# Chapter 4:
# West of the Rockies Region - Affected Environment

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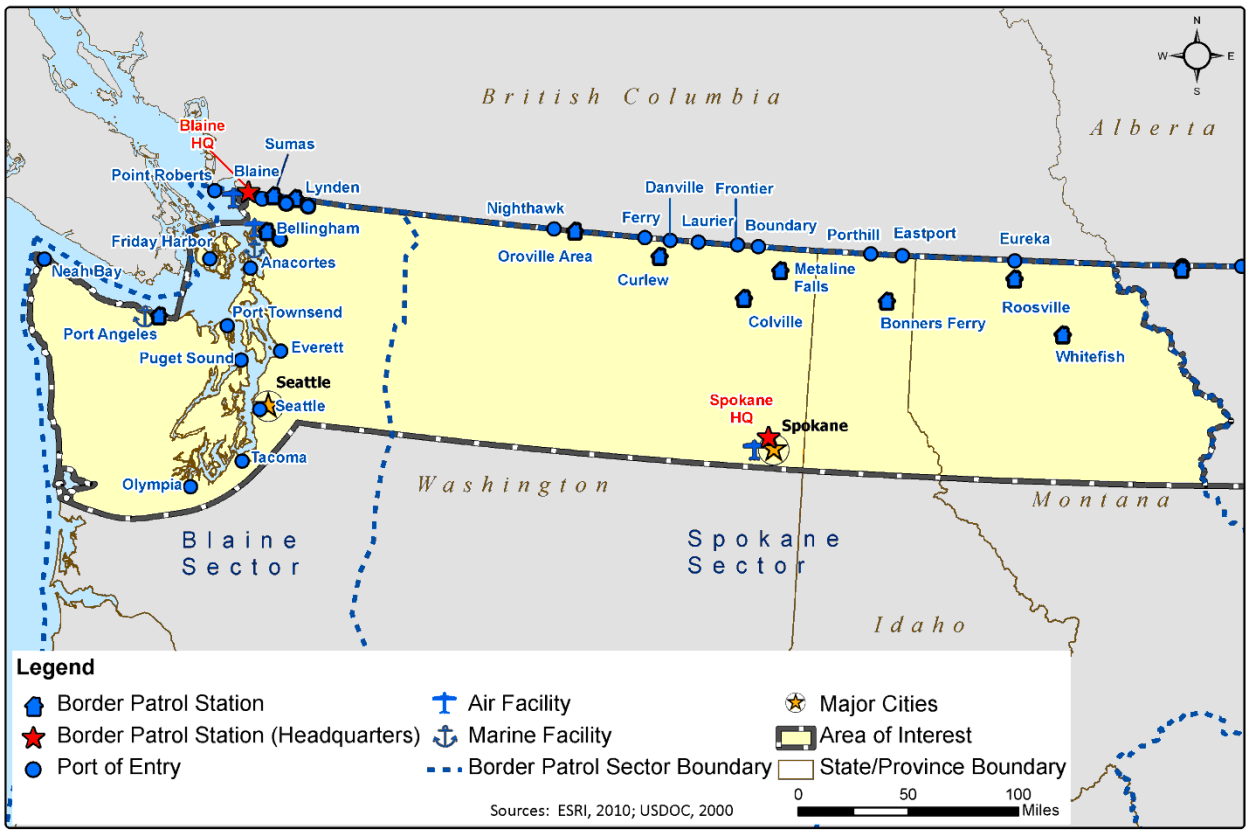
# 4 WEST OF THE ROCKIES REGION

## 4.1 INTRODUCTION

This chapter analyzes potential environmental effects from U.S. Customs and Border Protection (CBP) actions in the West of the Rockies Region within about 100 miles of the Northern Border. The West of the Rockies Region includes Washington, Idaho, and the part of Montana that is west of the Continental Divide (Figure 4.1-1).

**Figure 4.1-1. The West of the Rockies Region and U.S. Customs and Border Protection Facilities**




The Northern Border environment in the West of the Rockies Region has a wide variety of habitats and terrain types. Within Washington State these habitats include grasslands, badlands and coulees, foothills, mountain and alpine habitats, large river valleys and associated watersheds (including Ross Lake, Ososyoos Lake, the Similkameen River, the Kettle River, the Columbia River, and the Pend Oreille River), dense conifer and deciduous forests, wetlands and arid habitats, glacial and coastal habitats, and human developments of various densities.

The habitat within the Idaho portion of the region is mostly a combination of rugged, moist, forest; mountain and alpine habitats; large river valleys and associated watersheds (including the Kootenai River and the Moyie River); and human developments of various densities.

In Montana, habitats include prairie potholes, grasslands, badlands and coulees, foothills, mountain and alpine habitats, large river valleys and associated watersheds (including Lake

Koocanusa, North Fork Flathead National Wild and Scenic River, Waterton Lake, Saint Mary River, and Milk River), dense conifer and deciduous forests, wetlands and arid habitats, glacial and coastal habitats, and human developments of various densities.

Territory within the West of the Rockies Region is a combination of privately owned land, state trust property (Crawford State Park), Bureau of Land Management (BLM) land (managed by the BLM Field Offices in Spokane, Washington; Coeur d'Alene, Idaho; and Miles City, Glasgow, and Malta, Montana), national forest area (Mt. Baker Snoqualmie, Okanogan, Idaho Panhandle, Colville, and Kootenai National Forests), wilderness area (Mt. Baker Wilderness, Stephen Mather Wilderness, Pasayten Wilderness, and Salmo-Priest Wilderness), national park area (North Cascades and Glacier/Waterton), Indian reservation (the Kootenai Indian Reservation), and trail (the Pacific Crest and Idaho State Centennial Trails).

### U.S. Border Patrol in the West of the Rockies Region

The U.S. Border Patrol (USBP) in this region employs several hundred agents, who operate from 11 stations spread along 600 miles of the Northern Border. The large swaths of difficult-to-access terrain pose a challenge for surveillance, which leads to use of diverse patrols including on- and off-road-vehicle, snowmobile, pedestrian, horse, aerial, and waterborne patrols. The rough terrain in much of the region also requires heavy reliance on partnerships with governmental agencies (Federal law enforcement and land management agencies, state departments of natural resources, and Canadian authorities) and private entities (communities, landowners, and interboundary groups) for both law enforcement and intelligence missions.

The region's 11 USBP stations are divided into two sectors: Blaine, Washington and Spokane, Washington (see Figure 4-1-1). The Border Patrol's access to roads managed by the U.S. Forest Service (USFS) is important throughout the border area. The following areas pose specific access challenges: national forest areas (Mt. Baker Snoqualmie, Okanogan, Idaho Panhandle, Colville, and Kootenai National Forests) and wilderness areas (Mt. Baker Wilderness, Stephen Mather Wilderness, Pasayten Wilderness, and Salmo-Priest Wilderness). Both CBP and USFS are acting under a Memorandum of Understanding (MOU) signed in 2006 between the Department of Homeland Security (DHS), the U.S. Department of Agriculture, and the U.S. Department of the Interior. One area of cooperation provides for the DHS to have access to USFS lands for implementing its security mission. Section 4.8 on Land Use describes this MOU in more detail. Access to existing USFS roads will be a continuing concern as additional areas within the Metaline Falls station area are considered for wilderness designation.

USBP sectors within the region deploy a combination of static permanent surveillance, ground radar, and acoustic sensors, with repeaters for extended line-of-sight coverage. Forward operating bases are deployed in parts of this region, as are occasional mobile traffic checkpoints, in coordination with each state's department of transportation.

### Office of Air and Marine in the West of the Rockies Region

The CBP Office of Air and Marine (OAM) in Blaine, Washington deploys aircraft from Bellingham Airport and watercraft from marinas in Bellingham (U.S. Coast Guard facility) and Port Angeles. Several dozen pilots conduct airplane and helicopter patrols of land, air, and maritime coastal areas, and a similar number of boat operators conducts day and night patrols to the international border (an average patrol is 12 miles). The OAM in Spokane, Washington

operates from Felts Field but plans to move to Fairchild Air Force Base outside Spokane (Smith, 2010).

Marine patrols are coordinated with the U.S. Coast Guard. Nighttime patrols are conducted using navigational lighting.

**Office of Field Operations in the West of the Rockies Region**

Each CBP Office of Field Operations (OFO) region includes a large regional port of entry (POE) and the smaller POEs within its purview. This region includes the Blaine, Washington large, commercial POE and its associated smaller ports as well as the Great Falls, Montana POE and several ports it manages in Idaho and western Montana. (Note: Since most of the ports under the Great Falls POE are located in the East of the Rockies Region, these ports and the Great Falls POE are evaluated in the East of the Rockies chapter.)

The Blaine POE is a full-service port that oversees several maritime crossings, three medium POEs, and several smaller POEs. The Blaine POE itself processes over 10,000 passenger cars, 1,000 commercial vehicles, and 40-60 buses per day. Blaine is also the largest agriculture port on the Northern Border, employing several dozen agricultural specialists.

The POEs in Idaho and Montana that are west of the Rockies are generally small "permit" ports catering to specific commodities and are under the management of the Great Falls, Montana service port.

# 4.2 AIR QUALITY

## 4.2.1 INTRODUCTION

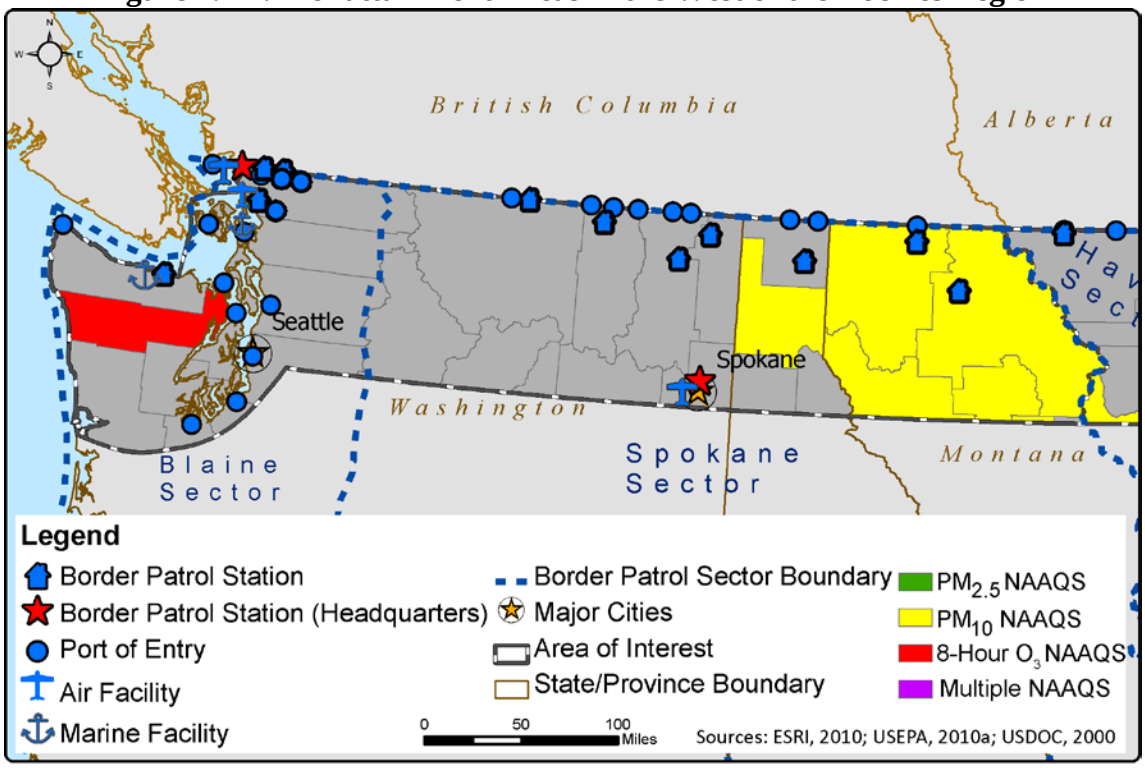
The West of the Rockies Region study area contains many air quality control regions (AQCR) and Class I areas that could experience impacts due to the proposed action and alternatives in this Programmatic Environmental Impact Statement (PEIS). However, the mere presence of a sensitive area, such as a nonattainment, maintenance, or Class I areas, does not guarantee that that area would be impacted by U.S. Customs and Border Protection (CBP) activities. (Class I areas are Federal lands, designated by Congress as of August 7, 1977, that have air quality restrictions under Section 162(a) of the Clean Air Act that are more stringent than the standards that apply elsewhere.) Chapter 3, Section 3.2 provides more information on generally applicable national standards and requirements used to describe and determine effects to air quality resources.

## 4.2.2 AFFECTED ENVIRONMENT

### 4.2.2.1 National Ambient Air Quality Standards and Attainment Status

Nonattainment areas within 100 miles of the border are shown in Figure 4.2-1. In Montana and part of Idaho there are large areas of nonattainment for $PM_{10}$ (particulate matter that is 10 micrometers in diameter and smaller). In these two states, narrow valleys and regional climate often cause temperature inversions that trap pollutants in cold air along valley floors. Federal regulations designate AQCRs that were once classified as nonattainment but have lowered levels of pollutants through the use of regional controls, as maintenance areas. Consistent with the nonattainment areas, Figure 4.2-2 shows maintenance areas in the near Seattle and Spokane. A complete list of nonattainment and maintenance areas organized by state and county is located in Appendix J.

