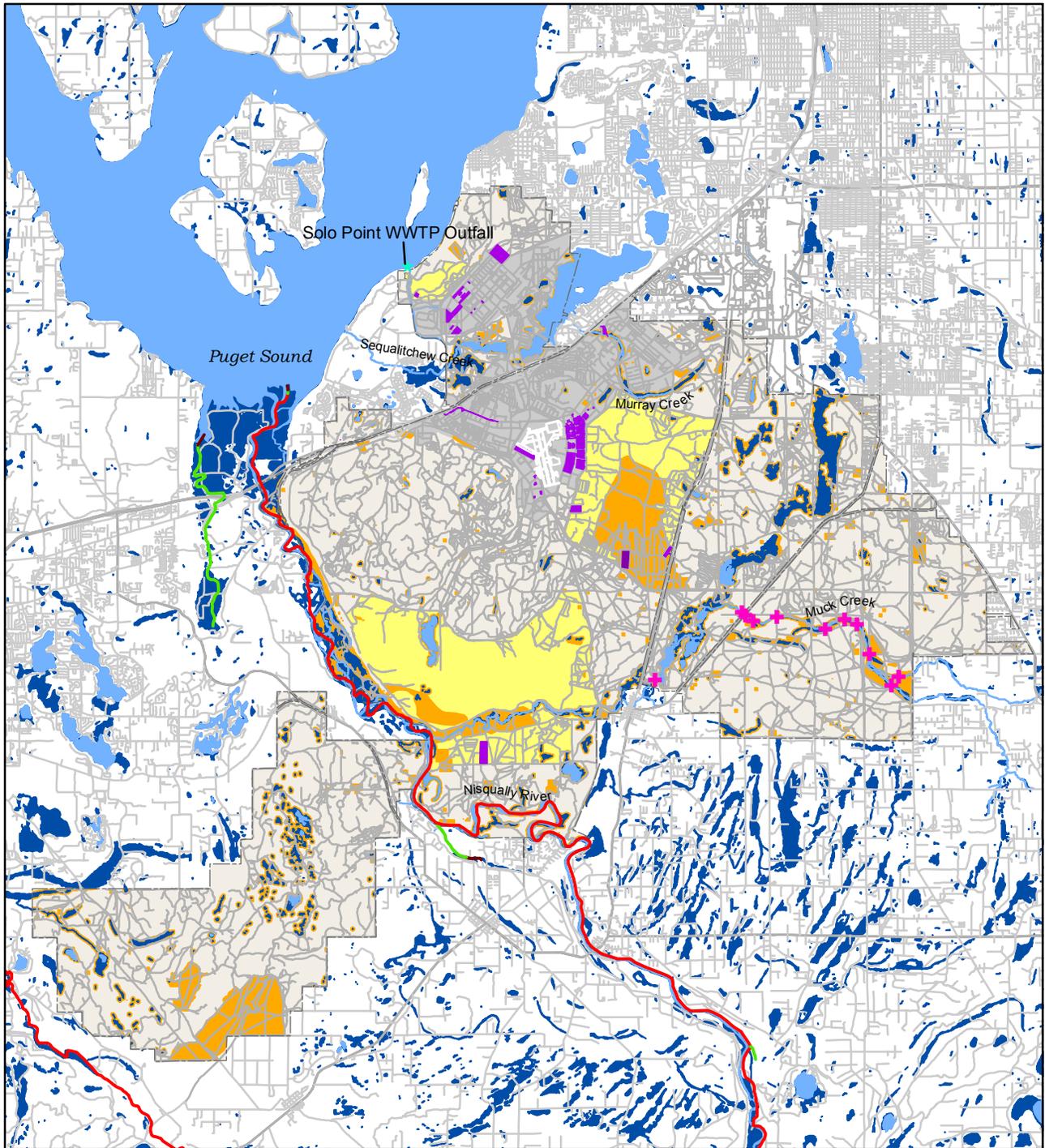
-  Discharge Point
-  Proposed Construction



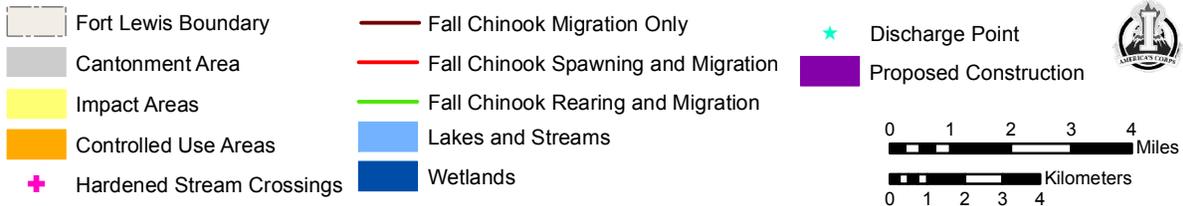
0 1 2 3 4 Miles

0 2 4 6 8 Kilometers

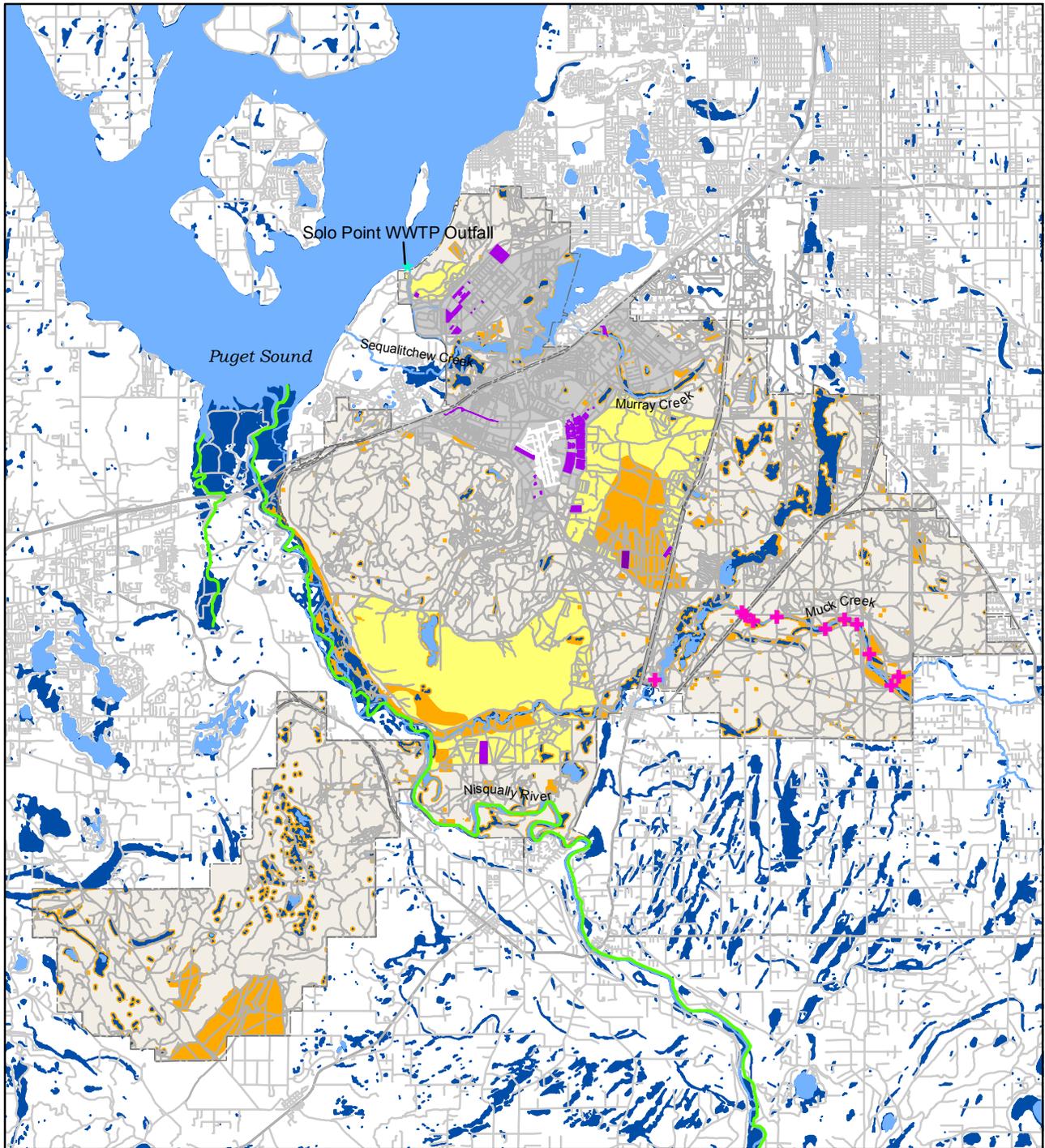
Source: StreamNet 2009



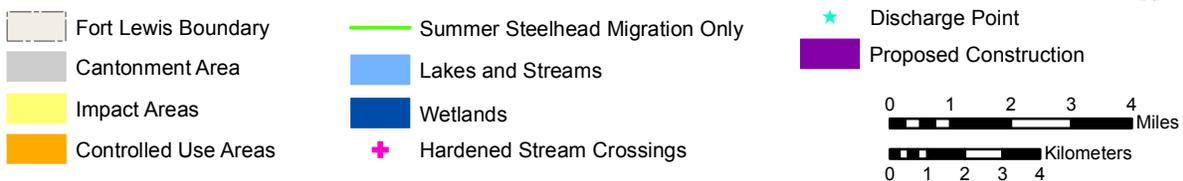
**Figure 5-3. Chinook Salmon Distribution in the Fort Lewis Project Area**



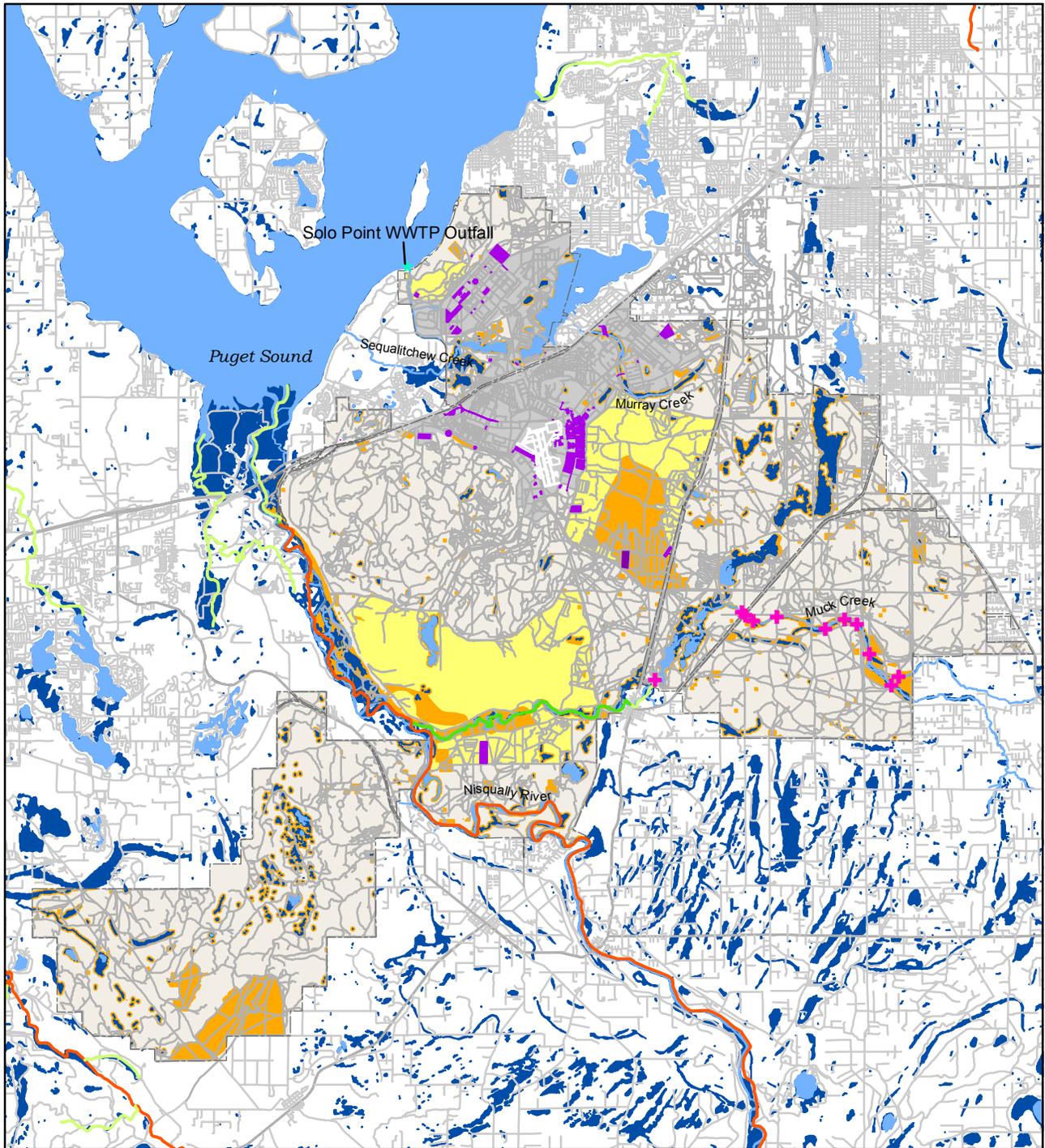
Source: StreamNet 2009



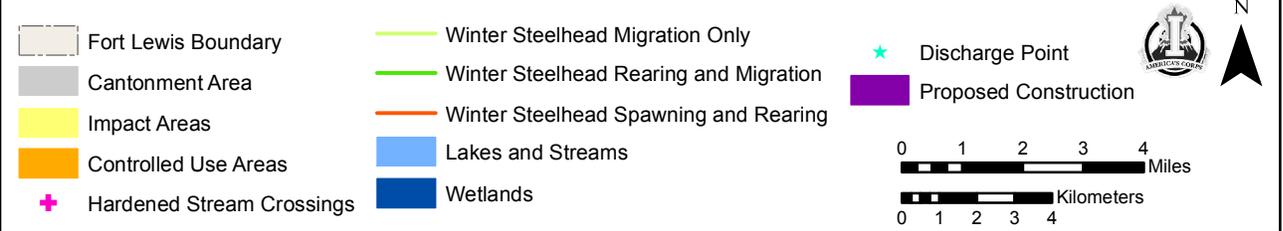
**Figure 5-4. Summer Steelhead Distribution in the Fort Lewis Project Area**



Source: StreamNet 2009



**Figure 5-5. Winter Steelhead Distribution in the Fort Lewis Project Area**



Source: StreamNet 2009



of vegetation along stream banks, while high flows add gravel, flush sediments from gravel, create new rearing channels, and perform other important functions.

Within the stream channel, salmon require sufficient clean and appropriately-sized cobbles and gravel for spawning and incubation. Riffles, rapids, pools, and floodplain connectivity are important for production, rearing, cover, and aeration. Riparian vegetation provides shade (which moderates the temperature of the stream), stabilizes banks, and controls soil erosion and sedimentation. It provides nutrients to the stream and contributes large woody debris, which increases channel complexity, creates backwater habitats, and increases the water depth of pools. Aquatic plants and organic litter provide food for salmon, and can be influenced by riparian vegetation, temperature, streamflow, and substrate. Finally, salmon require unobstructed access both downstream and upstream for migration and feeding. Factors that obstruct passage include physical structures, chemical pollution, inadequate streamflow, and high temperatures.

Nearshore marine habitats (e.g., marine tidal marshes, tidal channels, eelgrass (*Zostera marina*) beds, and kelp (*Nereocystis luekeana*) forests) provide salmon with spawning (pink salmon only), rearing, and feeding grounds and shelter. Several important features influence the value of estuarine and marine habitats: water quality; temperature; adequate food and cover; a saltwater/freshwater transition zone; marine vegetation and algae; adequate river or stream discharge; and migration pathways. Estuaries protect the shoreline from erosion, filter pollutants, and reduce flooding by retaining stormwater during high-flow periods. Estuaries are important habitats for anadromous salmon transitioning from fresh to salt water during juvenile downstream migration, and back again during the spawning migration upstream. Some species are dependent on estuaries as rearing areas. Salmon migrate to the ocean and rear there for 2 to 5 years while feeding and rapidly gaining weight before returning to their natal streams.

### **Bull Trout**

Bull trout are native to the Pacific Northwest and western Canada, and the Coastal/Puget Sound DPS was federally listed as a threatened species in November 1999 (U.S. Fish and Wildlife Service 1999a). On September 25, 2005, the USFWS designated critical habitat for the Coastal-Puget Sound DPS of bull trout, including 1,212 miles (1,951 km) of stream and marine shoreline in the Puget Sound region (U.S. Fish and Wildlife Service 2005). Fort Lewis water bodies are exempt from this critical habitat designation (pursuant to the National Defense Authorization Act for Fiscal Year 2004; Public Law 108-136). However, the critical habitat designation does include coastal Puget Sound waters adjacent to Fort Lewis. The USFWS recently proposed revising the critical habitat designation to expand its coverage in the Northwest (U.S. Fish and Wildlife Service 2010b).

Historically, bull trout were found throughout the Pacific Northwest including Montana, Idaho, northern California, and Nevada (Knowles and Gumtow 2005). They exhibit both resident and migratory life-history strategies throughout much of their current range (Rieman and McIntyre 1993). Resident bull trout complete their life cycles in the tributary streams in which they spawn and rear. Migratory bull trout spawn in tributary streams, and juvenile fish rear from 1 to 4 years before migrating to either a lake (adfluvial), river (fluvial), or, in certain coastal areas, saltwater (anadromous), to mature (Fraley and Shepard 1989, Goetz 1989). Anadromy is the least studied life-history stage in bull trout.

Spawning areas are associated with cold-water springs, areas of groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993; Rieman et al. 1997). Cold water temperatures are especially crucial during spawning, as temperatures above 7° Celsius (C; 46° Fahrenheit [F]) can decrease egg survival by at least 75 percent (Knowles and Gumtow 2005). Preferred spawning habitat generally consists of low gradient stream reaches, which are often found in high gradient streams that have loose, clean gravel (Fraley and Shepard 1989) and water temperatures of 5 to 7° C (41 to 48° F) in late summer to early fall (Goetz 1989). Growth of resident fish is generally slower than that of migratory fish; resident fish tend to be smaller at maturity and less productive (Fraley and Shepard 1989, Goetz 1989).



Biologists report repeated and alternate year spawning, although repeat spawning frequency and post-spawning mortality are not well known (Leathe and Graham 1983, Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1993). Bull trout typically spawn from August to November during periods of decreasing water temperatures. However, migratory bull trout may begin spawning migrations as early as April, and move upstream as far as 155 miles (250 km) to spawning grounds in some areas of their range (Fraley and Shepard 1989, Swanberg 1997). Depending on the water temperature, egg incubation is normally 100 to 145 days (Pratt 1992), and juveniles remain in the gravels after hatching. Fry normally emerge from the gravel from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell 1992).

Deforestation, along with agriculture, grazing, and mining, are the major causes of habitat degradation. These practices cause higher water temperatures and sediment buildup in streams that affects both water clarity and spawning gravels. Dams and irrigation projects have caused the extinction of most of the migratory bull trout subpopulations (Brown 1992, Knowles and Gumtow 2005). Other causes of population declines include habitat fragmentation and degradation, poor water quality, poor fisheries management, and introduction of non-indigenous species.

The Coastal-Puget Sound DPS of bull trout is significant to the species as a whole because it contains the only anadromous forms of bull trout in the coterminous United States. The DPS includes the Puget Sound Management Unit, which includes all watersheds within the Puget Sound Basin and the marine nearshore areas of Puget Sound (U.S. Fish and Wildlife Service 2004a). Bull trout have been observed in the Nisqually River, which passes through Fort Lewis (Fresh et al. 1979; Bottorff and Swanson 1993; Chan 2004). Bull trout historically were present in the Nisqually River, and there have been recent sightings in the Nisqually River, which have likely been foraging bull trout (Chan 2000, 2003; Ellings 2004). A single juvenile was collected during stream sampling in the lower reaches of the Nisqually River in the mid-1980s (Washington Department of Fish and Wildlife 1998a), and in the late 1990s a single adult was observed at Clear Creek hatchery in mid-September (U.S. Fish and Wildlife Service 2004a). In July 2004, a bull trout was collected in the lower reaches of the Nisqually River (Zuchowski 2006). Bull trout are most likely to be found in the Nisqually River during the winter and spring months, but are unlikely to be found there later in the summer and fall when they journey upstream into glacial streams to spawn. SalmonScape shows the stretch of the Nisqually River running through Fort Lewis and north into the Puget Sound as an area of historic bull trout presence (Washington Department of Fish and Wildlife no date). StreamNet does not show any bull trout presence in the Nisqually River or other streams on Fort Lewis (StreamNet 2009). Figure 5-2 shows the nearest bull trout presence, according to StreamNet data.

The Bull Trout Recovery Unit Team has decided that the Nisqually River Basin is not a core population watershed for Puget Sound bull trout. However, the team has designated it as “core habitat,” given the possibility that bull trout from other South Puget Sound watersheds may use the Nisqually River estuary for habitat. More recently, a single bull trout smolt was captured by seining at the mouth of the river (Kunz 2009, Phillips 2009). The origin of this fish is unclear and could have been another river system (Phillips 2009). For the analysis presented in this BA, it is assumed that the Nisqually River running through Fort Lewis to the Puget Sound supports bull trout.

A survey was conducted in 1996 to determine the presence of bull trout and potential habitat on Fort Lewis (Fort Lewis Public Works 2006). Cabin, Sequalitchew, and Murray creeks were surveyed for bull trout presence, but no populations were located. Muck and Clear creeks were not surveyed due to lack of suitable habitat. Bull trout is not known to occur in the Muck Creek system, and habitat requirements likely exclude bull trout as viable habitat. Muck Creek is a low gradient semi-ephemeral stream with summer water temperatures that exceed the tolerances of bull trout. Temperatures as high as 21.5 °C (70.7 °F) have been measured in Muck Creek during the summer (Swarts and Salema 1997). Along with increased temperature, Muck Creek has intermittent flow. Sections of Muck Creek begin to go dry in June and remain dry until



December. Bull trout spawn in early fall when flows in Muck Creek are at a minimum. The lack of flow precludes Muck Creek from being viable spawning habitat for bull trout. Therefore, the Army has not conducted any recent surveys for bull trout in Muck Creek.

### **Chinook Salmon**

This species is found from the Bering Strait south to southern California. The Puget Sound ESU for Chinook salmon is federally listed as threatened, although Chinook salmon populations appear stable in the Puget Sound Region. On September 2, 2005, NMFS designated critical habitat areas in Washington for Puget Sound Chinook salmon (Federal Register 2005). None of the streams on Fort Lewis are classified as critical habitat as Fort Lewis water bodies are exempt from this critical habitat designation (pursuant to the National Defense Authorization Act for Fiscal Year 2004; Public Law 108-136). However, critical habitat does include nearshore areas in the South Puget Sound adjacent to Fort Lewis.

Chinook salmon are the largest of any salmon, with adults often exceeding 40 pounds (18 kilograms). There are different seasonal runs of Chinook salmon, which correspond to the timing of migration from ocean to freshwater. These runs have been identified on the basis of when adults enter freshwater to begin their spawning migration. However, distinct runs also differ in the degree of maturation at the time of river entry, the thermal regime and flow characteristics of their spawning site, and their actual time of spawning.

Though they use a variety of freshwater habitats, Chinook salmon spawn in large mainstream rivers more frequently than other salmon species (Washington State Joint Natural Resources Cabinet 1999). As adults, they migrate from a marine environment into freshwater streams and rivers. These areas are mostly in rough gravel beds of major rivers, rather than the more protected tributaries (Tibbitts 1998). Physical qualities of the stream, including stream flow, gravel quality, and silt load, can significantly influence the survival of the eggs as they develop within these spawning beds. Adult females prepare spawning beds in stream areas with suitable gravel composition, water depth, and velocity. The female then lays eggs, which she guards for a brief period before dying. Eggs hatch between 90 and 150 days after deposition, depending on water temperatures. The following spring, young salmon fry emerge, and may spend from 3 months to 2 years in freshwater before migrating to estuarine areas as smolts, and then into the ocean to feed and mature. Chinook salmon remain at sea for 1 to 6 years, with the exception of a small number of yearling males that mature in freshwater, or return after 2 to 3 months in salt water.

To complete the freshwater portion of their life histories, Chinook salmon require cool, clean water with a high level of dissolved oxygen and low turbidity and sediment content. For spawning and incubation, clean gravel must be available, and streamflow must be of sufficient depth and velocity to allow passage, migration, and spawning (Washington State Joint Natural Resources Cabinet 1999). Dams and fishing pressure (commercial, tribal, and recreational) have been identified as major causes of declines in Chinook populations (Washington State Joint Natural Resources Cabinet 1999).

The Puget Sound Chinook ESU includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound, including the Straits of Juan de Fuca from the Elwha River, eastward, and rivers and streams flowing into Hood Canal, South Puget Sound, North Puget Sound, and the Strait of Georgia in Washington. Chinook salmon (and their progeny) from the following hatchery stocks are considered part of the listed ESU: Kendall Creek (spring run); North Fork Stillaguamish River (summer run); White River (spring run); Dungeness River (spring run); and Elwha River (fall run).

The streams surrounding the Puget Sound are one of the major producers of Chinook salmon. The Puget Sound Chinook ESU includes Fort Lewis. Puget Sound borders North Fort Lewis, an area that provides habitat for outmigrating juvenile and in-migrating adult anadromous salmonids using the Nisqually River to the south and Chambers Creek to the north (Walter 1998). Some experimental rearing of Chinook and coho salmon was conducted in Sequatchew Creek on Fort Lewis. Since the survival of Chinook salmon was poor



(Mills 1998), the Chinook and coho program was terminated in the early 1990s (Zuchowski 2006). Although some Chinook salmon may use the lower reaches of Sequelitchew Creek, it is unlikely that they spawn in the creek, as there is little spawning habitat within Sequelitchew Creek immediately downstream of Sequelitchew Lake (Carlson 1998, Norman 1998). Most spawning near Fort Lewis occurs in the mainstem of the Nisqually River (U.S. Army Directorate of Engineering and Housing 1984, CH2M HILL 1994, Nisqually Chinook Recovery Team 2001). According to SalmonScape, the section of the Nisqually River running through Fort Lewis and north to the Puget Sound provides spawning habitat for fall Chinook salmon (Washington Department of Fish and Wildlife no date). The data also indicate the presence of some rearing habitat south (upstream) of Fort Lewis. According to StreamNet, this portion of the Nisqually River provides spawning and migration habitat (StreamNet 2009; Figure 5-3).

Chinook salmon have been documented spawning in lower Muck Creek during high water years. Use of Muck Creek by Chinook is dependent on water levels. Occasional use occurs when flows in early fall are sufficient to allow upstream migration. Use has only been documented in the lower half mile of Muck Creek. In 2005, one carcass of a female Chinook salmon was observed approximately 328 feet (100 meters) upstream of the mouth of Muck Creek (Richardson 2010).

### **Steelhead**

The Puget Sound ESU for steelhead is federally listed as threatened. No critical habitat has been designated for this species. The original range of steelhead was from northern Mexico to southeastern Alaska, and inland to the tributaries of the upper Columbia River, to Hell's Canyon Dam on the Snake River and the Clearwater and Salmon rivers in Idaho.

Of all the salmonid populations within Washington State, steelhead spend the largest amount of their lives actually within the inland boundaries of the state. This species is found in most streams in Washington during all times of the year. Winter runs are normally found in the Puget Sound region with a few populations migrating east through the Cascades via the Columbia River. The summer runs migrate much farther and are found in most major streams in Washington. In western Washington, both forms (rainbow trout and steelhead) are present in most drainages of Puget Sound, coastal streams, and the lower Columbia River (Figures 5-4 and 5-5).

In general, steelhead that enter freshwater between May and October are considered summer-run steelhead. Steelhead that enter fresh water between November and April are considered winter-run steelhead. Summer steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn. Winter steelhead enter fresh water with well-developed gonads and spawn shortly thereafter.

The Nisqually River has both winter- and summer-run steelhead. The winter run consists of both native fish and hatchery fish of outside origin, but it is managed for natural production. This run contributes to both the Nisqually Indian commercial and non-Indian sport fisheries on the river. The summer run consists of hatchery fish of outside origin and contributes to a small non-Indian sport fishery on the river. According to digital data from SalmonScape (Washington Department of Fish and Wildlife no date), winter-run steelhead are found in the Nisqually River and Muck Creek, with historic presence in Spanaway Creek. The Nisqually River provides spawning habitat for winter-run steelhead, and Muck Creek provides rearing habitat. According to StreamNet, the Nisqually River provides habitat for summer steelhead migration and winter steelhead spawning, rearing, and migration, and Muck Creek provides rearing and migration habitat for winter steelhead (StreamNet 2009; Figures 5-4 and 5-5). Steelhead have been documented throughout most of the Muck Creek system on Fort Lewis (Kerwin 2000), and are known to use Muck Creek for spawning and rearing habitat. Recent spawning surveys of steelhead in Muck Creek documented five redds in 2008 and ten redds and two adults in 2009 (Richardson 2009).



Hatchery plants of both winter and summer steelhead have occurred historically in the basin, but they have been eliminated to protect the native wild stock. Spawning occurs from April through June, with fry emerging from late May through August (Nisqually Chinook Recovery Team 2001).

#### **5.1.4.2 Current Salmonid Habitat Use and Protection Measures**

As discussed in Chapter 2, training occurs predominantly on land, outside of streams and other aquatic habitats. Vehicles use the approved hardened stream crossings shown in Figure 2-2 to cross Muck Creek. As discussed earlier, vehicles do not currently ford the Nisqually River, and there are no plans to do so in the foreseeable future. As described in Section 2.4.8, amphibious operations occur in the Puget Sound, and Sequelitchew Lake, which is directly connected to the Puget Sound via Sequelitchew Creek. Additionally, stormwater and treated wastewater from Fort Lewis are discharged to the Puget Sound near Solo Point.

Existing protection measures for salmonids are listed in Table 2-4. They include stream buffers and hardened crossings throughout the installation, as well as restrictions on the military use of the Solo Point boat ramp and adjacent shoreline, which were developed as a result of consultation with NMFS. These measures limit activities that can occur during times when listed salmonids are likely to be present. Additionally, all construction, forest management, and stream management activities require an analysis of potential impacts to salmon and appropriate mitigation. Hardened crossings are maintained on an as-needed basis, as discussed in Section 2.1.4. Fort Lewis also has ongoing management to maintain and enhance riparian and instream habitats, primarily through the removal of invasive vegetation, followed by planting native shrubs and trees.

#### **5.1.4.3 Analysis of Direct and Indirect Effects**

##### **Construction**

The locations of proposed construction activities relative to waterways on Fort Lewis and streams where bull trout, Chinook salmon, and steelhead occur are shown in Figures 3-1, and 5-2 through 5-5. Construction would occur on approximately 220 acres (89 ha), in areas that are already developed, or that have already been cleared and/or disturbed in association with firing ranges. The alteration of soil structure during construction may increase sediment loading to streams, but the effect is likely to be short-term (Spence et al. 1996). Additionally, construction materials, fuels, solvents, and other hazardous materials would be used at the construction sites, which would have the potential to enter nearby water bodies if not handled and managed appropriately. The closest construction site to a water body with listed fish species is Range 92, which is approximately 1,300 feet (396 meters) south of Muck Creek at its closest point. As discussed in Chapter 3, planned construction activities at this site include upgrading existing range facilities. Construction projects require the use of engineering controls and Best Management Practices (BMPs), including a Stormwater Pollution Prevention Plan (SWPPP) to minimize the potential for construction-generated runoff and sedimentation. Additionally, a spill prevention control and countermeasures plan (SPCCP) would be in place to help prevent and respond to any spills occurring on the construction site. These procedures would help prevent loss of soil and other materials from construction sites in order to prevent sedimentation and release of pollutants into water bodies. At the Range 92 site, the 1,300 feet between the construction area and the stream, including a riparian buffer along the stream, would further help prevent release of materials into Muck Creek. Additionally, the site has very level topography, and runoff from that area into Muck Creek is very unlikely. Therefore, minimal effects to fish habitat are anticipated. All other construction projects would be at least 1.5 miles from the nearest fish-bearing streams, and would be subject to the same construction BMPs described above. The majority of the construction projects would occur in the cantonment area, in areas that area already developed, as shown in Figure 3-1.

The total area of new impervious surface created under this alternative would total up to 220 acres, spread out over the construction areas shown on Figure 3-1. This increase in impervious surface would have the potential to cause increased sedimentation into waterways if it resulted in an increase in overland flow. Under



construction requirements, all stormwater on new construction sites must be treated on site either through bioswales or injection wells. Therefore, there would be no increase in overland flow as a result of the increased impervious surface, and effects to fish habitat, including critical habitat in the Puget Sound for bull trout and Chinook salmon, are not anticipated.

### **Stationing**

The increase in people living and working on Fort Lewis would result in an increase in the amount of discharge from the Fort Lewis Solo Point WWTP into the Puget Sound. Discharges from the WWTP could potentially affect listed salmon and their habitat in the area of the outfall. The most likely use of the portion of the Puget Sound that is influenced by the outfall is by adult Chinook, steelhead, and bull trout that are migrating to freshwater systems, and by juveniles and subadults foraging in the area (U.S. Environmental Protection Agency 2009). Since the outfall is not located at a stream or river entrance, the area is unlikely to have high use by listed salmonids.

The total mixing zone length for all discharge ports of the WWTP combined is 670 feet. A BE prepared by the U.S. Environmental Protection Agency (EPA) in association with renewal of the Fort Lewis National Pollutant Discharge Elimination System (NPDES) permit analyzed maximum concentrations of water quality contaminants (at the edge of the mixing zone under maximum permitted discharge scenarios (7.0 mgd; U.S. Environmental Protection Agency 2009). According to the BE, these concentrations are not large enough to adversely affect listed species that swim through the area.

The additional contributions to the WWTP under the proposed action would be associated with an 8 percent on-post population increase, plus a 10 percent increase in people working on the installation. Although the WWTP is currently well below its hydraulic design capacity, there is evidence that it is already near its biological oxygen demand (BOD) design capacity, and therefore would not be able to meet the more restrictive permit limits of the new NPDES permit under the proposed action. Although additional effluent would be the same in composition as the current effluent, potential effects to listed fish species and their habitat in the form of increased BOD and reduced dilution, could have impacts to listed species and their habitat, including bull trout and chinook salmon critical habitat, beyond those addressed in the BE.

The new soldiers and family members living off-post would also contribute to increases in other treatment plants in the region. It is impossible to determine where these increases would occur, but it is assumed that the vast majority of the incoming population would live in Pierce and Thurston counties. Therefore, additional wastewater discharges into the Puget Sound associated with stationing actions are likely. Given that the total additional population in the region is just over 1 percent of the total regional population in Pierce and Thurston counties, it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to listed fish or critical habitat.

### **Ground Training**

Direct impacts to fish include those that cause mortality, physical trauma, harassment, or predation. Ground activities most likely to directly impact listed fish involve stream and river fording activities at Muck Creek. With a large increase in vehicle miles from SBCT, GTA, CSS, and CAB unit vehicles from current levels, there would be a substantial increase in the number of vehicle crossings of streams and rivers, increasing the potential to directly kill, harm, or harass fish, and degrade their habitat. One phenomenon associated with vehicles crossing streambeds is the creation of an “attractive nuisance,” where vehicles create gravel mounds in the streambed, which attract spawning fish, which could then be killed or harmed by further vehicle activity. However, stream crossings would occur at vehicle fords on Muck Creek that have been hardened with concrete to minimize the likelihood of salmon loitering in the area and exposing themselves to potential harm. These hardened crossings minimize the likelihood of vehicles directly impacting the streambed and therefore stop the creation of gravel mounds. River crossing activities on the Nisqually River are not reasonably foreseeable under the proposed action.



With increased training activities, particularly off-road, there is the potential for increased sedimentation to enter aquatic habitats and indirectly impact fish. This increase in instream sedimentation could result from soil compaction and increased erosion. Compacting soil increases the overland flow of water into the aquatic habitat and decreases the water storage capacity of the soil. Over the long-term, overland flow can erode the topsoil and cut rills and gullies or deepen existing gullies, concentrating runoff. As a result, sediment production is increased. Reduced infiltration and increased runoff may decrease the recharge of the saturated zone and increase peak flow discharge.

Sedimentation can cover spawning or rearing areas and fill pool habitats, making them unusable by fish and other aquatic organisms (USDA Forest Service 2002). A number of sublethal effects to aquatic species may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long-term, increased sediment loads reduce primary production in streams. Reduced instream plant growth, combined with the reductions in riparian vegetation, can limit populations of terrestrial and aquatic insects, which also serve as food sources for many salmonids.

The risk of sedimentation into aquatic habitats would remain low. Training activities with the potential to disturb soil would continue to be conducted outside the designated 164-foot (50-m) buffers, which would continue to minimize impacts to salmonids and their habitats. Additionally, the soils on Fort Lewis have a low potential for erosion and movement from training sites.

Fuel spills and leaks from vehicles present some risk to salmonids on Fort Lewis, primarily through contamination and modification of riparian habitat. However, these risks would be minimal, since all vehicle refueling sites and assembly areas would be located at least 328 feet (100 m) away from aquatic habitats. Additionally, the units would follow the installation SPCCP, which includes spill prevention measures, as well as spill contingency plans. Critical habitat for bull trout and Chinook salmon in the Puget Sound should not be affected.

### **Live-Fire Training**

There are fire risks associated with gunnery training and other activities that use fire or incendiary devices (such as flares and camp fires). These activities would increase in frequency under the proposed action, resulting in the ignition of more fires in training areas on Fort Lewis. Fires are only likely to impact fish if vegetation in the 164-foot (50-m) buffer zone adjacent to aquatic bodies is burned. Removal of this riparian vegetation would potentially increase sedimentation and short-term water temperatures of the water bodies, both of which can be harmful to fish. Since most fires attributable to training are contained in impact areas and other locations away from salmonid-bearing streams, risks are minimal. Although the frequency and number of fires on Fort Lewis would increase as a result of the increased live-fire training (as well as use of other incendiary devices), they would continue to be confined predominantly to open grassland habitats. Firebreaks and installation fire management activities (including placing restrictions on where tracer, pyrotechnics, and troop fires are authorized during high fire risk conditions) should continue to adequately minimize the risk of a fire escaping into riparian habitats, and should therefore continue to protect salmonid populations on Fort Lewis.

Digging would result in soil disturbance that could potentially increase the risk of erosion and sedimentation into water bodies. Given the low erodibility of soils and the regulation restricting digging within 164 feet (50 m) of streams, it is unlikely that salmonid habitats on the installation would be adversely affected. Additionally, critical habitat for bull trout and Chinook salmon in the Puget Sound should not be affected.

### **Aviation Training**

Aviation activities could contribute to sedimentation, should rotor wash occur near water bodies. Since helicopter training by the CAB would not involve extended hovering, and take-off and landing activities



would occur in areas with very little exposed soil, it is expected that minimal, if any, sedimentation into salmonid-bearing waters would occur.

#### **5.1.4.4 Interrelated and Interdependent Effects**

Population increases into the region associated with the proposed action would likely result in more pollutants eventually entering the Puget Sound, including critical habitat for bull trout and Chinook salmon. These pollutants would be associated with use of automobiles, wastewater discharge, and other day-to-day activities by local residents. The pollutant discharges associated with a 1 percent increase in the overall regional population in Pierce and Thurston counties would not be expected to have a substantial effect on the water quality in the Puget Sound.

Some construction of new housing and services could occur as a result of the regional population increase, although this would be dependent on overall economic conditions. Such construction projects would potentially result in an increase in impervious surface in the region, and could contribute to increases in stormwater runoff to streams and rivers, and associated flooding and sedimentation into aquatic habitats. All major construction projects would require separate consultation under the ESA to ensure they would not affect listed species.

Possible increases in the population of soldiers and their families may see an increase in recreational uses of the surrounding area. With state regulations (such as fishing licenses) in place, any increases in salmon fishing in the Nisqually River or Puget Sound should not impact local salmonid stocks. However, there could be an increase in illegal activities such as poaching and violations of fish harvest regulations. Any increase in recreational activities in American Lake, or other lakes on the installation, would have no effect on bull trout or Chinook salmon, as these fish do not occur in these water bodies. Since steelhead do go up Muck Creek, it is possible that they may be found in Chambers Lake. Fort Lewis fishing practices in Chambers Lake require catch and release of everything except spiny ray fish, and use of artificial lures and barbless hooks. These practices would limit impacts to steelhead, although violations of these practices could occur.

#### **5.1.4.5 Cumulative Effects**

Native American tribes catch Chinook salmon and steelhead commercially and for subsistence using beach seine and gillnets. Bull trout are caught incidentally during fishing operations and by recreational anglers. Logging and agricultural practices, industrial pollution, urbanization, and other factors associated with development in the Pacific Northwest are degrading and diminishing salmon habitat (Williams and Graves 1990; Spence et al. 1996). In addition, fuel leaks and spills from pleasure craft, fishing boats, or commercial boats may impact salmon habitat.

Training activities under the proposed action would be cumulative to those already occurring on the installation, resulting in an additive use of training lands and participation in training and other activities that disturb the ground. Additionally, future training activities, such as ground training by High Mobility Artillery Rocket System (HIMARS) field artillery battalions, would be cumulative as well. However, even with these cumulative increases in training, it is expected that protective measures would remain sufficient to protect fish habitats on the installation and downstream habitats off the installation.

Inaccessible habitat (because of historical farming practices of utilizing dikes) in the Nisqually Wildlife Refuge is slowly being opened up and restored for juvenile and adult salmonids. Hatcheries within the vicinity of Fort Lewis, including the Clear Creek Fish Hatchery operated by the Nisqually Tribe on Fort Lewis land, successfully contribute salmonids (e.g., Chinook salmon) to the local watersheds. These smolts increase the production of salmonid enhancement of the region.



**5.1.4.6 Pathways and Indicators Matrix Checklist**

An analysis of pathways and indicators of ecological function was prepared following guidance provided by NMFS (1999). The pathway and indicator of ecological function evaluation covers all relevant habitat parameters affected either positively or negatively by the proposed action (Table 5-1).

**TABLE 5-1  
Analysis of Pathways and Indicators for the Fort Lewis Area**

Pathways and Indicators	Environmental Baseline			Effects of the Action(s)			
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Improve	Maintain	Degrade
<b>Water Quality</b>							
Temperature						•	
Sediment						•	
Contaminants/Nutrients						•	
<b>Habitat Access</b>							
Physical Barriers						•	
<b>Habitat Elements</b>							
Substrate						•	
Large Woody Debris						•	
Pool Frequency						•	
Pool Quality						•	
Off-Channel Habitat						•	
Refugia						•	
<b>Channel Condition and Dynamics</b>							
Width/Depth Ratio						•	
Streambank Condition						•	
Floodplain Connectivity						•	
<b>Flow/Hydrology</b>							
Peak/Base Flows						•	
Drainage Network Increase						•	
Watershed Conditions						•	
Disturbance						•	
Riparian Reserves						•	
1 – The environmental baseline columns have been intentionally left blank. It is beyond the scope of the BA to establish baseline conditions for the Nisqually River watershed.							

Army activities under the proposed action would not be likely to substantially change temperature functions, habitat access, habitat elements, channel condition and dynamics, or flow and hydrology from baseline levels. Although sediment and contaminant loads to creeks and rivers could potentially increase as a result of the increase in off-road miles, use of BMPs and other protocols for protecting water quality should be sufficient to minimize impacts to water quality in the region.

**5.1.4.7 Conservation Measures to Reduce the Effects of the Action**

The following measures identified as mitigation in the GTA EIS would help reduce the effects of the action:

- Monitor annually all hardened crossings during the winter, and implement any required maintenance, such as extending the hardened approaches to crossings or re-gravelling approaches.
- Perform additional repair and maintenance of non-paved roads on Fort Lewis required by significantly increased travel related to training.
- Increase soldier awareness of areas receiving repeated impacts within aquatic buffer zones by marking them with signs or Seibert stakes.



- Construct a new WWTP to mitigate the significant impact of the proposed action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand and total suspended solids from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the proposed action, will not be able to meet the more restrictive permit limits.

#### 5.1.4.8 Determination of Effects

Activities under the proposed action would have the potential to impact fish habitat in fish-bearing streams on Fort Lewis, as well as in the Puget Sound. Releases from construction sites would be minimized through BMPs, SWPPPs and SPCCPs. Releases from training areas would be minimized through protective buffers around streams and wetlands. Increases in discharge from the WWTP with the potential to exceed permitted effluent levels would be mitigated for by the construction of a new WWTP. Therefore, the proposed action **may affect, but is not likely to adversely affect** bull trout, Chinook salmon, or steelhead or their critical habitats.

### 5.1.5 Rockfish

#### 5.1.5.1 Background Information

Based on recent status reviews, NMFS has determined that three species of rockfish occurring in the Puget Sound area are in danger of extinction, or are likely to become endangered within the foreseeable future. On April 27, 2010 NMFS listed the Georgia Basin DPS of bocaccio as endangered, and listed the Georgia Basin DPSs of yelloweye rockfish and canary rockfish as threatened (National Marine Fisheries Service 2010a). The listing will become effective on July 27, 2010. Most of the background information presented in this section is taken from the Federal Register notice of proposed listing of these species (National Marine Fisheries Service 2009b).

Rockfishes are bottom and mid-water dwelling fish that occur in various coastal habitats. Rockfish larvae are found in surface water, and larvae and small juveniles may remain in open waters for several months. Juveniles and subadults are associated with shallow water habitats, such as rocky reefs, kelp canopies, and artificial structures. Adults generally move into deeper water as they age. Larval rockfish feed on diatoms, dinoflagellates, tintinnids, and cladocerans; juveniles feed on copepods and euphasiids; and adults eat bottom and mid-water dwelling invertebrates and small fishes.

#### **Bocaccio**

Bocaccio are very rare in the Puget Sound, and have declined substantially since 1965, particularly relative to other rockfish species in the Puget Sound. The occurrence of large adult bocaccio in the Georgia Basin appears to be limited to certain areas. In past years, they were most commonly caught in the areas around Point Defiance and the Tacoma Narrows in the South Puget Sound. Based on limited information, they are frequently found in areas lacking hard substrates. Copulation and fertilization typically occur between August and November. Larvae are planktivores, pelagic juveniles are opportunistic feeders, and larger juveniles and adults are primarily piscivores. The main predators of adult bocaccio are marine mammals.

Threats to the Georgia Basin DPS of bocaccio include low dissolved oxygen within their range, bycatch in recreational and commercial harvest, and a reduction in kelp habitat necessary for juvenile recruitment.



### **Yelloweye Rockfish**

Yelloweye rockfish occur from Baja California to Alaska. They are distributed throughout the Strait of Georgia in the northern Georgia Basin, but are less frequently observed in South Puget Sound. They typically occur in waters 80 to 1,560 feet (25 to 475 meters) deep, and often occur in areas with high relief and complex rocky habitats. Juveniles settle in shallow, high relief zones, crevices, and sponge gardens, and then move to deeper waters as they grow. Fertilization may occur throughout the year, but is most common between September and April. Yelloweye rockfish are opportunistic feeders. Early life stages eat foods similar to those described for bocaccio. Adult yelloweye rockfish are larger than adult bocaccio, and tend to eat sand lance, gadids, flatfishes, shrimps, crabs, and gastropods. Predators include salmon and orcas. Threats to the species include low intrinsic productivity, bycatch in recreational and commercial harvest, loss of near shore habitat, chemical contamination, and areas of low dissolved oxygen.

### **Canary Rockfish**

Within their range (from Baja California to the Western Gulf of Alaska), canary rockfish are most common off the coast of central Oregon. They were once considered fairly common in the greater Puget Sound area. They inhabit waters 160 to 820 feet (50 to 250 meters) deep, and are associated with the various rocky and coarse habitats throughout the basins of the Puget Sound. Fertilization peaks in December, and spawning occurs once per year. Larvae are planktivores, juveniles are zooplanktivores, and adults are planktivores/carnivores. Predators include yelloweye rockfish, lingcod, salmon, sharks, dolphins, seals, and possibly river otters. Threats to the species include low intrinsic productivity, bycatch in recreation and commercial harvest, loss of near shore habitat, chemical contamination, and areas of low dissolved oxygen.

## **5.1.5.2 Analysis of Direct and Indirect Effects**

### **Construction**

All proposed construction would occur in areas that are already developed, or that have already been cleared and/or disturbed in association with firing ranges. These areas are not located adjacent to the Puget Sound where rockfish could potentially occur. Sediments, construction materials, fuels, solvents, and other hazardous materials originating at construction sites would be unlikely to be released into water bodies and make their way to the Puget Sound, given BMPs, SWPPPs, and SPCCPs to prevent release of these materials. The maximum 220 acres of new impervious surface created under this alternative would not result in increased overland flow, since all stormwater on new construction sites must be treated on site either through bioswales or injection wells. Therefore, effects to rockfish or their habitat in the Puget Sound are not anticipated.

### **Stationing**

The proposed population increase at Fort Lewis, as well as the increase in people who work on the installation daily would increase inputs to the Solo Point WWTP, increasing the discharge from this facility. A BE prepared by the EPA in association with renewal of the NPDES permit for the WWTP addressed the potential effects to listed species associated with maximum permitted discharge scenarios. Although the BE did not address the three rockfish species proposed for listing, it did address potential impacts to listed salmon species, which may be relevant to other types of large fish. Based on this information, it is unlikely that concentrations of various water quality contaminants would be large enough to adversely affect rockfish species that swim in the vicinity of the WWTP outfall. Discharges from the WWTP under the proposed action would be similar in makeup to those analyzed in the BE, but dilution of contaminants would potentially be less, given the increased amount of discharge. Furthermore, given that the WWTP is already near its BOD design capacity, it would not be able to meet the more restrictive permit limits of the new NPDES permit under the proposed action. Given that low dissolved oxygen is listed as a threat to all three rockfish species, increased BOD released by the WWTP under the proposed action could adversely impact these species.



Additionally, new soldiers and family members living off-post would contribute to increases in other treatment plants in the region. It is impossible to determine where these increases would occur, but it is assumed that the vast majority of the incoming population would live in Pierce and Thurston counties, and would contribute to various WWTPs in the region. Therefore, additional wastewater discharges into the Puget Sound associated with stationing actions are likely. Given that the total additional population in the region is just over 1 percent of the total regional population in Pierce and Thurston counties, increased discharges are expected to be small.

### **Training**

Training activities under the proposed action would have minimal effects on the three rockfish species proposed for listing or their habitat. Some risk of sedimentation would be associated with ground maneuver training, digging, and fire. However, given the low erodibility of soils on the installation, as well as riparian buffers and other regulations designed to prevent sedimentation into water bodies, the risk of impacts to habitats in the Puget Sound is minimal. There would not be an increase in amphibious training at Solo Point under the proposed action.

#### **5.1.5.1 Interrelated and Interdependent Effects**

Population increases into the region associated with the proposed action would likely result in more pollutants eventually entering the Puget Sound. These pollutants would be associated with use of automobiles, wastewater discharge, and other day-to-day activities by local residents. The pollutant discharges associated with a 1 percent increase in the overall regional population in Pierce and Thurston counties would not be expected to have a substantial effect on the water quality in the Puget Sound.

Possible increases in the population of soldiers and their families may see an increase in people who participate in recreational fishing in the Puget Sound. As bycatch in recreational harvests is listed as a threat to the three rockfish species proposed for listing, recreational fishing could potentially impact these species. The increase in recreational fishing associated with the regional population increase would likely be small, and would be regulated and monitored by state agencies tasked with protecting fisheries in the region.

### **Cumulative Effects**

Past recreational, commercial, and tribal fishing activities have contributed to the decline of these three rockfish species in the Puget Sound. Despite current limits on rockfish harvests, it is thought that the three rockfish species proposed for listing are still frequently caught as bycatch and discarded (National Marine Fisheries Service 2009b). Additionally, abandoned fishing gear in the Puget Sound is thought to be an ongoing cause of rockfish mortality. Therefore, all types of fishing are an ongoing threat to this species. Population increases associated with the proposed action would add to the overall regional population and could contribute to recreational fishing pressures.

Development and cumulative regional population increases, including those associated with the proposed action, have indirectly affected rockfish habitats by contributing to sources of pollutants in the Puget Sound. Nitrogen discharges from WWTPs and other point and nonpoint sources is thought to be the primary cause of low dissolved oxygen levels in the South Puget Sound (U.S. Environmental Protection Agency 2009). These water quality effects continue to threaten bocaccio, yelloweye rockfish, and canary rockfish.

Efforts to protect rockfish and their habitat have helped to offset some of the adverse cumulative effects on these three species in the region. These efforts include Federal laws and programs (e.g., the Clean Water Act, and the Coastal Zone Management Act), efforts to restore depressed salmon stocks (which also help rockfish), and other local efforts to identify and protect important habitats in the Puget Sound (National Marine Fisheries Service 2009b).



### 5.1.5.2 Conservation Measures to Reduce the Effects of the Action

The following measure has been included in the EIS as mitigation for potential impacts to rockfish and other marine species associated with increased discharges from the Solo Point WWTP:

- Construct a new WWTP to mitigate the significant impact of the proposed action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand and total suspended solids from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the proposed action, will not be able to meet the more restrictive permit limits.

### 5.1.5.3 Determination of Effects

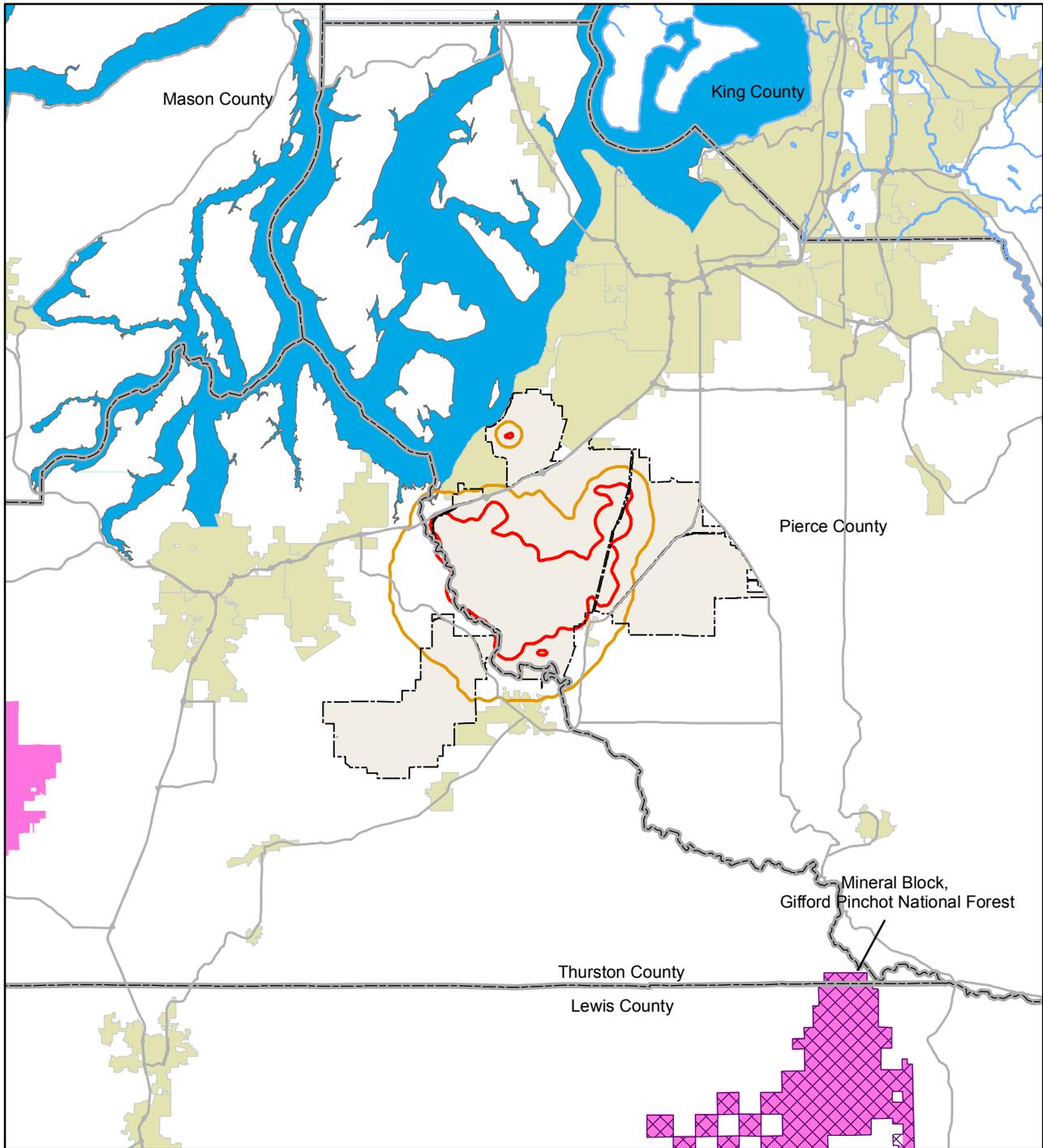
Construction and training activities under the proposed action would be unlikely to have an impact on rockfish or the waters of the Puget Sound where they occur. Population increases associated with stationing, however, would result in increased discharges from the Solo Point WWTP and other WWTPs in the region, which could potentially exacerbate existing problems with low dissolved oxygen in the Puget Sound. The proposed new WWTP to be constructed by Fort Lewis would mitigate for likely exceedences in BOD levels under the new NPDES permit. The new WWTP would be built to accommodate the increase in wastewater inputs associated with population growth, and would allow Fort Lewis to meet more stringent effluent limits required by both the 2010 and 2015 permits. Therefore, the proposed action **may effect, but is not likely to adversely affect** bocaccio, yelloweye rockfish, or canary rockfish, provided the new WWTP is built.

## 5.1.6 Marbled Murrelet

### 5.1.6.1 Background Information

The marbled murrelet is federally listed as a threatened species. The USFWS originally designated marbled murrelet critical habitat in January of 1994, and then amended this designation based on public comment. The majority of critical habitat in Washington is located in Late Successional Reserves (LSRs) on federal land in the North Cascade Range. Marbled murrelet critical habitat has been designated in Pierce County (U.S. Fish and Wildlife Service 2004b); however, this habitat is located primarily in LSR forests in the North Cascade Range in the eastern portion of the county. There is no critical habitat designation within Fort Lewis. The nearest critical habitat is shown in Figure 5-6.

Marbled murrelets are small seabirds that have been observed near Fort Lewis on the Nisqually River, and in the Puget Sound near Solo Point (i.e., North Fort Lewis). They live in marine waters that are close to forests that provide suitable nesting habitat (Washington Department of Wildlife 1993). Marbled murrelets are found from Alaska to central California. In Washington State, they are resident all year in nearshore marine areas and spend the majority of their lives on salt water. The greatest concentration of murrelets in Washington is found in the northern Puget Sound. Of the approximately 5,000 murrelets that inhabit the Puget Sound, a relatively small proportion use the coastal zones in the vicinity of Fort Lewis (Northwest Forest Plan Interagency Regional Monitoring Program 2008). Estimates in this area are one to three murrelets per square kilometer. Murrelets feed on small fish and crustaceans in nearshore marine waters in Washington, and remain closer inshore (usually within 1.2 miles [2 km] of shore) than most other alcid seabirds (Carter and Sealy 1990).



**Figure 5-6. Marbled Murrelet and Northern Spotted Owl Designated Critical Habitat**

-  Northern Spotted Owl Designated Critical Habitat
-  Marbled Murrelet Designated Critical Habitat
-  Fort Lewis Boundary
-  City Boundary
-  Lakes and Streams

**Predicted Peak Noise Levels**

-  115 dB
-  130 dB



Sources: USDA Forest Service 1997; U.S. Fish and Wildlife Service 2008a, c.



During the breeding season, murrelets fly inland to nest in large trees (Washington Department of Fish and Wildlife 1991). Nesting takes place between April 1 and September 15, with an incubation period of about 30 days. Murrelets nest either as a solitary pair or with other murrelets (Washington Department of Fish and Wildlife 1993). Both sexes share responsibility for incubation, with flights made to the ocean for food by the adult not attending the nest.

In Washington, murrelets tend to nest in forests that are made up of greater than 30 percent old-growth/mature stands, which are most likely to contain suitable nesting trees. Areas containing more than 25 percent clear-cut forest and/or meadow areas have significantly lower or non-existing populations of nesting murrelets (U.S. Fish and Wildlife Service 1992). Nest trees are typically greater than 35 inches (88 cm) in diameter at breast height (dbh) and average around 80 inches (200 cm) dbh. The most important component for nesting habitat is a platform, which may be a broad, moss-covered horizontal limb of an older tree, a broom, or a fork. A female murrelet lays a single egg on a platform, but does not construct a nest (Jordan and Hughes 1995). Forests with one or two usable platforms per acre are considered suitable nesting habitat (Grettenberger 2000). The primary threat to murrelets is the loss of suitable nesting habitat (U.S. Fish and Wildlife Service 1992, Washington Department of Fish and Wildlife 1993).

Land-based fixed point and marine surveys were performed in 1991 on Fort Lewis to detect marbled murrelets that use forest and marine habitats (Ritchie 1998). These surveys were conducted at sunrise during good weather conditions, in locations with unobstructed views of the sky. Surveys were conducted on the Nisqually River corridor and the 4<sup>th</sup> Division Bluff above Solo Point. Boat surveys of potential foraging and loafing areas were conducted off Solo Point toward the mouth of the Nisqually River. The forest along 4<sup>th</sup> Division Bluff contains some suitable murrelet nesting trees, including trees with large, often deformed branches (Clouse 1998).

No marbled murrelets were observed during these land-based surveys in 1991. Between five and 25 murrelets were observed along the coast during each boat survey. There was no indication that breeding activities were occurring nearby, as birds were not observed flying to or from land (Bottorff et al. 1991). During similar surveys in 1992, one murrelet was tentatively observed flying over Fort Lewis; however, no information was collected to confirm the murrelet sighting or breeding behavior on Fort Lewis. A survey of the forest east of Solo Point and the Nisqually River, and a marine survey between Anderson Island, Ketron Island, and the mouth of the Nisqually River, were conducted in 1993. No murrelets were detected during the forest survey, but some were observed along the coast. Although marbled murrelets have not been sighted in the forests on Fort Lewis, there is still the potential that they nest there and have not been detected. During the most recent 2009 survey, 40 murrelet-type detections were made by radar, some of which were likely other species of birds, based on speed and time of day (Hamer Environmental 2009). The 24 detections that occurred before sunrise are more likely to be marbled murrelets, although there were no visual or audio confirmations of murrelets. Additionally, there was no indication that the birds detected were flying into or out of forested habitat on Fort Lewis rather than passing through the area on their way to or from the Puget Sound.

Eight murrelets were sighted along the coast between Solo Point and the Nisqually River during summer and autumn boat surveys of seabirds in Puget Sound in 1995 and 1996. Murrelets were concentrated in well-defined areas, with seasonal shifts in the locations of these aggregations. Therefore, these sites were thought to be primarily the result of changes in food availability. Low numbers of murrelets were found in South Puget Sound, from Ketron Island to Johnson Point, during the summer (< 15 each year), and none were found in the autumn. Most murrelets were seen 1,000 to 1,600 feet (304 to 488 m) offshore (Courtney et al. 1996; Merizon et al. 1997).

Figure 5-6 shows critical habitat for marbled murrelet in the vicinity of the action area. Currently, since murrelets are unlikely to utilize habitats at Fort Lewis, most training activities are having a minimal effect on the species. The exception would be amphibious training at Solo Point, which could disturb murrelets



foraging for food in the area. Most aspects of ongoing training do not adversely impact the potential habitat of forested habitats. The exception would be noise and human disturbance, which might make murrelets avoid use of Fort Lewis.

### **5.1.6.2 Analysis of Direct and Indirect Effects**

#### **Construction**

Noise and human activity associated with construction activities should not affect marbled murrelets, as noise levels would be similar to those that currently occur on or near Fort Lewis, and most noise-generating activities would occur a mile or more from the shoreline. No murrelets are known to use forests near proposed construction activities.

#### **Stationing**

The WWTP at Fort Lewis discharges in the Puget Sound, and could potentially impact marbled murrelets who ingest prey in the area. The increase in people living on-post, as well as the increase in soldiers working on-post, would result in an increase in the amount of wastewater being treated by the WWTP, as well as the associated discharges from this facility. According to the BE prepared by EPA, maximum concentrations of water quality contaminants at the edge of the mixing zone under maximum permitted discharge scenarios would not be large enough to adversely affect marbled murrelets through ingestion of prey (U.S. Environmental Protection Agency 2009). Population increases could result in reduced dilution of water quality contaminants, although it is still unlikely that concentrations would be large enough to affect marbled murrelets through ingestion of prey.

The new soldiers and family members living off-post would also contribute to increases in other treatment plants in the region. It is impossible to determine where these increases would occur, but it is assumed that the vast majority of the incoming population would live in Pierce and Thurston counties. Therefore, additional wastewater discharges into the Puget Sound associated with stationing actions are likely. Given that the total additional population in the region is just over 1 percent of the total regional population in Pierce and Thurston counties, it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to marbled murrelets.

#### **Ground Training**

Primary marbled murrelet use areas adjacent to Fort Lewis are along the shoreline of Puget Sound, with a few birds using the mouth of the Nisqually River. There is no evidence that murrelets use forests on Fort Lewis, although surveys of potential murrelet use of forests have not been conducted during the past decade. Puget Sound in the vicinity of Fort Lewis does not appear to provide high-value habitat for marbled murrelets (Clouse 2010). Although military training does occur in potential foraging habitat and would likely increase with the proposed actions, the bulk of the increase would be in prairies and other open habitats, which are not associated with murrelet foraging. Therefore, ongoing and future ground training activities should not impact marbled murrelets.

#### **Live-Fire Training**

Noise associated with an increase frequency of gunnery activities as a result of ongoing or future military training activities should not affect murrelets, as noise levels from these training activities would be similar to those that currently occur on or near Fort Lewis, and most noise-generating activities would continue to occur a mile or more inshore from the shoreline. Predicted peak noise levels under the proposed action are shown as contour lines on Figure 5-6.

#### **Aviation Training**

Helicopter training would be land-based only, with no over water training proposed. This would reduce the potential for direct interaction between helicopters and murrelets. However, noise associated with helicopter



training near the coastline could impact foraging and loafing murrelets in this area. Impacts would be short-term, lasting only as long as helicopters were in the area.

Military flights along the Nisqually River would likely increase under proposed CAB training. Few, if any murrelets are likely to use the Nisqually River in the vicinity of Fort Lewis, therefore, impacts to marbled murrelets in this area would be negligible.

### **5.1.6.3 Interrelated and Interdependent Effects**

Possible increases in the population of soldiers and their families may result in an increase in recreational uses, such as boating, in the surrounding area. Marbled murrelets are moderately sensitive to noise and human activity, but are tolerant of humans walking along beaches in areas where murrelets feed (Bottorff et al. 1991; ENSR 1995). In addition, murrelets are tolerant of boating activity near Fort Lewis, since boating is a common activity in Puget Sound and on the Nisqually River.

### **5.1.6.4 Cumulative Effects**

Recreational and commercial fisheries in the marine waters off of Fort Lewis may disturb or harm marbled murrelets. One murrelet observed in Puget Sound in 1991 had a baited herring with hook and fishing line dangling from its beak (Bottorff et al. 1991). Data collected during seabird surveys in 1995 and 1996 suggest that tribal fisheries with gillnets do not pose a significant risk to marbled murrelets in the South Puget Sound. Furthermore, murrelets are generally found farther off shore than the nearshore zone in which these fisheries operate (Merizon et al. 1997). Construction, training increases, and other activities under the proposed action would result in cumulative noise and other disturbance on Fort Lewis, which would have the potential to make habitats on the installation less suitable for use by marbled murrelets. Additionally, off-post construction associated with population increases, should it occur, could potentially contribute to cumulative losses of forest habitats on the region. Population increases associated with the proposed action would increase the cumulative wastewater and other regional discharges into the Puget Sound. Activities on Fort Lewis that may help offset some of these cumulative impacts include a new pretreatment program at the WWTP, and possible future reductions in wastewater discharge through wastewater re-use (U.S. Environmental Protection Agency 2009).

### **5.1.6.5 Conservation Measures to Reduce the Effects of the Action**

The following mitigation measure, as presented in the GTA EIS, would minimize risks to marbled murrelet populations and habitat from increased discharges from the WWTP:

- Construct a new WWTP to mitigate the significant impact of the proposed action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand and total suspended solids from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the proposed action, will not be able to meet the more restrictive permit limits.

### **5.1.6.6 Determination of Effects**

Proposed military training activities on Fort Lewis could disturb murrelets. Most training activity would occur a mile or more from Puget Sound. Noise and human disturbance associated with military training would occur at the Nisqually River, but would be similar to current levels. Murrelet habitat would not be physically altered



or disturbed by the proposed actions. No marbled murrelet critical habitat is on the installation. Thus, the proposed action **may affect, but is not likely to adversely affect** marbled murrelets or their critical habitat.

## 5.1.7 Northern Spotted Owl

### 5.1.7.1 Background Information

The northern spotted owl is associated with most of the major types of coniferous forest in the Pacific Northwest. The northern spotted owl was listed as a threatened species in 1990. Suitable habitat for the species on Fort Lewis was identified and mapped by the USFWS, and in 1992, 62,000 acres (25,090 ha) of Fort Lewis were designated as critical habitat for northern spotted owl (U.S. Fish and Wildlife Service 1991). Based on a recent decision by the USFWS, however, the areas previously designated as critical habitat for the northern spotted owl on the installation have been removed as part of the overall critical habitat revision for this species (U.S. Fish and Wildlife Service 2008b). Fort Lewis is considered a strategic location between known spotted owl populations on the Olympic Peninsula to the west and the Cascade Range to the east.

Although a secretive and mostly nocturnal bird, the northern spotted owl is relatively unafraid of human beings (Forsman et al. 1984). The adult spotted owl maintains a territory year-round; however, individuals may shift their home ranges between the breeding and non-breeding season.

Forest practices on Fort Lewis consist of land clearing (for the development of military facilities and housing) as well as a limited timber harvest regime. In addition, military activities have resulted in an extensive network of roads throughout the forested parts of Fort Lewis. These direct and indirect forest practices have resulted in the development of the partially fragmented, mixed-age timber stands that now characterize the installation. Surveys for spotted owls using calling stations on Fort Lewis were conducted in 1991, 1994, 1995, 1998, 1999, 2002, 2003, 2006, 2008, and 2009 (Bottorff et al. 1991; Raedeke Associates, Inc. 1995; Malkin 1999; ENSR 2003, 2006, 2008). No resident or dispersing spotted owls were detected on Fort Lewis during these surveys.

Although no spotted owl occurrences have been documented on Fort Lewis, it is possible that this species was present on the installation's forests in the past, and could potentially inhabit them in the future. Fort Lewis is positioned between known populations of spotted owls on the Olympic Peninsula to the west and the Cascade Range to the east, in what is considered a strategic location. Fort Lewis is viewed as providing the potential for demographic interchange between these two known owl populations (U.S. Department of the Interior 1992). There is no evidence, however, to suggest that spotted owls travel between the existing populations (Raedeke Associates, Inc. 1995).

Location of spotted owl nests is sensitive information that cannot be shown in this public document. However, Figure 5-6 shows northern spotted owl designated critical habitat in the region, which provides an idea of where owls are located relative to Fort Lewis. The nearest known habitat occupied by northern spotted owls is over 12 miles (19 km) to the south of the cantonment area in the Mineral Block of the Gifford Pinchot National Forest in southeastern Thurston County. Even though spotted owls have not been detected on Fort Lewis during the breeding season, the species may use the installation in the autumn and winter. Juvenile owls have been known to travel long distances from their nest and through seemingly unsuitable habitat during dispersal in autumn and winter (Raedeke Associates, Inc. 1995; ENSR 2003). Therefore, the potential exists for dispersing owls and other owls to use Fort Lewis outside of the breeding season.

The forest attributes that are generally recognized as key features of habitat suitable for spotted owl nesting, roosting, and foraging are primarily characteristics of old-growth stands. These characteristics include structural diversity, large trees and snags, coarse woody debris, sufficient space under the canopy for owls to fly, and a low level of fragmentation of habitats across the landscape (Bottorff and Swanson 1993). Presently,



forests with suitable nesting and roosting habitat are primarily limited to the Nisqually River corridor, Ellsworth Woods, and the 4<sup>th</sup> Division Bluff. The few late successional and old-growth stands on Fort Lewis receive little to no management, beyond protection. Other forests are managed to increase their suitability for supporting northern spotted owls, using methods such as thinning to create a predominantly uneven-aged forest structure, leaving down trees and snags, and underplanting thinned stands with shade tolerant species (Department of the Army 2007c).

Beyond the limited timber harvest regime, which is designed to increase the suitability of forested habitats to support spotted owls, ongoing activities on Fort Lewis have little impact on potential spotted owl habitat. Forests are not used extensively for training, particularly destructive forms of training such as off-road vehicle travel and digging. However, noise associated with activities at Fort Lewis, including live-fire and helicopter training, may contribute to an ambient environment that is not conducive to supporting northern spotted owls, should the physical characteristics of the habitat improve.

### **5.1.7.2 Analysis of Direct and Indirect Effects**

#### **Construction**

Proposed construction activities, shown in Figure 3-1, would entail minimal removal of trees, restricted to areas within or at the edge of the cantonment area, or at the edge of already disturbed openings at existing ranges. These areas do not represent suitable habitat for spotted owl, and because of their locations are not currently being managed for habitat characteristics suitable for northern spotted owl. Since no spotted owls currently use the installation, construction activities would not have direct impacts on the species. Additionally, given the location of these construction projects, they would not interfere with management practices on the installation to improve spotted owl habitat characteristics. Noise from construction could disturb birds in the vicinity of the construction sites. However, since northern spotted owls are not known to utilize these habitats, and the nearest known spotted owls are 12 miles (19 km) away, noise from construction should not affect the species.

#### **Maneuver Training**

The proposed ground training activities are not expected result in direct effects to northern spotted owls, as no populations have been recorded on the installation. If any owls happened to use forests on Fort Lewis during the dispersal, they could be disturbed by these activities. However, most of the new training would occur in open grassland habitats, with limited training in forests. Off-road vehicle activities would occur only in open areas. Forested areas with the potential to provide northern spotted owl habitat in the future would not be directly affected by training activities to the degree that potential habitat would be altered.

The large increase in training on Fort Lewis annually would increase the frequency of human disturbances and loud noises, as well as result in training activities occurring in more locations on the installation at any one time. Although these disturbances would primarily occur outside of forest habitats, the overall ambient noise level and human presence on the installation would increase, potentially making existing habitats less suitable for supporting spotted owls in the future.

#### **Weapons Qualification and Gunnery Training**

The amount of weapons training occurring on Fort Lewis would increase under the proposed action. Noise associated with weapons training would extend off the installation, as shown in Figure 5-6. The USFWS has established a threshold of 92 decibels as the point at which spotted owls are likely to show signs of disturbance such as flushing (Harke 2008). Noise levels this high would occur entirely within the installation boundary. Therefore, noise would be unlikely to affect spotted owls, although if dispersing owls were present on the installation during weapons training, they would likely be disturbed by the noise. Additionally, the increased frequency of loud noises on Fort Lewis could potentially make the forested habitats on the installation less suitable for supporting spotted owl populations in the future.



The increased amount of weapons training, as well as other types of training that utilize incendiary devices, would increase the risk of fire at Fort Lewis. Although fires would originate almost exclusively in open grassland habitats, a fire could potentially spread to other portions of the installation, burning through forested habitat. However, the risk of such an occurrence is very rare, since existing fire management practices are to control fires that escape from high fire areas very quickly. Although some forested habitat could burn, fire management practices would continue to limit these fires to no more than a few acres in size. Therefore, potential northern spotted owl habitat on Fort Lewis would be affected only minimally at most.