**Figure 4.2-1. Nonattainment Areas in the West of the Rockies Region**

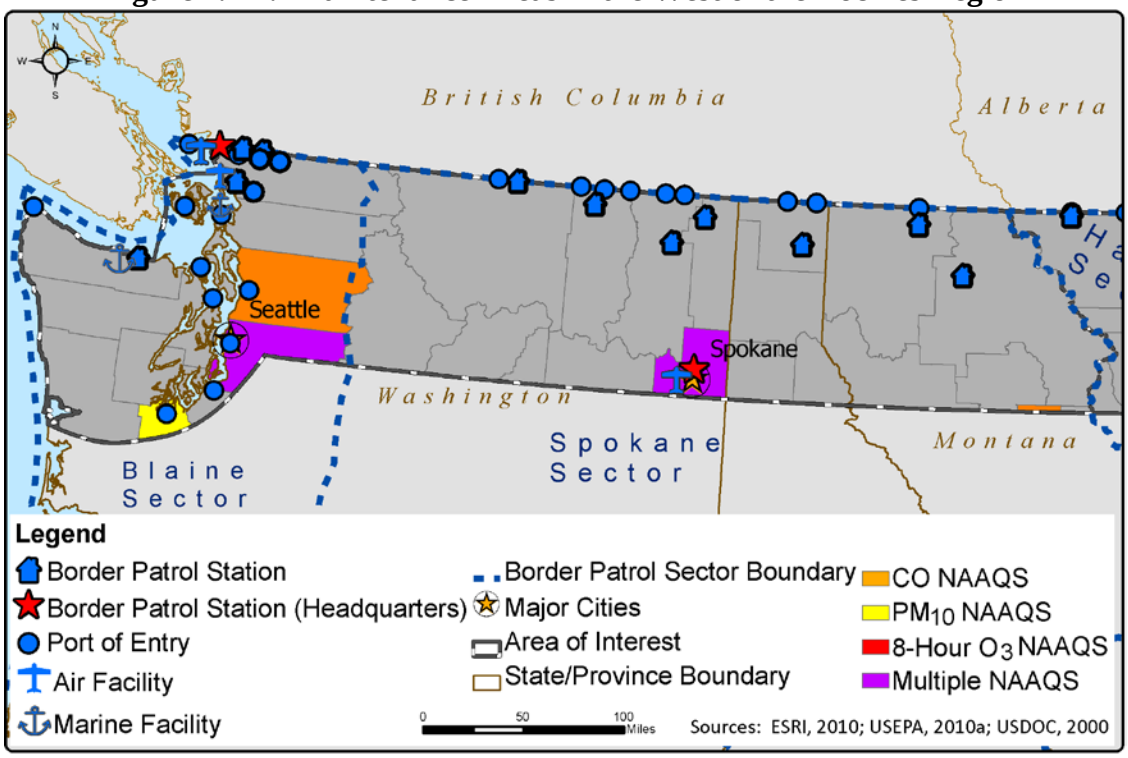



Notes:

NAAQS: National Ambient Air Quality Standards

$PM_{2.5}$: particulate matter that is 2.5 micrometers in diameter and smaller

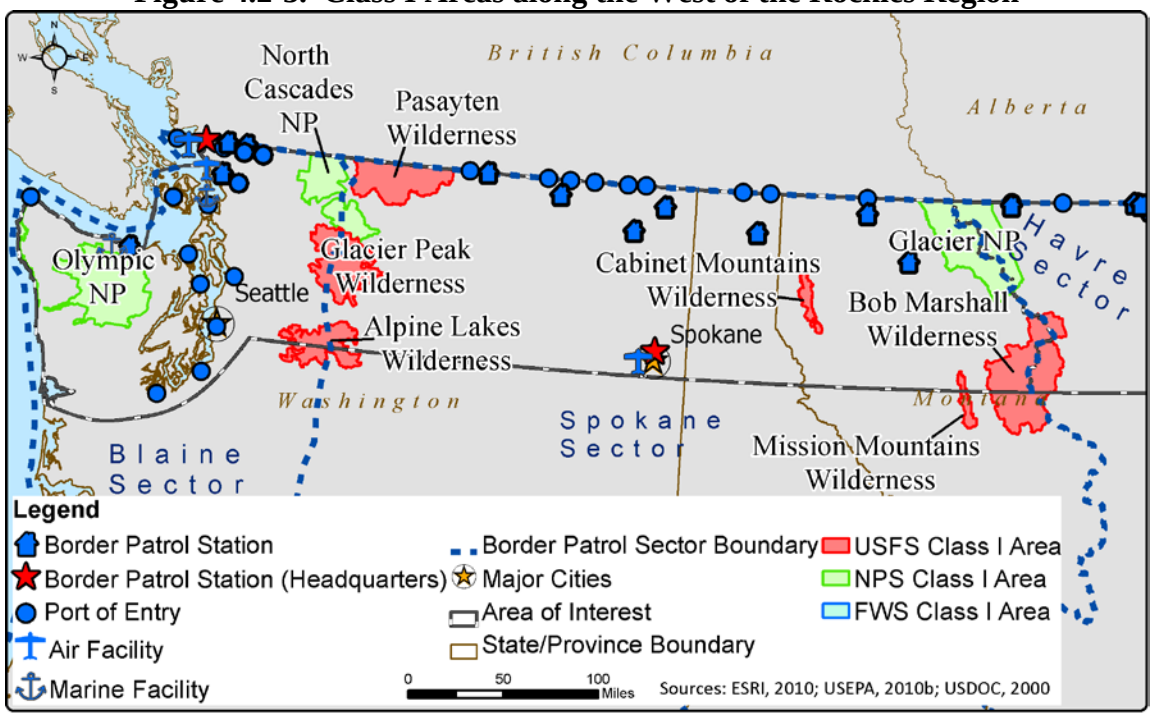
**Figure 4.2-2. Maintenance Areas in the West of the Rockies Region**




### 4.2.2.2 Class I Areas

The Clean Air Act (CAA) protects areas where air quality exceeds than national standards established by the U.S. Environmental Protection Agency (EPA) by measures to prevent significant deterioration of air quality (PSD). The more stringent restrictions in effect in Class I areas are largely meant to maintain unimpaired visibility in areas such as “national parks, national wilderness areas, national monuments, national seashores, and other areas of special natural, recreational, scenic, or historic value.” In general, "clean air areas" are protected through ceilings on the additional amounts of certain air pollutants over a baseline level. The PSD increment amounts vary based on the area’s classification. Class I areas and major CBP facilities in the WOR Region are shown on the map in Figure 4.2-3.

**Figure 4.2-3. Class I Areas along the West of the Rockies Region**



# 4.3 BIOLOGICAL RESOURCES

## 4.3.1 INTRODUCTION

The WOR Region falls within portions of the following states: Montana, Idaho, and Washington. Biologically the region can be divided into five major ecoregions:

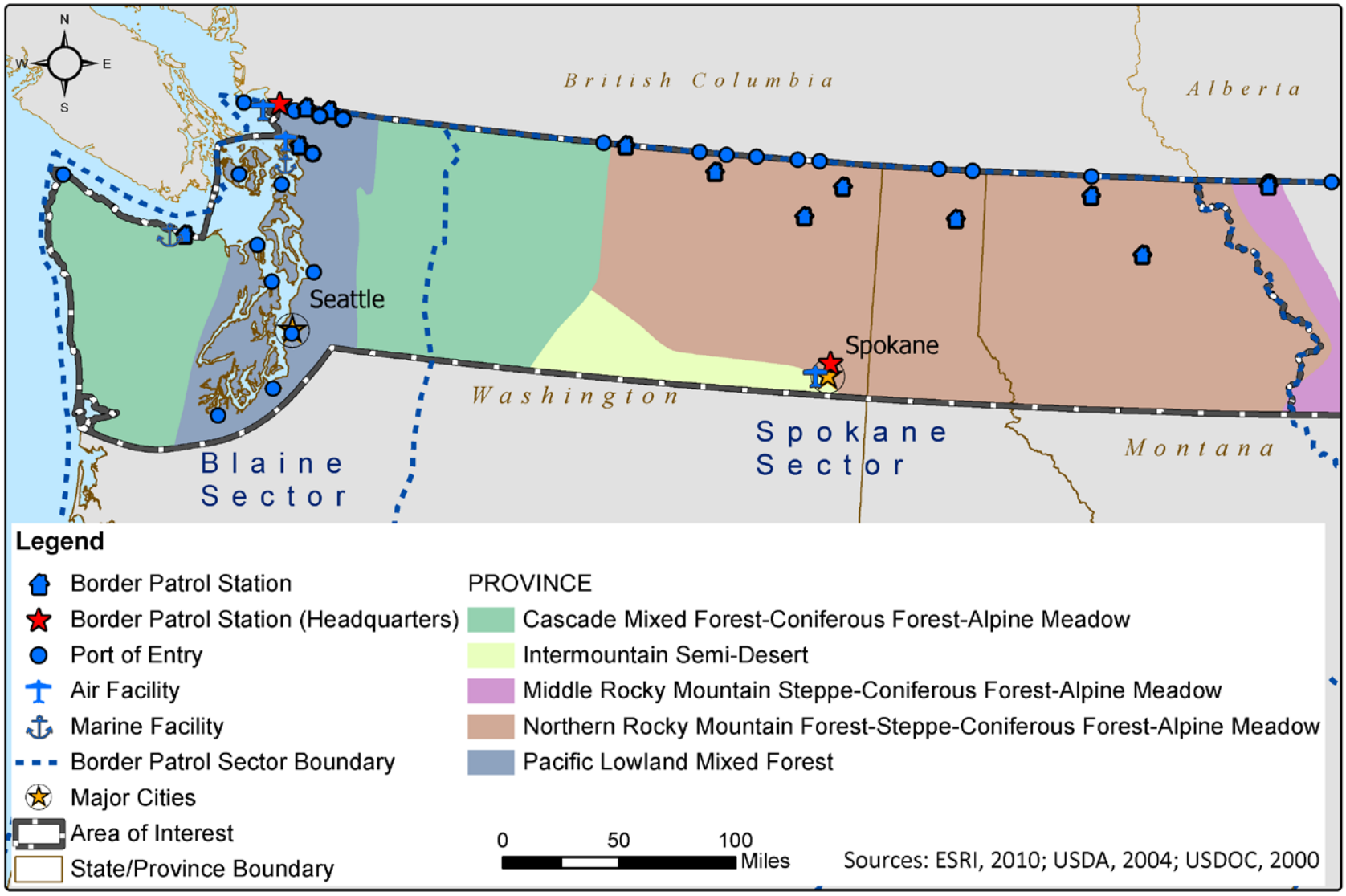
- Northern Rocky Mountain Forest Steppe–Coniferous Forest–Alpine Meadow;
- Middle Rocky Mountain Steppe–Coniferous Forest–Alpine Meadow;
- Intermountain Semidesert;
- Cascade Mixed Forest–Coniferous Forest–Alpine Meadow; and
- Pacific Lowland Mixed Forest.

Generally, these ecoregions continue north of the U.S.–Canada border (Figure 4.3-1). For a complete description of the above ecoregions, see Appendix L.

Map resources for the ecoregion map in this section were developed from the U.S. Census Bureau, USGS, and Environmental Systems Research Institute (ESRI) databases.

Each ecoregion has a unique set of biological, climatic, and topographical characteristics along with unique challenges and opportunities for U.S. Customs and Border Protection.

**Figure 4.3-1. Ecoregions of the West of the Rockies Region**



## 4.3.2 AFFECTED ENVIRONMENT

### 4.3.2.1 Blocks of Regionally Significant Habitat

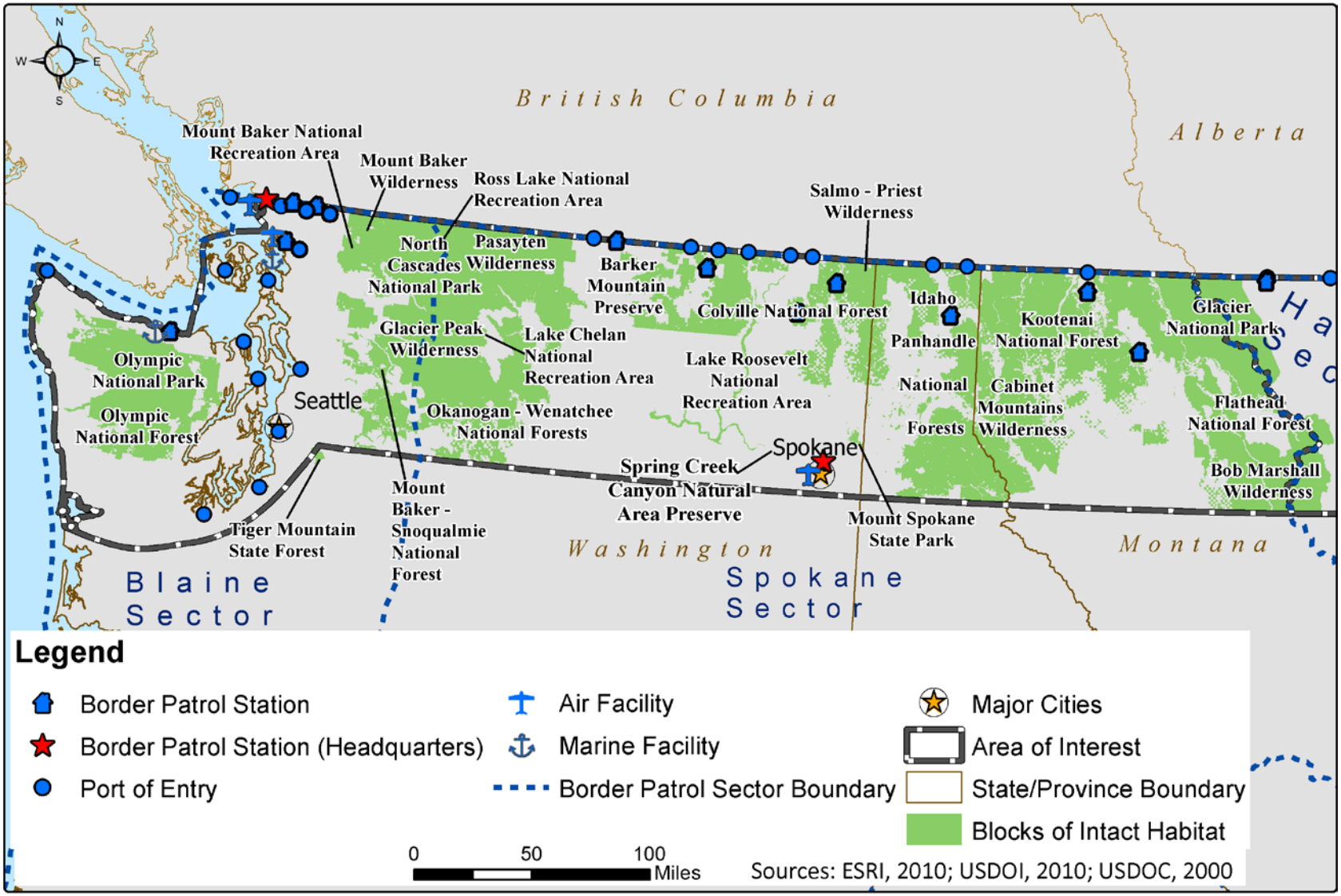
The blocks of regionally significant habitat listed below and shown in Figure 4.3-2 are relatively undeveloped and intact habitat protected as wilderness, state parks, and state and national forests. "Intact habitat" refers to areas of largely unfragmented habitat with few alterations or disturbances, such as improved roads or other development. Most areas listed are protected by law (wilderness areas, national parks), while others may occupy private lands and often cross state and country boundaries.

Selected regionally significant blocks that represent this region include:

- Barker Mountain Natural Area Preserve (Washington)
- Bob Marshall Wilderness (Montana)
- Cabinet Mountains Wilderness (Montana)
- Coeur d'Alene National Forest (Idaho)
- Colville National Forest (Washington)
- Coulee Dam National Recreation Area (Washington)
- Flathead National Forest (Montana)
- Glacier National Park (western portion) (Montana)
- Glacier Peak Wilderness (Washington)
- Kaniksu National Forest (Washington, Idaho, Montana)
- Kootenai National Forest (Idaho)
- Lake Chelan National Recreation Area (Washington)
- Mount Baker National Recreation Area (Washington)
- Mount Baker Wilderness (Washington)
- Mt. Spokane State Park (Washington)
- North Cascades National Park (Washington, U.S.)/Skagit Valley Provincial Park and EC Manning Provincial Park (British Columbia, Canada)
- Okanogan National Forest (Washington, U.S.)/Cathedral Provincial Park and Protected Area (British Columbia, Canada)
- Olympic National Forest (Washington)
- Olympic National Park (Washington)
- Pasayten Wilderness (Washington)
- Ross Lake National Recreation Area (Washington)
- Salmo-Priest Wilderness (Washington)

- Selway-Bitterroot Wilderness (Montana)
- Snoqualmie National Forest (Washington)
- Spring Creek Canyon Natural Area Preserve (Washington)
- Stephen Mather Wilderness (Washington)
- Tiger Mt. State Forest (Washington)
- Wenatchee National Forest (Washington)

**Figure 4.3-2. Blocks of Regionally Significant Habitat in the West of the Rockies Region**



### 4.3.2.2 Sensitive Habitats

Within a 100-mile zone adjacent to the U.S.–Canada border in the WOR Region are several ecological communities representing sensitive habitats. The sensitive habitats described here occur in many of the larger habitat areas listed in Section 4.3.2.1, and are home to many of the threatened and endangered species listed in the next section. For example, alpine meadows exist in many mountainous areas in this broad geographic region, such as Glacier National Park, and house many protected species like the grizzly bear (*Ursus arctos horribilis)* and common plant species like beargrass (*Xerophyllum tenax)*. Some descriptive habitats lower down, such as old growth/mature forest, span many regional boundaries and are more general in meaning. Others, such as Great Plains ponderosa pine woodlands (plant communities dominated by ponderosa pines), define more specific ecological associations.

**Beargrass in an alpine meadow at Glacier National Park**

Source: (Anonymous, 2008a).

Many of these habitats are very fine in scale (they cover small areas in a mosaic of various habitats) and form a patchwork of biologically sensitive and diverse areas. The list of sensitive habitats is based on those enumerated and described by the World Wildlife Fund (2001), ecological system descriptions within the NatureServe.org database, and each state's respective natural resources agency. The habitats are as follows:

- Alpine dwarf-shrubland—dwarf-shrubs or dwarf willows forming a heath-type ground cover.
- Alpine meadows—open meadows at and above the timberline.
- Aspen stands—pure or mixed stands of aspen greater than 0.4 ha (1 acre).
- Biodiversity areas and corridors—biologically diverse cities or urban growth with habitat valuable to fish or wildlife, mostly with native vegetation; corridors are zones of relatively undisturbed and unbroken tracks of vegetation that connect fish and wildlife habitat conservation areas, priority habitats, areas identified as biologically diverse or valuable within city or urban growth areas.
- Coastal nearshore—relatively undisturbed, nearshore estuaries of Washington's outer coast.

- Douglas-fir and ponderosa pine forest, as well as shrub-grassland ecosystems.
- Dry conifer forest—northern Rocky Mountain western larch woodland in mountainous regions at 2,000 to 9,800-feet elevation.
- Eastside steppe—non-forested vegetation dominated by forbs, perennial bunchgrasses, or a combination.
- Freshwater wetlands and fresh deepwater—lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water; deepwater habitats are permanently flooded lands below the deepwater boundary of wetlands.
- Great Plains ponderosa pine woodland and savanna-ponderosa pine woodlands surrounded by grasslands.
- Herbaceous balds—variable-sized patches of grasses and forbs on shallow soils over bedrock, commonly fringed by forest or woodland.
- Inland dunes—sand dunes formed by wind action, not necessarily near water bodies.
- Instream habitats—a combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- Juniper savannah/juniper woodlands—grassland with scattered junipers, grading into a zone with more junipers and less grass cover.
- Northern conifer forest—northern Rocky Mountain hemlock—western red cedar forest.
- Northern Rocky Mountain Douglas—fir forest and woodland—mixed deciduous/coniferous forests.
- Old growth/mature forest—a forest of great age exhibiting unique structural and ecological features.

**Douglas-firs in an old-growth forest**

Source: (Anonymous, 2005a).

- Open coast nearshore—relatively undisturbed, non-estuarine nearshore areas of Washington's outer coast.
- Oregon white oak woodlands—stands of oak or oak/conifer associations where canopy coverage of the oak component exceeds 25 percent.
- Palouse prairie (of the Columbia Basin)—gentle, rolling terrain at elevations of 2000 to 3000 feet.
- Riparian zones—areas adjacent to flowing or standing freshwater aquatic systems.
- Rocky Mountain riparian woodland and shrubland—within the flood zone of rivers, on islands, sand and gravel bars, and adjacent streambanks.
- Rocky Mountain subalpine spruce-fir forest and woodland—spruce-fir forests of the mountainous and subalpine zones of the Rocky Mountains; these systems are a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta and southward.
- Rocky Mountain subalpine—montane fen–mountain wetland fed by mineral-rich surface water or groundwater; below alpine areas in elevation.
- Rocky Mountain wooded vernal pool–temporary pools, usually devoid of fish, that allow development of amphibian and insect species.
- Shrub-grassland ecosystems (shrub-steppe), including antelope bitterbrush/Idaho fescue habitat.
- Shrub-steppe—non-forested vegetation with one or more layers of perennial bunchgrasses and a conspicuous, but discontinuous, layer of shrubs.
- Subalpine forest—northern Rocky Mountain subalpine dry parkland, Rocky Mountain lodgepole pine forest, Rocky Mountain subalpine dry-mesic spruce-fir forest and woodland.
- Westside prairie—herbaceous, non-forested plant communities; either dry or wet prairie.

#### 4.3.2.3 Threatened and Endangered Species

Federally listed threatened and endangered species are protected by the Endangered Species Act (ESA) of 1973. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend.

Appendix M lists the threatened or endangered species by county in the West of the Rockies Region. Species are listed as threatened or endangered at either the Federal and/or state level; some non-threatened or endangered species are categorized as "conservation concern" or "special concern" species.

Some states differ in how they list and protect threatened and endangered species. The following list gives the specific agencies and listing differences (if applicable) in the WOR Region.

- Idaho does not have an endangered species act for animals, but does legally recognize threatened, endangered, and specially protected species in the state per Idaho Administrative Code 13.01.06. In addition, the Idaho Department of Fish and Game

(IDFG) maintains a list of species of special concern (NANFA, 2011). Idaho does not list species as state threatened or endangered, but defers to Federal listings.

- Montana has an endangered species act that covers animals, but not plants. More species are listed as species of concern (NANFA, 2011). Montana Fish, Wildlife, and Parks lists some species as species of concern in place of either threatened, or endangered or threatened listing. The status represents a separate category, described as "potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas" (MT FWP, 2010).
- Washington has an endangered species law that covers animals, but not plants. Recovery plans are required, although critical habitat designation and agency consultation are not. The Washington Department of Fish and Wildlife (WDFW) maintains a list of threatened, endangered, special concern, and sensitive species (NANFA, 2011).

The following examples of some of the threatened and endangered species in the WOR Region show the wide range of fauna and flora affected.

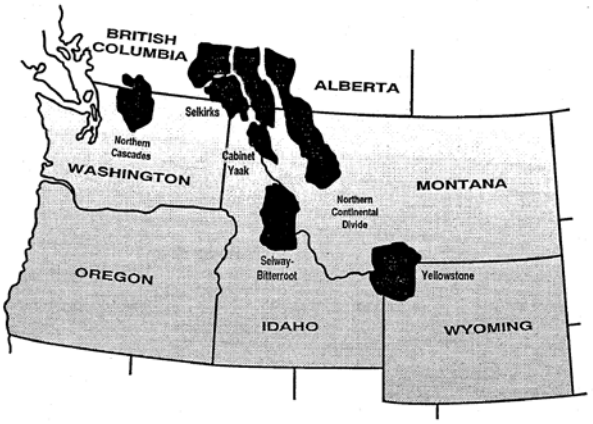
The Selkirk Mountains population of woodland caribou (*Rangifer tarandus caribou)* is one of the federally endangered species in the region. The population in the Selkirk recovery zone is estimated at 40 to 50 individuals (USDOI, 2008a).

**Woodland Caribou, *Rangifer tarandus caribou***

Source: (Bauer, 1993).

The grizzly bear (*Ursus arctos horribilis)* is an example of a rare species with a large home range, frequently traveling between the United States and Canada. This species is especially sensitive to habitat disturbance. The grizzly bear requires contiguous, relatively undisturbed, mountainous habitat with noteworthy vegetative and topographic diversity. Grizzly bears have a low reproductive rate and are slow to recover from high mortality rates. The USFWS identified recovery zones needed for the recovery of the grizzly bear (USDOI, 1993). In Washington, two grizzly bear recovery zones exist: the northern Cascades zone, and the Selkirk recovery zone in northeast Pend Oreille County. The northern Cascades zone currently has a remnant population of fewer than 20 bears (USDOI, 2010a), but is capable of supporting a larger population.

**Grizzly Bear** **Recovery Zone Map**




Source: (Tollefsbol, 2008; USDOI, 1993).

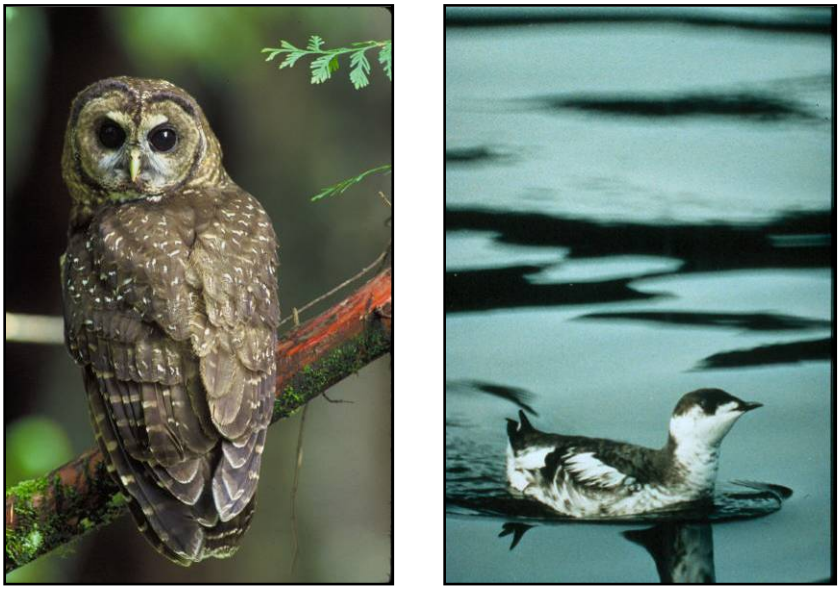
Another example is the leatherback turtle (*Dermochelys coriacea)*, the only sea turtle capable of surviving in cold waters and lives in the Northwest coastal region. It ranges more widely than other sea turtles, north to the coasts of Washington and British Columbia. Leatherbacks are listed as endangered in both the United States and Canada.

**Leatherback Turtle**

Source: (Rabon, 2005).

The northern spotted owl (*Strix occidentalis)* and marbled murrelet (*Brachyramphus marmoratus)* are both listed as federally threatened species in the region and require old-growth conifer forests for breeding.

**Northern Spotted Owl–Left; Marbled Murrelet–Right**



Source: (Hollingsworth, 2011; Van Vliet; 2008).

### 4.3.2.4 Wildlife Typically Found in the Region

The alpine meadows, subalpine forests and high-elevation grasslands in this ecoregion are home to numerous wildlife species. Many bird species annually migrate into or out of this region in spring and fall. Typical avian species include Clark's nutcracker (*Nucifraga columbiana*), Steller's jay (*Cyanocitta stelleri*), common raven (*Corvus corax*), Williamson's sapsucker (*Sphyrapicus thyroideus*), Wilson's warbler (*Wilsonia pusilla*), blue grouse (*Dedragapus obscurus*), fox sparrow (*Passarella iliaca*), Swainson's thrush (*Catharus ustulatus*), American pipit (*Anthus rubescens*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), mountain bluebird (*Sialia currucoides*), and western tanager (*Piranga ludoviciana*). These avian species, along with over 200 others, are distributed broadly within the forested and open habitats of the WOR Region, according to preferred vegetation and ecological niche.

A wide variety of mammals and some "permanent-resident" bird species remain in the region throughout the year. Common large and medium-sized mammal species include elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), mountain goat (*Oreamnos americanus*), moose (*Alces alces*), mountain lion (*Puma concolor*), black bear (*Ursus americanus*), American beaver (*Castor canadensis*), and porcupine (*Erethizon dorsatum).* Many small mammals, including rabbits, ground and arboreal squirrels, and other rodents, are also present along with a variety of reptile and amphibian species, including snakes, turtles, lizards, frogs, and salamanders, distributed by habitat and vegetation type.

Orcas (or killer whales, *Orcinus orca),* seals (Suborder–Pinneped), whales (Order–Cetacean), and sea otters (*Enhydra lutris)* inhabit the region's coastal area. Chinook (*Oncorhynchus tshauytscha),* pink (*O. gorbuscha),* chum (*O. keta),* sockeye (*O. nerka),* and coho salmon (*O. kisutch*) and steelhead trout (or sea-run rainbow trout, *O. mykiss*) move in and out of Puget Sound. All marine mammals are protected under the Marine Mammal Protection Act (MMPA) of 1972. This act prohibits, with certain exceptions, the take of marine mammals in U.S. waters.

The Department of Interior (DOI) oversees protection of the sea otter, walrus, polar bear, dugong, and manatee; and the Department of Commerce (DOC) oversees the protection of pinnipeds (other than walrus) and cetaceans (whales) (Bailey, 1995; EOE, 2009; WADFW, no date; Montana Field Guide, 2010; IDFG, 2009).

#### 4.3.2.5 Vegetative Habitat Typically Found in the Region

The region's vegetation is dominated by mixed evergreen-deciduous forests primarily comprising Douglas-fir (*Pseudotsuga menziesii)*, western red cedar (*Thuja plicata)*, and western hemlock (*Tsuga heterophylla)*. Grasses and sagebrush may cover the lower slopes and valleys of some areas, constituting a "semi-desert" (Bailey, 1995). Alpine meadows, grasslands, wooded riparian stands, and higher-elevation treeline/alpine communities are also common in this ecoregion.

Much of the central area of the WOR Region is made up largely of sagebrush (primarily big sagebrush, *Artemisia tridentatata*) and shadscale (*Atriplex confertifolia)*, with some short grasses. In many areas, ground-layer vegetation makes up less than 25 percent of the total cover, with a dense shrub layer. Adjacent to streams near the mountains are valleys lined with willows (*Salix* spp.*)* and sedges (*Carex* spp.*)*, which may be replaced by greasewood and other alkaline-tolerant plants further away from the mountains (McNab and Avers, 1994). Areas in the Columbia River basin that experience more than 10 inches (26 cm) of rainfall per year are vegetated with bunchgrass species. Riparian zones in this ecoregion often are bordered by cottonwoods (*Populus deltoides)* and willows.

**Cottonwood Stand**

Source: (Hillebrand, 2008a).

The Cascade Mixed Forest is the second largest ecoregion west of the Rockies. It is mountainous, with elevations from sea level to above 5,000 feet (1,500 m). It is located along

the Pacific Coast of Washington and the Cascade Mountains. Douglas-fir is the most abundant species at low elevations, along with numerous shrub species. In the Olympic Mountains, the shade-tolerant Pacific silver fir (*Abies ambilis)* takes the place of hemlock. A dry forest composed primarily of ponderosa pine (*Pinus ponderosa)* grows on the dry eastern slopes of the Cascade Mountain Range.