### **Aviation Training**

Most aviation training would occur within the boundaries of Fort Lewis, with the only regular flight path occurring in the area surrounding GAAF. Aircraft noise levels of 60 dB higher would be restricted to approximately 2 miles of the airfield. Therefore, noise from most helicopter training would not be expected to directly affect spotted owls. Dispersing owls temporarily using the installation could potentially be disturbed by aircraft, particularly those flying at 400 feet or less above forested habitats. Additionally, increased noise levels associated with increased aviation training could potentially make Fort Lewis less suitable for supporting northern spotted owls in the future. Aircraft associated with the CAB would need to fly to and from Fort Lewis. These aircraft would not follow any prescribed route, but would potentially fly above northern spotted owl populations in the Cascade Range. However, they would “fly friendly” at altitudes well above 2,000 feet AGL. At this altitude, the noise at tree level would be much less than the 92 dB at which spotted owls are likely to show signs of disturbance.

#### **5.1.7.3 Interrelated and Interdependent Effects**

Stationing of new units at Fort Lewis might eventually result in additional construction in the cantonment area in the future to provide housing and other needs created by the new troops, beyond the construction directly associated with the action that has been identified in this BA. This construction, should it occur, would likely be located entirely within the cantonment area, and would therefore have minimal risk of affecting northern spotted owls. Although it is possible that some construction should occur outside of the cantonment area, it is not reasonably foreseeable that it would occur in forested habitats with the potential to eventually support spotted owl populations.

The population increases of soldiers and their families associated with the proposed action could potentially result in additional construction of housing and other structures in the region surrounding Fort Lewis, although the likelihood of such construction would be dependent on the housing market and other economic conditions. Such construction projects would most likely occur in Pierce or Thurston counties, although it is impossible to say where such projects would occur. Given the lack of northern spotted owl habitat in the more developed areas of Pierce and Thurston counties, it is unlikely that northern spotted owls would be affected by these activities. Additionally, all new construction would require separate ESA consultation.

#### **5.1.7.4 Cumulative Effects**

Northern spotted owl population declines in Washington and Oregon can be attributed to habitat fragmentation and degradation due to logging activities, increased urban development, and competition with barred owls (Forest Ecosystem Management Assessment Team 1993; Spotted Owl Recovery Team 1994). In general, forest stands within the vicinity of Fort Lewis are young and thus lacking key habitat components such as compositional and structural diversity, snags, and coarse woody debris. As a result, there is a lack of critical habitat elements for northern spotted owl within the vicinity of Fort Lewis.

Forest habitat on Fort Lewis remains important for potential future immigration of spotted owl and could be a link between the Olympic Peninsula habitat and Cascade Range habitat. State, tribal, local, and private activities that disturb or destroy suitable northern spotted owl habitat between these areas and Fort Lewis,



however, has the potential to reduce the likelihood that northern spotted owl would use the installation in the future.

The proposed increases in training, particularly live-fire training and aviation training, would contribute additional noise to the area, which could have cumulative effects to potential spotted owl habitat, when added to other sources of noise in the region. Additionally, increases in Army and other helicopter flights over the Cascades would be cumulative to other sources of aircraft noise over nesting areas.

#### **5.1.7.5 Conservation Measures to Reduce the Effects of the Action**

No conservation measures are needed to reduce the effects of the action at Fort Lewis on northern spotted owls.

#### **5.1.7.6 Determination of Effects**

Northern spotted owls have not been detected at Fort Lewis, although barred owls (*Strix varia*) and other owls have. Proposed increases in military training are not likely to impact potential habitat and would predominantly occur outside of forested habitats. Ground activities would be located sufficient distances from areas that are managed to mimic the structural and species-component characteristics of late-successional forests to minimize risks to potential habitat. With existing fire management in place, the risk of forest fires on Fort Lewis would remain low. No spotted owl critical habitat is found on Fort Lewis. Effects would be limited to increases in noise and disturbance that could potentially reduce the suitability of nearby forests to support owls in the future. Overall, the proposed activities **may affect, but are not likely to adversely affect** this species or its critical habitat.

### **5.1.8 Canada Lynx**

#### **5.1.8.1 Background Information**

On March 24, 2000, the lynx was federally listed as a threatened species in several states in the Northeast, Great Lakes Region, Southern Rockies, and North Cascades. In March 2009, the USFWS designated critical habitat in several states, including 1,836 mi<sup>2</sup> in Okanogan and Chelan counties, Washington.

The lynx is a medium-sized cat with long legs. The lynx's long legs and large feet make it highly adapted for hunting in deep snow. The historical and present range of the lynx north of the contiguous United States includes Alaska and the portion of Canada extending from the Yukon and Northwest Territories south across the United States border and east to New Brunswick and Nova Scotia. In the contiguous United States, lynx historically occurred in the Cascades Range of Washington and Oregon; the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, northern Utah, and Colorado; the western Great Lakes Region; and the northeastern United States region from Maine southwest to New York (McCord and Cardoza 1982, Quinn and Parker 1987). Lynx are often found in forest habitats with their main prey item, snowshoe hare (*Lepus canadensis*). Lynx are most likely to persist in areas that receive deep snow, for which the lynx is highly adapted (Ruggiero et al. 1999).

Lynx in Washington are concentrated in the northeast and northcentral portions of the state. In the 1960s and 1970s, there were very few reports of lynx caught in Yakima, Kittitas, Pierce, and Lewis counties that may have been transients. The size of the lynx population in Washington is almost certainly less than 200 individuals, and possibly less than 100 individuals (Washington Department of Fish and Wildlife 2000b). Lynx are not believed to reside in the project area, and there is no designated critical habitat in the project area. However, the USFWS has determined that this species may be expected to occur in appropriate habitat



throughout Washington. Lynx are not known to occur on Fort Lewis, and the lowland environments on the installation and surrounding areas do not provide suitable habitat for this species.

#### **5.1.8.2 Analysis of Direct and Indirect Effects**

Because forested habitats on Fort Lewis are isolated from other suitable habitat for this species, and because lynx have not been recorded on the installation, it is not likely that lynx occur on or near Fort Lewis. Therefore the proposed action is not expected to adversely affect lynx. On the off chance that a lynx found its way onto the installation, it could be disturbed by training noise, although most training would occur outside of forested habitats. Additionally, lynx are highly mobile animals that can easily travel away from areas where training are occurring to avoid disturbance.

#### **5.1.8.3 Interrelated and Interdependent Effects**

No interrelated or interdependent impacts to Canada lynx are expected from the proposed actions.

#### **5.1.8.4 Cumulative Effects**

The major factors affecting habitat and the lynx population include forest management, fire and fire suppression, insect epidemics, and management of lynx harvest and habitats in southern British Columbia. Lynx are relatively tolerant of human activity, but recreational developments and roads with high traffic volumes may affect lynx movement. Anecdotal observations have fueled speculation that snow compaction on forest roads and trails may affect the degree to which lynx must compete with coyotes and other carnivores, but few data exist from which to draw conclusions about the effect on lynx (Stinson 2001).

Although lynx are not known to occur in the project area, population increases in the region and associated increases in roads and traffic make existing forests in the project area less suitable for lynx that may immigrate into the area from areas in northcentral Washington and British Columbia. Population and traffic increases associated with the proposed action would be cumulative to other regional impacts. In addition, human alteration of forests has facilitated competition by creating habitats that are more suitable to lynx competitors (McCord and Cordoza 1982, Quinn and Parker 1987, Buskirk et al. 1999a in U.S. Fish and Wildlife Service 2000b). Lynx movements may be negatively influenced by high traffic volumes on roads that bisect suitable lynx habitat.

#### **5.1.8.5 Conservation Measures**

No conservation measures are needed to reduce the effects of the action on Canada Lynx.

#### **5.1.8.6 Determination of Effects**

The Canada lynx has not been documented on Fort Lewis, and no critical habitat is on or near the installation. Additionally, the boreal forests favored by the lynx and its preferred prey, snowshoe hare are not found on Fort Lewis. Therefore, the proposed actions would have **no effect** on Canada lynx or its critical habitat.

### **5.1.9 Gray Wolf**

#### **5.1.9.1 Background Information**

The gray wolf, which was once abundant across both North America and Washington, has been rare in Washington since the early 1900s. The gray wolf was first federally listed as an endangered species on March 11, 1967 (U.S. Fish and Wildlife Service 1999b). Currently, most of the populations in the lower 48 states are still listed as endangered, including any populations in western Washington. The current distribution of



wolves in North America is mainly confined to the northern half of the continent, with wolves occasionally seen in the North Cascade Range and the northeastern corner of Washington (Paradiso and Nowak 1982). No critical habitat for gray wolf is found on Fort Lewis.

Gray wolves are the largest wild members of the Canine family (National Park Conservation Association no date). With their long legs and a deep narrow chest, they are well adapted to fast, far-ranging travels, including frequent hunting expeditions (University of Nevada 1997). Wolf territories range from 40 to 1,000 square miles (104 to 2,590 square km) depending on pack size and prey density. Gray wolves use a variety of habitats, from dense forest to open tundra. The key components of wolf habitat are a sufficient, year-long prey base, suitable and somewhat secluded denning and rendezvous sites, cover for tracking prey, and sufficient space with minimal interaction with humans (Thiel 1985, Frederick 1991). Dens are typically burrows constructed in sandy soil in well-drained areas near water (Mech 1970, Peterson 1986). Abandoned beaver lodges, hollow trees and logs, rock caves, and shallow surface beds are also used for denning. Pups remain in semi-open areas next to swamps or beaver ponds, near forest cover, and away from human activity while the adults hunt (Frederick 1991). Human disturbance and accessibility to wolf habitats, primarily through open roads, are the main factors limiting wolf recovery, and account for the major sources of wolf mortality in most areas today (Mech et al. 1988; Mech 1989; Frederick 1991).

Gray wolves are carnivorous, feeding on a variety of wildlife, from large ungulates such as elk, to small rodents such as mice. As opportunistic predators, their main sources of prey are deer, moose, and small animals (Paradiso and Nowak 1982, Carbyn 1987). The wolf's location and time of year are the primary factors determining their diet (University of Nevada 1997).

The gray wolf is listed by the USFWS as potentially occurring in Pierce County. However, it is unlikely gray wolves would be found on Fort Lewis. If a wolf were found on the installation, it would most likely be a lone wolf migrating through in search of a new territory. Lone dispersing wolves have been known to travel as far as 500 miles (800 km) in search of a new territory. No packs, dens, or sightings are known to be in the vicinity of Fort Lewis.

#### **5.1.9.2 Analysis of Direct and Indirect Effects**

While gray wolves are not known to occur in the project area, the USFWS has determined that this species may be expected to occur in appropriate habitat throughout Washington. For this reason, the gray wolf has been placed on all species lists for areas containing potentially suitable habitat. However, given that there has been no evidence of wolves on or near Fort Lewis, it is anticipated that there would be no effect to the gray wolf. Increased noise associated with training and increased traffic in the region associated with stationing could potentially make habitats on and around Fort Lewis less suitable for gray wolves. Additionally, potential habitat may be degraded by training activities.

#### **5.1.9.3 Interrelated and Interdependent Effects**

No interrelated or interdependent impacts to gray wolf are expected from the proposed action.

#### **5.1.9.4 Cumulative Effects**

The gray wolf is not known to occur on Fort Lewis. Most viable wolf populations occur in remote areas away from human activities (Carbyn 1987). However, potential habitat in the region has been changed considerably by urban and agricultural development. Ongoing riparian habitat restoration and enhancement activities on Fort Lewis could make these areas potentially suitable for gray wolves in the future.



### **5.1.9.5 Conservation Measures to Reduce the Effects of the Action**

No conservation measures are needed to reduce the effects of the action on gray wolves.

### **5.1.9.6 Determination of Effects**

Since the gray wolf is not known or likely to utilize Fort Lewis or the surrounding areas as habitat, the proposed action should have **no effect** on this species or its critical habitat.

## **5.1.10 Grizzly Bear**

### **5.1.10.1 Background Information**

The grizzly bear once ranged from the Arctic Slope to Central Mexico and from the Pacific Coast to Minnesota. Grizzlies prefer rugged mountains and forests undisturbed by human encroachment. On July 28, 1975, the grizzly bear was listed as threatened in the lower 48 states (Federal Register 1975). No critical habitat has been designated for the grizzly bear. Within the United States, grizzlies are currently found in the mountain regions of Wyoming, Montana, Idaho and Washington near the border with British Columbia, throughout western Canada, and in Alaska. However, they occupy a much smaller range compared with their historic distribution (Rausch 1963). Today, only about 1,400 grizzly bears remain in a few populations in the lower 48 states, including Washington. The North Cascades region, which is the closest region to the project area, is estimated to contain less than 20 grizzly bears (U.S. Fish and Wildlife Service No Date). The next closest region, the Selkirks, contains an estimated 40 to 50 bears. While it is very unlikely, the potential does exist for grizzly bears to be found on Fort Lewis. However, no grizzly bear sightings on the installation have been reported (Clouse 2004).

Grizzly bears are the largest land-based carnivores on the planet; although better characterized as omnivores because of their varied diet. Their diet varies by the season and includes grasses, roots, berries, nuts, insects, fish, rodents, and sometimes small and large mammals. This species is an opportunist, constantly looking to eat. They protect prime sources of food and can be aggressive towards perceived competitors. Hibernating for half the year, bears need to eat enough in 6 months to last the whole year. Stores of body fat are especially crucial for nursing grizzlies. Females give birth to one to three cubs in early February while still in their winter dens and must wait 3 more months before they can emerge and eat again. Males are usually intolerant of other bears except at mating time.

A grizzly bear territory ranges from 10 to 380 square miles (26 to 984 km<sup>2</sup>; U.S. Fish and Wildlife Service 1993). Most bears are active during the morning and early evening hours. During the day they rest in day beds, often constructed in dense cover to escape the heat. As food items become scarce, a grizzly bear's territory increases. Within their home range, grizzly bears use a wide variety of habitats, traveling from alpine food sources to estuaries, to berry patches, to salmon spawning sites, visiting each site when its particular food source is available (Stirling 1993).

### **5.1.10.2 Analysis of Direct and Indirect Effects**

While grizzly bears are not known to occur in the project area, the USFWS has determined that this species may be expected to occur in appropriate habitat throughout Washington. For this reason, the grizzly bear has been placed on all species lists for areas containing potentially suitable habitat. Increased training and disturbance under the proposed action, as well as increased traffic, construction, and population in the region, could further reduce the suitability of the area for grizzly bears. However, given that grizzly bears have not been observed on Fort Lewis, and are very unlikely to occur there, it is anticipated that there would be no effect to grizzly bears from the proposed action.



### 5.1.10.3 Interrelated and Interdependent Effects

The increase in population in the region associated with stationing could result in an increase in recreation in more remote areas in the state that do provide habitat for grizzly bears. No other interrelated or interdependent impacts to grizzly bear are expected from the proposed action.

### 5.1.10.4 Cumulative Effects

The grizzly bear is not known to occur on Fort Lewis. Most viable bear populations occur in remote areas away from human activities. Potential habitat may be degraded by the presence of military personnel and training activities. The surrounding habitat has been changed considerably by urban and agricultural development.

### 5.1.10.5 Conservation Measures to Reduce the Effects of the Action

No conservation measures are needed to reduce the effects of the action on grizzly bears.

### 5.1.10.6 Determination of Effects

Because the grizzly bear is not known to occur on Fort Lewis, the proposed activities should have no effect on this species. Continued enhancement of the open areas and overall management of forested areas on the installation should result in increased potential habitat for the grizzly bear, but it is unlikely that grizzly bears would use the habitat. Therefore, the proposed action would have **no effect** on grizzly bears or their potential for establishment on Fort Lewis.

## 5.1.11 Marine Mammals

The Southern Resident killer whale, humpback whale, and steller sea lion are listed marine mammal species that occur in the Puget Sound.

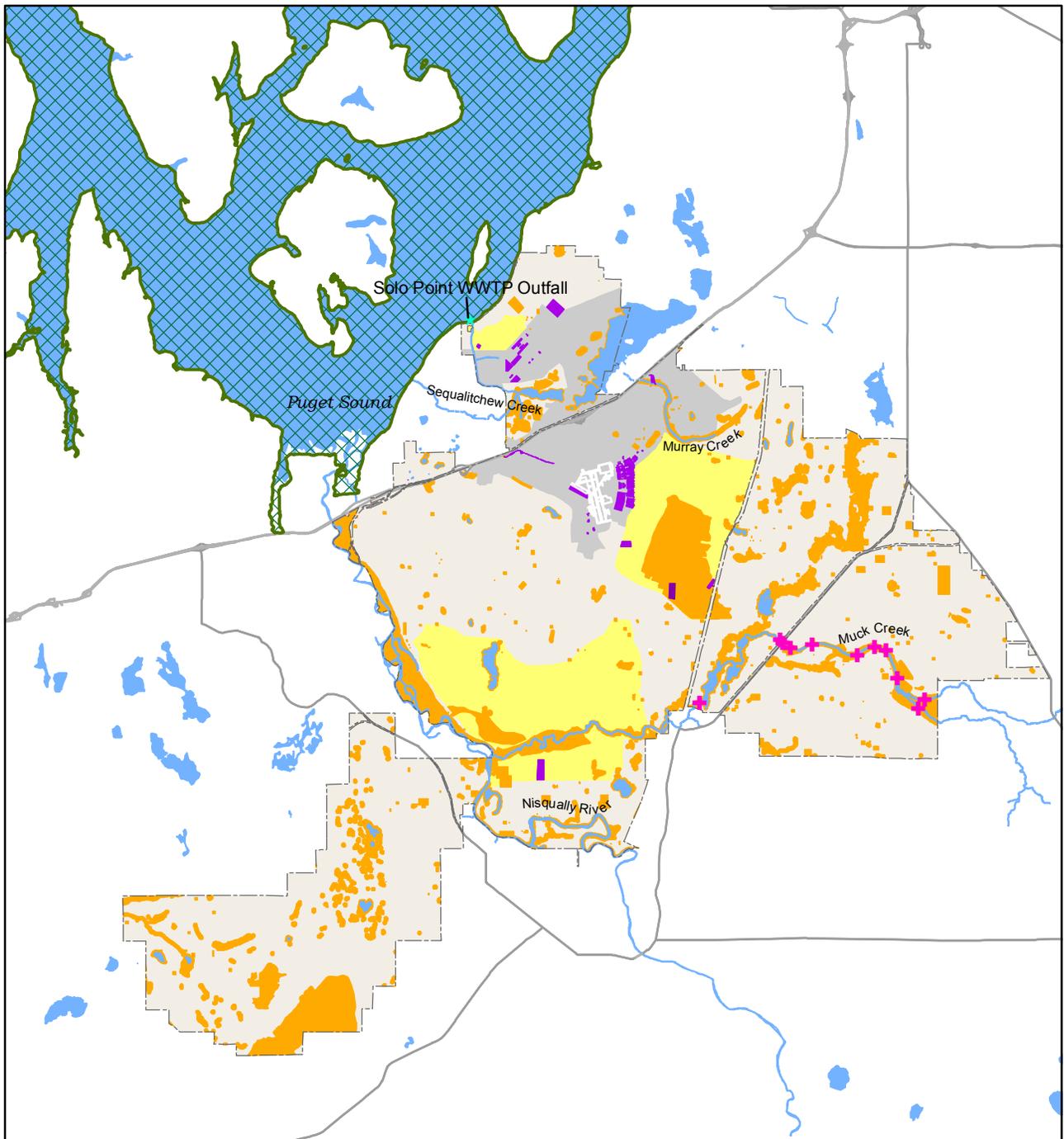
### 5.1.11.1 Background Information

#### Southern Resident Killer Whale

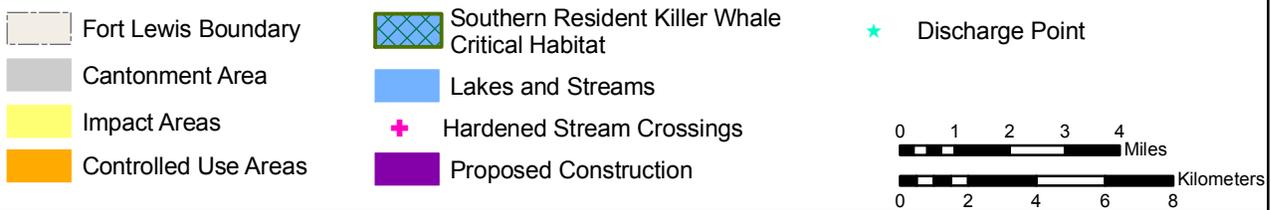
The Southern Resident DPS of killer whale was listed as endangered in November 2005 (National Marine Fisheries Service 2005). Killer whales are the most widely distributed cetacean (e.g., whales, dolphins, and porpoises) species in the world (National Marine Fisheries Service 2009c). Killer whales are highly social animals that occur primarily in pods, or groups, of up to 50 animals. The Southern Resident killer whale population contains three pods (or stable family-related groups), and is considered a stock under the Marine Mammal Protection Act. The range of killer whales during the spring, summer, and fall includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait. Their occurrence in the coastal waters off Washington has been documented. The Southern Resident killer whale population is currently estimated at about 88 whales, a decline from its estimated historical level of about 200 during the mid- to late 1800s (National Marine Fisheries Service 2009c). Critical habitat has been designated in most of Puget Sound, including along Fort Lewis, and along the northern Washington coast (Figure 5-7). Sightings of each pod within Puget Sound have occurred in the northern sound-Strait of Juan de Fuca area and are occasionally in the south Puget Sound.

#### Humpback Whale

The humpback whale is distributed worldwide in all ocean basins, though in the North Pacific it does not occur in Arctic waters (National Marine Fisheries Service 2009d). In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres. The North Pacific population was considerably reduced as a result of intensive commercial exploitation during the 20th century and



**Figure 5-7. Southern Resident Killer Whale Designated Critical Habitat**



Source: National Marine Fisheries Service 2006.



recovery has been very slow. Studies indicate that humpback whales from the Western and Central North Pacific mix on summer feeding grounds in the central Gulf of Alaska and perhaps the Bering Sea. Humpback whales were listed as endangered in December 1970 (U.S. Fish and Wildlife Service 1970a). No critical habitat has been designated for humpback whales. Humpback whales are infrequent visitors to waters near the Nisqually National Wildlife Refuge and are considered an accidental migrant to Puget Sound. When in Puget Sound, however, they may stay for extended periods of time (Calambokidis and Steiger 1990).

### **Steller Sea Lion**

The Steller sea lion, also known as the northern sea lion, is the largest member of the Otariid (eared seal) family. Steller sea lions “forage” near shore and pelagic waters (National Marine Fisheries Service 2009e). They are capable of traveling long distances in a season and can dive to approximately 1,300 feet (400 meters) in depth. They also use terrestrial habitat as haul-out sites for periods of rest, molting, and as rookeries for mating and pupping during the breeding season. At sea, they are seen alone or in small groups, but may gather at the surface near rookeries and haul outs. The western DPS of the Steller sea lion was federally listed as endangered in May 1997 (a change from its previous status of threatened; National Marine Fisheries Service 1997).

Steller sea lions typically occur in Puget Sound (in northern Puget Sound more so than central and southern Puget Sound) during the winter months (Johnson and O’Neill 2001). Puget Sound is not a high-density Steller sea lion area, with less than 50 sea lions seen each year (Adolfson and Associates, Inc. 1998). No Steller sea lion haulout sites are located in the vicinity of the project area (Washington Department of Fish and Wildlife 2000). Although critical habitat has been designated for the species in Alaska and Oregon, there is none in the Puget Sound (Jeffries et al. 2000).

#### **5.1.11.2 Analysis of Effects**

With the proposed increases in training, noise on and in the vicinity of Fort Lewis would increase. The loudest noises from live-fire training would continue to be heard only on the installation, although average sound levels between 57 and 62 decibels, and peak noise levels near 115 decibels, from large caliber weapons firing and demolitions would extend to the Puget Sound (Figure 5-6 shows predicted peak noise level contours). These noise levels could cause some annoyance to marine mammals. Studies have shown that loud noises can affect killer whale behavior by masking or covering up calls they use to communicate with group members while foraging (NOAA Northwest Fisheries Science Center 2009). However, the noise associated with gunnery training on land would be discontinuous, and would be much lower than that of motorized boats in the water, which is the primary source of disturbance to whales. Avoidance behaviors in marine mammal species have been observed at levels of 140 to 160 dB (National Marine Fisheries Service 2008), which is greater than peak noise levels associated with live-fire training that would reach the Puget Sound. Additionally, although killer whales do forage in the area, they are infrequent visitors to the area (National Marine Fisheries Service 2008). Humpback whales and Steller sea lions are infrequent visitors as well.

Helicopters associated with the CAB and other units would travel outside Fort Lewis airspace on their way to and from YTC. According to guidelines from NMFS, aircraft are advised to maintain a minimum altitude of 1,000 feet (300 m) above all marine mammals, and to not circle or hover over the animals (National Marine Fisheries Service 2008). Aircraft traveling to and from Fort Lewis would “fly friendly,” which generally includes maintaining altitudes of 2,000 feet.

Increased discharge from the Solo Point WWTP would have the potential to affect killer whale critical habitat, as well as any marine mammals present in the vicinity of the outfall. A BE prepared in association with renewal of the Fort Lewis NPDES permit analyzed maximum concentrations of water quality contaminants at the edge of the mixing zone under maximum permitted discharge scenarios (U.S. Environmental Protection Agency 2009). The BE determined that these concentrations were not large enough



to adversely affect marine mammals that swim through the area. Additionally, listed marine mammals do not spend substantial amounts of time within the area of the WWTP outfall. Therefore, exposure to water within the mixing zone should be very low.

Although the WWTP is currently well below its hydraulic design capacity, there is evidence that it is already near its BOD design capacity, and therefore would not be able to meet the more restrictive permit limits of the new NPDES permit under the proposed action. Although additional effluent would be the same in composition as the current effluent, potential effects to killer whales and their critical habitat in the form of increased BOD and reduced dilution of contaminants, could be greater than those addressed in the BE.

The new soldiers and family members living off-post would also contribute to increases in other treatment plants in the region. It is impossible to determine where these increases would occur, but it is assumed that the vast majority of the incoming population would live in Pierce and Thurston counties. Therefore, additional wastewater discharges into the Puget Sound associated with stationing actions are likely. Given that the total additional population in the region is just over 1 percent of the total regional population in Pierce and Thurston counties, it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to listed marine mammals or their habitats.

#### 5.1.11.3 Cumulative Effects

Listed marine mammals in the Puget Sound in the vicinity of Fort Lewis may experience cumulative effects from increases in vessel traffic and sound, and reduction of preferred prey species. The proposed activities would only be expected to contribute a small amount to these effects, although ongoing amphibious training by the Army would contribute to disturbances in the Puget Sound. Additionally, discharges from the Solo Point WWTP would contribute to cumulative effects from all regional discharges of wastewater and other pollutants to the Puget Sound. Other activities on Fort Lewis that may help offset some of these cumulative impacts include a new pretreatment program at the WWTP and possible future reductions in wastewater discharge through wastewater re-use (U.S. Environmental Protection Agency 2009).

#### 5.1.11.4 Conservation Measures to Reduce the Effects of the Action

The following mitigation measure from the GTA EIS would minimize risks to Southern Resident killer whale, humpback whale and Steller sea lion, and Southern Resident killer whale critical habitat, from increased discharges from the WWTP:

- Construct a new WWTP to mitigate the significant impact of the proposed action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand and total suspended solids from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the proposed action, will not be able to meet the more restrictive permit limits.

#### 5.1.11.5 Determination of Effects

Although noise from live-fire training and aircraft would increase as a result of the proposed action, these increases would have a limited effect on any listed marine mammals in the area. Increased discharges from the WWTP with the potential to exceed permitted effluent levels would be mitigated for by the construction of a new WWTP. Therefore, the proposed action **may affect, but is unlikely to adversely affect** Southern Resident killer whales or their critical habitat, humpback whales, or steller sea lions.



## 5.1.12 Marine Turtles

### 5.1.12.1 Background Information

#### **Leatherback Sea Turtle**

The leatherback sea turtle is the largest turtle and the largest living reptile in the world (National Marine Fisheries Service 2009f). Leatherback sea turtles are commonly known as pelagic animals, but also forage in coastal waters. In fact, leatherback sea turtles are the most migratory and wide ranging of sea turtle species. Leatherback sea turtle nesting grounds are located around the world, with the largest remaining nesting assemblages found on the coasts of northern South America and West Africa. Leatherback sea turtles were federally listed as threatened in June 1970 (U.S. Fish and Wildlife Service 1970b). Leatherback sea turtles are rarely seen in southern Puget Sound, and there is no critical habitat designation in Puget Sound.

#### **Loggerhead Sea Turtle**

The loggerhead sea turtle is named for its relatively large head, which support powerful jaws and enables them to feed on hard-shelled prey (National Marine Fisheries Service 2009g). Loggerheads reach sexual maturity at around 35 years of age. Loggerheads are circumglobal, occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters. In the U.S., occasional sightings are reported from the coasts of Washington and Oregon, but most records are of juveniles off the coast of California. Loggerheads face threats on both nesting beaches and in the marine environment. The greatest cause of decline and the continuing primary threat to loggerhead turtle populations worldwide is incidental capture in fishing gear, primarily in longlines and gillnets, but also in trawls, traps and pots, and dredges. The loggerhead turtle was federally listed as threatened in July 1978 (National Marine Fisheries Service 1978). NMFS recently determined that the loggerhead sea turtle is composed of nine DPSs, which it has proposed listing separately (National Marine Fisheries Service 2010b). The population occurring off the coast of Washington would become the North Pacific Ocean DPS. There is no designated critical habitat for the loggerhead turtle. Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Pacific Northwest.

#### **Green Turtle**

The green turtle is the largest of all the hard-shelled sea turtles, but has a comparatively small head (National Marine Fisheries Service 2009h). Adult green turtles are unique among sea turtles in that they are herbivorous, feeding primarily on seagrasses and algae. Green turtles primarily use three types of habitat: oceanic beaches (for nesting), convergence zones in the open ocean, and benthic feeding grounds in coastal areas. The green turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30° North and 30° South. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south. The green turtle was federally listed as threatened (except for breeding population in Florida and the Pacific Coast of Mexico, which are endangered) in July 1978 (National Marine Fisheries Service 1978). Critical habitat was designated in 1998 for green turtles in coastal waters around Culebra Island, Puerto Rico. Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Pacific Northwest.

#### **Olive Ridley Turtle**

The olive ridley turtle is considered the most abundant sea turtle in the world, with an estimated 800,000 nesting females annually (National Marine Fisheries Service 2009i). Olive ridley turtles reach sexual maturity around 15 years, a young age compared to some other sea turtle species. Olive ridley turtles are globally distributed in the tropical regions of the South Atlantic, Pacific, and Indian Oceans. In the South Atlantic Ocean, they are found along the Atlantic coasts of West Africa and South America. In the Eastern Pacific, they occur from Southern California to Northern Chile. The principal cause of the historical, worldwide



decline of the olive ridley turtle is long-term collection of eggs and killing of adults on nesting beaches. The olive ridley turtle was federally listed as threatened (except for breeding populations on the Pacific coast of Mexico, which are endangered) in July 1978 (National Marine Fisheries Service 1978). There is no designated critical habitat for the olive ridley turtle. Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Pacific Northwest.

#### 5.1.12.2 Analysis of Effects

All four of the listed marine turtle species are very rare in the Pacific Northwest, and there are no breeding beaches in the region. Although it is possible that one or more of these turtles could make their way into the Puget Sound area near Fort Lewis, it is not reasonably foreseeable. The proposed action would have **no effect** on listed marine turtles.

## 5.2 Yakima Training Center

### 5.2.1 Ute Ladies'-tresses

#### 5.2.1.1 Background Information

Ute ladies'-tresses was federally listed as threatened on January 19, 1992 (U.S. Fish and Wildlife Service 1995). Critical habitat has not been designated. Ute ladies'-tresses is a perennial, terrestrial orchid that currently occurs in eight states: Colorado, Idaho, Montana, Nebraska, Nevada, Utah, Washington and Wyoming. In Washington, this species is known to occur in the north-central portion of the state (Okanogan and Chelan counties; Washington Department of Natural Resources 2006).

Ute ladies'-tresses grows in lowland areas, at elevations ranging from 1,500 to 7,000 feet (457 to 2,134 m) MSL in the western region of its range, and usually abutting or near moderate gradient, medium to large streams and rivers. The plant is typically found in open riparian areas in the transition zone between mountains and plains. The species' microhabitat consists of grass-dominated openings in shrubby areas, often associated with beaked spikerush (*Eleocharis rostellata*). One of the key habitat features necessary for survival of the Ute ladies'-tresses is saturated soil throughout the growing season. It is usually located within 12 inches (30 cm) of the water table (Washington Department of Natural Resources 2006). While this species will tolerate periodic flooding, it does not occupy areas constantly inundated with water. Ute ladies'-tresses is commonly found in alkaline substrates. This species depends on natural disturbance, growing in areas where early successional conditions are perpetuated or competition from other vegetation is restricted (U.S. Fish and Wildlife Service 2000c).

The riparian and wetland habitats that support Ute ladies'-tresses have been heavily impacted by urban development, stream channelization, water diversions, and other watershed and stream alterations that degrade natural stream stability and diversity. As a result, Ute ladies'-tresses habitat has been degraded or destroyed in many areas.

Numerous surveys have been conducted for this species on YTC, but it has never been located. A installation-wide rare plant survey was done in 1995 (Salstrom and Easterly 1995). Additionally, numerous surveys have since been done at various project sites prior to land disturbance, in accordance with the *Sensitive Plant Management Plan* (YTC Environment and Natural Resources Division 2006a). Although these surveys were not for Ute ladies'-tresses in particular, all rare plants with the potential to occur on YTC were considered, including Ute ladies'-tresses. Additionally, vegetation sampling has been done at all major springs and riparian areas in the course of riparian and spring assessments that have been done in the last 15 years. Because the species grows in open riparian areas, potential habitats for this species are currently protected from destructive forms of training by riparian buffers (Zone 1 on Figure 2-15).



### 5.2.1.2 Determination of Effects

The Ute ladies'-tresses was listed by USFWS as a species that may occur in Kittitas and Yakima counties, Washington. Although potential habitat for this species may be present, Ute ladies'-tresses' is not known to occur on YTC. Additionally, wetland and riparian buffers and enhancement measures will continue to protect and increase the suitability of potential habitat for the species. Therefore, the proposed project will have **no effect** on Ute ladies'-tresses.

## 5.2.2 Salmonids

### 5.2.2.1 Background Information

Salmonid species associated with the Columbia River system have been extirpated over a greater percentage of their range than species primarily limited to coastal rivers. Coastal populations tend to be healthier than populations inhabiting interior drainages (Washington Department of Wildlife, Washington Department of Fisheries, and Western Washington Treaty Indian Tribes 1993).

Bull trout within the Columbia River Basin were federally listed as threatened in June 1998 (U.S. Fish and Wildlife 1998x). Six anadromous salmonid populations associated with the Columbia River Basin have been listed under the ESA: the Lower Columbia River Chinook ESU (threatened); the Upper Columbia River spring-run Chinook ESU (endangered); the Snake River fall-run Chinook ESU (threatened); the Snake River spring/summer-run Chinook ESU (threatened); the Upper Columbia River steelhead ESU (endangered); and the Mid-Columbia River steelhead ESU (threatened). Of the six ESUs listed, only the Upper Columbia River spring-run Chinook salmon ESU and the Upper and Mid-Columbia steelhead ESUs may potentially be influenced by activities on YTC (Carlson 1998).

#### **Bull Trout**

The Columbia River bull trout population DPS is found in the watersheds of four major tributaries of the Columbia River in Washington: the Yakima, Wenatchee, Entiat, and Methow rivers. Critical habitat for Columbia River bull trout DPS extends from the Columbia River mouth and estuary throughout the Columbia Basin, including all tributaries historically accessible to the species. On September 22, 2004, the USFWS designated approximately 737 miles (1,180 km) of streams in the Columbia River Basin, Washington, as critical habitat for bull trout under the ESA. On Sept 26, 2005, critical habitat for Columbia Basin populations of bull trout was excluded from areas covered by the Federal Columbia River Power System (70 Federal Register [FR] 56253) which includes those waters on and adjacent to YTC.

Historically, bull trout were found throughout the Pacific Northwest, Montana, Idaho, and northern California, as well as Nevada (Knowles and Gumtow 2005). The Yakima River has 8 of the 16 documented bull trout subpopulations found in the mid-Columbia River (Lohr 1998). Of the 16 subpopulations recognized by the USFWS, 10 are considered to be at risk of extinction. All bull trout stocks found in the Yakima River basin are native fish sustained by wild reproduction, as there are no hatchery bull trout in Washington (Anderson 2006). There is no available information to indicate whether these stocks are genetically distinct. The stocks are currently treated separately based on geographical, physical, and thermal isolation of the spawning populations (Washington Department of Fish and Wildlife 1998a). Bull trout do not spawn on YTC because the streams are too small and not cold enough for long enough periods of time to provide suitable spawning and rearing habitat (Bottorff and Swanson 1993). However, bull trout could use streams for short periods for foraging (Chan 1998). The results of a stream temperature monitoring study (summarized in Table 5-2) indicate Johnson, Lmumma, and Selah creeks were potentially suitable for some use of habitat by salmonids, but temperatures are generally much higher than 46 °F (7 °C), or the preferred spawning temperature. The study was conducted from 2005 to 2009, with temperature data recorded at 1-hour intervals.



**TABLE 5-2**  
**Summary of Stream Suitability for Salmonids, Based on Temperature**

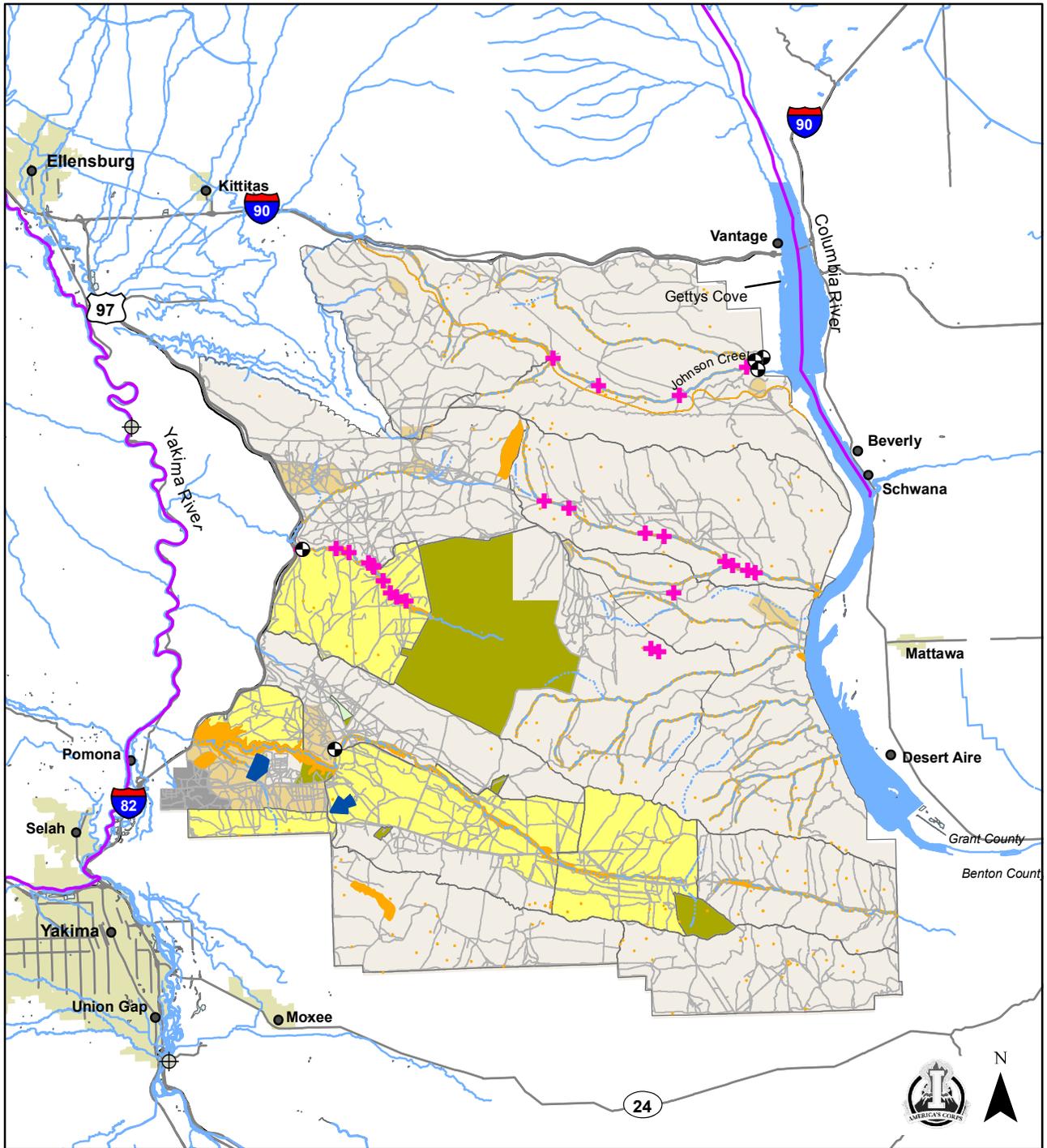
Creek	Percent of Time Temperatures Exceeded 68 °F (20 °C)	Suitability for Salmonids
Alkali	Less than 15	Thermally unsuitable, exceeding 75 °F (24 °C) regularly. Fish presence is likely sustained by thermal refugia.
Cold	Less than 5	Thermally suitable for salmonids at stress-inducing levels. Absence of fish likely due to fish passage barriers located downstream of YTC boundaries.
Corral	Less than 22	Not suitable. High temperatures consistent with dewatering. Ephemeral.
Foster	Less than 20	Thermally suitable for salmonids at stress inducing levels. A potential barrier and lack of sufficient water likely exclude salmonids from this stream.
Hanson	Less than 15	Thermally unsuitable in the lower reach, but contains large ponds that may act as cold-water refugia.
Johnson	Less than 5	Thermally suitable at stress-inducing levels.
Lmumma	Less than 5	Thermally suitable.
Selah	Less than 10	Thermally suitable at stress-inducing levels.
Sourdough	Less than 22	Not suitable. High temperatures consistent with dewatering. Ephemeral.

Source: Yakima Training Center Environment and Natural Resources Division 2009b.

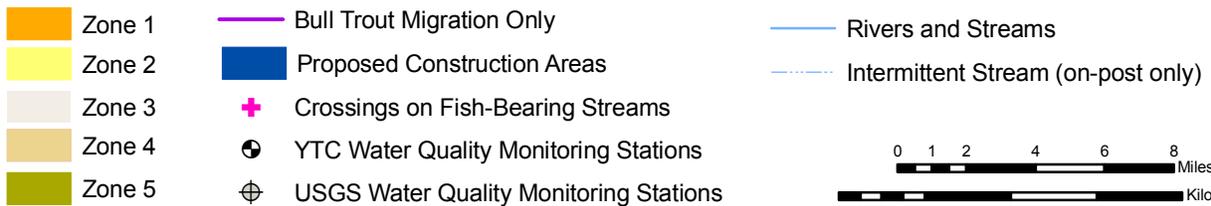
There is a fluvial stock found within the mainstem of the Yakima River, located approximately 4 miles (6.4 km) from the nearest training area on YTC (Washington Department of Fish and Wildlife 1998a; Anderson 2006). Presence of bull trout downstream from YTC in the Yakima River has been confirmed, with bull trout observed migrating upstream near Rosa Dam by WDFW biologists (Anderson 2006). Although there has been some mention of potential bull trout spawning and rearing habitat on YTC (Bottorff and Swanson 1993), this is highly unlikely and bull trout have never been documented on YTC.

In addition, most streams do not have continuous flow from the installation to either the Yakima or Columbia rivers during the time in which bull trout would potentially be spawning or migrating to spawn. However, bull trout could forage in streams on 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 by bull trout (i.e., Naches River), 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 1999a). Data from StreamNet show portions of the Columbia and Yakima rivers adjacent to YTC as providing migration habitat for bull trout (Figure 5-8).

Factors contributing to the decline of bull trout in the Columbia Basin are similar to those affecting salmon, but also include additional elements. Since bull trout are less tolerant of higher water temperatures and sediment loading, they have been affected to a greater degree by logging practices, channelization, water diversions, mining, and grazing practices which have degraded riparian communities. Hydropower and storage dams hindered and precluded migrations normal for fluvial and adfluvial populations. Bull trout are



**Figure 5-8. Bull Trout Distribution in the YTC Project Area**



Source: StreamNet 2009



highly susceptible to capture by anglers, because of their aggressive nature. As road networks have expanded and angler access has increased, bull trout populations have declined. Finally, bull trout will interbreed with brook trout, resulting in sterile hybrids. In the past, brook trout were planted widely in the Columbia Basin and elsewhere throughout the West.

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

### **Chinook Salmon**

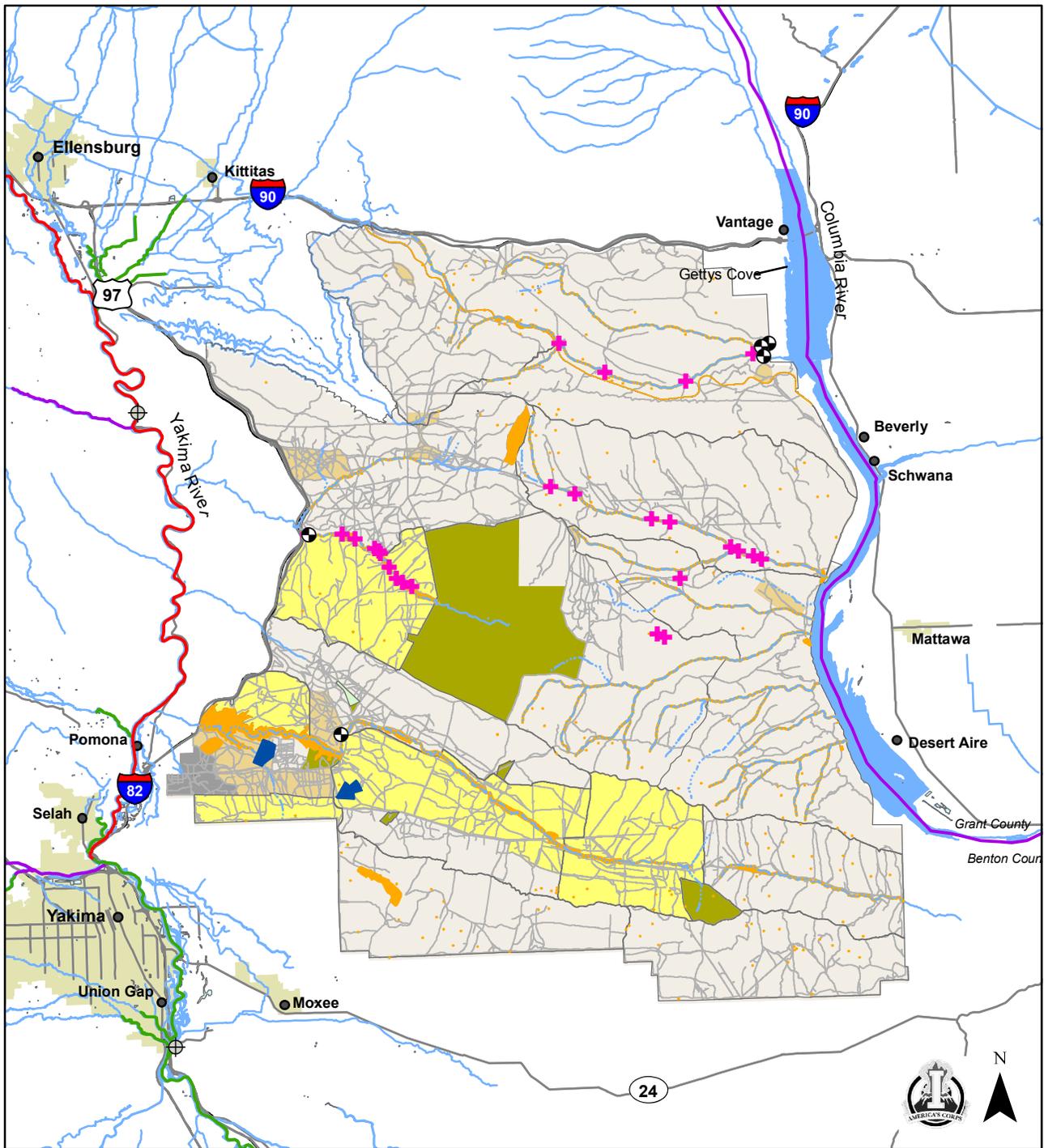
The Upper Columbia River spring-run Chinook salmon ESU was federally listed as threatened on March 24, 1999 and as endangered on June 28, 2005. The Columbia River immediately adjacent to the installation is designated critical habitat for this ESU, but YTC is excluded from critical habitat designation for this ESU pursuant to the National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136).

Included in this ESU are all naturally spawned populations occurring in all accessible river reaches in the Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Nine Upper Columbia spring Chinook stocks occur in this ESU. The Upper Columbia spring Chinook salmon ESU includes all wild stocks upstream of the Wenatchee River confluence, and does not include the Yakima River system. All nine stocks are considered depressed due either to chronically low escapement, a long-term negative trend, or a short-term severe decline in escapement. All stocks are native with wild production, except for the Methow stock, which has composite production because of hatchery stray introgression. Major river basins containing spawning and rearing habitat for this ESU comprise approximately 7,003 square miles (18,138 square km) in Oregon and Washington.

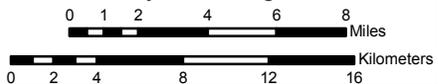
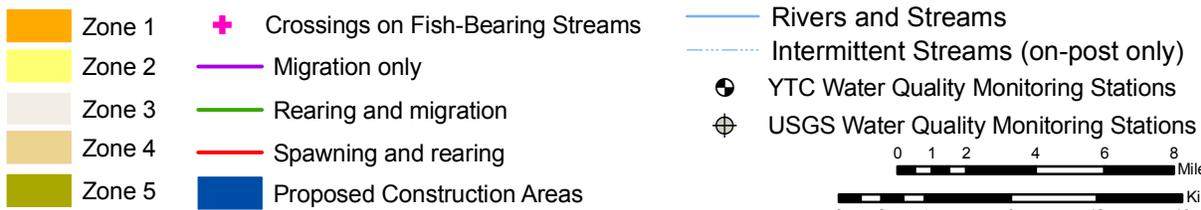
The decline in abundance of upper Columbia River stocks began in the late 1800s due to over-harvest, hydropower development, creation of water storage reservoirs, water diversions, logging, mining, and domestic livestock grazing. In particular, Chief Joseph and Grand Coulee Dams on the Columbia River block access to a substantial portion of the historic range of this ESU. The upper Columbia and upper Snake tributary stocks are thought to be among the first to be decimated by the early fishery present on the Columbia River at the turn of the 19th century.

All streams and drainages on YTC are located outside the area occupied by 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 Rapid Dam. Spawning occurs from late August to mid-September and all documented spawning areas for this ESU are upstream of YTC and the proposed project area. According to digital data from WDFW's SalmonScape (Washington Department of Fish And Wildlife no date), no historic or current spring-run Chinook are documented on YTC, but there is documented presence in the stretch of the Columbia River adjacent to YTC, as well as use of the Yakima River adjacent to YTC for spawning and rearing. StreamNet indicates use of the Columbia River adjacent to YTC for migration, and use of the Yakima River and tributaries northwest of YTC for spawning, rearing, and migration (StreamNet 2009; Figure 5-9).

Habitat requirements for spring Chinook salmon consist of water quality, passage, water velocity and, to a lesser extent, food availability. Chinook salmon have the lowest high-temperature threshold in the genus *Oncorhynchus*. Of the salmonids evaluated in this document, only bull trout require cooler water. Turbidity and sediment transport are issues as it relates to food production. Gravel, cobble, and boulder substrates



**Figure 5-9. Spring Chinook Distribution in the YTC Project Area**



Source: StreamNet 2009



produce benthic macroinvertebrates when not embedded with sand or silt particulates. Chronic turbidity can also hinder the photosynthetic basis of the food chain.

### **Steelhead**

Steelhead are the anadromous form of rainbow trout. East of the Cascade Range, steelhead are found in tributaries of the Columbia River, including the Entiat, Okanogan, and Yakima rivers, and tributaries of the Snake River, including the Grande Ronde River. Steelhead prefer cool water below 70 °F (21 °C), but they can survive in waters from 32 to 80 °F (0 to 27 °C). Steelhead require plenty of oxygen and can tolerate a wide range of salinities.

Steelhead migrate to the ocean beginning in April and continuing through June, with a peak around mid-April (Washington State Department of Transportation 1998). Unlike other salmonids, adult steelhead usually survive spawning and migrate as individuals, rather than in schools (Page and Burr 1991). Spawning typically occurs in March, but may extend into July. The eggs incubate from late March through June, and fry may emerge from the gravel from late spring to August. However, steelhead found near YTC in both the Yakima and Columbia rivers spawn from February to May, and fry emerge in May and June (Cummins 1999b). Out-migration of smolts occurs from March to early June, with smolts having spent from 1 to 7 years in freshwater, although the average is 2 to 3 years.

***Upper Columbia River Steelhead ESU.*** The Upper Columbia River steelhead ESU was federally listed as endangered on August 18, 1997. The status was revised to threatened on January 5, 2006, and then reinstated to endangered status in June 2007 based on a U.S. District Court decision. On September 2, 2005, NMFS designated approximately 1,262 miles (2,030 km) of streams and 7 acres (2.8 ha) of lakes as critical habitat for the Upper Columbia River steelhead ESU; Yakima Training Center was excluded from this critical habitat designation.

This ESU occurs in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border. The Wells Hatchery stock steelhead are part of the listed ESU. Major river basins containing spawning and rearing habitat for this ESU comprise approximately 9,545 square miles (24,722 square km) in Washington.

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

***Mid-Columbia River Steelhead ESU.*** The Mid-Columbia River steelhead ESU was federally listed as threatened on March 25, 1999. On September 2, 2005, NMFS designated approximately 5,815 miles (9,356 km) of streams as critical habitat for the Mid-Columbia River steelhead; YTC was excluded from this critical habitat designation.

This ESU occurs in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington. Steelhead excluded from this ESU includes those from the Snake River Basin. Major river basins containing spawning and rearing habitat for this ESU comprise approximately 26,739 square miles (69,254 square km) in Oregon and Washington. The Yakima River is the only stock near YTC and is adjacent to the installation's western boundary. The Yakima River flows into the Columbia River downstream of YTC.

Historically, the Mid-Columbia River steelhead ESU run in the Yakima River has been estimated to be approximately 10,000 fish (Busby et al. 1996). The current run size averages approximately 1,000 fish, with



an annual escapement of about 800 wild fish. Stock status has been determined to be depressed because of chronically low spawner escapement. Within the Yakima Basin, five distinct populations have been identified. These include runs in Satus Creek, Toppenish Creek, Naches River, the mainstem Yakima River between Rosa Dam and Wapato, and the mainstem Yakima River above Rosa Dam.

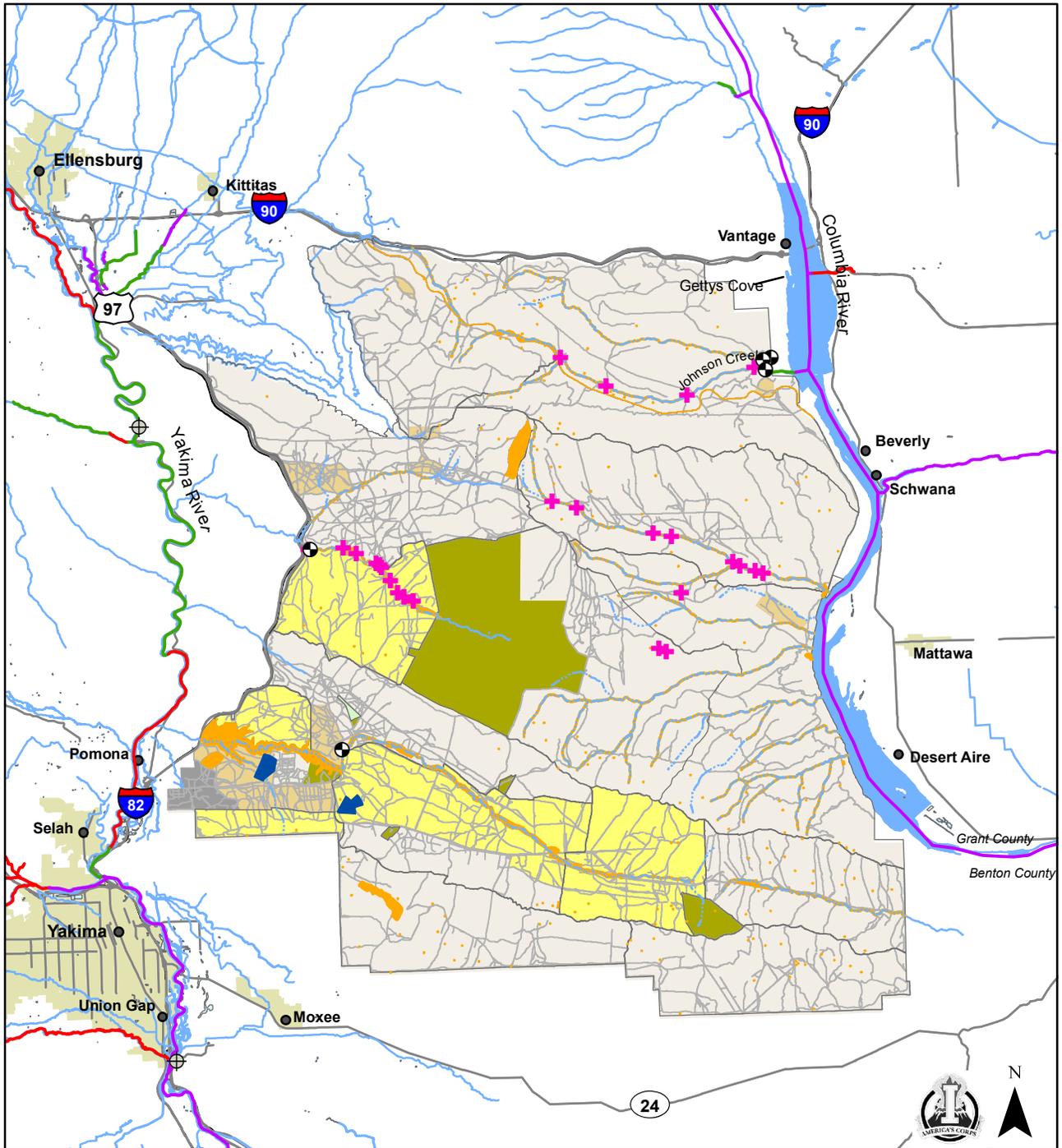
The Mid-Columbia River steelhead ESU run in the Yakima River is a native, wild stock sustained by wild and artificial production. Population declines have been attributed to hydropower, loss of habitat, overharvesting, irrigation diversions, high water temperatures/low dissolved oxygen, and a highly altered hydraulic regime (Northwest Power Planning Council 1990). Storage reservoirs are operated in concert with water needs of an extensive irrigation program in the Columbia Basin. This leads to an inverted hydraulic regime, with lower than optimal spring flow rates and excessive summer flow rates.

The run in the Yakima River is bimodal, with an early migration entering the river from September through November. The later migration is from February through June. Spawning occurs from mid-February to late May. Information on emergence timing for the mainstem river is lacking, but occurs May through June in Satus and Toppenish creeks and from June to August in the colder Naches River system. Smolt out-migration at Prosser, Washington, occurs from early March through mid-June, mostly as 2-year-olds. The median date for passage at Prosser is April 30. Habitat requirements for the Mid-Columbia River steelhead ESU are similar to the Upper Columbia River steelhead ESU.

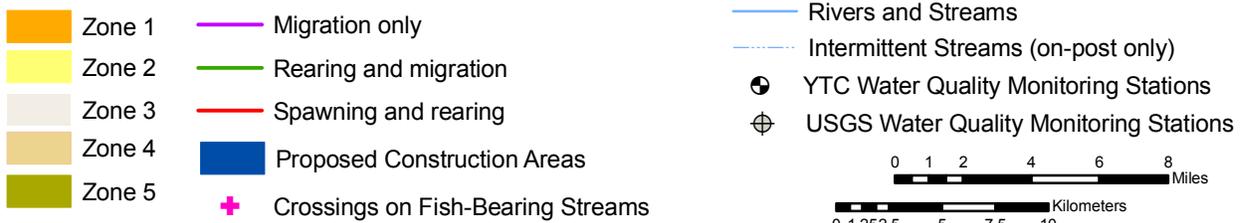
***Steelhead Occurrence in the Project Area.*** Of the streams on YTC, Johnson Creek contains both resident rainbow trout and steelhead (Rogers et al. 1989, Cummins 1999b). Johnson Creek is considered part of the Upper Columbia River Steelhead ESU. As discussed previously, several adults have been observed in the lower portion of this creek that is located east of the installation boundary and are likely hatchery strays that have become naturalized over the years. Whether the fish observed in Johnson Creek were naturalized or not, it is certain they are not of Johnson Creek origin prior to 1967. Before the Wanapum Dam was constructed, Johnson Creek was physically separated from the Columbia River. It previously spilled out into a steep, porous alluvial fan of cobble deposited by the Missoula flood. The creek flowed below the ground surface through this formation before eventually connecting with the Columbia River. For the purpose of this analysis, naturalized steelhead that inhabit Johnson Creek are considered part of the Upper Columbia River Steelhead ESU. Although Johnson Creek is located on YTC, all known observations of steelhead within it have occurred east of YTC as there are dry reaches that prevent their movement upstream onto the installation.

YTC has completed spawning surveys for steelhead since 2007, which have included visual surveys for adult steelhead and their redds in the lower portions of Alkali, Corral, Cow, Sourdough, Hanson, Johnson, and Lmumma creeks. No steelhead or redds were observed in any of the survey creeks during these surveys (Yakima Training Center Environment and Natural Resources Division no date). During previous surveys in 1989 and 2005, adult steelhead were observed in Gettys Cove, or the lower reaches of Johnson Creek, just outside its confluence with the Columbia River (Battelle 1989, Baldwin 2007). None of these surveys found steelhead redds or observed spawning activity in the area.

Digital data from SalmonScape shows documented presence of summer steelhead in the stretch of the Columbia River adjacent to YTC, as well as a small piece of rearing habitat in Johnson Creek on the installation (Washington Department of Fish and Wildlife no date). Additionally, spawning and rearing habitat are shown in the Yakima River next to YTC. StreamNet shows migration habitat for steelhead throughout the Columbia River adjacent to YTC, as well as rearing and migration habitat in the lower reaches of Johnson Creek (Figure 5-10; StreamNet 2009). Additionally, the stretch of the Yakima River running adjacent to YTC is shown as providing migration, spawning, and rearing habitat.



**Figure 5-10. Steelhead Distribution in the YTC Project Area**



Source: StreamNet 2009



### 5.2.2.2 Current Habitat Use and Management

Ongoing training activities at YTC, as well as firebreak maintenance, have the potential to affect habitat of listed fish species by causing sedimentation into streams. Other causes of water quality impairment that could affect salmonid habitat (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. One of the most significant factors limiting fish populations on YTC is the lack of water. Base flows in perennially flowing streams are very low, and most watercourses on YTC are intermittent or ephemeral. High water temperatures result from low base flows and a lack of shade from trees and shrubs; historic military and grazing activities removed riparian vegetation (CH2M HILL 1996). High intensity storm events and fires (naturally occurring or resulting from military activity) modify riparian vegetation and stream channels, which can affect fish populations within the area.

Given the erodible soils at YTC, as well as the steep slopes in portions of the installation, movement of soil during off-road vehicle maneuvers, digging, crossing streams, and other activities have the potential to result in sedimentation into waterways. Although only Johnson Creek has documented listed fish species presence, any sedimentation into water bodies on YTC could move downstream and potentially affect fish populations off the installation in the Columbia and Yakima rivers, particularly during runoff events. Wildland fires, maintenance of fire breaks, and fire suppression activities are other ongoing activities with the potential to contribute to sedimentation and other alteration of water quality. Sediment yield at YTC has been quantified by modeling, as summarized in Table 5-3. Results of this study found that yearly sediment yields across YTC under current conditions range from nearly zero to 1.64 tons per acre (4.05 tons/ha). Often, unimproved roads and firebreaks contribute disproportionate amounts of sediment load within a given watershed than the surrounding rangeland.

**TABLE 5-3**  
**Yearly Sediment Yield at Yakima Training Center**

<b>Sediment Class</b>	<b>Class Limits (tons/acre/year)</b>	<b>Portion of YTC Areal Extent (percent)</b>	<b>Portion of YTC Sediment Yield (percent)</b>
1 (low yield)	0.00-0.158	25.2	9.3
2	0.158-0.312	32.6	26.6
3	0.312-0.502	28.7	34.9
4	0.502-0.870	11.4	22.5
5 (high yield)	0.870-1.639	2	6.6

Source: Wigmosta et al. 2007.

The primary water quality concern that is pertinent to habitat for listed fish species is introduction of fine sediment into streams, with subsequent discharge into the Yakima and Columbia rivers. Discharge of fine sediment is most likely following high, short-duration flow events, which typically involve rain falling on snow or frozen ground. High discharges of solids from YTC may occur over very short periods (36 to 48 hours). Infrequent runoff events have been monitored, resulting in sporadic data that are difficult to interpret. Due to high variability in dryland hydrology and weather, it is difficult to determine whether changes in water quality are attributable to management practices or natural processes associated with dryland hydrology (Yakima Training Center Environment and Natural Resources Division 2002). As part of a Surface Water Quality Monitoring Protocol, YTC has installed remote water quality monitoring stations on Selah Creek, Middle Canyon, Sagebrush Canyon, and north fork of Lmumma Creek, as shown in Figures 5-8 through 5-10. However, no data have been collected to date because high flow events have been lacking during the past few



years, or because the automated samplers were improperly installed or programmed (Yakima Training Center Environment and Natural Resources Division 2004, 2006b, 2007c).

Discharges of sediment to the Yakima River are more critical than those to the Columbia River because the Yakima River basin has high sediment inputs from other existing sources, primarily runoff from agricultural lands, and, in particular, irrigation return flows. Most of the agricultural loading of suspended sediment occurs downstream from YTC, although some occurs in the Kittitas Valley and from tributaries west of YTC that drain similar terrain. Solids loads from YTC appear to be small compared to loads carried by the Yakima River adjacent to YTC. The USGS monitors water quality in the Yakima River at both the Umtanum and Union Gap Stations (see Figures 5-8 through 5-10), and at the Kiona station located in the lower part of the Yakima River, downstream of YTC. The most recent monitoring at the Kiona station indicated that sediment loads in the Yakima River have been greatly reduced (by 50 to 70 percent) compared to previous decades, following an EPA Water Cleanup Plan to reduce suspended sediments and pesticides in the Yakima River (Coffin et al. 2006; Washington Department of Ecology 2008).

YTC has an ongoing restoration program to reduce and minimize discharge of sediment to both the Yakima and Columbia rivers. The program includes management and rotation of training areas to allow vegetation to recover, active rehabilitation by planting, construction of sediment trapping check dams at critical locations, and protection of critical riparian vegetation corridors by restricting use of those areas. Rest intervals of training areas vary by site. In Zone 2 areas (See Section 2.6.2 for a discussion of land use zones), rest intervals are long term, and training is extremely limited. In Zone 3 and 4 areas, rest intervals have been infrequent. In most cases, removal from training use to allow establishment of vegetation has not occurred. This has resulted in some low use areas that recover to provide desirable vegetative cover, and other high use sites that remain in a degraded state. Two levels of rehabilitation/restoration occur. Rehabilitation occurs at sites where protection of base resources (soils, vegetation, surface water quality) is required, and restoration occurs in areas where specific habitat elements are required. In upland areas, the best opportunity for establishment of understory species is through a fall reseeded program; spring reseeded efforts have consistently failed. Therefore, bare ground conditions following training disturbance (and other disturbances) can persist up to 12 months, depending on the timing of the training activity.

Within recent years, YTC has completed improvements in the road network and structure, road closures and realignments, and channel crossings. Nearly 300 miles (480 km) of existing roads have been resurfaced with crushed rock. Approximately 14 miles (23 km) of roads have been re-routed away from stream channels and areas with a high potential for erosion. Approximately 14 miles (23 km) of deteriorated or poorly located roads have been closed to vehicle traffic and rehabilitated. In addition, 390 stream channel crossings have been improved with culverts and fords. However, no structures that could potentially block fish passage have been or will be installed in fish-bearing streams.

Along with these improvements, riparian and upland restoration programs contribute to minimizing the quantity of fine sediment reaching YTC streams and subsequently being transported to the Columbia and Yakima rivers (Department of the Army 2005b). A riparian habitat assessment completed in 2003 indicated that evidence of soil erosion peaked between 1989 and 1992 when there was a peak in military training, and that land condition on YTC have since improved, including riparian condition (YTC Environment and Natural Resources Division 2006c). Riparian restoration projects are ongoing, and contribute to an improvement in stream habitats on YTC. Riparian restoration includes both active and passive strategies (Yakima Training Center Environment and Natural Resources Division 2008). Active restoration includes mechanical preparation and planting or seeding, and focuses on reestablishing woody species. Passive restoration includes efforts to remove sources of disturbance (e.g., grazing, vehicle traffic, digging, exotic species) and leaving areas to recover naturally. Stream corridors restored between 1994 and 2007 include areas along Alkali Creek, Johnston Creek, Cold Creek, Corral Creek, Hanson Creek, Johnson Creek, Lmumma Creek, Middle Creek, and Selah Creek. Most upland rehabilitation (upland seeding) occurs in Zone



3 areas where training activities have resulted in the loss of desirable vegetative cover (e.g., dig sites, training objective sites, impromptu fire suppression lines, bivouac sites). Through establishment of desirable vegetative cover (e.g., perennial grasses) in high-use areas, sites are capable of maintaining soil stability that minimizes soil erosion from these sites. There are no data to quantify how upland and riparian restoration/rehabilitation efforts have minimized sediment delivery to streams. However, they have resulted in less bare ground and recovery of riparian areas, which would be expected to result in a reduction in sediment delivery into streams.

### 5.2.2.3 Analysis of Direct and Indirect Effects

#### Construction

Proposed construction at YTC is shown in Figure 3-2. Construction of the two training ranges could result in temporary increases in erosion and runoff during construction activities. An intermittent stream that eventually drains to Selah The proposed SFF range construction area is less than 1,000 feet (305 meters) from Selah Creek, which drains to the Yakima River, which provides habitat for listed fish species. Additionally, an intermittent stream that drains to Selah Creek runs through the SFF range construction area. To minimize potential sedimentation impacts, engineering controls and BMPs would be used to minimize erosion and soil loss during construction. With these measures in place, the amount of sediment reaching the Yakima River should be minimal, particularly as compared to the total sediment load in the Yakima system. Pursuant to provisions in the Clean Water Act, contractors must submit a Notice of Intent to obtain coverage under the NPDES General Permit for Storm Water discharges from construction activities for each project that disturbs 1 acre or more of land. Contractors must also develop and implement an SWPPP for each project, that outlines mitigation strategies to reduce impacts associated with stormwater runoff during construction. The Army would incorporate BMPs that would reduce runoff and sedimentation to aquatic environments in accordance with Clean Water Act regulations for stormwater runoff at construction sites.

Construction of facilities at the new ranges would result in an increase in impervious surface, which could potentially increase stormwater runoff from these areas over the long term. However, new facilities would be constructed with appropriate stormwater BMPS to minimize the risk of stormwater runoff that could eventually reach salmonid habitat in the Yakima River system.

Construction activities would temporarily increase the use of fuels, solvents, and other hazardous and toxic substances, which could result in indirect impacts to fish habitat if accidentally released to the environment. Potential spills would likely be small in magnitude and localized. Measures in place to minimize the risk of spills entering aquatic habitats would include BMPs such as training personnel in spill prevention and control techniques and requirements, maintaining appropriate spill control equipment in areas where refueling may occur, prohibiting refueling and storage of fuel near water bodies, and complying with all hazardous materials management regulations. With these measures in place, the risk of spilled substances entering streams on post and migrating to the Yakima River in quantities large enough to affect fish habitat would be extremely small.

#### Ground Training

As discussed previously, Johnson Creek is the only creek on YTC that is likely to support salmonids (steelhead). Ground training activities most likely to directly impact potential fish habitat in Johnson Creek involve stream and river fording activities at crossings on the lower reaches of the Creek. Because of the low water flow in the upper reaches of Johnson Creek, impacts from upstream crossings would be negligible. With a substantial increase in vehicle miles from current levels, there would also be an increase in the number of vehicle crossings of Johnson Creek, increasing the potential to kill, harm, or harass any fish that are present. However, stream crossings on Johnson Creek would occur at hardened crossings, minimizing the likelihood of vehicles directly impacting the streambed, and of developing gravel mounds that might attract fish. Although no listed fish species are known to occur in any of the other streams on YTC with suitable



flows to potentially support other salmonids, use of hardened crossings on these streams would minimize impacts to streambeds and prevent alteration of potential habitat.

With increased training activities, particularly off-road, there is the potential for increased sedimentation to enter aquatic habitats and indirectly impact fish. The greatest potential for impacts would be in association with training activities near the lower reaches of Johnson Creek. However, sedimentation into other streams on the installation could move downstream and potentially into the Columbia and Yakima rivers, which provide habitat for all three listed fish species. An analysis completed for the EIS (Section 6.1) estimated that the installation-wide sediment yield associated with maneuver training would increase from approximately 102,620 to 110,940 tons per year, an increase of approximately 8 percent over current levels. This represents total erosion; the amount reaching water bodies would be expected to be much less, particularly because of buffers between maneuver training and riparian areas. The amount of sediment eventually traveling downstream and entering the Columbia and Yakima rivers would be smaller still.

Additional sedimentation increases would be associated with increases in digging activities, bivouacking, and foot training. It is anticipated that the amount of digging would increase from approximately 50 acres per year at YTC, to approximately 75 acres per year, a 50 percent increase over current levels. Digging activities would continue to be prohibited within 328 feet (100 meters) of riparian areas, and would require approval through the dig permit process to avoid environmentally sensitive areas and water quality degradation. Bivouacking and vehicle assembly would also continue to be prohibited within 328 feet (100 meters) of riparian areas. Foot traffic, which is allowed in many riparian areas, would increase under the proposed action, but would still be expected to contribute minimally to sedimentation. These increases are not expected to have a substantial effect on the habitat of listed species, although some habitat degradation could occur.

It is expected that the total amount of sediment in the Columbia and Yakima rivers that originates on YTC would be greater than at present, but would still represent a small proportion of the total sediment in these river systems. Additionally, YTCs continued implementation of projects to improve riparian habitats and control erosion (e.g., installation of erosion control features, road upgrades) would help to limit the transport of sediment off the installation, but would likely need to be expanded to offset training increases under the proposed action.

Fuel spills and leaks from vehicles would present some risk to aquatic habitats on YTC, which would include risks of degradation of listed species habitat in the lower reaches of Johnson Creek, or off the installation in the Columbia and Yakima rivers. With the increase in training under the proposed action, fuel use would increase over current levels. However, risks would continue to be minimized by regulations prohibiting refueling within 656 feet (200 meters) of any drainage (wet or dry), utilizing hardened stream crossings, and adhering to installation spill control and cleanup plans.