The Pacific Lowland Mixed Forest Province is situated primarily between prominent mountain ranges (Cascade and Olympic mountains), varying in elevation from sea level to above 1,500 feet (460 meters). In Washington, this area has been largely modified by human uses and cultivation. At the lowest elevations with native forest cover, dense conifers include western red cedar, western hemlock, and Douglas-fir. In the Puget Sound region and interior valleys, coniferous tree species are less abundant than in coastal areas. In these habitats, deciduous trees such as big-leaf maple (*Acer macrophyllum),* Oregon ash (*Fraxinus latifolia),* and black cottonwood become more common. Some remaining prairies have oaks, but also include groves of Douglas-fir, Oregon white oak (*Quercus garryana),* and Pacific madrone (*Arbutus menziesii).* Wetlands with swamp or bog plant communities are also present (WWF, 2001a).

Invasive (non-native) plant species pose a serious threat to the natural areas in this region. For example, scotch broom (*Cytisus scoguarius*) is invading the oak forests. Scotch broom is an invasive shrub that currently occupies more than 700,000 acres in the northwest coastal regions of the western coastal states. It displaces native plant species, posing a serious problem for reforestation (Bailey, 1995; EOE, 2009; WADFW, no date; Montana Field Guide, 2010; IDFG, 2010).

#### 4.3.2.6 Wetlands and Waterways

Wetland types in this region include:

- Forested/scrub-shrub wetlands;
- Freshwater emergent wetlands;
- Riverine habitats;
- Deepwater marine and estuarine habitats;
- Marine and estuarine wetlands; and
- Riverine habitats.

Puget Sound and its associated habitats represent an important marine resource. As such, the sound is the focus of multi-agency, multi-disciplinary conservation efforts (Puget Sound Partnership, 2009). Puget Sound is home to a complex estuarine system of interconnected marine waterways and basins, as well as about 3.4 million people (USDOC, 2009). Highly seasonal fresh waters from the Olympic and Cascade Mountains feed this large saltwater system of estuaries. Orcas and seals live throughout the sound and are protected under the MMPA.

**Puget Sound**

Source: (WDE, No Date).

Estuaries feature a mixture of salt and fresh water and are extremely biologically productive and important to marine life. The estuaries of Washington State have deltas, mudflats, and salt marshes. Many estuaries contain abundant eelgrass communities, which are highly productive areas for marine life and as well as many birds. Aquatic resources in this region are of great importance and diversity (detailed in the following section and Section 4.5).

Washington State identifies more than 300 rivers, creeks, and other waterways protected under its Shoreline Management Act. The Washington Administrative Code (WAC) Chapter 173-18 defines protected reaches of these waterways. Washington also has 127 marine protected areas that cover 6 million feet of coastline (Van Cleve et al., 2009).

The inland wetlands and waterways of Idaho and Montana are of high natural value. Alpine lakes, streams, bogs, fens, wet meadows, marshes, and other wetlands provide wildlife habitat. Non-alpine wetlands have become increasingly valued due to their importance in water quality protection, stormwater control, and role in maintaining groundwater levels.

#### 4.3.2.7 Aquatic Resources in the Region

Fisheries and aquatic resources are of great importance in this region. This area is rich with rivers, lakes, reservoirs, ponds, and has considerable coastline along the Pacific Ocean. Alpine lakes and streams are of critical importance to fish and aquatic wildlife; any available surface waters are especially important in the arid intermountain semi-desert regions.

The marine and coastal part of Washington forms a complex marine border with the Canadian Province of British Columbia. It stretches along the Olympic Peninsula, the Strait of Juan de Fuca, Haro Strait, Boundary Pass, the Strait of Georgia, and the Salt Spring Islands of Canada. The area from the outer Pacific Coast to the Strait of Georgia (also called Georgia Basin) is a rich, productive cold-water environment for many marine and coastal organisms. Much of it is also an area of considerable human use with extensive shipping channels, commercial and sport fisheries, and ferryboats. Steep cliffs border many areas. Much of this outer rocky shore is home to thick kelp beds, which form key habitat for many marine organisms, including sea otters and abalone. Rocky intertidal areas—shallow areas exposed at some time between high and low tides—along the Pacific coast also provide important habitat for many marine organisms.

Fast-flowing major rivers are important habitat for various salmon and trout species. Chum salmon (*Oncorhynchus keta),* coho salmon (*O. kisutch),* pink salmon (*O. gorbuscha),* sockeye salmon (*O. nerka),* and Chinook salmon and steelhead are among the Pacific Northwest's most

sought-after species. Rivers, such as the Skagit and Skykomish, are of great economic importance to the human population of the region and remain important for native salmon.

Other major rivers in this region include: a portion of the Clarke Fork, the Moyie River (which flows south from Canada), and the Kootenai, Similkameen, Coeur d'Alene, Pack, and Priest rivers. The Clark Fork River drains into Lake Pend Oreille; the Pend Oreille River drains out of Lake Pend Oreille.

The Flathead, Skagit, and Missouri river systems are designated as National Wild and Scenic Rivers. Protected by the Wild & Scenic Rivers act of 1968, these rivers and their immediate environments possess outstandingly remarkable and various scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar attributes.

Major lakes in the region include Lake Pend Oreille, Rufus Wood, Banks, Long, Palmer, Osoyoos, Kalispell, Sullivan, Priest, and Hayden lakes, Boundary Reservoir, a portion of Coeur d'Alene Lake, and Little Bitterroot, Swan, Flathead, Whitefish, and Medicine lakes, to name just a few.

Many lakes and major rivers are connected by smaller waterways and wetland complexes, making aquatic resources in the West of the Rockies Region of considerable importance economically and ecologically (Bailey, 1995; EOE, 2009).

# 4.4 GEOLOGY AND SOILS

## 4.4.1 INTRODUCTION

The geology and soils in the West of the Rockies Region in the Northern Border study area vary widely throughout the region. Geology is the study of the earth's history through rock formations. These rocks often serve as the parent rock for soils present at and below the surface. Topography is considered to be the physical expression of geologic or man-made conditions of a region taken collectively. Topographically, the West of the Rockies Region ranges from mountains and volcanoes to low valleys and shorelines to relatively flat plains.

This section addresses the geologic conditions in the West of the Rockies Region and describes the potential impacts of U.S. Customs and Border Protection (CBP) program alternatives on geologic resources. The study area contains significantly different topographic features ranging from the bay type features of Puget Sound and Cascade Mountains or volcanoes in Washington to relatively flat plains in Montana. Geologic formations including glacial deposits, lava from volcanoes or fissure flows, intruded granitic rocks, and soil conditions are all present within the West of the Rockies Region and have been shaped over thousands of years by glacial, water, and wind mechanisms.

## 4.4.2 AFFECTED ENVIRONMENT

### 4.4.2.1 Physiographic Provinces

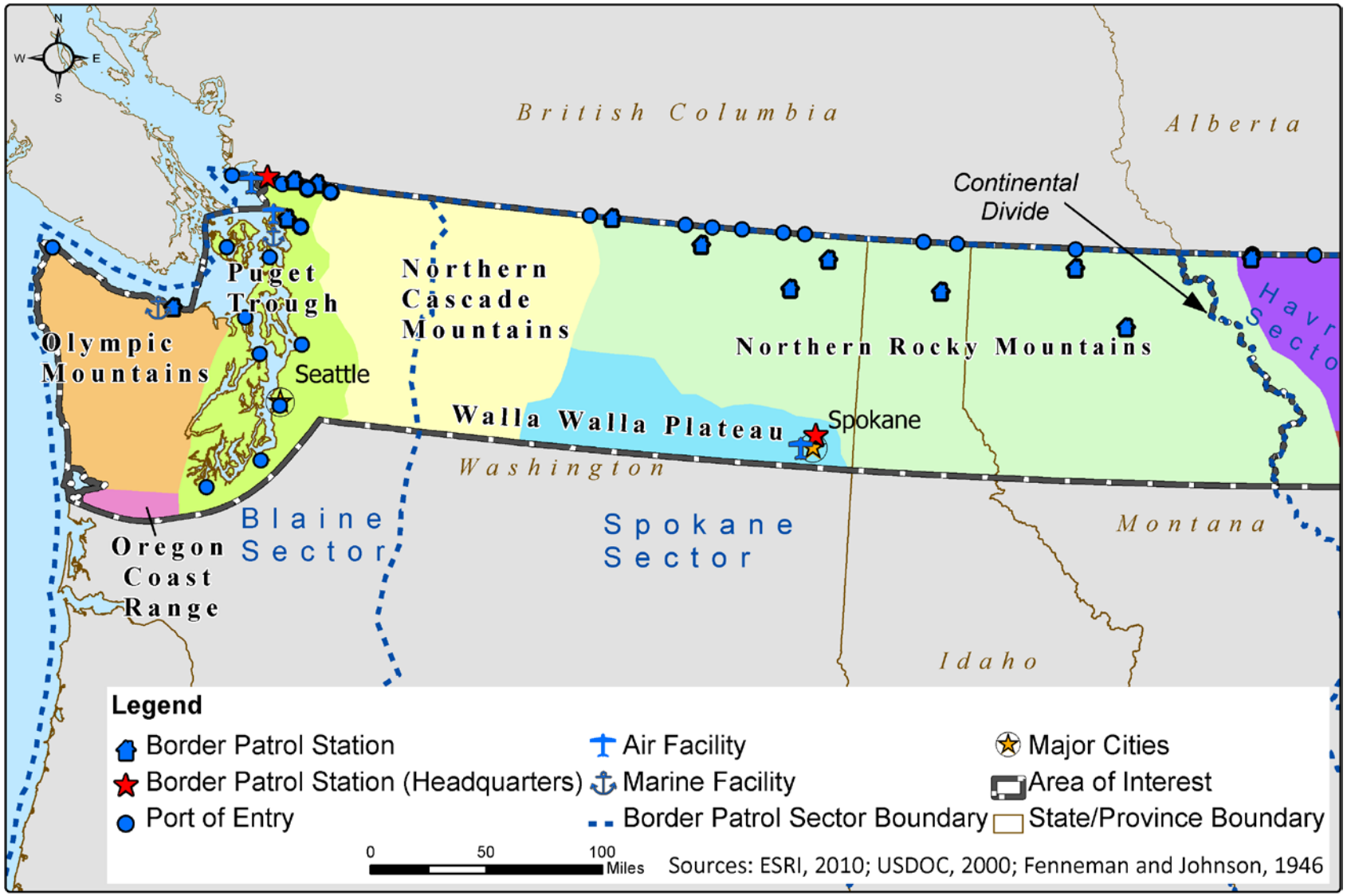
Three physiographic divisions span the West of the Rockies Region in the Northern Border area. These divisions are subdivided into provinces as well as some sections (Figure 4.4-1, Table 4.4-1).

The Pacific Mountain System forms the westernmost physiographic division of the West of the Rockies Region. In the area of study, this division is divided into two provinces: the Pacific Border Province and the Cascade-Sierra Range. The Pacific Border Province in the study area is further divided into the Olympic Mountain section, Puget Trough section, and Oregon Coast range. The Cascade-Sierra Range division of the study area includes the Northern Cascade section.

The Intermontane Plateaus make up the physiographic region east of the Pacific Mountain System. The Columbia Plateau is a province of the Intermontane Plateaus and is divided into sections. The Walla Walla Plateau is the section of focus within the study area.

The final physiographic division is the Rocky Mountain System (Rockies). The northern Rockies form the province of interest and are not further divided into sections. Table 4.4-1 provides details on the geology of these areas. Appendix N features a geologic time scale showing the ages of the geologic time periods with which rock formations are dated.

**Figure 4.4-1. Physiographic Provinces, Divisions, and Sections of the West of the Rockies Region**



1 **Table 4.4-1. Physiographic Provinces in the West of the Rockies Region**

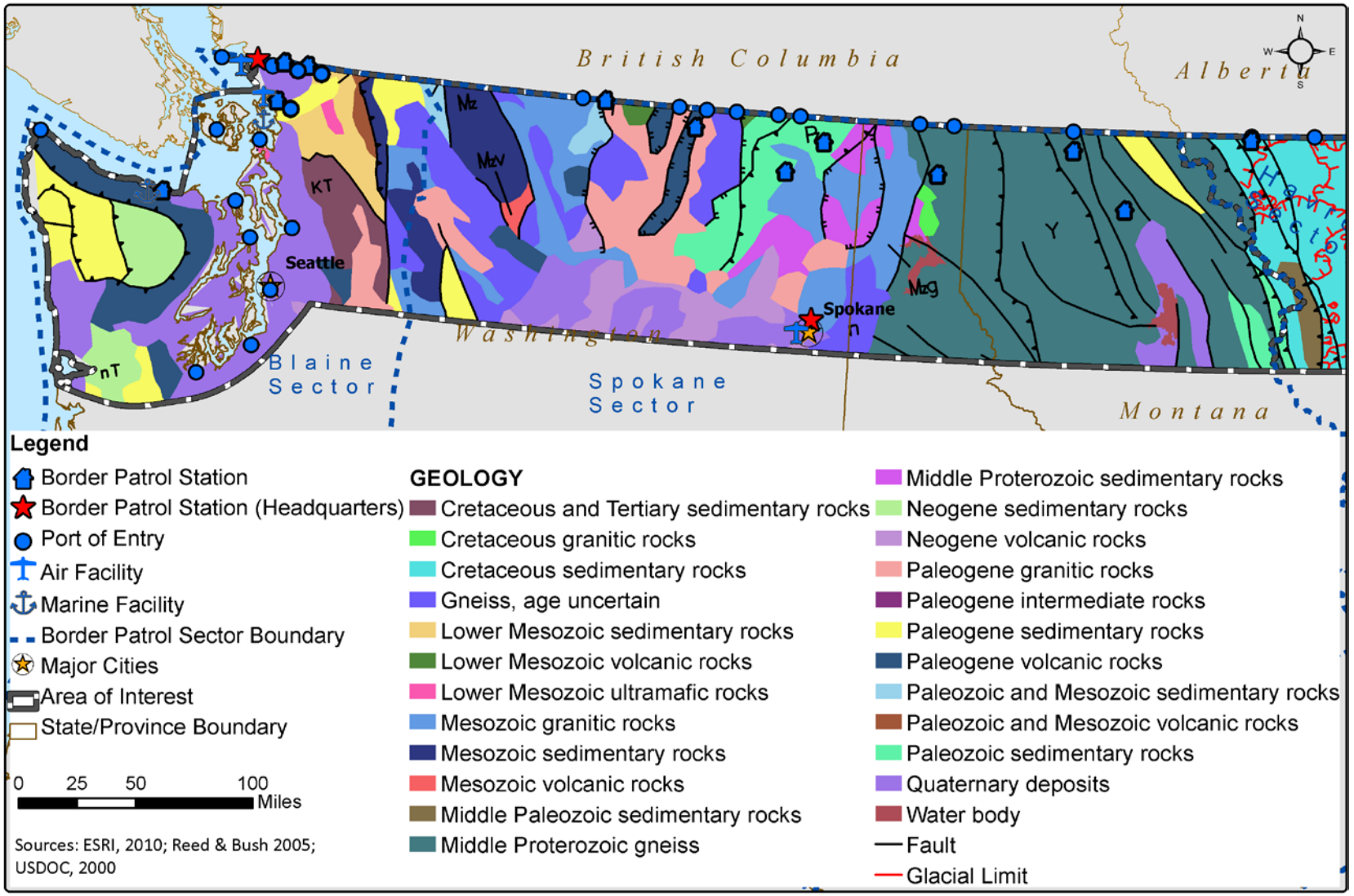
| Division | Province | Section | Terrain Texture including Topography | Geologic Structure and History | Generalized Rock Types |
|---|---|---|---|---|---|
| Pacific Mountain System | Pacific Border Province | Olympic Mountains | Elevations in the Olympic Mountains range around 5,000 ft (1,524 m) but top 7,965 ft (2,448 m) on Mount Olympus.<br>The range is circular with a 46 mi (74 km) average diameter (USDOI, 2004b). | Mountains formed during the middle to late Miocene (Figure 4.4-1, Figure 4.4-2) due to subduction of the Juan de Fuca tectonic plate under the North American plate. On the northern and eastern flanks, Pleistocene erosion and deposition occurred from glacier advance and retreat. | Basement rocks are mainly basalts, manganese deposits, marine sediments, and limestones. Glacial deposits of sand and gravel in the valleys and coastal plains (WSDNR, 2011a). |
| Pacific Mountain System | Pacific Border Province | Puget Trough | Low-lying area between the Olympic Mountains and the Cascade Range. | Tectonically active zone created by the subduction of the Juan de Fuca plate under the North American Plate. Unconsolidated early Quaternary sediments overlay Tertiary sedimentary rock. As many as four glaciations here, evidenced by Quaternary glacial deposits. | Thick (3,700 ft, 1,130 m) unconsolidated glacial sediments cover sedimentary bedrock, which is up to 10,000 ft (3,050 m) thick (CEC, 2007). |
| Pacific Mountain System | Pacific Border Province | Oregon Coast Range | Range is 200 miles long with average elevations of 1,500 ft (457.5 m) and a maximum elevation at Mary's Peak of 4,097 ft (1249 m).<br>Slopes are steep, nearing 50 degrees in some areas. | Oregon Coast Range created during subduction of the Juan de Fuca plate under the Pacific plate.<br>East of the Cascadia Subduction Zone; called a forearc (region closest to the sea in an area of volcanic activity). Forearc contains rocks from the subducting plate, scraped off during subduction. | Rocks originated as oceanic sediment with the oldest from the Paleocene to middle Eocene. Uplift and deposition produced sandstone and siltstone (University of Oregon, 2008). |