### **Live-Fire Training**

There are fire risks associated with gunnery training and other activities that use fire or incendiary devices (such as flares and camp fires). Increases in training under the proposed action would include increased use of these ignition sources, and would likely result in more fires each year, as well as an increased risk of a large fire disturbing a large portion of land. Fires, by burning vegetation, would be capable of exposing soil, potentially leading to erosion and sedimentation into waterways, particularly if riparian vegetation were burned. Most fires would continue to be low-fuel burns in the CIA and MPRC, which would be most likely to impact nearby water resources, including Hanson and Alkali creeks. However, it is expected that additional fires would occur in training areas as well, and could result in sediment transport into other streams on the installation, including Johnson Creek. Sediment could potentially be transported off the installation to fish habitat in the Yakima and Columbia rivers.



### **Aviation Training**

With the stationing of a medium CAB under the proposed action, the amount of helicopter training occurring at YTC would increase, as discussed in Section 3.6.3. Because many of the soils at YTC are susceptible to wind erosion, activities such as landing/takoff and low-level hovering could result in increased wind erosion of soil through rotor wash. A portion of the sediment produced during these activities could be transported into stream channels and eventually make its way to habitat (or potential habitat for listed fish species). To minimize these impacts, areas where recurring take offs, landings, and hovering occur have been hardened to support this type of use. Stationing of additional aviation units would result in an increase in the amount of gunnery training occurring at YTC.

#### **5.2.2.4 Interrelated and Interdependent Effects**

Increases in vehicle training would likely result in the creation of new roads in the landscape and increased use of existing roads. Increased use of roads would likely result in the need for increased maintenance of roads, which could contribute to soil disturbance, and therefore sedimentation into nearby water bodies. Additionally, the increase in fire management practices required by the proposed action in order to account for the increased fire risk would entail maintenance of firebreaks, which could also contribute to soil disturbance and sedimentation. The long-term benefits provided by maintaining roads and firebreaks, in terms of minimizing erosion, would be expected to far outweigh the short-term effects of the necessary maintenance activities.

#### **5.2.2.5 Cumulative Effects**

Potential cumulative effects to fish habitat in the region would result from activities under the proposed action that contribute to erosion and sedimentation, which would be added to ongoing impacts from training as well as other sources of sedimentation. Additionally, activities associated with training by HIMARS field artillery battalions, would contribute to erosion and potentially sedimentation into streams. Sedimentation into streams on YTC would potentially migrate into the Columbia and Yakima rivers, where fish habitat is subject to effects from numerous activities in the region. Historically, the Yakima River basin has been receiving high sediment inputs from sources such as runoff from agricultural lands, particularly irrigation return flows. Other sources of sediment include improperly designed and located roads, degraded channels resulting from mass wasting, and natural erosion processes. Discharges of suspended solids from YTC from all training, fire, and other activities, combined with larger natural and agricultural sources, could contribute cumulatively to water quality impairment of the Lower Yakima River, and therefore habitat utilized by listed fish species.

In 1998, the EPA approved a Water Cleanup Plan designed to reduce suspended sediments and pesticides in the Yakima River. More recent monitoring by the Washington Department of Ecology in 2003 evaluated the suspended solid loads at the Kiona Station and concluded that the loads have been greatly reduced (by 50 to 70 percent) compared to previous decades (Coffin et al. 2006). Continued measures under this Cleanup Plan would continue to minimize cumulative effects to fish habitat in the Yakima River from regional activities.

Water quality in the Columbia River is considered good, and has not been designated as impaired in the vicinity of YTC. Past and present actions contributing to water quality effects include training and other activities on YTC, as well as agriculture and recreational activities. Some chemicals associated with fertilizers and pesticides end up in the Columbia River via erosion of soil particles, surface runoff, or returning irrigation water. These chemicals would be expected to have a cumulative effect on fish habitats in the Columbia River. However, these effects are minor because the chemicals that do reach the river are heavily diluted.

Native American tribes catch salmon commercially and for subsistence using beach seine and gillnets along the Columbia and Yakima rivers. Steelhead trout are caught incidentally during commercial fishing operations and by recreational anglers.



Dams associated with hydroelectric development on the Columbia and Snake rivers have blocked the access of salmon to habitat on portions of these rivers. Furthermore, urbanization and livestock grazing have degraded the quality of riparian and instream habitat for this species (Pacific States Marine Fisheries Commission 1998, National Marine Fisheries Service 1999). Irrigation projects have contributed to the decline of salmonid populations and caused the extinction of most of the migratory bull trout subpopulations. Other factors contributing to population declines include habitat fragmentation and degradation, poor water quality, poor fisheries management, introduction of non-indigenous species, and isolation of subpopulations. For example, the majority of the Columbia River bull trout subpopulations are small in number and occur in scattered areas, isolating them from the remaining migratory bull trout.

**5.2.2.6 Pathways and Indicators Matrix Checklist**

An analysis of pathways and indicators of ecological function was prepared for YTC following guidance provided by NMFS (1999). The pathway and indicator of ecological function evaluation covers all relevant habitat parameters affected either positively or negatively by the proposed action (Table 5-4).

**TABLE 5-4  
Analysis of Pathways and Indicators for the Yakima Training Center Area**

Pathways and Indicators	Environmental Baseline			Effects of the Action(s)			
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Improve	Maintain	Degrade
<b>Water Quality</b>							
Temperature						•	
Sediment							•
Contaminants/nutrients						•	
<b>Habitat Access</b>							
Physical barriers						•	
<b>Habitat Elements</b>							
Substrate						•	
Large woody debris						•	
Pool frequency						•	
Pool quality						•	
Off-channel habitat						•	
Refugia						•	
<b>Channel Condition and Dynamics</b>							
Width/depth ratio						•	
Streambank condition						•	
Floodplain connectivity						•	
<b>Flow/Hydrology</b>							
Peak/base flows						•	
Drainage network increase						•	
Watershed conditions						•	
Disturbance						•	
Riparian reserves						•	
1 – The environmental baseline columns have been intentionally left blank. It is beyond the scope of the BA to establish baseline conditions for the Yakima River watershed and Upper Columbia River Basin.							

Army activities under the proposed action would not be likely to substantially change temperature functions, habitat access, habitat elements, channel condition and dynamics, or flow and hydrology from baseline levels. Additionally, existing regulations and spill prevention and control measures would be suitable for preventing impacts to water quality associated with the increased risk of spills and releases of fuels and other water contaminants under the proposed action. Sediment loading into creeks and rivers would be likely to increase



as a result of increases in vehicle maneuver training, digging, aviation training, fire, and other activities associated with training that can contribute to soil disturbance and movement into aquatic habitats. The increases in sediment loading would require additional conservation measures on the part of YTC to maintain water quality in listed fish species habitat.

#### **5.2.2.7 Conservation Measures**

The following measures, included as mitigation in the GTA EIS, would help reduce the effects of the action and minimize transport of sediment into aquatic habitat that supports, or could potentially support, listed fish species:

- Implement appropriate site rehabilitation (e.g., revegetation, restoration, erosion control, irrigation, and landscaping) following all construction related projects to provide the appropriate vegetative community or landscaping/xeriscaping (include irrigation if necessary) to protect soil resources.
- Modify the YTC CNRMP/INRMP to account for wind erosion, and implement requirements to include: evaluating high-use landing zones (e.g., ranges) to determine if site hardening is required to prevent excessive soil erosion at these sites; and install hover pads at helicopter landing zones where it is determined that hardening is appropriate to reduce the effects of wind erosion caused by rotor wash.
- Implement erosion control measures to address sediment delivery to the Yakima and Columbia rivers following fire events. This includes measures to reestablish vegetation in upland and riparian areas, and installation of erosion control devices such as excelsior blankets, straw wattles, and rock structures to reduce channel scouring.
- Restrict military training activities on recently restored sites, burned sites, and locations where mitigation measures were employed until restoration and resource rehabilitation measures for the site are successful.
- Implement fire mitigation to reduce fire-related impacts to water bodies and riparian areas, as listed below (these measures are described in more detail in Section 5.2.3.6)
  - Establish wildland fire containment areas.
  - Establish fire exclusion areas.
  - Develop and maintain pre-incident plans for designated locations or activities.
  - Conduct periodic review and refinement of the Wildland Fire Risk Matrix.
  - Implement temporal constraints and other training restrictions during the high fire danger period (15 May through 30 September).
  - Provide additional Range Inspectors.
  - Increase wildland fire staffing.
  - Provide wildland fire suppression equipment.
  - Continue aerial fire suppression capability.
  - Develop additional water resources for fire suppression.
  - Conduct firebreak update and maintenance.
  - Conduct site restoration for wildland fire impacts (efforts are estimated at 9,500 acres annually over the first 5 years and on 6,300 acres annually thereafter).
  - Continue to implement the Training Land Recovery Program.

#### **5.2.2.8 Determination of Effects**

Listed fish species may infrequently use the lower reaches of Johnson Creek and other streams on YTC, although based on past surveys, use is likely infrequent, if it occurs, and no suitable spawning or rearing habitat has been identified. Hardened stream crossings on streams with potential listed fish habitat would help prevent direct impacts to streambeds and any fish that may be present. Proposed training increases under the proposed action are likely to contribute to sediment discharges into the habitat of listed fish species in Johnson Creek and the Yakima and Columbia rivers. Releases to the Yakima and Columbia rivers would be



cumulative to those from other sources in the region. Fires and maneuver training would be most likely to causes of sedimentation into streams, although buffers between riparian areas and vehicle maneuvers would help limit the amount of sediment reaching stream channels and aquatic habitats. It is expected that the amount of sediment reaching listed fish species habitat could potentially be greater than at present. However, the conservation measures listed in 5.2.2.7, as well as ongoing erosion control practices, would minimize erosion and sediment transport off of YTC. With these measures in place, degradation of listed species habitat would be minimized, and the proposed action **may affect, but is not likely to adversely affect** Chinook salmon, steelhead trout, or bull trout populations or designated critical habitat for these species.

### 5.2.3 Greater Sage-grouse

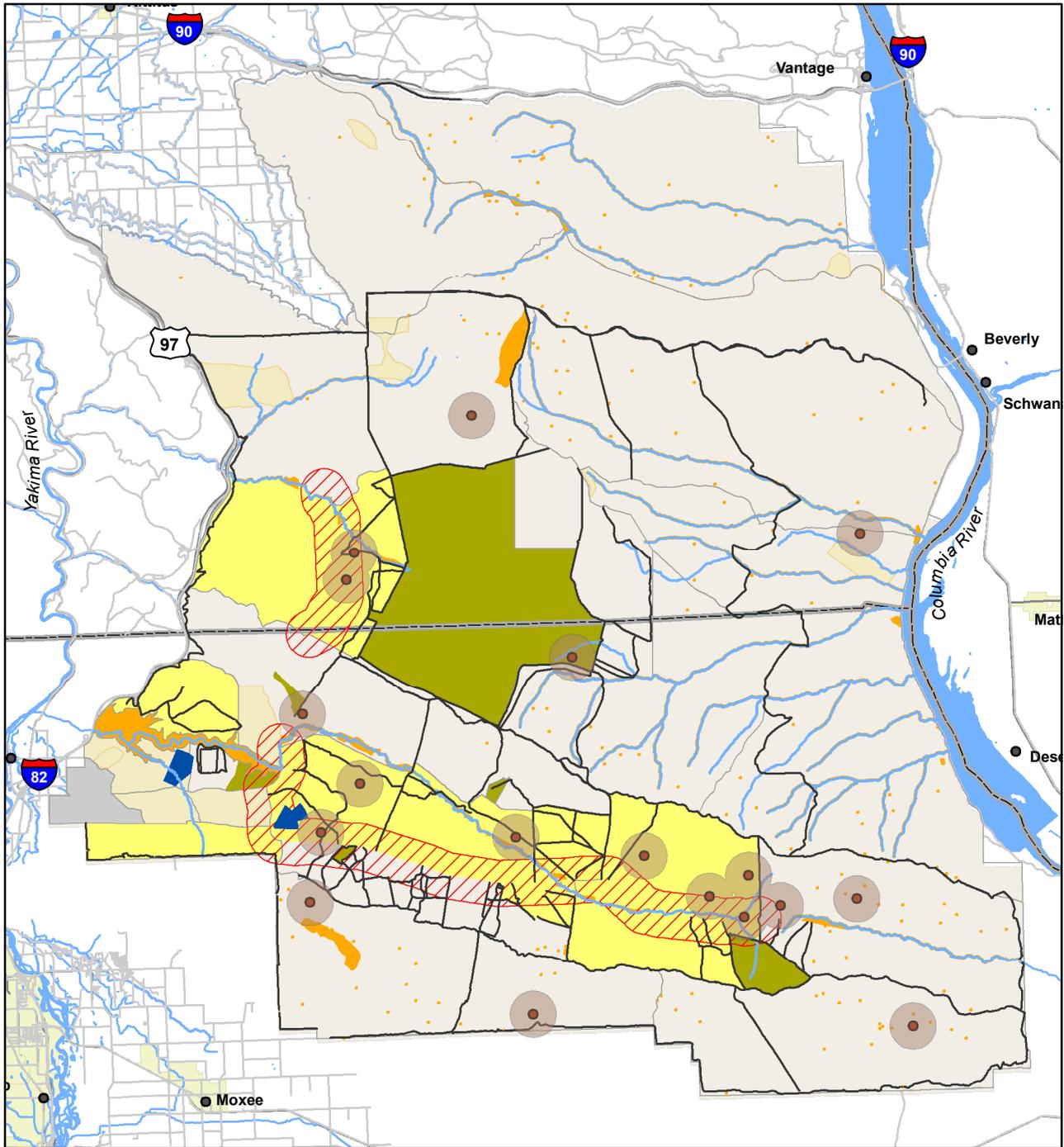
#### 5.2.3.1 Background Information

The greater sage-grouse (sage-grouse) is state-listed as threatened, and is a candidate for federal listing under the ESA. Sage-grouse were historically found throughout most of the sagebrush, deciduous shrub, and grass habitats of eastern Washington (Washington Department of Fish and Wildlife 1997). Their range extends north to British Columbia, south to New Mexico and Oklahoma, east to Nebraska, and west into California (Connelly and Braun 1997). Recent studies have shown that the two remaining sage-grouse populations in Washington are primarily restricted to Douglas, Kittitas, and Yakima counties. These remaining populations are isolated and found in partially intact habitat areas (Washington Department of Fish and Wildlife 1997, 1998b). YTC supports one of these populations, which is the only population on federally administered lands in the state. The other population is in Douglas and Grant counties, primarily on private land. These populations together make up the Columbia Basin DPS, which was determined a candidate species for federal listing in 2001. In March 2010, the USFWS determined that listing of the species range-wide was warranted, and all populations of the species became candidate species for future federal listing (U.S. Fish and Wildlife Service 2010c). The status of the Columbia Basin DPS remains candidate for listing.

Suitable sage-grouse habitat consists of medium to dense sagebrush stands with a mix of tall and short sagebrush plants, as well as a variety of forbs and grasses (Washington Department of Fish and Wildlife 1998b). Sagebrush is an essential food for sage-grouse throughout the year, and comprises 60 to 80 percent of the species' diet (Remington and Braun 1985). Sage-grouse on YTC tend to use habitat with slopes of less than 15 percent and areas where the dominant species are big sagebrush (*Artemisia tridentata*), three-tipped sagebrush (*Artemisia tripartita*), antelope bitterbrush (*Purshia tridentata*), and bluebunch wheatgrass (*Agropyron spicatum*; Livingston 1998). Shrubs provide nesting habitat with shelter from avian predators and weather elements. Grasses provide shelter from ground predators and create a favorable microclimate (Washington Department of Fish and Wildlife 1995).

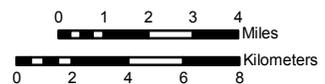
Greater sage-grouse usually roost on the ground from evening until early morning, feed and rest during the late morning and afternoon, and then return to their roosts at night. Male and female sage-grouse gather during the spring for mating at specific locations called leks, and nest on the ground in the vicinity of these leks (Hays et al. 1998). Annual surveys for leks have been conducted on YTC since 1989, and ten leks have been active since 1999. Radio-telemetry studies have shown that sage-grouse on YTC are non-migratory, and are found on the installation throughout the year, primarily in the Lmumma and Selah Creek watersheds (Eberhardt and Hofmann 1991; Cadwell et al. 1994). These areas contain the majority of active leks and nests sites on YTC and are a priority for habitat conservation and protection (Figure 5-11; Hays et al. 1998). Sage-grouse also use the Cold Creek watershed and areas south of Yakima Ridge. Opportunistic sightings and past telemetry locations suggest that greater sage-grouse also occupy the northern portion of the installation in limited numbers.

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 active lek decreasing



**Figure 5-11. Existing Sage-Grouse Protection Area and Lek Buffers on Yakima Training Center**

- |  |  |
|--|--|
|  Zone 1 - No Vehicles or Digging      |  Sage-Grouse Seasonal No-Fly Zone |
|  Zone 2 - Sage Grouse Protection Area |  Sage-Grouse Leks and Buffers     |
|  Zone 3 - General Use                 |  Proposed Construction Areas      |
|  Zone 4 - Bivouac Locations           |  Firebreaks                       |
|  Zone 5 - Off Limits Area             |  |





(Livingston 1998). Annual surveys for leks (communal mating grounds), and lek counts have been conducted on YTC since 1989 to monitor trends and assess population status. The location of leks on YTC is shown in Figure 5-11. Eighteen known leks were monitored in 2009, and 12 were found to be active. Three of the 12 active leks were classified as major leks (i.e., ten or more male sage-grouse observed at least once during the season). In 2008 the population estimate for sage-grouse on YTC was 187, which is the lowest estimate since 1995 and the second-lowest population estimate since 1989. It is also below the population level goal of 200 in the Sage-Grouse Management Plan. The 21-year population average was 288. The peak population estimate of 421 occurred in 1999. It is not known why the sage-grouse population on YTC has declined in recent years, despite improvements in the condition sage-grouse habitat as a result of removal of cattle grazing and other management practices (Livingston et al. 2003). Possible explanations for the decline include a population health problem or insufficient habitat quality or quantity.

Throughout Washington, population declines in greater sage-grouse have resulted from large-scale removal of native vegetation for agriculture purposes, combined with reduced habitat quality caused by intensive grazing by livestock (Washington Department of Fish and Wildlife 1997). Sagebrush removal using herbicides and fire have contributed to their decline as well (Washington Department of Fish and Wildlife 1995). From 1960 to 1995, land on YTC was used for livestock grazing. Indirect threats to greater sage-grouse on YTC are habitat-related, and are primarily from fire and military training activities. Fire, in particular, can result in habitat loss. Fire kills big sagebrush, and repeated fires can make an area vulnerable to invasions by noxious weeds such as downy brome (cheatgrass; *Bromus tectorum*) and knapweed (*Centaurea* spp.). Fire regimes in the lower Columbia River Basin were historically characterized by regular, low-intensity burns, which created a mosaic of seral stages. Following fire, natural re-establishment of sagebrush is slow (about 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. Although less suitable than sagebrush communities, burned areas that have become dominated by grasses still receive some use by sage-grouse as demonstrated by both radio-marked birds and observations.

Sources of sage-grouse mortality include predation, weather, accidents, disease, parasitism, and environmental hazards (e.g., pesticides). Raptors and coyotes (*Canis latrans*) are the primary predators of greater sage-grouse, while common raven (*Corvus corax*) American crow (*Corvus brachyrhynchos*), badgers (*Taxidea taxus*), and ground squirrels are nest predators. Weather influences nesting success and survival of young chicks. Diseases and parasites are not a major source of mortality (Hays et al. 1998). A sage-grouse augmentation project on YTC that began in 2004 with the translocation of sage-grouse hens from Nevada, has allowed some monitoring of mortality on YTC. Most mortality of translocated birds was caused by mammalian and avian predators (YTC Environment and Natural Resources Division 2009c). Fences were another source of mortality.

### 5.2.3.2 Current Sage-grouse Habitat Use and Protection Measures

Sage-grouse management at YTC involves: 1) protection of birds during the breeding season; 2) protection of habitat; 3) habitat restoration in disturbed areas; 4) monitoring of restored sites; and 5) monitoring of leks.

Sagebrush habitats on YTC are used to support most types of training summarized in Section 2.4. Training of various levels of intensity and frequency occurs in habitats utilized by sag-grouse throughout YTC. However, the Army has identified areas of essential sage-grouse habitat, within which only limited training can occur. This area, known as the Sage-Grouse Protection Area, is depicted as Zone 2 on Figure 2-15. This area is subject to the training restrictions listed in Table 2-5, including no bivouacking and excavations only on existing firebreaks. Additionally, all off-road activities are prohibited in this area during the breeding period (March 1 through June 15). Exceptions include the firing ranges 4, 5, 10, 10Z, 12, 14, 15, 16, 26, and 55. Vehicle travel in the protection area is limited to Major Supply Routes and/or designated roads to these firing



ranges. Training area boundaries have been realigned to coincide with the Sage-Grouse Protection Area, resulting in improved scheduling of training activities and potentially reduced conflicts between trainers and sage-grouse management efforts.

In addition to the restrictions within the Sage-Grouse Protection Areas, there are some restrictions on training and other land use practices within a 0.6-mile (1-km) radius of each active lek between March 1<sup>st</sup> and May 15<sup>th</sup> (see Table 2-5). This restriction includes overflights by aircraft lower than 300 feet (91 meters) above ground level within 1 km of leks and in the seasonal no-fly zone shown in Figure 2-15. Given that most nesting and brood rearing occurs within 5 miles of leks, current protection zones and buffers minimize training disturbances in some of the sage-grouse breeding habitat, though not all.

In addition to the training regulations listed in Table 2-5 and discussed above, YTC is involved in additional management activities to protect and improve sagebrush habitats on the installation. Management actions for upland vegetation include noxious weed control, erosion control, upland revegetation and rehabilitation, monitoring of restored sites, and fire management practices. Upland revegetation and sagebrush restoration sites are identified through post-training satellite imagery, aerial photography, and field reconnaissance. In the Sage-Grouse Protection Area, degraded sites are revegetated with native species. In areas identified for sagebrush restoration, sites are reseeded with sagebrush seeds, and in some areas sagebrush seedlings are planted. Noxious weed control includes biotic controls, application of herbicides, a vehicle wash policy, and revegetation. Specific sites within sage-grouse protection areas may be periodically closed to military training (off-line) to permit recuperation following training events.

Since 2004, YTC has been cooperating with the WDFW on a genetic augmentation project, which entailed translocation of 25 female sage-grouse from Nevada to YTC in 2004, and 18 females and 5 males in 2005 (Livingston et al. 2006). Additionally, in 2006 15 sage-grouse were released on YTC: 12 female, 1 male, and two birds of unknown gender (Leingang 2010). The long-term objective of this project is to increase the viability of the YTC population by adding birds from genetically diverse populations. Future genetic monitoring will determine whether the project has had a beneficial effect on the sage-grouse population.

Ongoing fire management measures by YTC include use of a matrix to assess fire danger risks (risks of a fire starting, and ability to effectively suppress fires) associated with training activities. Throughout the fire season, the type of military training, fuel conditions, and current weather conditions are evaluated periodically throughout the day using the matrix. The greater the fire risk, the higher up the level at which a decision about whether to train is made. Additional fire prevention activities that are of benefit to sage-grouse habitat on the installation include a system of firebreaks distributed around established training ranges, an annual control burn program, downrange wells as sources of water for fire suppression, aerial capabilities for fire suppression, pre-incident planning for activities in the MPRC SDZ, and a Training Land Recovery Program that allows training areas to be taken off-line (i.e., not used for certain types of training) after they have been impacted by fire or other training-related factors. YTC has also identified several fire-related BMPs that will be implemented regardless of whether the proposed action is implemented. These BMPs are discussed in more detail under Section 5.2.3.6, Conservation Measures.

### **5.2.3.3 Analysis of Direct and Indirect Effects**

#### **Construction**

The general construction areas for the proposed SFF Range and the MPMG Range overlay the Sage-Grouse Protection Area, as shown in Figure 5-11. The general construction area is also inclusive of a portion of a lek buffer. Therefore, proposed construction activities would have the potential to impact sage-grouse and habitat. One of the proposed targets for the MPMG would be located within a lek buffer, near its outside edge. However, no direct alteration of sage-grouse leks would occur. Since sage-grouse would likely avoid construction sites, direct injury or mortality to birds from construction equipment is not likely. Noise from



construction activities would have the potential to disturb sage-grouse, which could cause flushing of birds from nests and leks, or large, atypical movements away from the area of disturbance. To limit these effects, the Army has guidance that construction activities within the Sage-Grouse Protection Area be accomplished outside the nesting and brood rearing period to the greatest extent possible. When these activities must occur during the protection period, all actions are reviewed by a YTC wildlife biologist to ensure disturbance to sage-grouse is minimized and habitat protection is maintained.

Proposed construction activities would disturb up to 388 acres (157 hectares), the vast majority of which would occur within the footprint of existing ranges. Because the construction is associated with new targets and firing positions, it would entail small disturbances dispersed throughout the general areas shown in Figure 5-11. The construction activities would disturb habitat and remove vegetation, and would potentially result in a decrease in the quality of sage-grouse habitat.

### **Ground Training**

Maneuver training activities have the potential to affect sage-grouse by disturbing them, particularly during the breeding season, and by altering habitat. Under the proposed action, there would be a substantial increase in the amount of maneuver training occurring on YTC annually. Noise and human activity associated with training can disturb sage-grouse, which are vulnerable at leks and nests during the breeding season. Potential effects include flushing of birds from nests and leks, and possible abandonment of these sites. Sage-grouse also may make large, atypical movements away from the area of disturbance. All of these effects could potentially lead to decreased reproductive success of the population. Training restrictions that minimize training within the Sage-Grouse Protection Area and lek buffers during the nesting and brood rearing period (see Table 2-5) would help to minimize disturbances to birds at lek sites, and would prevent vehicles from driving over leks or nests. A few leks (MPRC and Range 15) are outside of the Sage-Grouse Protection Area and are not afforded the extra protection during the breeding period. Because most nesting and brood rearing activity occurs within 5 miles of leks, some birds are still potentially exposed to various types of training during the breeding period. Therefore, it is likely that higher levels of vehicle activity under the proposed action would increase the potential for mortality or injury of adult sage-grouse or their young in certain areas, as well as disturbance potentially leading to decreased reproductive success.

Ground training activities with the potential to modify sage-grouse habitat, such as off-road vehicle travel, digging, and bivouacking would increase under the proposed action. Because sage-grouse appear to have specific habitat requirements, any degradation of habitat resulting from these activities would have the potential to adversely affect the species. Although digging and bivouacking can damage soil and vegetation, bivouacking is not allowed within the Sage-Grouse Protection Area, and digging is only allowed on established firebreaks. Outside of Protection Areas, bivouacking occurs in hardened areas whenever possible to minimize effects to vegetation and soil, and dig permits must be obtained prior to all excavation activities.

Off-road vehicle maneuvers can also damage sage-grouse habitat. Although habitat in the Sage-Grouse Protection Area would receive year-round protection by regulations prohibiting most off-road vehicle travel, the existing protection measures do allow battalion-size or larger training exercises directly related to train-up activities associated with Combat Training Center deployments to occur in the Sage-Grouse Protection Area outside the sage-grouse protection period. The sage-grouse management plan indicates that maneuver training is anticipated occur in the Sage-Grouse Protection Area every 18 to 24 months. However, based on conversations with YTC personnel, the Sage-Grouse Protection Area is rarely used for maneuver training. Other sage-grouse habitat on the installation would be protected only during the breeding period, or not at all. Based on estimates completed for the EIS, maneuver activities could impact between 17 and 25 percent of training lands annually, which would be a substantial increase from estimated 9 to 13 acres percent that are impacted at present. The degree of effect to sage-grouse habitat would depend on how units train in the future. Although it is likely that most impacts to vegetation would continue to be concentrated into small areas, it is also possible that future training needs would require more off-road travel in less heavily used available



training lands. Additionally, it is likely that the increase in off-road miles under the proposed action would require more use of the Sage-Grouse Protection Area than at present, which could result in a degradation of key sage-grouse habitat. Impacts would be greatest if National Guard units with heavy tracked vehicles were allowed to train in the Sage-Grouse Protection Area.

### **Live-Fire Training**

Under the proposed action, the amount of live-fire training would increase, resulting in more noise and activity on and near ranges in sage-grouse habitat, and increasing the risk of fire. Additionally, construction of new ranges, particularly the MPMG, would increase the number of targets and firing positions in and near the Sage-Grouse Protection Area, expanding the use of this area. Firing of rounds on ranges would potentially disturb sage-grouse, although sage-grouse that have used the area for many years may be habituated to this type of noise. The proposed action would entail an increase in the frequency and extent of gunnery training, but would not increase the level of noise originating at ranges. Use of ranges within lek buffers is prohibited between 12:00 a.m. and 9:00 a.m. during the breeding period, but otherwise training on ranges is not curtailed during the nesting and brood rearing period.

Fire poses a significant threat to the remaining sage-grouse habitat in Washington because it kills sagebrush, and because long periods are required to recolonize large burned areas. Most fires on YTC are started by gunnery training and begin in the CIA or range fans. Although most fires remain within these areas, under certain conditions fires can escape and burn large portions of the installation. A fire of large magnitude in the primary sage-grouse areas (Lmumma Creek, Selah Creek, and Cold Creek watersheds) would significantly impact habitat utilized by sage-grouse, and could jeopardize the species' existence at YTC. Although a greater number of ignition sources could increase the risk of such a fire occurring, weather conditions and the success of fire management programs would influence the occurrence and spread of fire, as well. A large 2009 fire that burned a portion of the Sage-Grouse Protection Area is indicative that recent fire management programs have not been effective enough to prevent detrimental effects to sage-grouse habitat on YTC.

### **Aviation Training**

Flying aircraft near leks or nests during the breeding season would have the potential to disturb sage-grouse, possibly interfering with reproductive success. The amount of aviation training on YTC would likely increase over current levels, resulting in a greater likelihood that sage-grouse would be disturbed by aircraft flying nearby. To limit such disturbances during the breeding season, aircraft are not permitted to fly over sage-grouse leks below 300 feet (91 m) AGL between 12:00 a.m. and 9:00 a.m. during the lek protection period. A higher minimum flight altitude is not feasible because of the way airspace on the installation is partitioned.

#### **5.2.3.4 Interrelated and Interdependent Effects**

Increases in vehicle training would likely result in the creation of new roads in the landscape and increased use of existing roads. Increased use of roads would likely result in the need for increased maintenance of roads. Additionally, the increased fire risk could require additional firebreaks or more frequent firebreak maintenance. These activities would potentially increase the amount of disturbance in sage-grouse habitats, particularly for roads and firebreaks located near leks. Herbicide applications by aircraft would have the greatest potential to affect sage-grouse, although firebreak maintenance would occur outside of the protection period. Additionally, use of aerial equipment would require coordination with wildlife staff to ensure that sage-grouse and sage-grouse habitat would not be affected by treatment actions.

#### **5.2.3.5 Cumulative Effects**

Habitat loss, disturbance, and food availability are important factors for determining greater sage-grouse success regionally and at YTC (Stinson et al. 2004). Greater sage-grouse population numbers are slowly declining in Washington and throughout much of the western U.S. Important factors include loss and



fragmentation of habitat, conversion of shrub-steppe habitat to croplands, and isolation of sage-grouse populations. Most sage-grouse habitat that once occurred in the Columbia Basin has been converted to agriculture or residential or commercial development, a trend that continues throughout the region. In addition, fire, naturally occurring and caused by human activities (e.g., military training), reduces sage-grouse habitat; Wyoming big sagebrush, the dominant shrub on YTC, is fire intolerant (Tisdale and Hironaka 1981; Stinson et al. 2004). The two remaining greater sage-grouse populations in Washington, at YTC and in Douglas and Grant counties, are too small to be considered viable and secure. Although chance events, such as fires, may be the biggest threat to sage-grouse populations in the state, the isolation of remaining small populations will likely result in the loss of genetic quality (Lacy 1987). Based on an analysis of greater sage-grouse populations in the western U.S., Washington populations exhibited the lowest genetic diversity, with YTC populations represented by only one common haplotype (Benedict et al. 2003). Inbreeding can affect male fitness and has contributed to the declines and extinctions of several species (Brook et al. 2002). Connecting the YTC population to populations outside of the YTC is necessary for their long-term persistence (Stinson et al. 2004). A primary goal of the recent genetic augmentation project at YTC (discussed in Section 5.2.3.2) is to determine whether the YTC population suffers from an intrinsic health problem.

The effects of proposed training increases would be cumulative to the effects of past and ongoing training at current levels, which are potentially a factor in the decline of sage-grouse on the installation. Additionally, planned future training by HIMARS units would be associated with noise disturbance and fire risk, which would contribute to cumulative impacts to greater sage-grouse. Although the precise causes of the recent population decline are not known, one possible explanation is that habitat quality and/or quantity are insufficient. Ongoing management of sage-grouse habitat on YTC, including restoration efforts and removal of grazing, has helped to improve the condition of upland and riparian/wetland communities in sage-grouse areas (Livingston et al. 2003). However, a lack of response by sage-grouse could indicate that habitat improvements have been insufficient or that a health problem exists. Proposed training activities, when added to existing levels of training that YTC currently supports, would be expected to raise the level of habitat degradation and disturbance affecting an already-declining population.

### 5.2.3.6 Conservation Measures

YTC would continue to implement the protection measures listed in Regulation 420-5 to minimize the effects of training on sage-grouse. Given the increases in training under the proposed action, it is likely that the amount of restoration/rehabilitation needed to maintain sage-grouse habitat would increase substantially.

#### **Fire**

YTC has identified BMPs and mitigation measures to help reduce the risk of fire on YTC, which would also help prevent fire-related effects to sage-grouse habitat. The BMPs are conservation measures that YTC has decided to implement regardless of whether the proposed action occurs, in an acknowledgement that existing fire management may be inadequate to protect sage-grouse habitat at existing levels of training. The mitigation measures are additional measures presented in the GTA EIS to help minimize the heightened risk of fire associated with proposed training increases.

#### **BMPs:**

- Complete a comprehensive update of the Integrated Wildland Fire Management Plan (this is being done in 2010).
- Recently, policy and technical committees were established to oversee, update, and implement the Wildland Fire Management Plan. These committees include a Fire Technical Team, a Fire Restoration Team, and a Fire Policy Team.
- Increase fire awareness training for Training Units. This BMP will entail adding a wildland fire emphasis to the Sustainable Range Awareness brief, during unit scheduling, and during the daily Range Brief, and



developing outreach products (such as posters). The intent is to reiterate fire concerns to Training Units at all briefings to increase the level of troop awareness.

- Maximize Fire Department Personnel down range. The presence of these personnel will be maximized with roaming patrols, hiring an increased number of seasonal staff, improving hiring practices, and adjusting work schedules.
- Evaluate mutual aid practices and make adjustments to ensure that adequate coverage is available at YTC during training activities. This BMP addresses the risk that in responding to off-post fire incidents, YTC fire staff are made unavailable to respond to fires at YTC.
- Increase accountability. This BMP entails a process of post-fire review to determine whether negligence on the part of training units has caused fires that have impacted resources and require restoration. In certain cases, the training unit causing the fire may be required to pay for repairs and restoration resulting from negligence. The intent is to obtain alternate sources of funding for post-fire restoration and to attain better compliance by training units if laws and regulations are enforced with repercussions.

Additional fire related mitigation has been proposed to minimize the risks of fire associated with increased training under the proposed action. By minimizing fire risk, these mitigation measures would help prevent fire-related impacts to sage-grouse habitat on YTC. In the list that follows, mitigation measures are presented, followed by a brief explanation to clarify what the mitigation does.

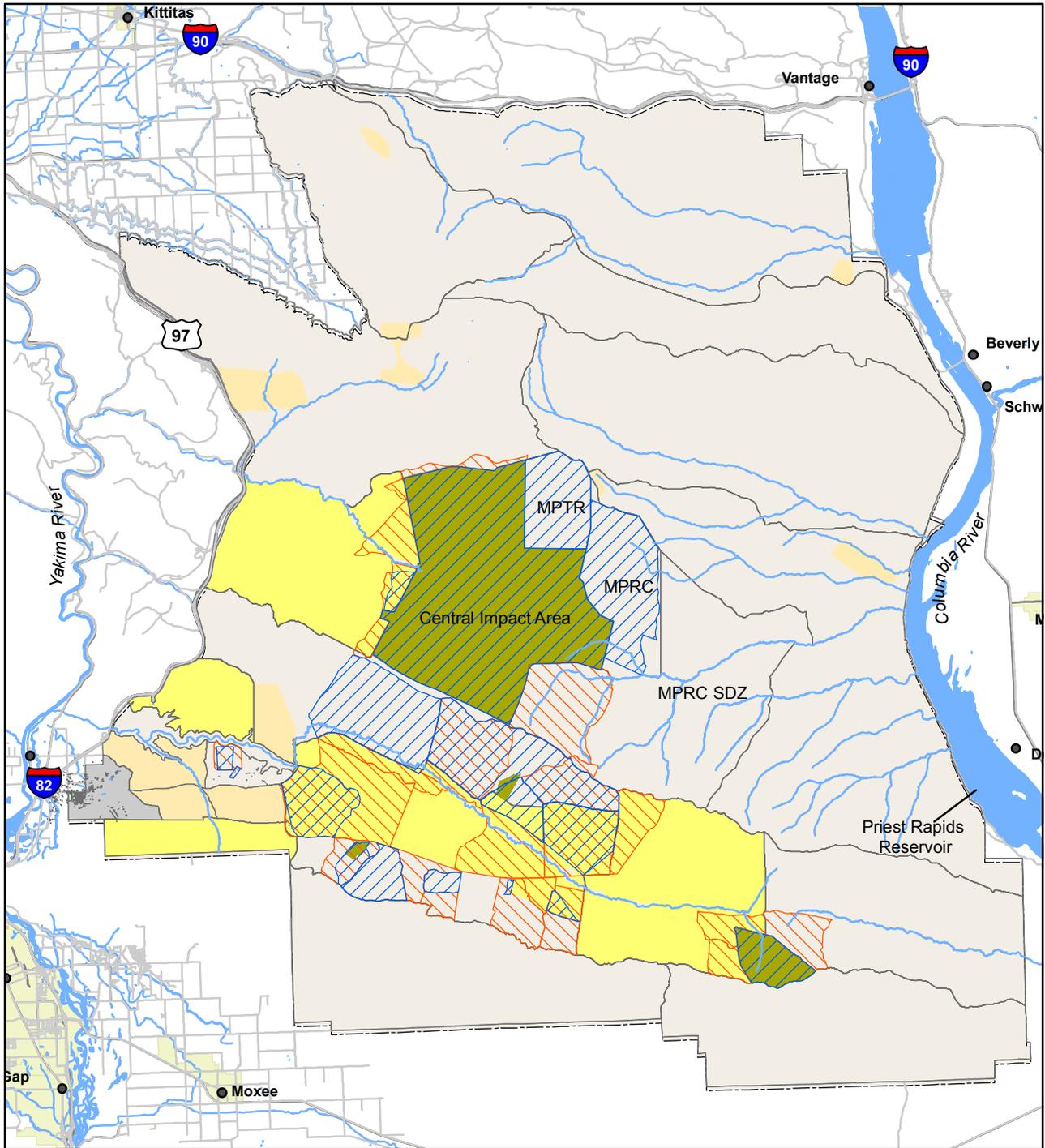
- Mitigation: Establish wildland fire containment areas – To more effectively contain and suppress fires within areas where recurring fires are expected (e.g., established firing ranges and impact/dud areas), establish prior to, and maintain throughout the fire season, containment areas where fires will be suppressed at minimal size within the containment area boundary.

Explanation: The identified primary and secondary containment areas are shown in Figure 5-12. These containment areas were identified based on past fire history and current and future land use (e.g., tracer burn-out distance). Their designation results from a recognition by the Army that training activities result in unavoidable fire impacts, which are most likely to occur in certain locations. The Army also recognizes that to successfully contain fires, other land use objectives will not be attainable within containment areas. Primary containment areas will be managed to an early successional stage to reduce the amount of fuels that are present, which will have localized effects on habitat quality within these areas. However, successful containment of fires as a result of such management will have a long-term benefit on surrounding habitats by reducing the fire risk. Secondary containment areas are backup containment areas within secondary firebreaks that do not exist at present.

- Mitigation: Establish fire exclusion areas – To protect high value resources (e.g., mature late seral shrub-steppe, sage-grouse habitat, restoration sites, and riparian areas) and to allow restoration and rehabilitation to occur where applicable, establish fire exclusion areas on the installation that have increased fire prevention and suppression priority (e.g., land use constraints, enhanced prevention and suppression assets/capabilities).

Explanation: Fire exclusion areas are areas outside of containment areas that contain high value resources, and therefore merit increased fire prevention and suppression capabilities to protect resources. These areas would include sage-grouse habitat.

- Mitigation: Develop and maintain pre-incident plans – To improve efficiencies in fire prevention and suppression, develop and maintain pre-incident plans for designated locations or activities (e.g., containment areas, fire exclusion areas, and high risk activities outside of containment areas). Plan components would include, but not be limited to, burn plans, firebreak plans, mock suppression plans,



**Figure 5-12. Proposed Wildland Fire Containment Areas**

- |   |   |
|---|---|
|  Yakima Training Center Boundary |  Primary Containment Area            |
|  Cantonment Area                 |  Secondary Containment Area          |
|  City Boundary                   |  Current Sage-Grouse Protection Area |
|  Impact Areas                    |  Bivouac Locations                   |



0 1 2 4 6 8 Miles

0 1 2 4 6 8 Kilometers



- and pre-staging of fire suppression assets. The plans would be implemented as a part of the Integrated Wildland Fire Management Plan.

Explanation: Although pre-incident plans are a part of the current fire management program, they are only done for the MPRC SDZ. Under this mitigation, the pre-incident planning program would be expanded to include all established ranges, the convoy live-fire route, and activities occurring outside of established containment areas.

- Mitigation: Conduct periodic review and refinement of the Wildland Fire Risk Matrix – To assist in reducing the potential for ignition caused by training related events, refine the existing Wildland Fire Risk Matrix components, and add new elements needed to include a “no-firing” decision in those instances when the adjective fire danger rating reaches Extreme. Following each fire season or as appropriate, conduct a review of the Matrix to incorporate new information and lessons learned.

Explanation: Although a Wildland Fire Risk Matrix is currently used to assess fire danger risks, the matrix is being refined by changing the wind thresholds, simplifying the scoring, adding timing considerations, and adding spatial adjustments. Additionally, the revised matrix results in an automatic “no-firing” decision if the fire danger rating is Extreme (approximately 3 percent of the time), which does not occur at present.

- Mitigation: Implement temporal constraints and other training restrictions during the high fire danger period (15 May through 30 September) – To reduce the risk of ignition during periods of highest potential for ignition, and to minimize the occurrence of catastrophic fires, fires in exclusion areas, or fires leaving the installation, the YTC Commander (as the installation land manager) retains the authority to restrict or modify training seasonally, daily, and by training area/range or activity.

Explanation: Analysis of data indicates that most fires start between 12:00 p.m. and 6:00 p.m., during the high fire danger period (15 May through 30 September). This information will be used as a criterion in the proposed Wildland Fire Risk Matrix (see previous bullet), as a means to reduce the risk of fire during high fire potential conditions. Use of timing restrictions will be monitored to determine their effectiveness.

- Mitigation: Provide additional Range Inspectors – To support current and increased training activities associated with GTA actions, establish a Tier 2 Installation Range Control organization that would provide three Range Inspectors (with vehicles). The additional personnel would monitor and enforce land use policies and assist in controlling unavoidable impacts to training and natural resources by identifying policy violations (e.g. encroachment within Siber staked areas, digging without a permit or digging in unauthorized areas, bivouacking in unauthorized areas, refueling within the protective buffer for water bodies, and violating installation wildland fire management policies).

Explanation: Currently, there is a lack of staff to adequately monitor training unit compliance with land use policies and procedures. Hiring of three Range Inspectors would allow compliance monitoring to ensure that training units are following all regulations in place to protect resources. In addition to monitoring for compliance with wildland fire management policies, the Range Inspectors would also monitor for compliance with other regulations (discussed in Table 2-5 and elsewhere in this BA) that are in place to protect sage-grouse and their habitat.

- Mitigation: Increase wildland fire staffing – Provide additional staff necessary to support wildland fire management requirements associated with current and increased training activities associated with GTA



actions. Staff increases will include 1 dedicated Wildland Fire Manager to oversee the wildland fire management program, 4 Permanent Seasonal Employees and 12 Seasonal Wildland Firefighters.

Explanation: At present, YTC has nine Seasonal Wildland Firefighters, so the proposed mitigation will result in a substantial increase in personnel.

- Mitigation: Provide wildland fire suppression equipment – To address the inadequacy of existing equipment to meet current requirements and projected pre-suppression and suppression requirements associated with increased GTA training activities, acquire needed equipment (e.g., weather station; pre-burn, suppression, safety, and communications equipment).

Explanation: because more live-fire training will occur under the proposed action, and more ranges will be occupied on a daily basis, additional fire suppression equipment is needed.

- Mitigation: Continue aerial fire suppression capability – To ensure adequate fire suppression capability, particularly in areas of YTC where ground fire suppression is impractical (54 percent of YTC lands) or ineffective, continue to provide aerial fire bucket suppression capability on an annual basis and pre-positioned prior to the fire season.

Explanation: A 2007 Environmental Assessment prepared for YTC identified a need to ensure continued aerial suppression capabilities at YTC. Although YTC currently has these capabilities, the intent of this mitigation measure is to ensure that they will continue indefinitely.

- Mitigation: Develop additional water resources for fire suppression – To address the lack of sufficient aerial fire suppression water resources (water storage or dip tanks at some existing sites, wells and storage tanks at new sites) to support current and increased training activities associated with GTA actions, develop 12 additional water resources in areas where they currently do not exist or where enhancement of existing water resources is required to enable a maximum 12-minute turn-around time across the installation.

Explanation: This mitigation measure will help provide YTC with sufficient aerial and ground suppression resources for adequate fire suppression response. Although YTC currently has some water resources for fire suppression, the Army has identified areas where these capabilities would be lacking under the proposed action, considering that the action would potentially result in more spread out utilization of training lands.

- Mitigation: Conduct firebreak update and maintenance – To reduce fire-related impacts from increased training associated with the proposed action that result in degraded mission capabilities and natural resource conditions, and to ensure the maximum effectiveness of firebreaks, continue recurring firebreak maintenance activities that include maintenance of existing firebreaks and periodic realignment or addition of new firebreaks to address evolving needs.

Explanation: this mitigation is an improvement/expansion of current firebreak maintenance programs in order to address the increased fire risks associated with the proposed action. It includes establishment of new firebreaks around primary and secondary containment areas, as well as regular reassessment of the firebreak system in order to make necessary adjustments. All firebreaks would be maintained on an annual basis, prior to the fire season.

- Mitigation: Conduct site restoration for wildland fire impacts – To compensate for incremental annual loss or large-scale fire impacts to habitat, and to meet increased site restoration requirements associated



with fire damage from GTA-related training, prioritize and restore areas based on integration of fire history; designation of containment and fire exclusion areas; site potential; and past, present, and project impacts. In addition, YTC will utilize pre-incident planning to identify threats to and measures for protection of restoration sites.

Explanation: This mitigation addresses the current back-log of restoration needed to repair the damage caused by previous fire impacts. The proposed mitigation is a system for prioritizing restoration efforts, to include sage-grouse habitat. The Army has identified that during the first 5 years after the implementation of this mitigation, a substantial restoration effort would be required in order to start the restoration process in all the identified areas. It is estimated that restoration efforts would occur on 9,500 acres annually over the first 5 years, and would occur on 6,300 acres annually thereafter. The recurring acreage is based on the annual acreage burned at present, under the assumption that the fire mitigation measures presented here would keep the annual burned acreage at or below this level by adequately mitigating for increased risks associated with increased training under the proposed action. If the annual burned acreage is reduced, the annual restoration acreage would decrease accordingly.

- Mitigation: Continue to implement the Training Land Recovery Program – To meet resource objectives (e.g., site repair and recovery) and land use objectives (e.g., sustainable military training) for sites that have been impacted by military training (e.g., fire and mechanical disturbance), continue to implement the Army’s Training Land Recovery Program. At a minimum, restriction of ground-disturbing activities for one complete growing season is needed to allow recovery of ground cover and to address soil erosion and water quality concerns.

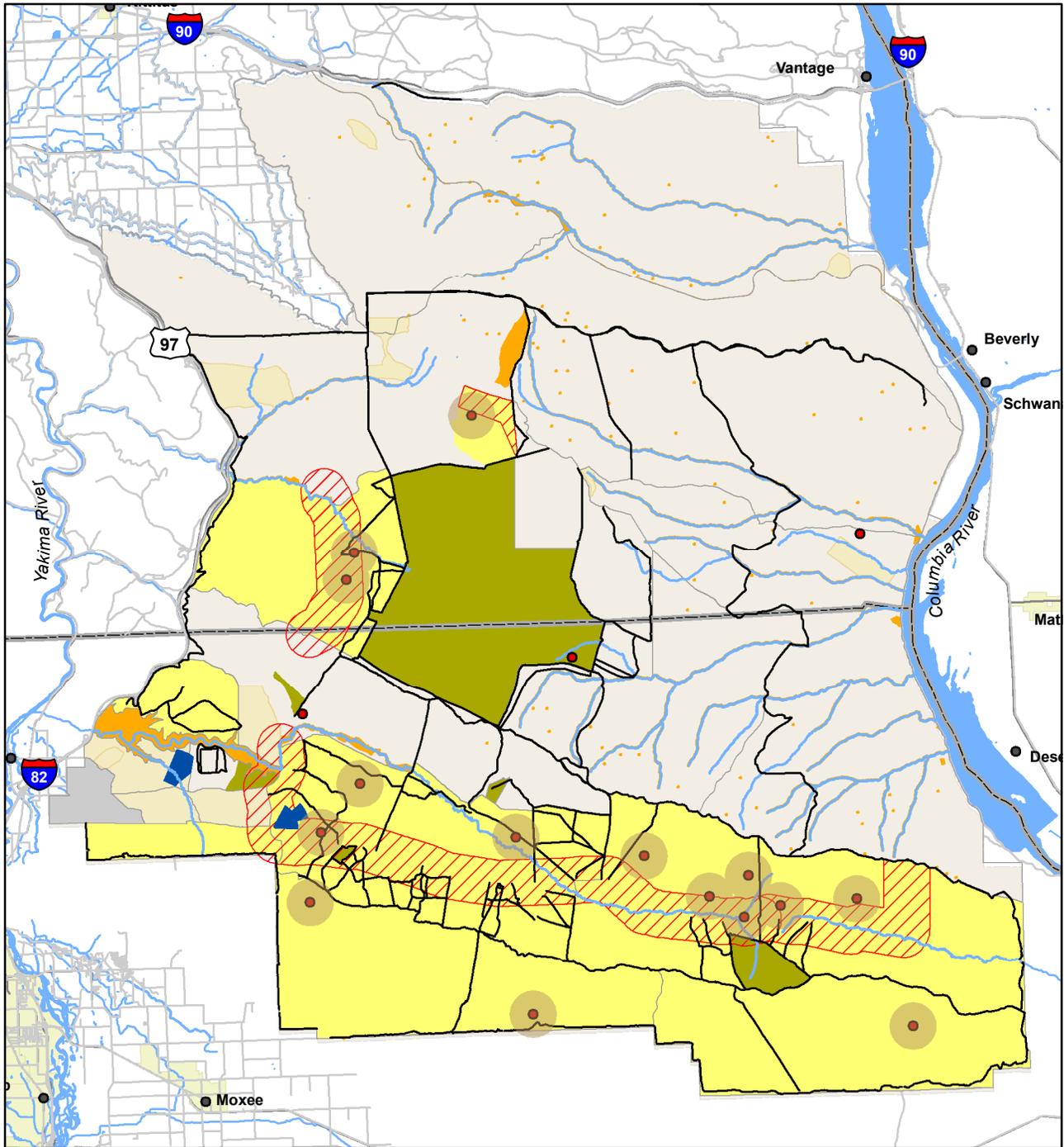
Explanation: The Training Land Recovery Program exists currently; however, there are no established criteria for determining when an area is taken “off-line,” or for how long the area should be closed to certain training activities. This mitigation defines a process for taking damaged areas off-line and requires a restriction of ground-disturbing activities for at least one complete growing season. Protection periods may be extended to allow for long-term site-specific objectives requiring extended rest or recovery periods.

### **Other Mitigation Measures**

Additional mitigation has been proposed in the GTA EIS to help reduce the potential impacts of training on sage-grouse and their habitat:

- Mitigation: Realign sage-grouse habitat and core use area protection boundaries – To mitigate for reductions in available habitat and to protect areas consisting of core areas of sage-grouse use on YTC, realign sage-grouse habitat and core use area protection boundaries in TAs 7, 8, 10, 11, and 16 to incorporate sage-grouse use information not considered in the current management plan, and to manage primary containment areas to early seral conditions within the current Sage-Grouse Protection Area.

Explanation: The proposed new protection area boundaries are shown in Figure 5-13. These boundaries were revised by identifying core sage grouse areas that are not currently protected, based on habitat potential, sage-grouse data (e.g., telemetry studies), recent impacts to habitat, locations of proposed containment areas, and other pertinent data. The proposed realignment would increase the acreage of the Sage-Grouse Protection Area by 33,109 acres, resulting in a total Sage-Grouse Protection Area of 77,600 acres, although 4,852 acres would be in proposed primary containment areas, and therefore would be managed to early successional conditions rather than to maintain sage-grouse habitat. Protection measures in these areas would remain as at present. In addition, 24,460 acres would be designated as Secondary Sage-Grouse Management Areas, although 1,922 acres would be in proposed primary containment areas. In Secondary Sage-Grouse Management Areas, sage-grouse habitat considerations would be emphasized when not in conflict with mission requirements.



**Figure 5-13. Proposed Sage-Grouse Protection Area and Lek Buffers on Yakima Training Center**





- Mitigation: Provide appropriate sage-grouse lek area designation protection – To ensure that leks receive the appropriate protection, provide a process to ensure that newly discovered leks receive designated area protection, and that leks that may have become inactive area managed to the land allocation standards they are contained in. Provide designated area protection to two recently discovered leks in TAs 16 and 8, and manage two inactive leks in TAs 12 and 5, and the active lek in the CIA, to the allocation standards they are contained in.

Explanation: This mitigation would maximize protection of active leks but remove protective buffers from inactive leks. Additionally, the Army would remove the 1-km buffer around the active lek in the CIA. This lek is effectively not protected by the buffer at present, as the current regulations allow vehicles to drive on nearby roads to access ranges at all times of the year.

- Revise the Sage-Grouse Management Plan – Revise the Sage-Grouse Management Plan to incorporate new information and proposed mitigation measures as part of the YTC INRMP revision.

Explanation: The Sage-Grouse Management Plan has not been revised since 1998, and would need to be revised because of the changes in management presented here.

- Mitigation: Revise flight restrictions related to sage-grouse leks and nesting – Extend existing flight restrictions to all new proposed Sage Grouse Protection Area and Secondary Sage-Grouse Management habitat areas that contain a primary flight route (see Figure 5-13) and/or within 1 kilometer of a lek receiving protection.

Explanation: This mitigation measure clarifies the current flight restrictions related to sage-grouse leks and nesting.

- Mitigation: Increase West Nile virus surveillance and control – To reduce the susceptibility of sage-grouse to West Nile virus, continue the current cooperative surveillance program and increase control efforts at all man-made sources of mosquito breeding habitat to include newly proposed water suppression sources.

Explanation: Sage-grouse are extremely susceptible to West Nile virus, which has been confirmed on YTC and within Washington. This mitigation measure expands on management that is currently being done, which is necessary given the increase in water sources proposed as fire mitigation.

- Mitigation: Install forb restoration/greenhouse facilities – To augment sage-grouse habitat restoration efforts, install/use previously acquired greenhouses and procure additional greenhouse/restoration supplies for annual forb growing.

Explanation: The intent of this mitigation is to ensure a source of plant materials for restoration activities. This includes some species of forbs that are not commercially available.

- Mitigation: Install a genetic augmentation program – To provide for the interchange of genetic material and to actively augment the existing sage-grouse population in a periodic basis, establish an agreement with WDFW to work cooperatively in implementing periodic genetic augmentation, as described in the WDFW Sage-Grouse Recovery Plan.

Explanation: YTC is currently taking part in a genetic augmentation project, as discussed in Section 5.2.3.2. The proposed mitigation would continue this project into the future, and would include a schedule of periodic genetic augmentation.



- Mitigation: Continue partnership and provide support of the South Central Washington Shrub-Steppe Collaborative (SCWSSC) – To further the goals/objectives of the partnership, which include conserving shrub-steppe habitat on public and private lands in the four-county Yakima Focal Area containing YTC, conserving sage-grouse, maintaining sustainable rangeland resources, and sustaining military training, provide support of the SCWSSC Coordinator position (GS-11) for 5 years.

Explanation: YTC currently participates in the SCWSSC, but under the proposed mitigation would provide an Army-funded coordinator position for the next 5 years. The SCWSSC would have a regional focus, and would potentially be a means of identifying off-post mitigation options.

- Mitigation: Establish a Candidate Conservation Agreement with the USFWS – To ensure that YTC sage-grouse management efforts to preclude the species from further listing are acknowledged, work cooperatively with the USFWS in revising and including the YTC sage-grouse management plan in a Candidate Conservation Agreement with the USFWS.

Explanation: A Candidate Conservation Agreement with the USFWS would be a mechanism for the USFWS to acknowledge sage-grouse management efforts on YTC.

- Mitigation: Explore Army Compatible Use Buffer (ACUB) and Candidate Conservation Agreement with Assurances for off-installation mitigation – To provide added assurances and as an incentive to landowners for sage-grouse and shrub-steppe conservation efforts, recommend that the SCWSSC explore the possibility of a Candidate Conservation Agreement for private landowners within the Yakima Focal Area of the SCWSSC. Complete an ACUB feasibility assessment and develop ACUB proposals, where appropriate, to reduce encroachment issues pertaining to YTC.

Explanation: This mitigation would potentially extend species protection and preservation efforts to off-post areas within the region. The ACUB program allows the Army to work with partners to protect habitat and training without acquiring any new land for Army ownership. The program allows the Army to contribute funds to the partner's purchase of easements and properties from willing landowners. These partnerships preserve high-value habitat and limit incompatible development in the vicinity of the installation (Department of the Army 2008c).

- Mitigation: Recommend development of a regional habitat restoration/protection strategy – To ensure that the management for sage-grouse and shrub-steppe extends beyond YTC boundaries at scales appropriate for management of sage-grouse and its habitat, explore the possibility of a Regional Restoration Strategy for all federal and state agencies within the Yakima Focal Area of the SCWSSC.

Explanation: This mitigation is intended to take a regional focus on sage-grouse management that extends beyond YTC.

- Mitigation: Develop a sage-grouse predator assessment and management plan – To address the continuing impact of predation on production and survival of sage-grouse populations, assess the predation issues and predator management options, and develop a predator management plan (3-year phased one-time project).

Explanation: Predation has been identified as an important source of sage-grouse mortality on YTC. This mitigation would include an assessment of predation and preparation of a management plan that addresses habitat quality issues and predator management options.



- Mitigation: Remove old livestock fences that are no longer required downrange, and mark required fences (i.e., around impact and dud areas) to increase their visibility to sage-grouse.

Explanation: Fences have been documented as a source of sage-grouse mortality throughout YTC. Numerous fences exist downrange that pose a threat to sage-grouse. This mitigation will remove fences that are no longer needed, and make the rest more visible to reduce their threat to sage-grouse.

### 5.2.3.7 Summary of Effects

Proposed increases in training would result in greater disturbance of sage-grouse on YTC, despite ongoing training restrictions, particularly at leks located outside or near the edges of the Sage-Grouse Protection Area. Increased off-road maneuver training in shrub-steppe habitats, as well as increased training-related ignitions, would lead to continued degradation and loss of sage-grouse habitat. Additionally, the increased frequency with which training areas are degraded would lead to an increased need for restoration of degraded habitats. The extensive list of conservation measures proposed in Section 5.2.3.6 would expand fire management and sage-grouse management (both on-post and regionally), and are likely to help maintain habitats and populations on YTC and decrease long-term impacts to sage-grouse, despite increases in training. These measures are intended to preclude the need to list the greater sage-grouse in the future. The success of these measures would be dependent on Army funding and on how they are implemented. The Army would continue to monitor sage-grouse populations and the effectiveness of mitigation to determine whether changes are warranted in the future.

## 5.2.4 Marbled Murrelet

### 5.2.4.1 Background Information

A description of marbled murrelet population status and habitat requirements and potential effects to marbled murrelets from military training activities are given in Section 5.1.5.

The marbled murrelet has been listed by the USFWS as occurring on or near YTC. However, the shrub-steppe environments at YTC do not provide suitable habitat for this forest-dependent species, and it has not been documented on the installation. There is no designated critical habitat for marbled murrelets on YTC; the closest critical habitat is nearly 50 miles (80 kilometers) west of the installation. Therefore, the proposed action would have **no effect** on marbled murrelets or their habitat.

## 5.2.5 Northern Spotted Owl

### 5.2.5.1 Background Information

A description of northern spotted owl population status and habitat requirements and potential effects to northern spotted owls from military training activities are given in Section 5.1.6.

The northern spotted owl has been listed by the USFWS as occurring on or near YTC. However, the shrub-steppe environments at YTC and the surrounding areas do not provide suitable habitat for this forest-dependent species, and it has not been documented as occurring on the installation. There is no critical habitat for northern spotted owl on YTC; the closest critical habitat is more than 25 miles (40 kilometers) from the installation. Therefore, the proposed action would have **no effect** on northern spotted owls or their critical habitat.



### 5.2.6 Canada Lynx

A description of Canada lynx population status and habitat requirements and potential effects to Canada lynx from military training activities are given in Section 5.1.7.

The Canada lynx has been listed by the USFWS as occurring on or near YTC. However, the shrub-steppe environments at YTC and the surrounding areas do not provide suitable habitat for this forest-dependent species and this species has not been recorded on the installation. There is no critical habitat for lynx near YTC. Therefore, the proposed action would have **no effect** on Canada lynx or their critical habitat.

### 5.2.7 Gray Wolf

A description of gray wolf population status and habitat requirements and potential effects to gray wolves from military training activities are given in Section 5.1.8.

The shrub-steppe environments at YTC and the surrounding areas do not provide suitable habitat for this species, and gray wolves have not been documented on the installation. No designated critical habitat for gray wolf is found on YTC. Therefore, the proposed action would have **no effect** on the gray wolf or its critical habitat.

### 5.2.8 Grizzly Bear

A description of grizzly bear population status and habitat requirements and potential effects to grizzly bears from military training activities are given in Section 5.1.9.

The shrub-steppe environments at YTC do not provide suitable habitat for this forest-dependent species and grizzly bears have not been documented on the installation. No critical habitat has been designated for grizzly bears. Therefore, the proposed action would have **no effect** on the grizzly bear or its critical habitat.



## 6.0 ESSENTIAL FISH HABITAT ASSESSMENT

### 6.1 Introduction

In 1976, Congress passed the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This law authorized the United States to manage its fishery resources out to 200 miles (320 km) off its coast, an area referred to as the exclusive economic zone. Under the MSA, regional councils established by Congress were charged with preparing Fishery Management Plans for every fishery requiring management. In 1996, the Sustainable Fisheries Act (Public Law 104-267) amended the MSA, requiring the identification of Essential Fish Habitat for federally managed fishery species, and the implementation of measures to conserve and enhance the habitat of these species, as described in federal Fishery Management Plans. All federal agencies are required to consult with NMFS on current or proposed actions, permitted, funded, or undertaken by the agency, which may adversely affect EFH. Adverse affects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey), site-specific, or habitat-wide impacts.

Congress defined EFH in the interim final rule (62 FR 66551) as: “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” For the purpose of interpreting the definition of EFH habitat, “waters” include aquatic areas and their associated physical, chemical, and biological properties; “substrate” includes sediment underlying the waters; “necessary” refers to the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types utilized by a species throughout its life cycle.

There are four components of an EFH consultation:

1. **Notification** – the federal agency provides notification of an activity that “may adversely affect” EFH to NMFS;
2. **EFH Assessment** – the federal agency provides a description of the proposed action, an analysis, and effects determination to NMFS;
3. **Conservation Recommendations** – Under section 305(b)(4) of the MSA, NMFS is required to provide EFH conservation and enhancement recommendations to the federal agency for actions that may adversely affect EFH. In turn, NMFS will discuss EFH conservation recommendations with the federal agency and provide these recommendations to the federal agency, pursuant to section 305(b)(4)(A) of the MSA; and
4. **Federal Agency Response** – the federal agency provides written responses to NMFS and the appropriate Council within 30 days after receiving the conservation recommendations.

The objective of this EFH assessment is to describe potential adverse effects of the proposed Army GTA actions on areas designated as EFH for the federally managed fisheries of the Pacific Coast. This assessment will include conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects resulting from the proposed action in the designated EFH.

### 6.2 Species and Regions Involved in this EFH Assessment

The Pacific Council manages federal fisheries for Washington, Oregon, Idaho, and California under three Fishery Management Plans. These Fishery Management Plans are the Pacific Coast Groundfish Management Plan (82 species), the Coastal Pelagic Species Fishery Management Plan (5 species), and the Pacific Coast Salmon Plan (3 species: Chinook, coho, and Puget Sound pink salmon).



### 6.2.1 Salmon Species

All three salmon species overseen by the Pacific Council will be reviewed in this assessment. The EFH for the Pacific Coast salmon fishery includes those waters and substrates that are necessary for salmon production, and that are capable of supporting a long-term, sustainable salmon fishery and salmon contributions to a healthy ecosystem. To achieve this level of production, EFH includes all streams, lakes, ponds, wetlands, and other viable water bodies that are accessible to salmon, as well as most of the habitat that was historically accessible (excluding areas upstream of longstanding naturally impassable barriers) in Washington, Oregon, Idaho, and California. In estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters, out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California, north of Point Conception (Pacific Fishery Management Council 1999).

### 6.2.1 Pelagic Species

There are four Pacific Coast pelagic species that occur in the Puget Sound: Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicas*), northern anchovy (*Engraulis mordax*), and market squid (*Loligo* spp.). EFH for these species includes marine and estuarine waters from the coast offshore to 200 miles from shore, and above the thermocline where surface temperatures range between 50 and 69 °F.

### 6.2.2 Groundfish Species

Of the 82 total managed groundfish species, 43 may occur within the Puget Sound (Table 6-1). EFH for groundfish is habitat that contributes to spawning, breeding, feeding, growth to maturity, and production (Pacific Fishery Management Council 2006). Habitat areas of particular concern are estuaries, canopy, kelp, seagrass, rocky reefs, and special areas of interest of the coasts of Washington, Oregon, and California. In Washington, these areas include all waters and sea bottom in Washington State waters from the 3 nautical mile boundary of the territorial sea shoreward to mean higher high water. Washington State waters are important to juvenile rockfish, juvenile lingcod, juvenile flatfish, and English sole.

## 6.3 Species and Life History Stages Affected

### 6.3.1 Salmon

The natural ranges of the Pacific salmon species addressed within this EFH assessment include large portions of the Pacific Rim of North America and Asia. Anadromous salmonids exhibit a significant shift in habitat requirements, where adults migrate from the ocean to their natal streams to spawn (Groot and Margolis 1991). However, all anadromous salmonids (except steelhead and cutthroat trout [*Oncorhynchus clarki*]) follow the same general life history pattern, which includes incubation and hatching of embryos, and emergence and initial rearing of fry (a life stage of salmon between absorption of the yolk sac and juvenile salmonid) in freshwater; migration to oceanic habitats for extended periods of feeding and growth; and return to natal waters for completion of maturation, spawning, and death within a few weeks after spawning. Although all anadromous salmonids share the same general life cycle, there are substantial differences among species in the amount of time spent in freshwater and marine environments, as well as in the types of habitat they utilize for spawning and rearing (Table 6-2).



**TABLE 6-1**  
**Pacific Coast Species with Designated Essential Fish Habitat in Puget Sound**

Common Name	Scientific Name
Salmon Species	
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Puget Sound pink salmon	<i>Oncorhynchus gorbuscha</i>
Pelagic Species	
Market squid	<i>Loligo</i> spp.
Northern anchovy	<i>Engraulis mordax</i>
Pacific mackerel	<i>Scomber japonicas</i>
Pacific sardine	<i>Sardinops sagax</i>
Groundfish Species	
Aurora rockfish	<i>Sebastes aurora</i>
Big skate	<i>Raja binoculata</i>
Black rockfish	<i>Sebastes melanops</i>
Bocaccio	<i>Sebastes paucispinis</i>
Brown rockfish	<i>Sebastes auriculatus</i>
Butter sole	<i>Isopsetta isolepis</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
California skate	<i>Raja inornata</i>
Canary rockfish	<i>Sebastes pinniger</i>
China rockfish	<i>Sebastes nebulosus</i>
Copper rockfish	<i>Sebastes caurinus</i>
Curlfin sole	<i>Pleuronichthys decurrens</i>
Darkblotched rockfish	<i>Sebastes crameri</i>
Dover sole	<i>Microstomus pacificus</i>
English sole	<i>Parophrys vetulus</i>
Greenstriped rockfish	<i>Sebastes elongatus</i>
Kelp greenling	<i>Hexagrammos decagrammus</i>
Lingcod	<i>Ophiodon elongatus</i>
Longnose skate	<i>Raja rhina</i>
Pacific cod	<i>Gadus macrocephalus</i>
Pacific hake	<i>Merluccius productus</i>
Pacific ocean perch	<i>Sebastes alutus</i>
Pacific sanddab	<i>Citharichthys sordidus</i>
Petrale sole	<i>Eopsetta jordani</i>
Quillback rockfish	<i>Sebastes maliger</i>
Redstripe rockfish	<i>Sebastes proriger</i>
Rock sole	<i>Lepidopsetta bilineata</i>
Rosethorn rockfish	<i>Sebastes helvomaculatus</i>
Rosy rockfish	<i>Sebastes rosaceus</i>
Rougheye rockfish	<i>Sebastes aleutianus</i>
Sablefish	<i>Anoplopoma fimbria</i>
Sand sole	<i>Psettichthys melanostictus</i>
Sharpchin rockfish	<i>Sebastes zacentrus</i>
Shortspine thornyhead	<i>Sebastolobus alascanus</i>
Spiny dogfish	<i>Squalus acanthias</i>
Splitnose rockfish	<i>Sebastes diploproa</i>
Spotted ratfish	<i>Hydrolagus colliei</i>
Starry flounder	<i>Platichthys stellatus</i>
Stripetail rockfish	<i>Sebastes saxicola</i>
Tiger rockfish	<i>Sebastes nigrocinctus</i>
Vermilion rockfish	<i>Sebastes miniatus</i>
Yelloweye rockfish	<i>Sebastes ruberrimus</i>
Yellowtail rockfish	<i>Sebastes flavidus</i>



**6.3.1.1 Habitat Requirements of Salmonids in Streams**

Adult Pacific salmon typically migrate upstream at temperatures between 37 and 68° F (3 and 20° C), in water depths between 7 and 9.5 inches (18 and 24 cm; Bjornn and Reiser 1991). Salmon may spawn within this temperature range, although spawning typically occurs between 39 and 52° F (4 and 11° C; Bell 1986). Once spawning is complete, water temperature affects the timing of salmonid egg incubation (Laufle et al. 1986; Healey 1991; Sandercock 1991; Spence et al. 1996; National Marine Fisheries Service 1999). For example, the time it takes 50 percent of the larval salmonids of Pacific salmon species to hatch ranges from 115 to 150 days at 39° F (4° C), and from 35 to 60 days at 54° F (12° C; Bjornn and Reiser 1991). However, the alevin (a larval salmonid that has hatched but not yet fully absorbed its yolk sac) stage is generally less temperature sensitive than the embryonic stages (Spence et al. 1996). Newly hatched and juvenile salmonids are variable with regard to their temperature requirements, although as parrs most species are at risk when water temperatures exceed 77° F (25° C). Although juvenile salmonids may briefly tolerate such high temperatures, they are mostly lethal.

**TABLE 6-2  
Generalized Biological and Habitat Requirements of Pacific Salmonids**

Species	Spawn Sites	Time in Gravel (Eggs)	Emergence	Rearing Sites	Time in Freshwater	Time in Marine	Return to Freshwater
Chinook	mainstem	<i>Fall run:</i> 90-150 days <i>Spring run:</i> 90-150 days	March-April	mainstem	<i>Fall run:</i> 60-120 days <i>Spring run:</i> 1-2 yrs	2-6 yrs	<i>Spring run:</i> April <i>Summer run:</i> July <i>Fall run:</i> Nov
Coho	tributaries	80-150 days	April-May	mainstem/ side channels, slack water	1-2 yrs	1-2 yrs	Late fall
Pink	mainstem/ tributaries/ intertidal	90-150 days (odd years only)	Late Jan, April-May	saltwater (nearshore)	several days	2 yrs	Early fall

Sources: Laufle et al. 1986; Healy 1991; Heard 1991; Meehan and Bjornn 1991; and Sandercock 1991.

Embryos and alevins are very susceptible to low dissolved oxygen (DO) levels, and require oxygen levels greater than 8 parts per million to survive (Phillips and Campbell 1961). If DO concentrations are low, the incidence of morphological abnormalities of emerging alevins is increased (Bjornn and Reiser 1991). Upon hatching, however, alevins in the gravel are able to detect oxygen gradients and move to areas with more suitable DO levels. Salmon, when rearing in freshwater, require DO levels of 6.5 to 7.0 parts per million. They may survive when DO concentrations are lower (< 5 parts per million), but growth, food conversion efficiency, and swimming performance may be adversely affected.

Riparian vegetation provides shade, shelters salmon from predation, moderates water temperature of a stream, stabilizes banks, and controls soil erosion and sedimentation. Furthermore, this vegetation provides nutrients to the stream, food for juvenile salmon, and may contribute large woody debris (LWD), which in turn increases channel complexity, creates backwater habitats, and increases the water depth of pools. Studies have shown a correlation between the amount of LWD and salmon production (Dolloff 1983, House and Boehne 1986).



Adult salmonids can successfully migrate any stream reach of reasonable length if the water depth is greater than 5 inches (12.7 cm) where substrate particles average larger than 3 inches (8 cm) in diameter, or if the depth is greater than 3.5 inches (9 cm) where particles are less than 3 inches (7.6 cm; Bjornn and Reiser 1991). Adult salmonids, upon reaching spawning beds, typically deposit eggs within a range of water depths and velocities that minimize the risk of desiccation over the coming incubation period. These depths and velocities vary depending on species and run of population (i.e., spring, summer, or fall runs). However, studies suggest that a depth of 7 inches (18 cm) and a velocity of 0.98 feet per second (ft/s; 0.03 meters per second [m/s]) meet the minimum criteria (Thompson 1972, Neilson and Banford 1983, Bjornn and Reiser 1991, Healy 1991, Heard 1991).

Upon emerging from the substrate, fry between 0.7 and 1.4 inches (1.8 and 3.6 cm) long require water velocities of less than 0.32 ft/s (0.01 m/s), whereas juvenile salmon between 1.6 and 7 inches (4.1 and 18 cm) long usually occupy sites with velocities of up to 1.3 ft/s (0.04 m/s; Bjornn and Reiser 1991). When rearing in freshwater, juvenile salmon seek out slower velocity areas adjacent to faster water for feeding, resting, and growing. Overall, velocities required and used by juvenile salmonids vary with the size of the fish, and may change seasonally. By occupying slow velocity areas, salmon are likely to use less energy. Invertebrate drift abundance increases with velocity across a stream. Therefore, darting into the stream to feed and then resuming position in slower waters may provide a potential energy benefit for fish. Salmon use less energy maintaining their position in slow velocities while at the same time benefiting from the increased food abundance provided by faster velocities.

Within the stream channel, salmon require sufficient clean and appropriately sized cobbles and gravel (ranging from 0.5 to 4 inches [1.3 to 10 cm]) for spawning and incubation (Spence et al. 1996). Furthermore, riffles, rapids (a section of stream with considerable surface agitation, swift current, and drops of up to 3 feet [1 m]), pools, and floodplain connectivity with the stream are important for production, rearing, cover, and aeration.