| Division | Province | Section | Terrain Texture including Topography | Geologic Structure and History | Generalized Rock Types |
|---|---|---|---|---|---|
| Pacific Mountain System | Cascade-Sierra Range | Northern Cascade Mountains | Mountain chain of high peaks and U-shaped valleys carved by Holocene glaciers.<br>Highest peak is Mt. Baker at 10,781 ft. (3286 m). | Still tectonically active, range developed by subduction of the oceanic northeast Pacific plate under the North American plate during the Mesozoic. Ages of rocks vary from the Permian to the Tertiary. Geology is extremely complicated and not fully understood. | The section is mainly comprised of crystalline and metamorphic rock, mylonite, and unconsolidated rare rocks called mélange, formed from sedimentary parent rock (WSDNR, 2011b). Some locations have thick beds (up to 60,000 ft, 18,000 m) of sedimentary rock. |
| Inter-montaine Plateaus | Columbia Plateau | Walla Walla Plateau | Topography of the plateau varies, including areas of high and low relief, rolling hills, narrow valleys, and entrenched streams. | Plateau had series of major lava flows, up to two miles (3.2 km) thick, due to fissures in the surface of the land throughout the Miocene. Later, tectonic movement caused extensive folding, faulting, and uplift. Pleistocene glaciation shaped the landscape by scouring the surface and depositing loess (windblown silt). Ice dam failure after glaciation caused a huge flood, depositing alluvium onto the Pleistocene sediments (WWBWC, 2004). | Basin base rock is of layers of basalt (Columbia River basalts) topped off with unconsolidated gravels and clays. Loess and alluvial deposits cover much of these gravels and clays (WWBWC, 2004). |
| Rocky Mountain System | Northern Rocky Mountains | N/A | Steep, glaciated mountains and peaked alpine ridges.<br>Elevations from 3,000 to 10,000 ft (920 to 3,100 m) | Northern Rockies formed during Laramide Orogeny, about 70 to 40 million years ago. Likely cause of Rocky Mountains development is an unusual oceanic subduction under the North American Plate. Most plates subduct at a high angle; the subduction that formed the Rockies occurred at a lower angle (USDOI, 2000). | Rock types include Precambrian sedimentary deposits (partially metamorphosed), upper Tertiary sedimentary deposits, and glacial deposits (USDOI, No Date). |

#### 4.4.2.2 Geologic Conditions

The geologic conditions within the West of the Rockies Region are extremely complex, resulting from tectonic and related activities (e.g., faulting, volcanic activities, and seismic sea waves) and glacial activities along with erosive actions of wind and water. The West of the Rockies Region contains consolidated geologic formations consisting of sedimentary, igneous, and metamorphic rocks. The West of the Rockies Region also contains unconsolidated geologic formations consisting of alluvium, terrace deposits, glacial deposits and other mixtures of sands, silts and clays with various mixtures of rocks. The geologic formations are shown on Figure 4.4-2.

**Figure 4.4-2. Geologic Conditions of the West of the Rockies Region**



## Regional Glaciation

During the last ice age, two ice sheets extended over the Canadian border into the United States. One was the Cordilleran Ice Sheet, which flowed into the United States from western Canada and covered the northern reaches of Washington, Idaho, and Montana between the Pacific Ocean and the Continental Divide (USDOI, 2002) (Figure 4.4-3). In addition to the ice sheets, mountain glaciers also expanded at high elevations.

The effects of glacial advances are readily apparent in the northern United States. Polished and striated outcroppings, rounded hills, moraines, valley fills of glacial till and outwash, and other typical glacial features are evidence of Pleistocene glaciation. All along the Northern Border, till deposits, erratics, and moraines are common (Nelson, 2003). Till, a sedimentary deposit derived from glacial erosion, was deposited throughout the northern United States as the ice sheets receded.

**Figure 4.4-3. Expanse of the Cordilleran Ice Sheet**


## Seismicity and Tectonics

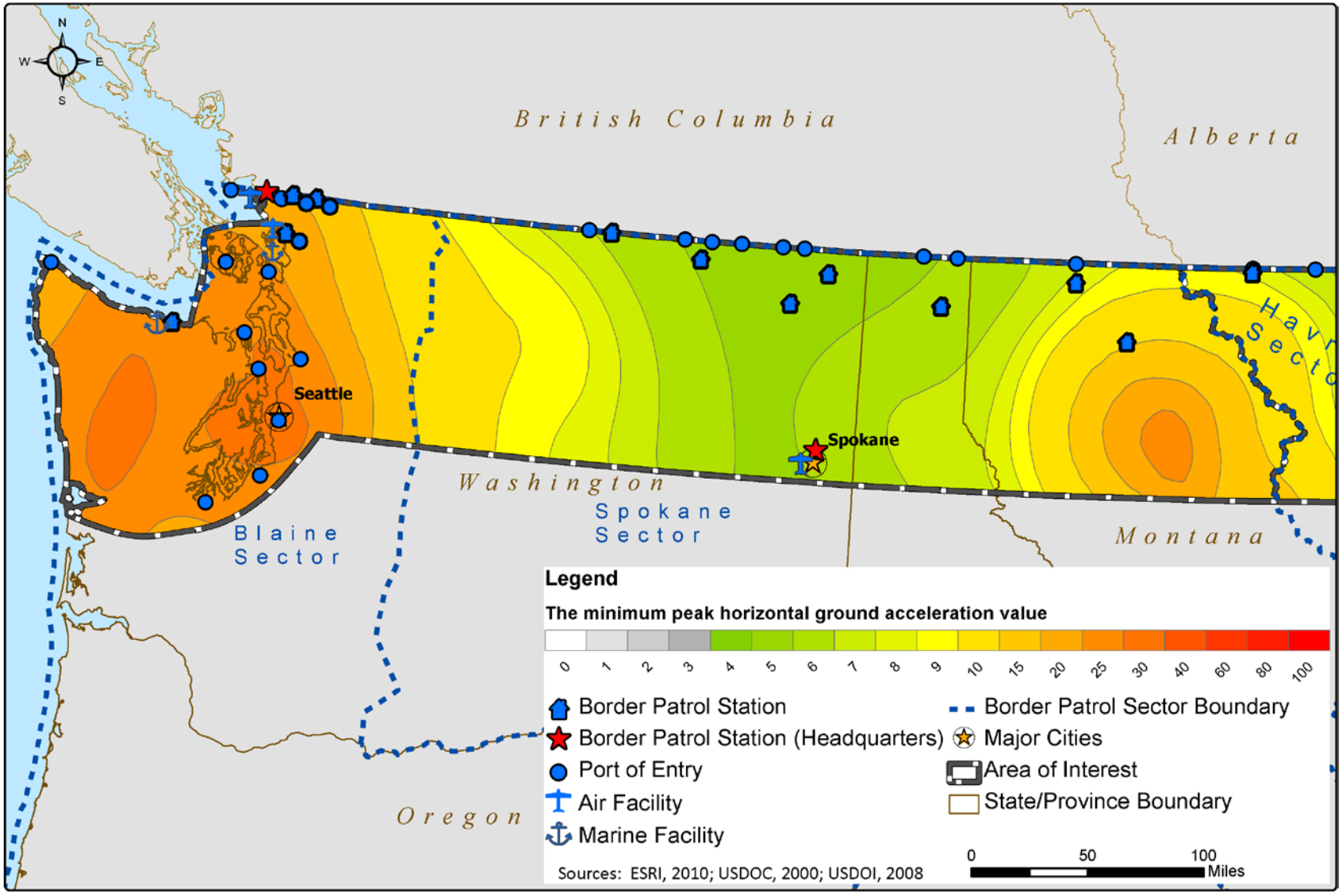
Seismic activity in the West of the Rockies Region occurs in the Cascadia Subduction Zone as well as the Intermountain Seismic Belt (Figure 4.4-4). Seismic hazards are described in terms of minimum peak horizontal ground acceleration values. The U.S. Geological Survey (USGS) describes this value as the fastest speed of horizontal particle movement at ground level due to an earthquake. Appendix N, Geology and Soils, describes the Cascadia Subduction Zone and the Intermountain Seismic Belt in greater detail.

Tsunamis or seismic sea waves pose a risk to coastal areas related to regional seismic activity along the Cascadia Subduction Zone or from other areas within the "Ring of Fire." The Cascadia Subduction Zone ranges from British Columbia, Canada to northern California. Earthquakes along this zone have the potential to generate large seismic sea waves. Research by the Washington State Department of Natural Resources suggests that locally generated tsunamis would not allow much response time for residents. Communities within tsunami hazard zones do have emergency management plans in place if a tsunami occurs (WSDNR, 2004).

**Volcanic Hazards**

One primary location in the West of the Rockies Region study area contains areas of volcanic hazard. In the Pacific Mountain Region, the Cascade Range is a growing and tectonically active mountain system. It forms the boundary of two plates: the Juan de Fuca and the North American. The subduction of the Juan de Fuca plate under the North American plate takes place as the two plates converge, creating high pressure and temperatures that deform and melt rock along the plate boundaries. Magma created during this process sometimes rises to the surface as volcanic eruptions. The Cascade Range is the volcanic chain that developed as a long-terms result of these processes (USDOI, 2007).

**Figure 4.4-4. Seismicity in the West of the Rockies Region**



## Landslides

A landslide is the sudden downward movement of rock, soil, mud, or debris on a slope (Figure 4.4-5). Landslide is a general term; there are many different types and causes of landslides. Along the Northern Border of the United States, most landslides occur along the steep slopes of the many mountain ranges in the region (Figure 4.4-6). Much of the Cascade region and the northern Rockies are susceptible to landslides due to their steep slopes. The Cascades, in particular, are at risk due to the large amounts of precipitation common to the region.

Landslides can be triggered by various mechanisms, including seismicity, rainfall, snowmelt, volcanic events, and human activities (e.g., site development, mining, and deforestation). In the Cascades area, most landslides occur due to rainfall, along with seismic and volcanic activity (Nyborg, 2003). Landslide hazards in Montana result from seismic and human activities (State of Montana, 2004).

**Figure 4.4-5. Landslide**

Source: USGS, 2011.

## Karst Topography

In the West of the Rockies Region, karst landscapes occur in small areas (Figure 4.4-7) scattered through Washington, Idaho, and Montana. Long, short, and pseudokarst karst types all exist in these areas. Appendix N provides details on these pockets of karst terrain.

**Figure 4.4-6. Incidence of Landslides in the West of the Rockies Region**

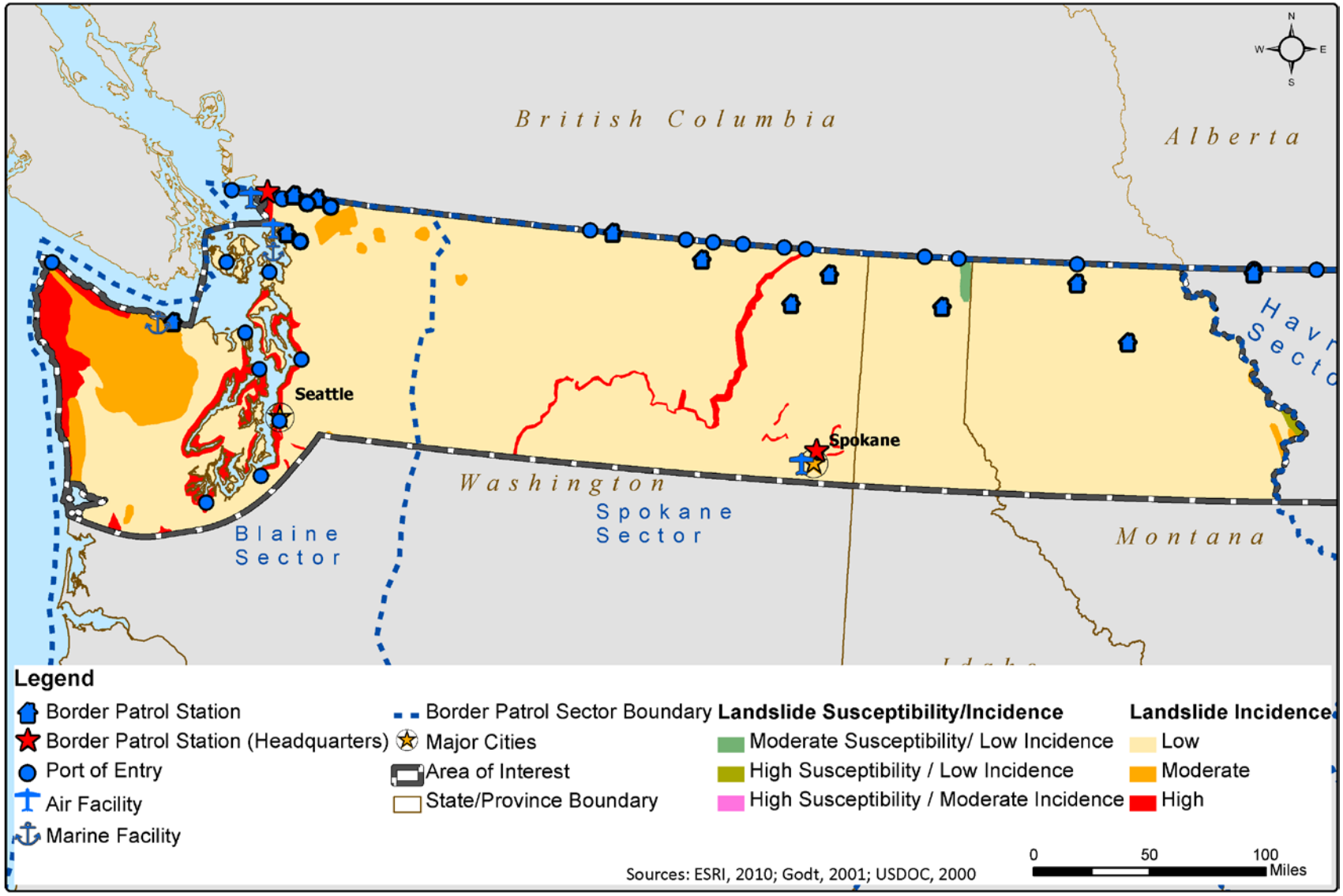
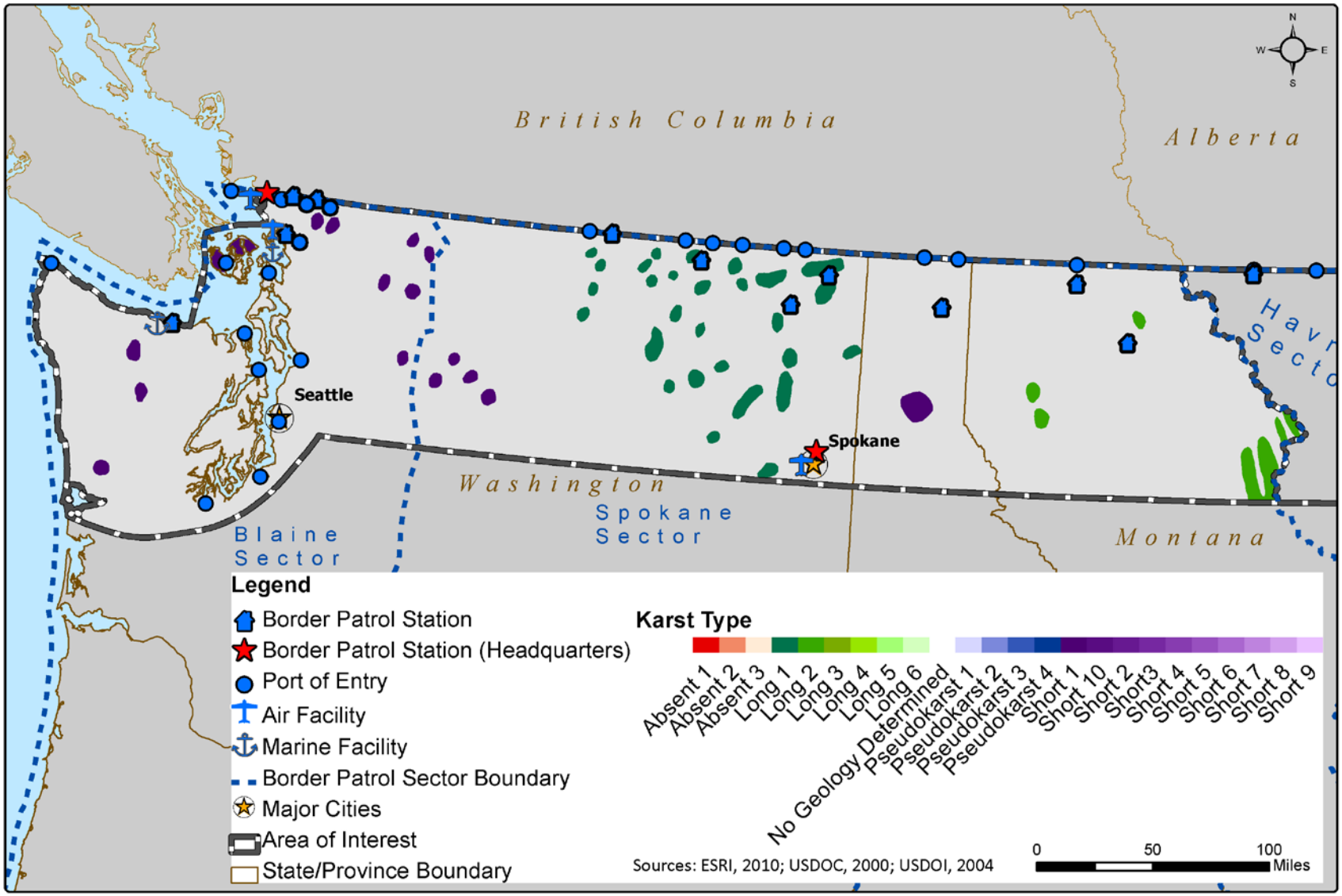


**Figure 4.4-7. Karst Topography in the West of the Rockies Region**



#### 4.4.2.3 Soils

In the West of the Rockies Region, nine major soil groups, or "orders," occur (Figure 4.4-8).

In the West of the Rockies Region, soils contain a wide range of particle sizes. One of the most dominant soil types—inceptisols—spans all three states and has a high potential for erosion. These soils develop on surfaces that have not had adequate time to develop soil profiles, thus they do not have extensive soil horizons. Both the lack of horizon development, as well their locations on steep slopes, contributes to their high erosion potential (University of Idaho, No Date[a]). Soils with high glass content (andisols), such as those in areas of volcanic activity, tend to have lower erosion rates (Busacca, et al., No Date).

Western Washington State also has spodosols throughout. This soil order is acidic and can be found in forested areas. They are not agriculturally productive without management because of the high acid content, but have sub layers of humus, or stable organic matter (University of Idaho, No Date[b]). To a lesser degree, ultisols and entisols are present in western Washington. Ultisols are soils with a high acid content, low fertility, and have been leached of minerals by the processes of weathering. Low soil fertility is due to a lack of nutrients in the soil resulting in the decreased ability to support plant life. While not productive as agricultural lands, ultisols are often found in highly productive forested areas (University of Idaho, No Date[c]). Entisols are soils that do not fit into any of the other 12 soil orders. These are young soils and have only an A Horizon. Entisols are the most extensive soils in the world and can be very diverse based on the parent material from which they develop (University of Idaho, No Date[d]). This soil order is often the transition layer between other soil orders and non-soil parent rock.

In addition to inceptisols, andisols, and entisols, eastern Washington and Idaho contain mollisols and a small amount of aridisols and histosols. These soils are common in grassland regions and are extremely agriculturally productive. In the United States, this is the most common soil order. The thick upper horizon (or layer) is a result of the decayed organic materials (University of Idaho, No Date[e]). The development of this order is most often related to the weathering of sedimentary parent rock, and in some cases the weathering of glacial deposits. Mollisol soil texture can vary to a great degree from sandy to fine loams (See table 3.4.2-1). This soil order is prone to erosion, especially by water in cultivated areas (University of Wisconsin, 1999). Aridisols are not agriculturally productive due to their location in arid regions. A major component of these soils is calcium carbonate in addition to clays, silica, and other soluble salts (University of Idaho, No Date[f]). They tend to have low permeability and low nutrient content (University of Wisconsin, 1999). Histosols in this region are mainly found in areas of poor drainage. This water accumulation decomposes organic materials and creates peaty and mucky conditions. They have a low weight-bearing capacity and if drained of water, land subsidence may occur (University of Idaho, No Date[g]).

Western Montana has alfisols, which is a soil order that is not present in the other parts of the region. Alfisols are often found in forested areas, but can also be found in prairies and grasslands. Most often located in temperate climates, they can develop in sub-

tropical and tropical areas as well (University of Idaho, No Date[h]). The primary component of this soil order is clay as a result of mineral weathering (University of Wisconsin, 1999).

#### 4.4.2.4 Prime and Unique Farmland

In the West of the Rockies Region, Prime and Unique Farmland is most concentrated in Idaho where it ranges from 6 to 10 percent of state land (Figure 4.4-9). In Washington, the percent is lower at 4 to 6 percent. Montana has the lowest percentage, with only 0 to 2 percent of state land designated. As a whole, the region contains a low percentage of designated Prime and Unique Farmland.

**Figure 4.4-8. Soil Orders in the West of the Rockies Region**

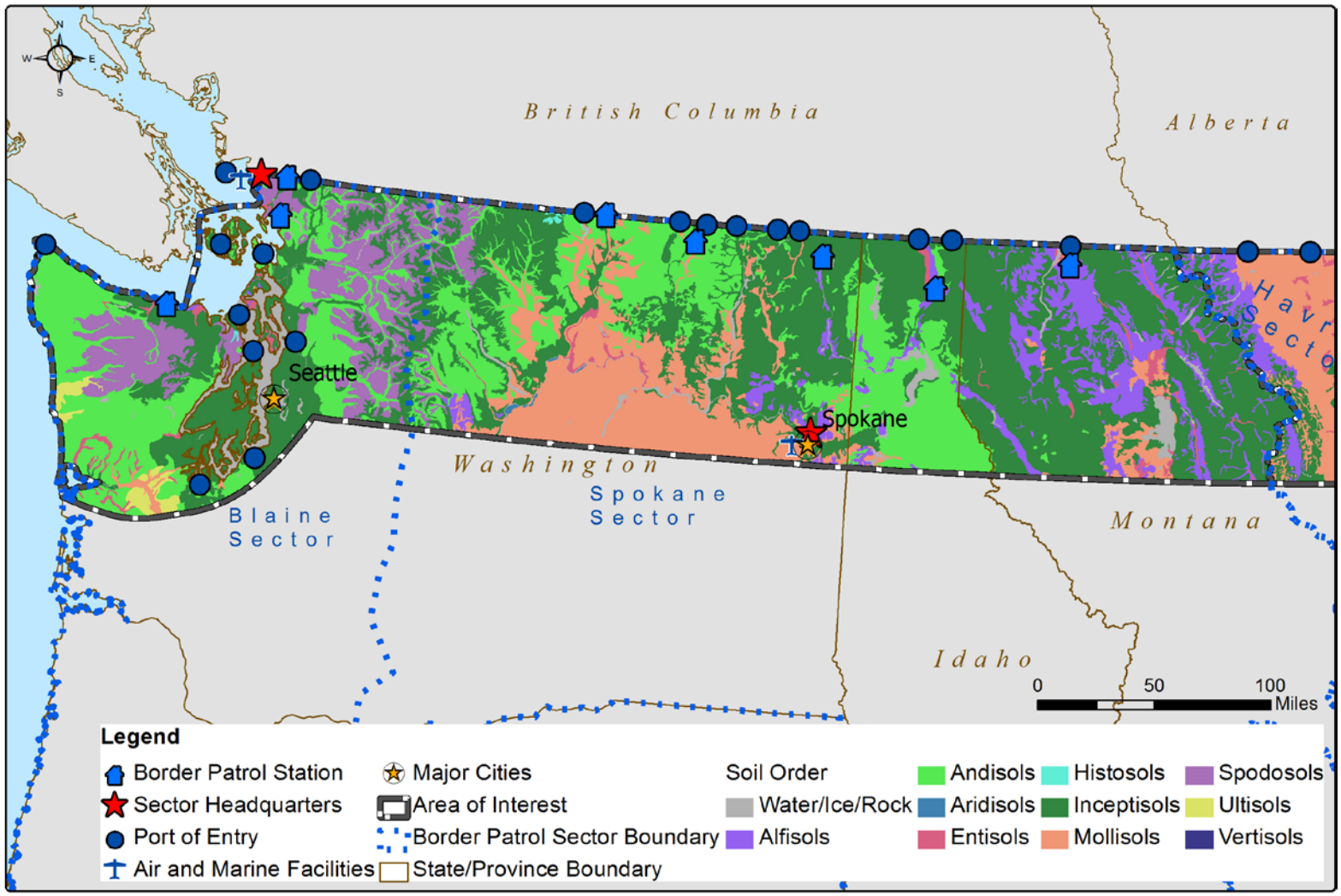
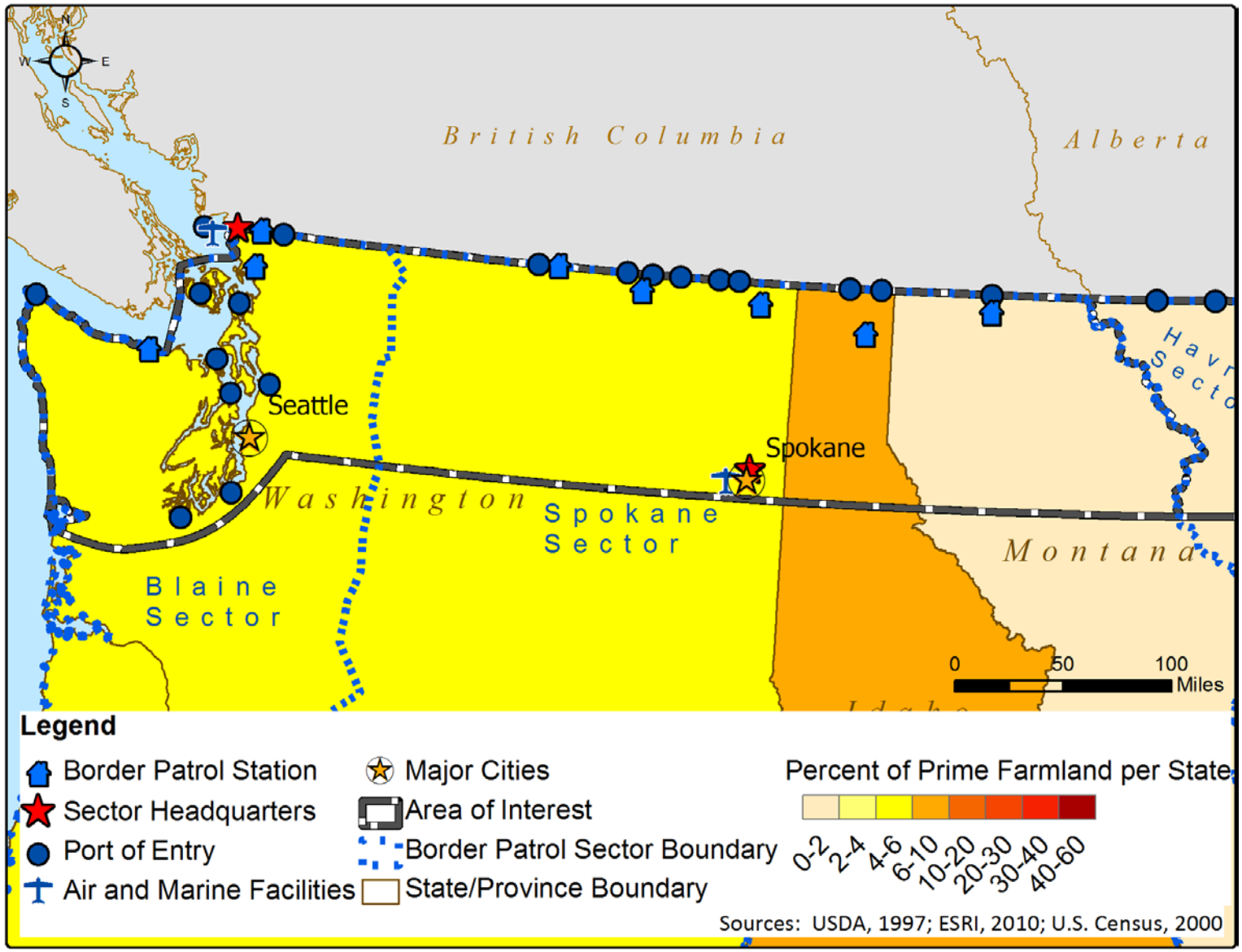


**Figure 4.4-9. Prime Farmland in the West of the Rockies Region**



# 4.5 WATER RESOURCES

## 4.5.1 INTRODUCTION

Water resources are distributed widely throughout the 100-mile Programmatic Environmental Impact Statement (PEIS) study corridor in the states of Washington, Idaho, and Montana west of the Continental Divide. For the purposes of this study, this resource area consists of hydrologic and groundwater resources (aquifers, subterranean watercourses, and recharge areas), surface water and waters of the United States (lakes, ponds, rivers, streams, and channels), and floodplains. Water resources include several beneficial elements, such as water supply quantity and quality, habitat for aquatic organisms, recreation, and flood storage capacity, which are subject to effects from proposed activities.