### **6.3.1.2 Habitat Requirements of Salmonids in the Marine Environments**

The marine environment can be subdivided into three general regions: estuary, coastal/nearshore, and ocean. Smoltification, the transition from fresh- to saltwater, marks a critical phase in the life history of anadromous salmonids. The emigration from freshwater to the ocean is preceded by rapid physiological, morphological, and behavioral transformations that preadapt fish for the marine environment. Once entering estuaries, juvenile salmon that have undergone smoltification (smolts) must acclimate to the new ecological conditions rapidly, including an immediate shift in diet, introduction to new predators, and a significantly different environment.

Utilization of marine habitats may vary both among and within salmon species. For pink and ocean-type Chinook salmon, smoltification occurs from within days to within a few months of life, whereas coho and stream-type Chinook salmon may reside in freshwater systems for an extended period then migrate to saltwater in their second year (or third year, more so in the case of coho salmon).

Rivers with well-developed estuaries, like the Nisqually Reach, are able to sustain larger ocean-type populations than those without (Levy and Northcote 1982). Brackish water areas in estuaries moderate the physiological stress during the parr-smolt transition. A longer estuarine residence exhibited by ocean-type Chinook salmon makes them more susceptible to changes in the productivity of the marine environment than stream-type Chinook salmon or coho salmon. This possible change in productivity, combined with the loss in coastal wetlands, may directly impact ocean-type populations.

Salmon, such as ocean-type Chinook salmon fry (as opposed to stream-type Chinook) prefer protected estuarine habitats with lower salinity, moving from the edges of marshes during low tide to protected tidal



channels and creeks during high tides. Ocean-type Chinook remain in estuaries for several months before migrating to marine waters, whereas stream-type Chinook spend little time in the estuary of their natal stream before their migration. As the salmonids grow, they move to higher-salinity waters and increasingly less-protected habitats (within the estuary) before entering into the strictly marine areas. Chinook salmon can reside in the ocean between 2 and 5 years before returning to natal streams to spawn (Healey 1991). They are typically distributed throughout the Bering Sea.

Coho salmon are thought to remain in estuarine areas for several days to several weeks, as opposed to more northern populations that remain in these areas for several months. In estuaries, smolts often occur in intertidal and pelagic habitats, with deep, marine-influenced habitats (Pearce et al. 1982). When reaching the marine environment, coho salmon exhibit two dispersal patterns. Some juveniles spend weeks in estuaries before migrating to offshore waters, while others remain in coastal waters for at least the first summer before moving offshore (Pearce et al. 1982; Pearcy 1992). Due to the increase in food availability, growth of smolts is very rapid once smolts reach the estuarine area (Sandercock 1991). Juvenile coho feed mostly on marine invertebrates but also prey upon chum and pink fry (Slaney et al. 1985). Most coho remain at sea for about 18 months, moving northwest and south along the West Coast before returning to coastal areas and entering freshwater to spawn (Sandercock 1991). In Washington, adults typically enter freshwater habitat from October through November. In general, larger river basins have a wider range of river entry times than do smaller systems, with river entry occurring later the farther south a river is situated.

Pink salmon generally begin migration immediately upon emergence from the gravel. Upon entering the marine environment (around March – April), pink salmon appear to utilize the nearshore extensively for early rearing (Hard et al. 1996). The use of estuaries by pink salmon varies widely, from passing directly through en route to the nearshore areas to residing in estuaries for 1 to 2 months (Heard 1991). In general, most pink salmon prefer nearshore habitats over estuaries for their initial rapid growth. Rearing of pink salmon is typically 2 to 3 months, but may be as long as 4 months in the Puget Sound before juveniles move into the ocean (Heard 1991; Hard et al. 1996). At approximately 2 to 3 inches (5 to 7.6 cm) in length, pink salmon move from the nearshore to colder, deeper water to begin their ocean migration (Healey 1980). For populations in the Puget Sound, this movement begins in July and lasts through October as fish migrate out of the Puget Sound into the Pacific Ocean. Research shows that pink salmon from the Puget Sound migrate rapidly northward along the coasts of British Columbia and southeastern Alaska (Hartt and Dell 1986). Pink salmon is one of the fastest growing salmonid species (Heard 1991).

### 6.3.2 Pelagic Species

Descriptions provided below are taken from the Coastal Pelagic Species Fishery Management Plan (Pacific Fishery Management Council 1998).

Market squid are found from the southern tip of Baja California, Mexico, to southeastern Alaska. They prefer oceanic salinities and are rarely found in bays or estuaries, or near river mouths. Known major spawning areas include shallow protected nearshore areas with sandy or mud bottoms adjacent to submarine canyons, with egg deposition occurring between 16 and 180 feet. Juvenile squid feed on copepods, while mature squid feed on euphasids, other small crustaceans, small fish, and other squid.

Northern anchovy are typically found in schools near the surface, with nearshore habitat areas supporting 70 percent of the juvenile anchovy population. They eat phytoplankton and zooplankton by either filter feeding or biting, depending on the size of the food. Spawning can occur year-round, but most occurs during February to April. Both the eggs and larvae are found near the surface, but all life stages may be found in the surface waters where temperatures range from 54 to 71 °F.



Pacific mackerel range from Mexico to southeastern Alaska. Juveniles are found off sandy beaches, around kelp beds, and in open bays. Adults are commonly found near shallow banks and from the surface to depths of 1,000 feet. Pacific mackerel larvae eat copepods and other zooplankton, including fish larvae. Juveniles and adults feed on small fishes, fish larvae squid, and pelagic crustaceans.

Pacific sardines inhabit coastal subtropical and temperate waters. They occur in estuaries, but are most common in the nearshore and offshore domains along the coast. Pacific sardines spawn in loosely aggregated schools in the upper 165 feet of the water column. Most sardines are found off the coast of California, but they have been seen as far north as British Columbia. Sardines are planktivores that consume both phytoplankton and zooplankton.

### 6.3.3 Groundfish Species

Greater Puget Sound is a fjord-like estuary located in northwest Washington State with significant freshwater flows from rivers like the Nisqually River and multiple smaller streams around the basin (Palsson et al. 1998). Groundfish occupy most habitats of the Puget Sound ecosystem, including shallow and deepwater habitats, which are linked to freshwater and oceanic ecosystems. Due to the general similarities among the flatfish species with regard to life history stages, habitat requirements, and the potential effects the proposed action may have on them and their aquatic habitats, this section will discuss effects on the fish as groups, rather than on a species-by-species basis.

This broad, flat-bodied group of benthic fishes is typically found on shiftable substrates such as gravel, sand, or mud (Lamb and Edgell 1986). Flatfish are found in water at depths between 30 and 1,700 feet (9 and 518 m). Migration is exhibited particularly during the adult stage, when fish enter shallow water (< 70 feet [20 m]) during the summer to feed. Species such as the starry flounder enter the river portions of estuaries. During spawning, flatfish migrate to deeper offshore areas. From winter through spring, eggs occur from the water surface to depths of greater than 650 feet (198 m).

These fish typically reside in or adjacent to estuarine areas and the upper saltwater extent in rivers, which are dominated by sandy or muddy substrates. Although not considered migratory species, adult flatfish generally migrate short distances (approximately 3 miles [4.8 km]) inshore to shallow (< 160 feet [49 m]) waters during summer to feed, returning to deeper (230 to 650 feet [70 to 198 m]), offshore waters in winter to spawn. Sand sole and starry flounder exhibit different migration patterns than the remaining species. Both species move to the nearshore in winter to spawn, returning offshore in the spring-summer to feed (Conley 1977, Rogers and Millner 1996).

## 6.4 Effects of the Proposed Action

Effects of ongoing and future training activities to the various aquatic habitats and fish populations can be separated into direct and indirect effects. Direct effects are those that contribute to the immediate loss or harm to individual fish or embryos (e.g., heavy vehicles directly crushing fish or embryos). Indirect effects are those effects that occur at a later time, causing specific changes in habitat features (e.g., sedimentation or changes in habitat structure and stability). These effects may cause loss or reduction of populations of fish, or reductions in habitat quantity and quality.

Anthropogenic disruption can affect production of Puget Sound salmon, pelagic, and flatfish populations. Such disruptions include poor water quality, excessive nutrient input, and elimination or disruption of freshwater or estuarine habitats. One source of impacts to EFH fisheries and their habitat from the proposed action is changes in streamflow rates increasing erosion and sedimentation, which can result from activities such as off-road vehicle travel or ordnance explosions (see Section 6.4.1). Erosion-promoting activities on a large scale may alter drainage patterns in a watershed, which may, over time, alter long-term flow regimes



(e.g., flash flooding, scouring, or prolonged periods of low flows). Coupled with erosion and sedimentation is the issue of soil compaction. Compacted soil will reduce stormwater infiltration rates, which can alter runoff patterns. Compaction leads to an increase surface flow, which in turn exacerbates high-flow events entering nearby streams. It also reduces groundwater recharge, which can prolong low-flow periods.

Another potential effect on EFH is increased discharges into the Puget Sound from the Solo Point WWTP. The WWTP is located on Fort Lewis, adjacent to the Puget Sound, and treats wastewater from Fort Lewis, McChord AFB, Madigan Army Medical Center, the Veteran's Hospital at American Lake, and Camp Murray National Guard Station. The mixing zone radius around each diffuser port is 270 feet (82 meters), and the total mixing zone length around the diffuser is 670 feet (204 meters).

#### **6.4.1 Effects on Salmon**

Due to the similarities in life histories and habitat requirements among species of Pacific salmon, this section will discuss the potential effects of the proposed action on salmon as a group, rather than on a species-by-species basis. All life history stages of salmonids at Fort Lewis may potentially be affected, while at YTC impacts occur only to freshwater stages.

Freshwater stages that may be affected include adult migration to natal spawning areas, incubation and maturation of eggs, as well as rearing and migration of juveniles to the ocean. The affected estuarine and nearshore marine stages include smoltification (i.e., the physiological process that prepares a juvenile anadromous fish to survive the transition from freshwater to saltwater) and migration of juveniles to the ocean, as well as adults returning to natal streams.

Increases in streamflow can lead to alterations in channel morphology. Doubling the speed of streamflow increases its erosive power by four times and its bedload and sediment carrying power by 64 times (USDA Forest Service 2002). Accelerated runoff can thus cause unstable stream channels to downcut or erode laterally, accelerating erosion and sediment production. Lateral erosion results in progressively wider and shallower stream channels, which can adversely affect fish populations. Pool/riffle (riffles are defined as shallow sections of the stream with rapid current and a surface broken by gravel, rubble, or boulders) and width/depth ratios, which are important habitat components for salmonids, may be altered.

Turbidity and sedimentation affect the abundance of food, and impact juvenile salmon behavior, adult spawning, and egg incubation habitats (Laufle et al. 1986; Healey 1991; Sandercock 1991; Spence et al. 1996). An increase in turbidity can cause a short-term increase in phytoplankton, as well as in inorganic and organic materials that are suspended in the water column during high flow conditions, potentially diminishing light penetration into the stream (Spence et al. 1996). Diminished light levels can reduce algal productivity and change the instream plant composition (Samsel 1973). This reduction of plant material instream may allow sediment to drift within the water column, increasing siltation. Siltation contributes significantly to a reduction in the diversity of aquatic insects and other aquatic invertebrates (Spence et al. 1996). Silt reduces the interstices (narrow spaces) in the substrate, thereby limiting the microhabitat for benthic invertebrates (i.e., a portion of the juvenile salmon diet) in a stream. For example, feeding and territorial behaviors of juvenile coho salmon are disrupted by short-term exposure (approximately 2 to 5 days) to turbid water (Berg and Northcote 1985).

Training activities would follow the general timing restrictions within essential fish habitat provided in Table 6-3. These timing restrictions are established by WDFW (and imposed by NMFS) to limit when activities may be conducted for specific bodies of water as a means of protecting salmonid species from potential habitat disturbance during spawning. Typically activities are permitted around or within streams containing salmonids during the summer months (i.e., June through September); however, timing windows can and may vary depending on geographic location.



**TABLE 6-3**  
**Generalized Timing Restrictions in Washington, Indicating When Activities**  
**May Occur Within Streams Considered to be Essential Fish Habitat**

Installation	County/Watershed	General Season	Exceptions to General Season	Activity Is Allowed Between These Dates
Fort Lewis	Pierce	July 16–August 31	Nisqually River mouth to Alder Lake to include tributaries	July 16 - August 31
	Thurston	July 16 - Sept. 15	Nisqually River mainstem	July 16 – August 31
YTC	Kittitas	July 1 – Sept. 30	--	--
	Yakima	June 1 – Sept. 15	Yakima River mouth to Roza Dam	June 1 -- Sept. 15
			On-site tributaries	July 16 – August 15
	Columbia River (above Priest Rapid Dam)	July 16 – Feb. 28	All Columbia tributaries	See county listings

Source: Chapman (2009).

The addendum to the BE prepared in association with renewal of the Fort Lewis NPDES permit determined that since the mixing zone is a small fraction of the area surrounding the receiving water in Puget Sound, discharges under the proposed permit renewal would have no effect on EFH. Additionally, concentrations of water quality contaminants under maximum permitted discharge scenarios were not large enough to adversely affect fish at various life stages.

Although the WWTP is currently well below its hydraulic design capacity, there is evidence that it is already near its BOD design capacity, and therefore would not be able to meet the more restrictive permit limits of the new NPDES permit under the proposed action. Although additional effluent would be of the generally the same physical and chemical makeup as the current effluent, potential effects to EFH fish species and EFH in the form of increased BOD and reduced dilution of contaminants, could be greater than those addressed in the BE.

The new soldiers and family members living off-post would also contribute to increases in other treatment plants in the region. It is impossible to determine where these increases would occur, but it is assumed that the vast majority of the incoming population would live in Pierce and Thurston counties. Therefore, additional wastewater discharges into the Puget Sound associated with stationing actions are likely. Given that the total additional population in the region is just over 1 percent of the total regional population in Pierce and Thurston counties, it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to EFH salmon species or their habitats.

#### 6.4.2 Effects on Pelagic Species

The proposed action would not involve any fishing, but could result in some habitat disturbance through increased instream sedimentation discharged into the lower reaches of the Nisqually River, as well as increased wastewater discharges to the Puget Sound. Impacts to the Puget Sound from the proposed action should be minimal. Sedimentation and runoff from training activities could potentially affect pelagic species downstream. Within the estuary, tides, currents, and weather affect the sandy, muddy substratum of the Nisqually Reach. Furthermore, there is usually an abundance of fine silt brought down from the land (Kozloff 1996). Thus, training activities at increased levels should have little impact to pelagic species or their habitat due to the dynamic, unstable nature of this area.

As discussed above for salmon species, the discharges from the Solo Point WWTP under maximum permitted scenarios should remain below levels that would be expected to adversely affect pelagic species in the Puget Sound. However, population increases could result in increased levels of BOD and other water quality



contaminants. Total regional increases associated with the action would be a very small fraction of the current regional discharges, and it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to EFH pelagic species or their habitats.

### 6.4.3 Effects on Groundfish

Like many of the groundfish managed by the Pacific Council, focus has been diverted to fishing pressure on the stock, more so than possible habitat disturbance. For example, the bottom trawl fishery in the Puget Sound is the dominant fishery for flatfish, targeting species such as English sole, starry flounder, rock sole, Dover sole, and sand sole (Palsson et al. 1998). Several Indian tribes have treaty-fishing rights to harvest a share of surplus groundfish resources in Puget Sound. These tribes have imposed regulations similar to those imposed by the WDFW to limit fishing participation. The 1995 Status of Stocks document found that the majority of groundfish were below normal abundance. The proposed action would not involve any fishing, but could result in some habitat disturbance through increased instream sedimentation discharged into the lower reaches of the Nisqually River, as well as increased wastewater discharges to the Puget Sound.

The impacts to the Puget Sound from the proposed action should be minimal. Sedimentation and runoff from training activities could potentially affect groundfish species downstream. Within the estuary, tides, currents, and weather affect the sandy, muddy substratum of the Nisqually Reach. Furthermore, there is usually an abundance of fine silt brought down from the land (Kozloff 1996). Thus, training activities at increased levels should have little impact to groundfish or their estuarine habitat due to the dynamic, unstable nature of this area.

As discussed above for salmon species, the discharges from the Solo Point WWTP under maximum permitted scenarios should remain below levels that would be expected to adversely affect groundfish species in the Puget Sound. However, population increases could result in increased levels of BOD and other water quality contaminants. Total regional increases associated with the action would be a very small fraction of the current regional discharges, and it is not expected that these discharges would result in changes in water quality that would result in adverse impacts to EFH groundfish species or their habitats.

## 6.5 Conservation Measures

The goal of this EFH assessment is to ensure no net loss of freshwater, estuarine, and nearshore habitats valuable to both salmonid and flatfish populations, as a result of the proposed action. Activities associated with ongoing and future military training activities could have the potential to adversely affect salmonids and groundfish and their respective habitats, as the increased frequency of training activities could increase the rate of sedimentation entering water bodies. Additionally, population increases could result in increased levels of water quality contaminants. Implementation of the measures listed below would minimize these potential impacts. As discussed, each species requires specific types and amounts of habitat to maintain a healthy population. Their respective EFH includes habitats required by all life history phases during a species lifetime (i.e., spawning, incubation, dispersal, rearing, migration, and feeding, depending on the species).

The Puget Sound marine ecosystems are intricately linked to freshwater systems through estuaries. Activities occurring in watersheds and riverine areas can directly and indirectly affect fish species utilizing not only the freshwater habitat, but also the estuarine and nearshore ecosystems, through habitat disruption and alteration, flow and current modification, eutrophication, nutrient deprivation, and chemical contamination. These effects may be magnified by the effects of flooding and the intrusion of sediments into the marine environment that affect water quality and bottom habitats (Palsson et al. 1998).

Riparian areas include traditional riparian corridors, wetlands, intermittent streams, and other areas that help to maintain the integrity of aquatic ecosystems by: (1) influencing the delivery of coarse sediment, organic



matter, and woody debris to streams; (2) providing root strength for channel stability; (3) shading the stream; and (4) protecting water quality.

Fort Lewis has ongoing programs to minimize military intrusion into streams and wetlands on the installation. Fort Lewis has conducted detailed mapping of wetlands and streams on the installation to ensure that water bodies are identified and protected and has conducted several wetland habitat enhancement projects designed to maintain or improve water quality entering nearby streams (ENSR 1998a).

Yakima Training Center has implemented several programs to enhance fish habitat. These programs include: marking drainages with siber stakes; prohibiting entry by troops and equipment; minimizing military activities near streams; restoring upland habitats with vegetation to reduce erosion; and using riparian plantings and other stream stabilization and enhancement techniques to improve fish habitat.

To reduce aquatic degradation both Fort Lewis and YTC have implemented the following measures:

- Buffer zones along streams, rivers, and wetland habitats, within which off-road vehicle activities are prohibited.
- Hardened crossings at established stream crossing sites.
- Riparian buffer strips adjacent to aquatic habitats (freshwater or nearshore) to reduce direct impacts to the various life stages of fish species. These buffers protect fish and fulfill specific ecological functions (e.g., streambank stabilization, control of sediment inputs from surface erosion, and maintenance of shade to stream channels).
- BMPs to minimize sedimentation and disturbance of riparian vegetation.
- BMPs to reduce the risk of fire on the installations.
- Minimal construction activities near riparian areas.
- Environmental awareness training for military personnel.

Additionally, Fort Lewis has conservation measures in place to minimize the effects of amphibious training on aquatic habitats near Solo Point:

- Limit off-loading and deployment of floating bridge bays and support vessels at Solo Point between March 1 and June 30 to the existing boat ramp.
- Do not deploy from the native beach, alter the native beach material at Solo Point, or drive on the native beach substrate between March 1 and June 30.
- During the eight days of launch training activity scheduled between March and July of each year, limit nearshore activity to 3 hours each day.

Finally, the following mitigation measure from the GTA EIS would mitigate for increased inputs to the WWTP associated with population increases under the proposed action.

- Construct a new WWTP to mitigate the significant impact of the proposed action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand and total suspended solids from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the proposed action, will not be able to meet the more restrictive permit limits.

No additional conservation measures are necessary to minimize effects to EFH on and near Fort Lewis.



For YTC, the following additional conservation measures would help reduce the effects of the action and minimize transport of sediment into EFH.

- Implement appropriate site rehabilitation (e.g., revegetation, restoration, erosion control, irrigation, and landscaping) following all construction related projects to provide the appropriate vegetative community or landscaping/xeriscaping (include irrigation if necessary) to protect soil resources.
- Modify the YTC CNRMP to account for wind erosion, and implement requirements to include: evaluating high-use landing zones (e.g., ranges) to determine if site hardening is required to prevent excessive soil erosion at these sites; and install hover pads at helicopter landing zones where it is determined that hardening is appropriate to reduce the effects of wind erosion caused by rotor wash.
- Implement erosion control measures to address sediment delivery to the Yakima and Columbia rivers following fire events. This includes measures to reestablish vegetation in upland and riparian areas, and installation of erosion control devices such as excelsior blankets, straw wattles, and rock structures to reduce channel scouring.
- Restrict military training activities on recently restored sites, burned sites, and locations where mitigation measures were employed until restoration and resource rehabilitation measures for the site are successful.
- Implement fire mitigation to reduce fire-related impacts to water bodies and riparian areas, as listed below (these measures are described in more detail in Section 5.2.3.6)
  - Establish wildland fire containment areas.
  - Establish fire exclusion areas.
  - Develop and maintain pre-incident plans for designated locations or activities.
  - Conduct periodic review and refinement of the Wildland Fire Risk Matrix.
  - Implement temporal constraints and other training restrictions during the high fire danger period (15 May through 30 September).
  - Provide additional Range Inspectors.
  - Increase wildland fire staffing.
  - Provide wildland fire suppression equipment.
  - Continue aerial fire suppression capability.
  - Develop additional water resources for fire suppression.
  - Conduct firebreak update and maintenance.
  - Conduct site restoration for wildland fire impacts (efforts are estimated at 9,500 acres annually over the first 5 years and on 6,300 acres annually thereafter).
  - Continue to implement the Training Land Recovery Program.

## 6.6 Determination of Effects

The conservation measures presented in Section 6.5 will continue to prevent or minimize adverse effects from training to aquatic habitats on and near Fort Lewis and YTC. Additionally, construction of a new WWTP would mitigate for increased wastewater discharges associated with population increases. Therefore, proposed training activities would not result in a loss of freshwater, estuarine, or nearshore habitats valuable to salmonid and flatfish populations.



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#### **8.1.3 Stalmaster and Associates, Port Townsend, Washington**

Mark Stalmaster, Wildlife Biologist

#### **8.1.4 National Oceanographic and Atmospheric Administration National Marine Fisheries Service, Lacey, Washington**

Dan Guy, Branch Chief

#### **8.1.5 U.S. Fish and Wildlife Services, Lacey, Washington**

Tom McDowell, Manager, Branch of Federal Activities  
Mark Miller, Project Leader

#### **8.1.6 Washington State Department of Fish and Wildlife, Olympia, Washington**

Pat Chapman, Regulatory Species Coordinator  
Jason Kunz, Fish Biologist  
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#### **8.1.7 Washington State Department of Fish and Wildlife, Wenatchee, Washington**

Szilvia Rideg, Ecologist  
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Jim Cummins, Fisheries Biologist



# **Appendix A**

## **Acronyms and Abbreviations**



## ACRONYMS AND ABBREVIATIONS

<b>ACUB</b>	Army Compatible Use Buffer	<b>km</b>	Kilometers
<b>AFB</b>	Air Force Base	<b>LSR</b>	Late Successional Reserves
<b>AGL</b>	Above Ground Level	<b>LWD</b>	Large Woody Debris
<b>AH</b>	Attack Helicopter	<b>m</b>	Meter
<b>AIA</b>	Artillery Impact Area	<b>m/s</b>	Meters per second
<b>BA</b>	Biological Assessment	<b>MH</b>	Medivac Helicopter
<b>BCT</b>	Brigade Combat Team	<b>MPMG</b>	Multi-purpose Machine Gun
<b>BE</b>	Biological Evaluation	<b>MPRC</b>	Multi-purpose Range Complex
<b>BLM</b>	Bureau of Land Management	<b>MPTR</b>	Multi-purpose Training Range
<b>BMP</b>	Best Management Practice	<b>MSA</b>	Magnuson-Stevens Fishery Conservation and Management Act
<b>BO</b>	Biological Opinion	<b>MRF</b>	Modified Record Fire
<b>BOD</b>	Biological Oxygen Demand	<b>NEPA</b>	National Environmental Policy Act
<b>°C</b>	Degrees Celsius	<b>NMFS</b>	National Marine Fisheries Service
<b>CAB</b>	Combat Aviation Brigade	<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>CFR</b>	Code of Federal Regulations	<b>NOE</b>	Nap-of-the-Earth
<b>CH</b>	Cargo Helicopter	<b>NPDES</b>	National Pollution Discharge Elimination System
<b>CIA</b>	Central Impact Area	<b>NRCS</b>	Natural Resources Conservation Service
<b>cm</b>	Centimeter	<b>ROD</b>	Record of Decision
<b>CNRMP</b>	Cultural and Natural Resources Management Plan	<b>SBCT</b>	Stryker Brigade Combat Team
<b>CSS</b>	Combat Support Service	<b>SCWSSC</b>	South Central Washington Shrub-Steppe Collaborative
<b>CUA</b>	Controlled Use Area	<b>SDZ</b>	Surface Danger Zone
<b>dbh</b>	Diameter at breast height	<b>SFF</b>	Sniper Field Fire
<b>DO</b>	Dissolved Oxygen	<b>SHUAC</b>	Shoot House and Urban Assault Course
<b>DPS</b>	Distinct Population Segment	<b>SOP</b>	Standard Operation Procedure
<b>EFH</b>	Essential Fish Habitat	<b>SPCCP</b>	Spill Prevention Control and Countermeasures Plan
<b>EIS</b>	Environmental Impact Statement	<b>SWPPP</b>	Stormwater Pollution Prevention Plan
<b>ENRD</b>	Environment and Natural Resources Division	<b>TA</b>	Training Area
<b>EPA</b>	Environmental Protection Agency	<b>UAV</b>	Unmanned aerial vehicle
<b>ESA</b>	Endangered Species Act	<b>UH</b>	Utility Helicopter
<b>ESMP</b>	Endangered Species Management Plan	<b>USC</b>	United States Code
<b>ESU</b>	Evolutionary Significant Unit	<b>USDA</b>	United States Department of Agriculture
<b>°F</b>	Degrees Fahrenheit	<b>USFWS</b>	U.S. Fish and Wildlife Service
<b>FR</b>	Federal Register	<b>USGS</b>	United States Geological Survey
<b>ft/s</b>	Feet per second	<b>VAH</b>	Vagabond Army Heliport
<b>FY</b>	Fiscal Year	<b>WDFW</b>	Washington Department of Fish and Wildlife
<b>GAAF</b>	Gray Army Airfield	<b>WRIA</b>	Water Resource Inventory Area
<b>GIS</b>	Geographic Information Systems	<b>WWTP</b>	Waste Water Treatment Plant
<b>GTA</b>	Grow the Army	<b>YTC</b>	Yakima Training Center
<b>ha</b>	Hectare		
<b>HIMARS</b>	High Mobility Artillery Rocket System		
<b>HMMWV</b>	High Mobility Multi-wheeled Vehicle		
<b>INRMP</b>	Integrated Natural Resource Management Plan		



# **Appendix B**

**Fort Lewis Regulation 420-5**



DEPARTMENT OF THE ARMY  
HEADQUARTERS, I CORPS AND FORT LEWIS  
Fort Lewis, Washington 98433-9500

FL Regulation  
No. 420-5

9 August 2004

PROCEDURES FOR THE PROTECTION OF STATE AND FEDERALLY LISTED  
THREATENED, ENDANGERED, CANDIDATE SPECIES, SPECIES OF CONCERN, AND  
DESIGNATED CRITICAL HABITAT

1. PURPOSE. To prescribe procedures to protect endangered, threatened, candidate species, species of concern, and the habitat components necessary to support their continued existence on Fort Lewis and sub-Installations.
2. APPLICABILITY.
  - a. This regulation is applicable to all Active Duty and Reserve Component commands and units (including tenant organizations), civilian agencies, contractors, and individuals (military and civilian) living, visiting, or working at either Fort Lewis or Yakima Training Center (YTC), or other sub-Installations.
  - b. Commanders at Fort Lewis sub-Installations may further supplement this regulation as appropriate, to include policies and procedures, which address specific sub-Installation conditions and conform to the Endangered Species Act of 1973, as amended. Supplements to this regulation would require review by the Environmental and Natural Resources Division at Fort Lewis, Directorate of Environmental and Natural Resources at YTC, Director of Plans Training, Mobilization, and Security (DPTMS), and the Staff Judge Advocate Office (Civil Law Division) at Fort Lewis.
3. REFERENCES. See Appendix A.
4. DEFINITIONS. See Appendix B.
5. GENERAL. Several threatened, endangered, and candidate species are known to exist on Fort Lewis and YTC (sub-Installation). The Endangered Species Act of 1973, as amended (Citation in Appendix A), requires all Federal agencies, in consultation with, and with the assistance of the Secretaries of the Interior and Commerce, to ensure that their actions are not likely to jeopardize the continued existence of federally listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat of such species. In accordance with Section 7 (c) of the Endangered Species Act, consultation with the U. S. Fish and Wildlife Service (USFWS) should be conducted early in the planning process to ensure that listed species and/or critical habitat are not adversely affected by proposed actions. The

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\*This regulation supersedes FL Reg 420-5, 2 July 1998

Army is required to work with other agencies in the formulation of proposed actions and alternatives, which have the potential to affect listed species or critical habitat. The impacts of ongoing military activities on listed species and/or designated critical habitat must be addressed through the Section 7 process. Until the required Section 7 consultation is completed, it is imperative that no irreversible commitment of resources are made that would preclude reasonable alternatives to avoid jeopardizing listed species or adversely modifying critical habitat.

a. Failure to comply with the Endangered Species Act (Act) will delay or halt the ongoing or proposed activity and may result in substantial civil and criminal penalties, to include fines of up to \$50,000, and imprisonment for not more than one year for any one violation. The Act also requires Federal agencies to utilize their resources in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species. Accordingly, Senior Mission Commanders and Adjutant(s) General will ensure that:

(1) Actions that are federally authorized, funded, or carried out do not jeopardize the continued existence of federally listed endangered or threatened species, or result in the destruction or adverse modification of the habitat of such species, which has been determined through the consultation process to be critical.

(2) Where applicable, an inventory of endangered and threatened species and their designated critical habitat on the Installation will be developed, and a program for monitoring the species status will be developed and implemented.

(3) Consideration will be first given to species protected by both federal and state laws. Proposed actions will be avoided which could result in adverse impacts to these species, or result in the need to list federal candidate species.

(4) All cooperative plans, in accordance with the Sikes Act (Citation in Appendix A), for the conservation and development of fish and wildlife and other natural resources, will include endangered species management requirements where applicable.

(5) Introduction or reintroduction of federally listed endangered and threatened species will be accomplished only after a thorough assessment has been conducted as to the feasibility and impacts of such proposals, and in concurrence with appropriate Federal and State agencies, Installation Management Agency (IMA) Northwest, and the U.S. Army Engineering and Housing Support Center. Introduction or reintroduction proposals will be in accordance with the National Environmental Policy Act.

b. Management plans will be developed for all federally listed species and critical habitat occurring on Fort Lewis and sub-Installations, as required by AR 200-3 (Citation in Appendix A).

6. RESPONSIBILITY.

a. The Senior Mission Commander has overall responsibility for management of the environmental and natural resources of Fort Lewis and Yakima Training Center. This responsibility is manifested through providing adequate financial and personnel support to carry out necessary programs for the protection and management of natural resources, to include listed species.

b. The Director of Public Works (DPW) is the staff director responsible for managing the natural resources on Fort Lewis. These responsibilities include providing necessary financial and personnel support to protect and enhance habitat for listed species, and requiring a review by the Environmental and Natural Resources Division of all activities which have been identified as potentially affecting listed species.

c. The Environmental and Natural Resources Division (ENRD) of Public Works is the Installation environmental office under DPW responsible for the protection and enhancement of habitat for listed species on Fort Lewis. The ENRD will coordinate and manage all aspects of Installation actions regarding the provisions of this regulation to include the following: inventory and manage species addressed in this regulation and the habitat considered essential for their continued existence on the Installation, assist Installation program managers and military trainers in assessing potential impacts to federally listed species, conduct consultation with the U.S. Fish and Wildlife Service as required by Section 7 of the Endangered Species Act of 1973, as amended, and serve as the point of contact for federal, state, and local government agencies in matters dealing with the management and protection of listed species occurring on the Installation.

d. The Environment and Natural Resources Division of Public Works YTC is the sub-Installation environmental office responsible for managing natural resources at YTC, which includes the protection and enhancement of habitat for listed species. These responsibilities involve providing necessary financial and personnel support to protect and enhance habitat for listed species, and includes the review by the YTC ENRD of all activities identified as potentially affecting listed species. The YTC ENRD will coordinate and manage all aspects of sub-Installation actions regarding the provisions of this regulation to include the following: inventory and manage listed species and the habitat considered essential for their continued existence on the sub-Installation, assist sub-Installation program managers and military trainers in assessing potential impacts to federally listed species, conduct consultation with the U.S. Fish and Wildlife Service as required by Section 7 of the Endangered Species Act of 1973, as amended, and serve as the point of contact for federal, state, and local government agencies in matters dealing with the management and protection of listed species occurring on the sub-Installation.

e. Unit Commanders and Activity Directors are responsible for conducting their activities in accordance with the procedures set forth in this regulation.

f. The office of the Staff Judge Advocate (SJA), Civil Law Division, will provide legal advice and assistance to the Command and ENRD in the interpretation of laws and regulations pertaining to the management and protection of federally listed species, to ensure legal and regulatory compliance, and prevent Army liability.

7. PROCEDURES. The following sections prescribe measures to be implemented for the protection of listed species and the habitat necessary to support their continued existence on Fort Lewis and sub-Installations.

8. THREATENED/ENDANGERED AND CANDIDATE SPECIES AT FORT LEWIS. Fort Lewis provides habitat for five federally listed species and six species identified as candidate or species of concern. The Fort Lewis species, discussed in this regulation, include: Bald Eagle (*Haliaeetus leucocephalus*), federal status-threatened, state status-threatened; Water Howellia (*Howellia aquatilis*), federal status-threatened, state status-endangered; Northern Spotted Owl (*Strix occidentalis caurina*)/Designated Critical Habitat, federal status-threatened, state status-endangered; Chinook Salmon (*Oncorhynchus tshawytscha*), federal status-threatened, state status-candidate; Bull Trout (*Salvelinus confluentus*), federal status-threatened, state status-candidate; Mardon Skipper (*Polites mardon*), federal status-candidate, state status-endangered; Taylor's Checkerspot (*Euphydryas editha taylori*), federal status-candidate, state status-candidate; Streaked Horned Lark (*Eremophila alpestris strigata*), federal status-candidate, state status-candidate; Mazama Pocket Gopher (*Thomomys mazama*), federal status-candidate, state status-candidate; Western Gray Squirrel (*Sciurus griseus griseus*), federal status-species of concern, state status-threatened; and White-Topped Aster (*Aster curtus*), federal status-species of concern, state status-sensitive. The following measures provide for the protection of the species and their habitats.

a. Fort Lewis provides habitat for both nesting and wintering populations of Bald Eagles. The Recovery Plan, developed by the USFWS for the bald eagle (Citation in Appendix A), provides guidelines for the protection of this species, and the habitat elements essential for its continued existence. The plan recognizes a primary and secondary zone (400- and 800-meter respectively) around nest sites and communal night roosts, which require specific protection measures to avoid adverse impacts to eagles.

(1) Nesting Bald Eagles. The bald eagle nesting period at Fort Lewis extends from 1 December to 31 August. The following general measures have been implemented to protect nesting bald eagles on the Installation, and apply to both primary and secondary zones around nest sites, unless otherwise specified in nest specific measures (Table 1).

(a) Major land uses such as construction of buildings, roads, power lines, and trails shall be avoided.

(b) No timber harvest shall occur within the primary zone unless designed to enhance stand characteristics for the benefit of nesting eagles (e.g., to assure the dominance of the nest tree). There shall be no cutting in the primary zone without a nest site management plan.

(c) Use of toxic chemicals, which adversely affect eagles, shall be prohibited on the Installation. These include dichlorodiphenyl trichloroethane (DDT) and other persistent organo-chlorine pesticides, polychlorinatedbiphenyls (PCBs), mercury, 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), and other substances containing tetra chlorodibenzo-p-dioxin (TCDD).

(d) No bivouacs are allowed in the primary zone during the nesting period (see Table 1 for Halverson nest exception).

(e) Military training activities within the primary zone will be avoided during the nesting period. Overflight restrictions are nest specific (Table 1).

(f) Blasting, use of firearms, and recreational activities shall be avoided during the nesting period.

(g) Use of pyrotechnics shall be prohibited from 1 June to 31 October to reduce the possibility of fires.