## 4.5.2 AFFECTED ENVIRONMENT

### 4.5.2.1 Groundwater

Groundwater resources are sources of water that result from precipitation infiltrating the ground surface. Groundwater is contained in either confined or unconfined aquifers. When the water table or piezometric surface reaches the ground surface, groundwater will reappear as either streams, surface bodies of water, or wetlands. This exchange between surface water and groundwater is an important feature of the hydrologic cycle.

Groundwater has a variety of beneficial uses. In the West of the Rockies Region, as in the rest of the country, groundwater is a primary source for a wide variety of water uses including irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses, and livestock. Table 4.5-1 shows the categories of groundwater use for states within the West of the Rockies Region.

**Table 4.5-1. Water Use in the West of the Rockies Region in 2005**

| State | Irrigation Use (%) | Public Water Supply (%) | Industrial Use (%) | Rural Domestic, Livestock (%) |
|---|---|---|---|---|
| Montana | 95.7 | 1.4 | 1.9 | 1.0 |
| Idaho | 85.0 | 1.2 | 0.5 | 13.3 |
| Washington | 62.8 | 17.7 | 16.7 | 2.8 |

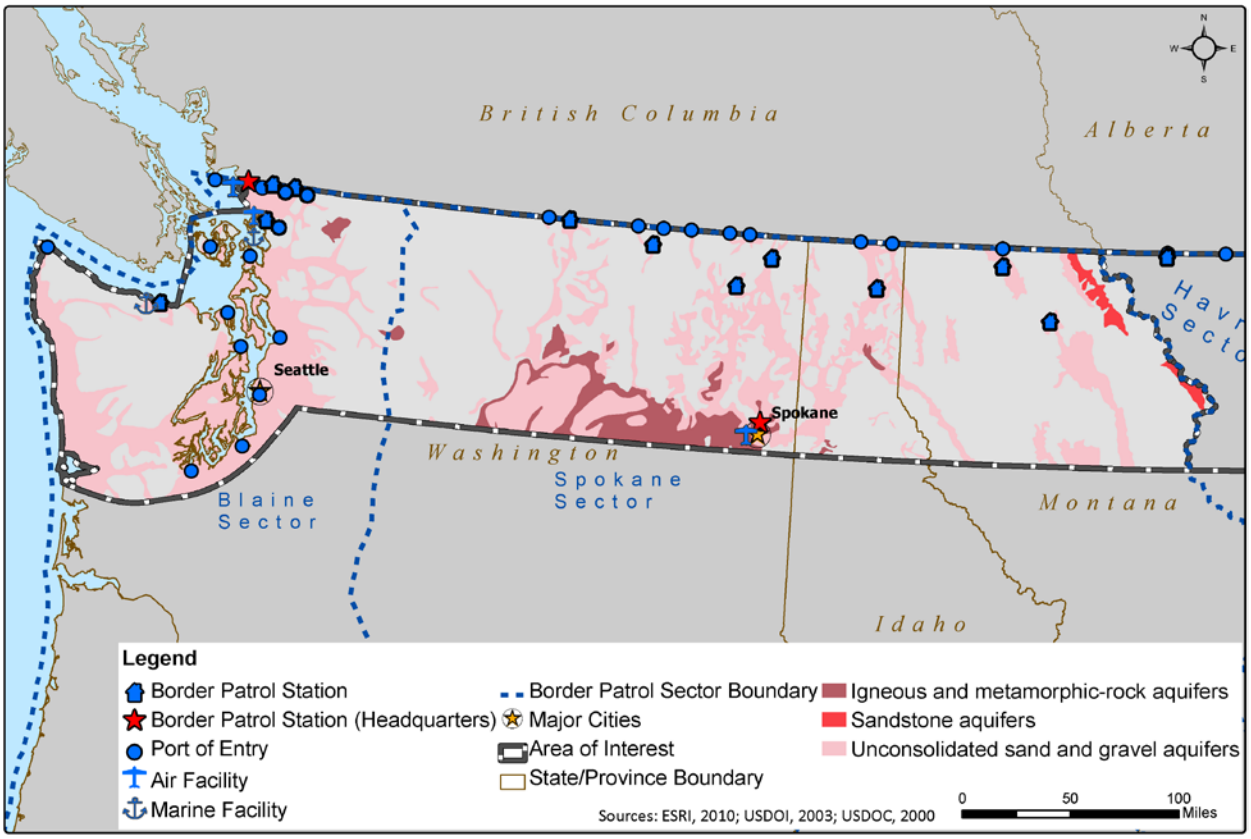
Source: (Kenny et al., 2009).

Groundwater occurs in porous geologic formations called aquifers, which may be large and regional, such as the Ogallala Aquifer that underlies many states in the Great Plains. Aquifers may also be very small and localized.

In the West of the Rockies Region, there is a large regional aquifer known as the Columbia River Basalt Aquifer. Although this aquifer is large, only a small amount of its northern portion underlies the 100-mile corridor that is the basis of this PEIS. The aquifers underlying the area within the corridor are glacial drift aquifers, valley-fill aquifers, or smaller localized aquifers. Glacial drift aquifers are formed from glacial outwash and the more permeable materials within glacial till. It has mostly unconsolidated sand and gravel, but also has silt, clay, and consolidated

till (hardpan). Valley-fill aquifers have mostly sand and gravel, providing yields of only a few gallons per minute, which is enough for single-family domestic use. Figure 4.5-1 shows principal aquifers in the West of the Rockies Region.

**Figure 4.5-1. West of the Rockies Region Groundwater Aquifers**

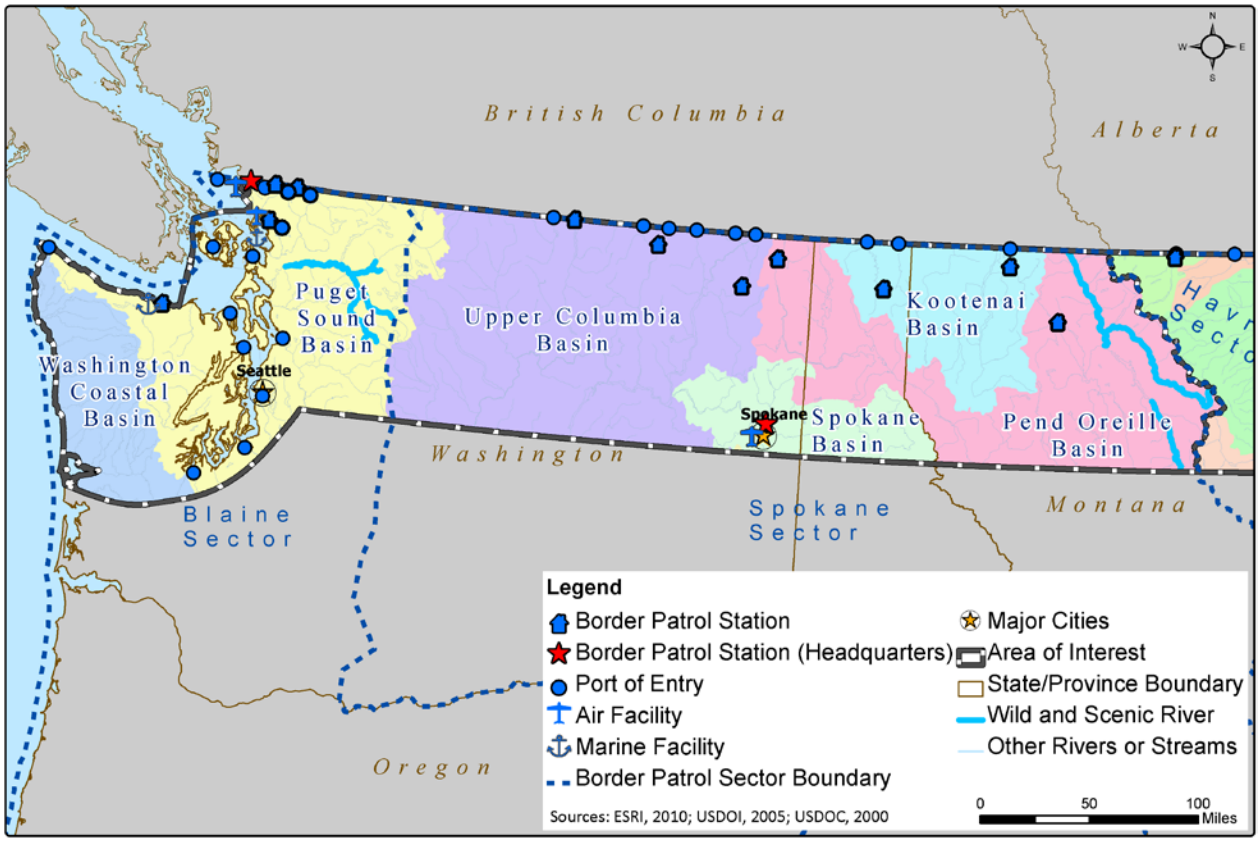



### 4.5.2.2 Surface Waters and Waters of the United States

Surface water is water found in lakes, rivers, ponds, wetlands, and oceans. It is the most abundant and visible form of water resource, with the greatest variety of uses. In addition to irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses, and livestock, surface water supports recreation, fish and wildlife habitat, hydropower, and transportation. Section 4.3.2.7 provides a discussion of the regional affected environment for aquatic resources. Surface water is often identified by the basin or watershed in which it is found. A watershed is simply the topographic area defined by the drainage of a single body of water.

There are two designated Wild and Scenic Rivers within the West of the Rockies Region: the Skagit River in Washington and the Flathead River in Montana. Figure 4.5-2 shows Wild and Scenic Rivers as well as the river basins found within the 100-mile corridor for the West of the Rockies Region

**Figure 4.5-2. River Basins in the West of the Rockies Region**




The Columbia River Basin is the dominant watershed in the West of the Rockies Region, covering areas that include western Montana, northern Idaho, and the eastern two-thirds of Washington. The basin also extends across the border northward into Canada. Major watersheds in western Washington include Puget Sound and coastal drainage basins.

**Figure 4.5-3. Basalt cliffs and crescent bar on Columbia River**

The Columbia River Basin is the second largest basin in North America, draining more than 260,000 square miles into a river with a length of 1,200 miles. The average flow of 7,785 cubic meters per second is second in the United States only to that of the Mississippi-Missouri River.

The system of dams in the basin has resulted in 250 large reservoirs and more than 100 large hydroelectric projects, making it one of the most developed river systems in the world.

Federal dams on the river generate an average of 8,664 megawatts (MW) of electricity. Non-Federal dams generate 5,368 MW. Combined, these dams produce enough power for eight million homes, or 13 cities the size of Seattle (NPCC, 2010). Hydroelectric plants at dams on the Columbia River within the 100-mile PEIS corridor include the Grand Coulee Dam operated by U.S. Bureau of Reclamation at Grand Coulee, Washington; the Chief Joseph Dam operated by the U.S. Army Corps of Engineers (USACE) near Bridgeport, Washington; and the Wells Dam operated by the Douglas County Public Utilities District south of Pateros, Washington.

The river is vital to fisheries of the region with salmon and steelhead runs that are among the largest in the world. Washington legislation passed in 2006 enables access to water resources while at the same time helping to restore salmon and other species (WSDE, 2009).

#### 4.5.2.3 Floodplains

Floodplain management seeks to preserve the flood storage capacity for the river corridor. This may be achieved in several ways. Local communities often have floodplain management or zoning ordinances that restrict development within the floodplain. The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP). FEMA also provides floodplain management assistance, including mapping of 100-year floodplain limits, to over 20,000 communities. The information provided by FEMA's flood management program is useful to U.S. Customs and Border Protection (CBP) planners who seek to avoid effects from flooding conditions. This is most relevant for CBP border facilities, such as ports of entry (POE), that are planned at locations where rivers define the Northern Border. While there are rivers of this type in other regions along the Northern Border with existing nearby CBP facilities, there are no rivers of this type in the West of the Rockies Region.

### 4.5.3 TRANSBOUNDARY WATER AGREEMENTS

#### Flathead Watershed Agreement with British Columbia

Montana and British Columbia have an agreement on policies and practices that protect the water quality of the Flathead River Basin. The agreement targets mining and energy extraction activities.

#### The International Boundary Waters Treaty Act

This treaty prohibits bulk water removal from boundary basins, requires permitting for water projects that would affect the level or flow of boundary waters, and provides sanctions and penalties for violation.

#### Columbia River Treaty

This treaty provides for the cooperative development of hydropower resources in the Columbia River Basin.

**High Ross Treaty**

This treaty involved agreement between Seattle City Light and British Columbia regarding considerations and timing for raising the height of the Ross Dam in Washington.

# 4.6 NOISE

## 4.6.1 INTRODUCTION

The study area contains many soundscapes and noise-sensitive receptors that could experience impacts due to the alternatives that U.S. Customs and Border Protection (CBP) is considering. However, the mere presence of a noise-sensitive area, such as a national park, residence, or school, does not guarantee that it would be significantly impacted by CBP's activities or that the overall impacts would be major under the National Environmental Policy Act (NEPA). As with other topics in this Programmatic Environmental Impact Statement (PEIS), the programmatic approach to describing noise is driven by the planning objective of the document and the potential for actual impacts.

## 4.6.2 AFFECTED ENVIRONMENT

Sound is a physical phenomenon consisting of vibrations that travel through a medium like air and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Because the human ear responds differently to different frequencies, "A-weighting" was developed to approximate the frequency response of the human ear. The A-weighting curve has been widely adopted for environmental noise measurement and is standard in many sound level meters. The dBA levels of common sounds of daily life are provided in Table 4.6-1.

**Table 4.6-1. Common Sound Levels**

| Outdoor | Sound level (dBA) | Indoor |
|---|---|---|
| Snowmobile | 100 | Subway train |
| Tractor | 90 | Garbage disposal |
| Downtown (large city) | 80 | Ringing telephone |
| Freeway traffic | 70 | TV audio |
| Normal conversation | 60 | Sewing machine |
| Rainfall | 50 | Refrigerator |
| Quiet residential area | 40 | Library |

Notes: dBA = A-weighted decibel. Sound level provided is as generally perceived by an operator or a close observer of the equipment or situation listed.

Source: Harris, 1998.

The dBA noise metric describes steady noise levels, although very few noises are, in fact, constant. Therefore, the measurement day-night sound level (DNL) has been developed. DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level ($L_{eq}$) is often used to describe the overall noise environment. $L_{eq}$ is the average sound level in dB.

#### 4.6.2.1 Regulatory Review

The Noise Control Act of 1972 (PL 92-574) directs Federal agencies to comply with applicable Federal, state, interstate, and local noise control regulations. In 1974, the USEPA provided information suggesting continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals.

State and local governments have the opportunity to regulate noise in their jurisdictions. These regulations are typically guidelines for activities that generate noise and the hours that such activities may be performed. Noise is typically regulated at the local level. A municipal noise ordinance might address the hours that heavy equipment can be operated, the distance heavy equipment can be operated in proximity of noise-sensitive receptors (i.e., schools, hospitals, churches, and residences), and the duration of operation of a single noise source considered to be annoying to the public, such as a diesel-powered generator. Some set specific not-to-exceed noise levels, and others are simple nuisance noise ordinances.

A number of sources of noise may be addressed for rural areas, such as parades, vendors, social engagements with music, and animal noises. Construction noise is typically exempt from noise ordinances in rural areas. In addition, noise regulations in an urban setting take into account the constant noise sources of urban living, such as large heating, ventilation, and air conditioning (HVAC) units, public transportation (trains and buses), emergency vehicles, and heavy traffic. Because urban noise levels are already relatively high, adding a source for an extended period can be highly annoying to some people, hours of construction and operation of heavy equipment are often limited. A typical ordinance in a major city will restrict construction related noise sources between the hours of 10:00 p.m. and 7:00 a.m.

#### 4.6.2.2 CBP Noise Sources

The CBP operates 24 hours a day and 7 days a week. The level of operation can be determined by the measures required to secure the border or necessary for normal facility activities. Table 4.6-2 lists CBP's operations and describes of the noise levels of these activities.

**Table 4.6-2. CBP Noise Sources**

| Operation | Description |
|---|---|
| Use of mobile surveillance systems (MSS) and surveillance towers | Very little noise is generated by the motor. In remote areas, standby generators may be used to supplement electric power. |
| Firing ranges and armories | CBP conducts small-arms training at many of its ports of entry (POE) and border patrol stations (BPS). Small-arms weapon fire is clearly audible in areas surrounding these ranges during training activities. Usually these activities are limited to daytime hours. |
| Maritime patrols | Boating noise is typically audible during marine patrols near the shoreline. This noise is widespread and at most locations only sporadic. The watercraft used are generally selected for their noise-suppression features because of the nature of their mission. |
| Patrols by foot, horse, off-road vehicle (ORV), and snowmobile | Foot and horse patrols are typically quiet. Noise from ORVs and snowmobiles is audible for a mile or more in remote, quiet areas. This noise is widespread and at most locations only sporadic. Areas near POEs and BPSs may have more concentrated noise associated with these activities. |
| Added and expanded POEs and checkpoints | This action may require construction, which would end at the completion of the project. |
| Operation of expanded BPS | Additional personnel would be required for addition or expansion of newly constructed facilities. The possibility of canine facilities, firing ranges, and patrol vehicles may be required for operations at some new/expanded facilities. |
| Aircraft operations | Air operations at CBP are diverse: Helicopters, fixed-wing aircraft, and unmanned aerial systems (UAS) may be used regularly at some locations, although not all aircraft are used simultaneously. Along with regular operations, training exercises are also a source of aircraft noise at some facilities. |
| Construction activities | CBP conducts both large and small construction projects. Each has some level of heavy equipment and truck transport noise. |
| Maintenance activities | Maintenance operations at CBP are as diverse as the facilities themselves. The noise associated with these actions can involve training to maintain each category listed above. These noise sources may be one major repair using heavy equipment, monthly routine maintenance, or daily maintenance in the case of dogs, horses, and vehicles. |

Source: USDHS, 2010.

### 4.6.2.3 Non-CBP Noise Sources

The sources of noise along the West of the Rockies border vary greatly, although most of the region is rural or remote. Sounds dominating the rural areas are aircraft overflights, bird and animal vocalizations, and very light traffic. Farming is a major activity in some of the rural areas identified with the project area. Farming is seasonal in this region and may create major sources of noise during planting, and even more during harvest in August through October when several large combines may operate concurrently. Although the majority of land is remote, the city of Seattle is in this region with significantly higher levels of noise. A complete list of counties with their population and current background noise levels can be found in Appendix O. Notably, these

levels are estimated average background levels based on population. Actual site-specific levels may vary base on location.

#### 4.6.2.4 Background Noise Levels

Estimated background noise levels for areas within 100 miles of the border are shown in Figure 4.6-1 and described in Table 4.6-3. The majority of areas within 100 miles of the border would be classified as remote or rural residential and are isolated, far from significant sources of sound. Townships and small cities are scattered throughout the 100-mile buffer area; however, more remote land areas cover most of the project area. These smaller cities can be described as rural-residential and quiet-commercial.

**Figure 4.6-1. Background Noise Levels in the West of the Rockies Region**

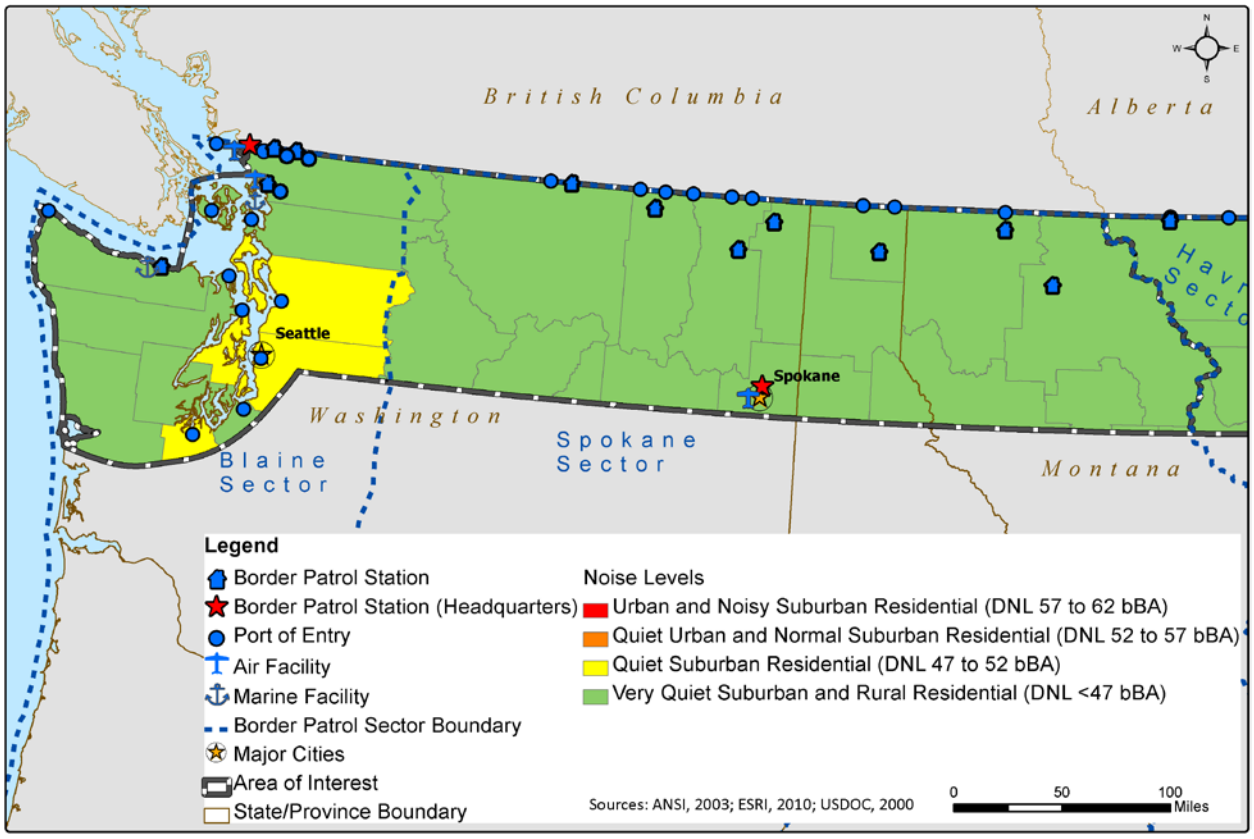



**Table 4.6-3. Description of Background Noise Levels**

| Intensity Level | Example Land Use Category | Average Residential Intensity (people per acre) | Leq (dBA) | | |
|---|---|---|---|---|---|
| | | | DNL | Daytime | Nighttime |
| Low | Quiet suburban residential | 2 | 49 | 48 | 42 |
| Medium-low | | 4 | 52 | 53 | 47 |
| Medium | Quiet urban residential | 9 | 55 | 56 | 50 |
| Medium-high | Quiet commercial, industrial, and normal urban residential | 16 | 58 | 58 | 52 |
| High | | 20 | 59 | 60 | 54 |

Source: ANSI, 2003.

Notes: Leq = equivalent sound pressure level
dBA = A-weighted decibels

### 4.6.2.5 National Parks

The National Park Service (NPS) recognizes the natural soundscape of each national park unit as an inherent resource, and manages this resource in order to "restore degraded soundscapes to the natural conditions wherever possible, and protect natural soundscapes from degradation due to noise" (USDOI, 2000). Non-impairment of natural soundscapes is mandated by the Organic Act of 1916 and is part of the NPS management goals and objectives. Each region of the project area has locations of special interest such as national parks. The national parks within 100 miles of

the border in the West of the Rockies Region are listed in Table 4.6-4 and shown in section 4.2 Air Quality, Figure 4.2-3.

**Table 4.6-4. National Parks in the West of the Rockies Region**

| State | National Park | Acres |
|---|---|---|
| Montana | Glacier National Park | 1,012,599 |
| Washington | Mount Rainier National Park | 235,239 |
| Washington | North Cascades National Park | 503,277 |
| Washington | Olympic National Park | 892,578 |

Source: (USEPA, 2010).

# 4.7 CLIMATE CHANGE AND SUSTAINABILITY

## 4.7.1 INTORDUCTION

According to the 2009 U.S. Global Change Research Program (USGCRP) report, "Global Climate Change Impacts in the United States," documented impacts to the Nation from climate change include increased average temperatures, more frequent heat waves, high-intensity precipitation events, sea-level rise, more prolonged droughts, and more acidic ocean waters, among others. Global and national temperature changes are not distributed evenly. Greater increases occur at high, northern latitudes (CEQ, 2010). In 2010, the Department of Homeland Security (DHS) identified global climate change as a long-term trend and global challenge that threatens America's national-security interests (USDHS, 2010).

Sustainability and smart growth are approaches to human activity that aim to meet the needs of the present without compromising the ability of future generations to meet their own needs. For U.S. Customs and Border Protection (CBP), the concepts of sustainability and smart growth include the ability to adjust to changing geopolitical realities while preserving the environment and working to improve the quality of life for American residents and visitors.

To reduce environmental impacts and address the challenge of limited resources, the DHS prepared a "Strategic Sustainability Performance Plan" to promote sustainable planning, design, development, and operations. The guidelines aim to decrease energy use, minimize reliance on traditional fossil fuels, protect and conserve water, and reduce the environmental impact of materials use and disposal. CBP's overarching goal is to size, plan, and carry out proposed development in a manner that is sustainable and that works to preserve and protect limited resources.

## 4.7.2 AFFECTED ENVIRONMENT

### 4.7.2.1 Climate Regions of the Northern Border—Overview

The climate along the Northern Border is characterized by mild summers and very cold to extremely cold winters. January is the coldest month. July is the warmest month throughout the entire project area, and its temperature can fluctuate 20-30 degrees Fahrenheit between day and evening (Idcide, 2010). Precipitation is evenly distributed throughout the year. The average annual precipitation across the entire Northern Border is approximately 31 inches. There are three recognized climatic zones within the West of the Rockies Region: Midlatitude Steppe Climate, Highland (Alpine) Climate, and Marine West Coast Climate. A discussion of these zones is provided in the following subsection.

### 4.7.2.2 Climate in the West of the Rockies Region

#### Midlatitude Steppe Climate

The Midlatitude Steppe Climate is found within temperate regions of the midlatitudes in the interior regions of continents and where air masses are forced to lift up over higher elevations. In the United States, these climates are found in the Great Plains and western states in the rain shadow of major interior mountain ranges at great distances from sources of moisture.

Temperatures in these regions vary with latitude, elevation, and position within the continent. Thus, the northern Great Plains experiences some of the lowest temperatures in this region. Average temperatures increase at the southern limits of this climate region.

The region is classified as semi-arid. Peak precipitation occurs during the summer months (Ritter, 2006).

**Highland (Alpine) Climate**

The Highland (Alpine) Climate is found in mountainous regions of the western United States that are above timberline. It is one of the coldest climates found in the United States due to its high altitude. It is similar to tundra and Arctic climate zones in that it is cold and dry throughout the year. Growing seasons are short—about 180 days—and night temperatures are almost always below freezing. Thinner atmospheres can allow often dangerous exposure to ultraviolet radiation.

**Marine West Coast Climate**

The Marine West Coast Climate is found along coastal Oregon, Washington, British Columbia, and southern Alaska. Climate characteristics are controlled by the coastal location in the midlatitudes. Maritime polar air masses bring ashore mild temperatures and high humidity. The orientation of mountains has a large effect on the geographic distribution of the climate. In North and South America, mountains tend to be north-south oriented and act as a barrier to oceanic air masses from the westerly winds, forcing them to rise and cool, producing cloudy, rainy conditions along the coast. The dry summer at the Northern Border near Vancouver is due in part to subsiding, subtropical high pressure lying to the south.

This climate has mild summers and winters and a small annual temperature range. Its West-Coast location in the midlatitudes means the climate receives a constant influx of oceanic air throughout the year from the westerlies. The mild air temperatures result from the moderating influence of ocean bodies. Temperature ranges increase as one moves inland.

The climate also features heavy cloud cover and high humidity through much of the year. This is especially true in the Pacific Northwest, where uplift of air masses crossing mountain ranges is an important climate control. Maritime polar air masses forced to rise up windward, western slopes create significant cloud cover and precipitation. The climate is dominated by cyclonic activity embedded in the westerlies. Frequent cyclonic storms bring prolonged periods of rain, drizzle, and fog to these west coast locations.

### 4.7.2.3 Climate Change in the United States—Pacific Northwest Regional Assessment

The Pacific Northwest Region became warmer and wetter during the course of the twentieth century. Average annual temperature warmed by 1 degree Fahrenheit to 3 degrees Fahrenheit (0.5 degree Celsius to 1.7 degrees Celsius) with the warming spread equally across the region and the summer and winter seasons. During the same period, precipitation has increased by 10 percent.

There are recurrent patterns of year-to-year variability in the climate. Warm years are dry with low streamflow and light snowpack. Cool years are wet with high streamflow and heavy snowpack. The variability has an apparent effect on regional resources, such as summer water

shortages in warmer, drier years that result in less-abundant salmon and increased risk of forest fires.

The variations are closely correlated with two large-scale climate variation patterns over the Pacific Ocean: the El Nino/Southern Oscillation every few years and the Pacific Decadal Oscillation every few decades (USGCRP, 2010).