**Table 1: Nest Specific Restrictions**

<b>Nest Name</b>	<b>Grid Coordinate</b>	<b>Restrictions*</b>
American Lake North	3270-2060	Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending 400 meters (1,312 feet) in radius from the nest site. Boat landing is prohibited on Picnic Point. A no wake zone has been established, and will be delineated by buoys in the vicinity of Picnic Point (GC 3230-2010).
American Lake South	3175-1830  (Alternate Nest Site 3225-1805)	Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending 400 meters (1,312 feet) in radius from the nest sites. A no wake zone has been established, and is delineated by buoys in the southern portion of American Lake.
American Lake West	3200-1940	Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending

<b>Nest Name</b>	<b>Grid Coordinate</b>	<b>Restrictions*</b>
		400 meters (1,312 feet) in radius from the nest sites.
Nisqually Bluff	2435-1030	Maintain overflight scenario in place at the time of initial nest establishment [Flights no lower than 91 meters at ground level (AGL) within a 400 meter radius of nest].
Nisqually River	2540-0720	Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending 400 meters (1,312 feet) in radius from nest site.
Spanaway Marsh	4130-1570	Any changes in the approach zone to McChord Air Force Base within a 400-meter radius of the nest site will require consultation with the U.S. Fish and Wildlife Service. Recreational activities are prohibited in training area nine, north of grid line 15 from 1 December to 31 August.
Johnson Marsh	3890-1080	Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending 400 meters (1,312 feet) in radius from the nest sites.
Halverson Marsh	6950-4950	Bivouacking within 400 meters of this nest site will be prohibited on the west side of the Burlington Northern Railroad tracks, but will be allowed on the east side of the railroad tracks. This exception to the standard restriction is implemented due to the fact that bivouacking was occurring in the area east of the railroad tracks when the eagles established this nesting territory. Aircraft will fly no lower than 365 meters (1,200 feet) MSL over an area extending 400 meters (1,312 feet) in radius from nest site.

\*Restrictions pertain to critical nesting period 1 December to 31 August.

(2) Wintering Bald Eagles: Wintering habitat on Fort Lewis is represented by communal night roosts and primary foraging areas.

(a) There are six identified communal night roosts located on the Installation (Table 2). Protection measures for night roosts will be limited to an area within 400 meters of roosts or 800 meters where eagles have line of sight vision, and will be in effect during the wintering bald eagle period (1 December to 31 March). Specific measures include: no blasting, demolition, or use of firearms (the exception to this is the Muck Creek roost located within the Artillery and South Impact Areas); prohibit bivouacking and recreational activities (camping and picnicking); exclude logging, construction, habitat improvement, and other activities with permanent negative effects on the environment.

(b) If consultation with the USFWS results in a beneficial or no adverse effect determination, these types of activities may proceed outside of the eagle use period.

**Table 2: Bald Eagle Communal Night Roost on Fort Lewis**

Name of Communal Night Roost	Training Area	Grid Coordinates
Muck Creek	Artillery Impact Area	3100-0550
Carter Woods	3 S	2490-0790
Cabin Creek	3 S	2630-0615
Riverbend	3 S	2580-0625
Yelm	18	2940-0180
Bluff	18	2945-0280

(c) Primary foraging areas on Fort Lewis are located along portions of Muck Creek and the Nisqually River, within the following specific protection zones: **Protection Zone One:** A 1,000 meter (3,280 foot) corridor along the Nisqually River between grid line 040 and 090 (from the mouth of Muck Creek to the Clear Creek Hatchery). This corridor will include 500 meters (1,640 feet) on each side of the river; and **Protection Zone Two:** A 1,000-meter (3,280 foot) corridor along Muck Creek from the mouth of the creek to grid line 32 (east slope of Harden Hill). This corridor will include 500 meters (1,640 feet) on each side of the creek.

(d) Activities occurring within protection zones one and two that have a permanent effect on the environment (vegetation removal, construction, logging, etc.), will require review and approval by ENRD. No aircraft will fly lower than 1,300 feet (MSL), within protection zone two, during the primary foraging period from 1 December to 31 March.

b. Several wetlands on the Installation either contain suitable habitat for Water Howellia, or have confirmed populations. Due to the specific habitat requirements of

water howellia, minor changes in wetland substrates, vegetation communities, or hydrology could have detrimental effects to this species. Major activities typically occurring on the Installation that could impact this species include: construction, forest management, wetland management, storm water discharge, and vehicular traffic. General measures to protect water howellia populations on Fort Lewis include:

(1) Construction Activities: All construction activities require review by ENRD for analysis of potential effects to listed species. Any projects, identified as having possible impacts to populations of water howellia or potential habitat, will require consultation with the USFWS.

(2) Forest Management Activities: Forest management activities, within the area of influence for wetlands containing water howellia or potential habitat, will be analyzed for possible impacts. The area of influence is defined as that portion of the landscape that serves as the drainage basin for a particular wetland. Forest management actions identified as having adverse impacts to water howellia populations or potential habitat will be avoided.

(3) Wetland Management Activities: Habitat enhancement projects within wetlands will be analyzed for impacts to existing populations of water howellia and potential habitat. Projects identified as having an adverse impact to either, will be avoided.

(4) Vehicular Traffic: Vehicles not traveling on established roads in the vicinity of wetlands can cause significant siltation to wetlands, resulting in adverse impacts to existing populations of water howellia or adverse modification to potential habitat. The section of Fort Lewis Regulation 200-1 (Citation in Appendix A) restricting vehicular traffic within 50 meters of wetlands and streams to established roads, and not allowing other ground disturbing activities within the 50-meter buffer zone, will provide adequate protection to populations of water howellia and potential habitat. Fort Lewis Regulation 350-33 (Citation in Appendix A) provides additional protection for this species by restricting recreational vehicular traffic to established roads.

(5) Recreational activities identified as having an adverse impact to water howellia populations will be restricted as needed on a case-by-case basis.

c. The northern spotted owl (*Strix occidentalis caurina*) is a federally threatened species. In 1992, approximately 52,000 acres of forested habitat on Fort Lewis was designated critical habitat for the northern spotted owl, as depicted on the Environmental Coordination Map (Citation in Appendix A). Activities affecting the forest structure (e.g., vegetation removal and ground disturbance) within designated critical habitat and not addressed in previous consultations with the USFWS, will require analysis by ENRD. Any actions identified as affecting designated critical habitat will require consultation with the USFWS.

d. Chinook Salmon and Bull Trout reside and spawn in the Nisqually River, but do not occur within streams on the Installation. Restrictions on ground disturbing activities within 50 meters of all bodies of water on the Installation afford adequate protection for the Nisqually River in regards to water quality and potential impacts to Chinook salmon or bull trout. There is one authorized crossing site on the Nisqually River occasionally used during military training exercises. Timing of river crossings is adjusted to avoid spawning activities within the river, providing adequate protection for both species. Proposed river crossing activities will require review and approval from ENRD. Consultation with NOAA Fisheries, concerning the military use of Solo Point, resulted in the following restrictions regarding the use of the Solo Point boat ramp and adjacent shoreline:

(1) Off-loading and deployment of floating bridge bays between 1 March and 30 June of each year should be limited to the existing boat ramp at Solo Point. Deployment from the native beach, or alterations to the native beach material should not be allowed.

(2) Off-loading and deployment of all support vessels between 1 March and 30 June of each year should be limited to the existing boat ramp at Solo Point.

(3) No more than three hours of near shore activity should occur on each of the eight days of launch activity training scheduled between March and July of each year. (Per the Department of the Army letters to NOAA Fisheries dated February 4 and February 9, 1999.)

(4) No vehicles should drive on the native beach substrate between 1 March and 30 June of each year.

e. Off-road vehicle traffic and ground disturbing activities represent the most significant potential impacts from military training to the Mardon Skipper butterfly, both from direct mortality and habitat degradation. Training activities involving off-road vehicular traffic and ground disturbing activities within a significant portion of the prairie ecosystem on Fort Lewis is prohibited. This policy is enforced within Johnson Prairie (279 acres), Upper and Lower Weir Prairies (1,372 acres), and by default is followed over a majority of the Artillery Impact Area (91<sup>st</sup> Division Prairie 6,960 acres) due to hazards associated with unexploded ordinance. Currently, the only remaining population of this species on the Installation occurs in the Artillery Impact Area (AIA), and by default is protected from most off-road training activities. Occasionally, specialized training events require limited off-road maneuvers within the AIA, but these actions will be assessed and adjusted to avoid impacts to populations of this species. Any re-introduction of this species on Fort Lewis would occur in areas currently afforded protection from off-road vehicle traffic and other ground disturbing activities. Recreational activities, identified as having an adverse impact to mardon skipper populations, will be restricted as necessary on a case-by-case basis.

f. Off-road vehicle traffic and ground disturbing activities represent the most significant potential impacts from military training to the Taylor's Checkerspot butterfly, both from direct mortality and habitat degradation. Training activities including off-road vehicular traffic and ground disturbing activities within a significant portion of the prairie ecosystem on Fort Lewis is prohibited. This policy is enforced within Johnson Prairie (279 acres), Upper and Lower Weir Prairies (1,372 acres), and by default is followed over a majority of the Artillery Impact Area (91<sup>st</sup> Division Prairie 6,960 acres) due to hazards associated with unexploded ordinance. Currently, the only remaining population of this species on the Installation occurs in the AIA, and by default is protected from most off-road training activities. Occasionally, specialized training events require limited off-road maneuvers within the AIA, but these actions will be assessed and adjusted to avoid impacts to populations of this species. Any re-introduction of this species on Fort Lewis would occur in areas currently afforded protection from off-road vehicle traffic and other ground disturbing activities. Recreational activities, identified as having an adverse impact to Taylor's checkerspot populations, will be restricted as necessary on a case-by-case basis.

g. The Streaked Horned Lark utilizes prairies and open grassland habitat on the Installation. It is a ground nesting bird that is closely associated with prairie habitat or areas that mimic native prairie habitat conditions, which include airfields and areas maintained for sporting events. Currently the only nesting populations occur at Training Area (T.A.) 14 (within the prairie habitat east of Pacemaker Airstrip), Artillery Impact Area (AIA), and Gray Army Airfield. The following restrictions are imposed during the primary nesting period (15 April to 15 July) to help avoid direct mortality and nest failure:

(1) Mowing restrictions are imposed on areas identified as being used by streaked horned larks for nesting habitat within the boundary of Gray Army Airfield. These restrictions are only imposed during the primary nesting period. If at any time during the nesting period vegetation height poses a safety concern to aviation activities, remedial actions will occur to include mowing. Any remedial actions occurring during the nesting period will be coordinated with ENRD to help assure minimal effects to nesting birds.

(2) No recreational activities are allowed in T.A.14 during the primary nesting period.

(3) Military training activities, within areas occupied by nesting birds, will be reviewed by Range Control and ENRD. Impact analysis will be conducted by ENRD and adjustments to training activities will be implemented as necessary to minimize impacts to nesting birds.

(4) Recreational activities, identified as having an adverse impact to streaked horned lark populations, will be restricted as necessary on a case-by-case basis.

h. The Mazama Pocket Gopher occurs in prairie and oak woodland habitat on the Installation. Activities that cause severe soil compaction represent the most significant potential impact to this species. Repeated traversing by heavy equipment, over the same area, usually causes the ground to be compacted to the point where it can no longer support populations of pocket gophers. The other major impact from training activities, that could directly and indirectly impact pocket gopher populations, is major digging exercises. This can result in individuals being killed during the digging activity. The re-distribution of soil layers may render the site uninhabitable for pocket gophers. Training activities including off-road vehicular traffic and ground disturbing activities within a significant portion of the prairie ecosystem on Fort Lewis is prohibited. This policy is enforced within Johnson Prairie (279 acres), Upper and Lower Weir Prairies (1,372 acres), and by default is followed over a majority of the Artillery Impact Area (91<sup>st</sup> Division Prairie 6,960 acres) due to hazards associated with unexploded ordinance. These restrictions protect the major populations of this species on Fort Lewis. Recreational activities, identified as having an adverse impact to Mazama pocket gopher populations, will be restricted as necessary on a case-by-case basis.

i. The Western Gray Squirrel is closely associated with oak woodland habitat on the Installation and typically resides in or near oak stands occurring in forested areas or prairie edges. Direct mortality from civilian and military vehicular traffic is one of the most significant impacts to this species on the Installation. The section of East Gate road between the East Gate Guard station and Highway 507 has historically been the area exhibiting the highest mortality of western gray squirrels caused by vehicle traffic. Warning signs will be placed at appropriate locations within this section of East Gate road, raising the awareness of drivers as to the presence of a rare species in an effort to reduce future mortality of this species from vehicular traffic. Recreational activities identified as having an adverse impact to western gray squirrel populations will be restricted as necessary on a case-by-case basis.

j. White-topped Aster is a small (4 – 12 inches tall) one stalked perennial; usually with a single compact cluster of heads with nearly rayless, plain flowers which are identifiable from late August through October. This species is found in and around prairies of Pierce and Thurston Counties. Currently no digging, track vehicle use, or other ground disturbance is allowed within Johnson and Weir Prairies in an effort to protect populations of this species.

9. THREATENED/ENDANGERED AND CANDIDATE SPECIES AT YAKIMA TRAINING CENTER. Yakima Training Center provides habitat for one federally listed species and eleven species as having either State status or other Federal designation. The Yakima Training Center species, discussed in this regulation, include: Bald Eagle (*Haliaeetus leucocephalus*), federal status-threatened, state status-threatened; Golden Eagle (*Aquila chrysaetos*), federal status-none, state status-candidate; Sage Grouse (*Centrocercus urophasianus*), federal status-candidate, state status-threatened; Ferruginous Hawk (*Buteo regalis*), federal status-species of concern, state status-

threatened; Burrowing Owl (*Athene cunicularia*), federal status-none, states status-candidate; Columbia Milk-vetch (*Astragalus columbianus*), federal status-none, state status-threatened; Basalt Daisy (*Erigeron basalticus*), federal status-candidate, state status-threatened; Dwarf Evening Primrose (*Camissonia pygmaea*), federal status-none, state status-threatened; Hoover’s Desert Parsley (*Lomatium tuberosum*), federal status-none, state status-threatened; Hoover’s Tauschia (*Tauschia hooveri*), federal status-none, state status-threatened; Kalm’s Lobelia (*Lobelia kalmii*), federal status-none, state status-endangered; and White Eatonella (*Eatonella nivia*), federal status-none, state status-threatened. (Note: All grid coordinate locations are derived from the Yakima Training Center Special Map Series V791S, Edition 4 (Citation in Appendix A) and range control should be contacted for site-specific restrictions.)

a. The Bald Eagle is a winter resident at the YTC. It utilizes the Columbia River and the sub-Installation’s eastern boundary for foraging. Four known roost sites on the sub-Installation are used for diurnal and nocturnal roosting: Borden Springs (KB720795), Lower Hanson Creek (GG254856), Middle Hanson Creek (GG235864), and Upper Hanson Creek (GG201871). The following table summarizes restrictions in place to avoid adverse impacts to this species.

**Table 3: Bald Eagle Restrictions at YTC**

Type of Restriction	Location	Time Period	Restriction
Flight	Hanson Creek Route: Between coordinates GG 190875 and GG280842	8 December to 24 March	Minimum flight level of 300 AGL (above ground level). Maintain a 1 km buffer to the north and south of Hanson Creek road, with traffic moving west remaining 1 km north of Hanson Creek road. The flight route will continue to support two-way traffic.
Flight	Columbia River Route: Between coordinates KB830 and KB690	8 December to 24 March	The flight route will support one-way traffic. Access will be coordinated by the Rattlesnake Flight Following Facility. No minimum flight level. Flights must maintain a 1 km buffer to the west of the railroad right-of-way along the Columbia River.
River Crossing	Priest Rapids Reservoir	8 December to 24 March	No river crossing exercises during this time frame.
Vehicle	Hanson Creek riparian zones	Year-Round	No off road vehicle traffic.
Vehicle	Siber staked roost trees.	Year-Round	No vehicle traffic within the enclosed area.

Vehicle	Hanson Creek road	8 December to 24 March	Traffic along Hanson Creek road is significantly curtailed between 1500 and 0900 hours, between coordinates GG180875 and GG280842. Coordination and prior approval by ENRD and Range Control is required to use this road during this time period.
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b. The Golden Eagle is a year-round resident of the sub-Installation. Four historic nest sites have been identified on YTC. Golden eagles require isolation from human activity during the nesting season, February through June. The species builds its nests on cliffs on the sub-Installation. Military maneuver restrictions (Contact Range Control for site-specific information) include: a 500-meter buffer is maintained between all military activities and all nest sites, a minimum of 300 feet AGL for all over-flights of the nest sites, and no air traffic is allowed below the rim of Selah Canyon between Badger Pocket Road (GG039731) and the I-82 bridge (FG958740).

c. The Sage Grouse is a year-round resident. Several active leks have been documented on the sub-Installation. A lek is an area where males compete with other males to breed with the female sage grouse. Sage grouse begin using leks daily in early February. Their numbers increase through March with peak lek attendance occurring in April. Habitat surrounding lek sites is used during and after the lekking season for feeding, nesting, and raising young. Two habitat components needed by sage grouse are protected from military disturbance at YTC: lek sites and nest/brood rearing areas as presented in the Yakima Training Center Sage Grouse Management Plan (Citation in Appendix A).

(1) Lek site protection (Contact Range Control for site-specific information):

(a) Seasonal restrictions of military training activities and other land use practices are in place between 1 March and 15 May within a 1 km radius of each designated lek. These restrictions are enforced daily between 2400 and 0900 hours. Lek surveys by YTC ENRD staff begin 1 February. If surveys reveal sage grouse are attending leks prior to 1 March, the restriction date is changed to correspond with the earlier date. During this period, access to ranges is restricted to Main Supply Routes (MSR's) and designated roads to ranges.

(b) Over-flights by aircraft, within a 1 km radius of leks, are prohibited during the period of 1 March through 15 May between 2400 and 0900 hours. Again, earlier seasonal restrictions may apply if lek attendance occurs before 1 March.

(2) Nest and brood rearing habitat protection (Contact Range Control for site-specific information):

(a) All off-road military activities are prohibited between 1 March and 15 June (24 hours a day) within the sage grouse protection areas. Exceptions within these areas include the following existing Firing Ranges: 4, 5, 10, 10Z, 16, 26, and 55. Vehicle travel is limited to MSR's and/or designated roads to the above Firing Ranges.

(b) Bivouacs are not permitted at any time of the year in the sage grouse protection area.

(c) Excavations are only permitted in the protection area on existing firebreaks. All excavations within the sage grouse protection areas are coordinated through YTC ENRD, and carried out in accordance with the YTC dig permit process.

d. The Ferruginous Hawk breeds and raises young in the western U.S., and winters in the southwestern U.S. and Mexico. Sixteen historic nest sites have been identified at YTC. In Washington, most ferruginous hawk nests are built on top of rocks, cliffs, and trees and most occur in rock outcroppings. The nesting season is between 1 March and 31 July. Ferruginous hawks are sensitive to human disturbance and require isolation from military activity during the nesting season. When an active nest is detected the following restrictions are enforced:

(1) No military activity within 500 meters of the site.

(2) An over-flight minimum of 1,000 feet AGL of all active nests.

e. Burrowing Owls use abandoned mammal burrows for nesting. Fifteen historic burrow nests have been documented on YTC. The nesting season for this species occurs between March and July. All known active burrowing owl nest sites are protected from vehicle maneuvers by siber stakes.

f. Columbia Milk-vetch is only found within a 100 sq. mile area along the west side of the Columbia River in the Priest Rapids area in Kittitas, Yakima, and Benton counties, Washington. This species is a low, sprawling plant with white flowers and reddish stems. The species has been found at over 16 locations on YTC, with the majority occurring in the eastern region. Designated sensitive plant sites are protected through siber staking.

g. Basalt Daisy is a perennial plant that grows up to four inches tall. It has lobed leaves and numerous (20-30) light lavender to white ray flowers. This species is identifiable from May to mid-October. It is found at YTC on the south side of Selah Creek (Selah Cliffs). Designated sensitive plant sites are protected through siber staking.

h. Dwarf Evening-Primrose is an annual with small white flowers. The leaves are lance shaped to oval, and are sometimes slightly toothed. The one population known

i. Hoover's Desert Parsley is a perennial that grows from a tuber-like root. The leaves are grayish-green and the flowers are typically light purple, sometimes yellow. Three populations are known to occur on YTC. Designated sensitive plant sites are protected through siber staking.

j. Hoover's Tauschia is a low growing perennial with white flowers and few leaves that are divided into linear segments. The species is found in areas of bare rocks and gravel with little soil present. Eight main populations are known to occur on YTC. Designated sensitive plant sites are protected through siber staking.

k. Kalm's Lobelia is a perennial herb with stems that are sometimes branched and reach up to 24 inches in length. The 4 to 15 leaves are borne on the stem and are narrow. The flowers are mostly blue with a white or white and yellow eye, but may be entirely white. One population is known extant on YTC at Borden Springs. Designated sensitive plant sites are protected through siber staking.

l. White Eatonella occurs on poorly developed soils in dry, sandy or volcanic desert areas between 763 and 1,900 meters in elevation. Sites that support the taxon are rather sparsely vegetated, usually with no apparent cryptogram layer. YTC supports 21 acres of this species predominantly on slopes ranging 18 to 45 percent. Designated sensitive plant sites are protected through siber staking.

m. YTC is within the range of three sensitive salmonid species that include the Upper Columbia Spring Chinook Salmon (*Oncorhynchus tshawytscha*) – federally endangered, Upper Columbia Steelhead Trout (*Oncorhynchus mykiss*) – federally endangered, and Mid-Columbia Steelhead Trout – federally threatened. In addition, the Columbia River Bull Trout (*Salvelinus confluentus*) is listed as a federally threatened species. 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.

(AFZH-PWE, 967-3474)

  
JAMES M. COLLINS, JR.  
Major General, USA  
Deputy Commanding General/  
Chief of Staff

DISTRIBUTION:  
A, B, C, D

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APPENDIX A

REFERENCES

AR 200-3 (Natural Resources-Land, Forest and Wildlife Management) 28 February 1995

FL Reg 200-1 (Environmental Protection and Enhancement) 1 February 2002

FL Reg 350-30 (Fort Lewis Range Regulations) 29 March 2000

Conservation Agreement Western Sage Grouse (*Centrocercus urophasianus phaios*), 1992 and 1994

Endangered Species Act (ESA) as amended 1973

Fort Lewis Endangered Species Management Plan for Bald Eagles, 2000

Fort Lewis Endangered Species Management Plan for Northern Spotted Owl, October 2000

Fort Lewis Endangered Species Management Plan for Water Howellia, 2000

Based on Fort Lewis Special Edition, 4 Series V791S (Environmental Coordination Map) 2004

Sikes Act 16 USC 670, 18 November 1997

U.S. Fish and Wildlife Service (Recovery Plan for the Pacific Bald Eagle) 1986

Based on YTC Special Series V791S, Edition 4-DMA (Yakima Training Center Environmental Coordination Map) 2000

Yakima Training Center Sage Grouse Management Plan, June 1998

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APPENDIX B

DEFINITIONS

**Federal Candidate**

A plant or animal taxa, native to the U.S., being considered for possible addition to the "List of Endangered and Threatened Wildlife and Plants".

**Federal Endangered**

A species on the brink of extinction throughout all, or a significant portion, of its range.

**Federal Species of Concern**

A species, whose conservation standing is of concern to the USFWS, but status information is still needed.

**Federal Threatened**

A species that is likely to become endangered within the foreseeable future.

**Critical Habitat**

Areas of land, water, and airspace, occupied by the species at the time of its listing, that are required for its normal needs and survival.

**Land Bank Zone**

Areas managed for significant and sensitive natural and/or cultural resources. Most forms of training, including all tracked and wheeled vehicle use are prohibited.

**Primary Buffer Zone**

This is the most critical area immediately around bald eagle nests and communal night roosts (400 meter radius from nests and roosts).

**Secondary Buffer Zone**

The purpose of this zone is to further minimize disturbance to bald eagle nest sites and communal night roosts (800 meter radius from nests and roosts).

**Siber (Seibert) Stake**

A stake, with bands of white, red, and yellow coloration that designates areas limited to non-destructive activities.

**State Listed Species**

Species listed by Washington State Department of Fish and Wildlife as requiring special status designation due to declining populations. Federal agencies are not required to abide by restrictions associated with state listed species.

**State Candidate**

Species that the Washington State Department of Fish and Wildlife will review for possible listing as State Endangered, Threatened, or Sensitive.

**State Endangered**

Any species, native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion, of its range within the state.

**State Sensitive**

Any species, native to the state of Washington, that is vulnerable or declining, and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.

**State Threatened**

Any species, native to the state of Washington, that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

# **Appendix C**

**Species Lists from U.S. Fish and Wildlife Service and National  
Marine Fisheries Service**



**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN PIERCE COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WESTERN WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised November 1, 2007)**

**LISTED**

Bull trout (*Salvelinus confluentus*)

Canada lynx (*Lynx canadensis*)

Gray wolf (*Canis lupus*)

Grizzly bear (*Ursus arctos* = *U. a. horribilis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Arenaria paludicola* (marsh sandwort) [historic]

*Castilleja levisecta* (golden paintbrush) [historic]

*Howellia aquatilis* (water howellia)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

## **DESIGNATED**

Critical habitat for bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

## **PROPOSED**

None

## **CANDIDATE**

Mardon skipper (*Polites mardon*)

(Roy Prairie and Tacoma) Mazama pocket gopher (*Thomomys mazama* ssp. *glacialis* and *tacomensis* [historic])

Oregon spotted frog (*Rana pretiosa*)

Streaked horned lark (*Eremophila alpestris strigata*)

Taylor's checkerspot (*Euphydryas editha taylori*)

Yellow-billed cuckoo (*Coccyzus americanus*)

## **SPECIES OF CONCERN**

Bald eagle (*Haliaeetus leucocephalus*)

California wolverine (*Gulo gulo luteus*)

Cascades frog (*Rana cascadae*)

Fender's soliperlan stonefly (*Soliperla fenderi*)

Larch Mountain salamander (*Plethodon larselli*)

Long-eared myotis (*Myotis evotis*)

Long-legged myotis (*Myotis volans*)

Northern goshawk (*Accipiter gentilis*)

Northern sea otter (*Enhydra lutris kenyoni*)

Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Oregon vesper sparrow (*Pooecetes gramineus affinis*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend=s big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)  
Tailed frog (*Ascaphus truei*)  
Valley silverspot butterfly (*Speyeria zerene bremeri*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Van Dyke=s salamander (*Plethodon vandykei*)  
*Aster curtus* (white-top aster)  
*Botrychium ascendens* (triangular-lobed moonwort)  
*Castilleja cryptantha* (obscure paintbrush)  
*Cimicifuga elata* (tall bugbane)  
*Cypripedium fasciculatum* (clustered lady=s slipper)  
*Lathyrus torreyi* (Torrey's peavine)



**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN **THURSTON COUNTY**  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WESTERN WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised November 1, 2007)**

**LISTED**

Bull trout (*Salvelinus confluentus*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to listed species and/or their avoidance of the project area.

*Castilleja levisecta* (golden paintbrush)

*Howellia aquatilis* (water howellia)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and habitat loss.
3. Changes in hydrology where taxon is found.

## DESIGNATED

Critical habitat for the bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

## PROPOSED

None

## CANDIDATE

Mardon skipper (*Polites mardon*)

(Olympia, Tenino, and Yelm) Mazama pocket gopher (*Thomomys mazama* ssp. *pugetensis*, *tumuli*, and *yelmensis*)

Oregon spotted frog (*Rana pretiosa*)

Streaked horned lark (*Eremophila alpestris strigata*)

Taylor's checkerspot (*Euphydryas editha taylori*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)

California wolverine (*Gulo gulo luteus*)

Cascades frog (*Rana cascadae*)

Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]

Long-eared myotis (*Myotis evotis*)

Long-legged myotis (*Myotis volans*)

Northern goshawk (*Accipiter gentilis*)

Northern sea otter (*Enhydra lutris kenyoni*)

Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)

Oregon vesper sparrow (*Pooecetes gramineus affinis*)

Olive-sided flycatcher (*Contopus cooperi*)

Pacific lamprey (*Lampetra tridentata*)

Pacific Townsend=s big-eared bat (*Corynorhinus townsendii townsendii*)

River lamprey (*Lampetra ayresi*)

Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)

Tailed frog (*Ascaphus truei*)

Valley silverspot butterfly (*Speyeria zerene bremeri*)

Van Dyke=s salamander (*Plethodon vandykei*)

Western gray squirrel (*Sciurus griseus griseus*)

*Aster curtus* (white-top aster)

*Cimicifuga elata* (tall bugbane)

*Sidalcea malviflora* ssp. *virgata* (rose checker-mallow)



**KITTITAS COUNTY**  
Updated 7/24/2008

**LISTED**

Endangered

Gray wolf (*Canis lupus*)

Threatened

Bull trout (*Salvelinus confluentus*) – Columbia River distinct population segment

Grizzly bear (*Ursus arctos horribilis*)

Canada lynx (*Lynx canadensis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

*Spiranthes diluvialis* (Ute ladies'-tresses), plant

Designated

Critical habitat for the northern spotted owl

Critical habitat for the Columbia River distinct population segment of the bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) - West Coast distinct population segment

Greater sage grouse (*Centrocercus urophasianus*) – Columbia Basin distinct population segment

Yellow-billed cuckoo (*Coccyzus americanus*)

**SPECIES OF CONCERN**

Animals

Bald eagle (*Haliaeetus leucocephalus*) (delisted, monitor status)

Black swift (*Cypseloides niger*)

Burrowing owl (*Athene cunicularia*)

Ferruginous hawk (*Buteo regalis*)

Larch Mountain salamander (*Plethodon larselli*)

Loggerhead shrike (*Lanius ludovicianus*)

Long-eared myotis (*Myotis evotis*)

Northern goshawk (*Accipiter gentilis*)

Olive-sided flycatcher (*Contopus cooperi*)

Pacific lamprey (*Lampetra tridentata*)

Pallid Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)

Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)

Pygmy whitefish (*Prosopium coulteri*)  
Redband trout (*Oncorhynchus mykiss*)  
River lamprey (*Lampetra ayresi*)  
Sagebrush lizard (*Sceloporus graciosus*)  
Sharptail snake (*Contia tenuis*)  
Townsend's ground squirrel (*Spermophilus townsendii*)  
Western brook lamprey (*Lampetra richardsoni*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)  
Wolverine (*Gulo gulo*)

### Vascular Plants

*Astragalus columbianus* (Columbia milk-vetch)  
*Cypripedium fasciculatum* (Clustered lady's-slipper)  
*Delphinium viridescens* (Wenatchee larkspur)  
*Lomatium tuberosum* (Hoover's desert-parsley)  
*Phacelia minutissima* (Least phacelia)  
*Pinus albicaulis* (Whitebark pine)  
*Silene seelyi* (Seely's silene)  
*Tauschia hooveri* (Hoover's tauschia)

### Mosses

*Orthotrichum praemorsum*

**YAKIMA COUNTY**  
Updated 7/24/2008

**LISTED**

Endangered

Gray wolf (*Canis lupus*)

Threatened

Bull trout (*Salvelinus confluentus*) – Columbia River distinct population segment

Grizzly bear (*Ursus arctos horribilis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

*Spiranthes diluvialis* (Ute ladies'-tresses), plant

Designated

Critical habitat for the northern spotted owl

Critical habitat for the Columbia River distinct population segment of the bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) - West Coast distinct population segment

Greater sage grouse (*Centrocercus urophasianus*) – Columbia Basin distinct population segment

Mardon skipper (*Polites mardon*), butterfly

Yellow-billed cuckoo (*Coccyzus americanus*)

**SPECIES OF CONCERN**

Animals

Bald eagle (*Haliaeetus leucocephalus*) (delisted, monitor status)

Black swift (*Cypseloides niger*)

Burrowing owl (*Athene cunicularia*)

Ferruginous hawk (*Buteo regalis*)

Larch Mountain salamander (*Plethodon larselli*)

Loggerhead shrike (*Lanius ludovicianus*)

Long-eared myotis (*Myotis evotis*)

Northern goshawk (*Accipiter gentilis*)

Olive-sided flycatcher (*Contopus cooperi*)

Pacific lamprey (*Lampetra tridentata*)

Pallid Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)

Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)

Redband trout (*Oncorhynchus mykiss*)

River lamprey (*Lampetra ayresi*)  
Sagebrush lizard (*Sceloporus graciosus*)  
Sharptail snake (*Contia tenuis*)  
Townsend's ground squirrel (*Spermophilis townsendii*)  
Western brook lamprey (*Lampetra richardsoni*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)  
Wolverine (*Gulo gulo*)

### Vascular Plants

*Astragalus columbianus* (Columbia milk-vetch)  
*Calochortus longebarbatus* var. *longebarbatus* (Long-bearded sego lily)  
*Castilleja cryptantha* (Obscure indian-paintbrush)  
*Cryptantha leucophaea* (Gray cryptantha)  
*Cypripedium fasciculatum* (Clustered lady's-slipper)  
*Erigeron basalticus* (Basalt daisy)  
*Lomatium tuberosum* (Hoover's desert-parsley)  
*Pinus albicaulis* (Whitebark pine)  
*Sisyrinchium sarmentosum* (Pale blue-eyed grass)  
*Tauschia hooveri* (Hoover's tauschia)

# Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated July 1, 2009)

		Species <sup>1</sup>	Current Endangered Species Act Listing Status <sup>2</sup>	ESA Listing Actions Under Review
Sockeye Salmon ( <i>Oncorhynchus nerka</i> )	1	Snake River	Endangered	
	2	Ozette Lake	Threatened	
	3	Baker River	Not Warranted	
	4	Okanogan River	Not Warranted	
	5	Lake Wenatchee	Not Warranted	
	6	Quinalt Lake	Not Warranted	
	7	Lake Pleasant	Not Warranted	
Chinook Salmon ( <i>O. tshawytscha</i> )	8	Sacramento River Winter-run	Endangered	
	9	Upper Columbia River Spring-run	Endangered	
	10	Snake River Spring/Summer-run	Threatened	
	11	Snake River Fall-run	Threatened	
	12	Puget Sound	Threatened	
	13	Lower Columbia River	Threatened	
	14	Upper Willamette River	Threatened	
	15	Central Valley Spring-run	Threatened	
	16	California Coastal	Threatened	
	17	Central Valley Fall and Late Fall-run	Species of Concern	
	18	Upper Klamath-Trinity Rivers	Not Warranted	
	19	Oregon Coast	Not Warranted	
	20	Washington Coast	Not Warranted	
	21	Middle Columbia River spring-run	Not Warranted	
	22	Upper Columbia River summer/fall-run	Not Warranted	
	23	Southern Oregon and Northern California Coast	Not Warranted	
	24	Deschutes River summer/fall-run	Not Warranted	
Coho Salmon ( <i>O. kisutch</i> )	25	Central California Coast	Endangered	
	26	Southern Oregon/Northern California	Threatened	
	27	Lower Columbia River	Threatened	• Critical habitat
	28	Oregon Coast	Threatened	
	29	Southwest Washington	Undetermined	
	30	Puget Sound/Strait of Georgia	Species of Concern	
	31	Olympic Peninsula	Not Warranted	
Chum Salmon ( <i>O. keta</i> )	32	Hood Canal Summer-run	Threatened	
	33	Columbia River	Threatened	
	34	Puget Sound/Strait of Georgia	Not Warranted	
	35	Pacific Coast	Not Warranted	
Steelhead ( <i>O. mykiss</i> )	36	Southern California	Endangered	
	37	Upper Columbia River	Threatened	
	38	Central California Coast	Threatened	
	39	South Central California Coast	Threatened	
	40	Snake River Basin	Threatened	
	41	Lower Columbia River	Threatened	
	42	California Central Valley	Threatened	
	43	Upper Willamette River	Threatened	
	44	Middle Columbia River	Threatened	
	45	Northern California	Threatened	
	46	Oregon Coast	Species of Concern	
	47	Southwest Washington	Not Warranted	
	48	Olympic Peninsula	Not Warranted	
	49	Puget Sound	Threatened	• Critical habitat
	50	Klamath Mountains Province	Not Warranted	
Pink Salmon ( <i>O. gorbuscha</i> )	51	Even-year	Not Warranted	
	52	Odd-year	Not Warranted	

<sup>1</sup> The ESA defines a “species” to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or “ESU,” a “species” under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as “species” under the ESA.

## ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries Service that may occur:

### off Washington & Oregon

- Southern Resident Killer Whale (E), *Orcinus orca*; [critical habitat](#)
  - Humpback Whale (E), *Megaptera novaeangliae*
  - Blue Whale (E), *Balaenoptera musculus*
  - Fin Whale (E), *Balaenoptera physalus*
  - Sei Whale (E), *Balaenoptera borealis*
  - Sperm Whale (E), *Physeter macrocephalus*
- Steller Sea Lion (T), *Eumetopias jubatus*; [critical habitat](#)

### in Puget Sound

- Southern Resident Killer Whale (E), *Orcinus orca*; [critical habitat](#)
  - Humpback Whale (E), *Megaptera novaeangliae*
- Steller Sea Lion (T), *Eumetopias jubatus*; [critical habitat](#)

(E) = Endangered

(T) = Threatened

**Page Title:** ESA Turtle List

**URL:** <http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Turtle-List.cfm>  
<http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Turtle-List.cfm>

## ESA-Listed Marine Turtles

Under the jurisdiction of NOAA Fisheries Service that may occur off Washington & Oregon:

- Leatherback Sea Turtle (E), *Dermochelys coriacea*
- Loggerhead Sea Turtle (T), *Caretta caretta*
  - Green Sea Turtle (E), *Chelonia mydas*
- Olive Ridley Sea Turtle (E), *Lepidochelys olivacea*

Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Northwest Region.

(E) = Endangered

(T) = Threatened

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**Feb. 19, 2010:** NOAA Fisheries extended the comment period on the proposed revision to existing critical habitat for the leatherback turtle under the Endangered Species Act. See the [Federal Register notice](#) (PDF 49KB) for details.

**Jan. 5, 2010:** NOAA Fisheries proposed to revise and expand critical habitat for the leatherback turtle under the Endangered Species Act. Additional information about this proposal can be found in the links below and on [NOAA Fisheries' Office of Protected Resources Website](#).

- [News Release](#) (PDF 73KB -- links to NOAA Fisheries Website)
- [Federal Register notice](#) (PDF 711KB)

**Page Title:** ESA Other List

**URL:** <http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Other-List.cfm>  
<http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Other-List.cfm>

## Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries Service that may occur off Washington & Oregon:

- southern distinct population segment, or DPS, of [eulachon](#) (Columbia River smelt) (T), (*Thaleichthys pacificus*)
- southern distinct population segment, or DPS, of [north American green sturgeon](#) (T), (*Acipenser medirostris*), listed in the NOAA Fisheries Service Southwest Region

(E) = Endangered

(T) = Threatened