

Draft
Okanogan Subbasin
Wildlife Assessment and Inventory

Submitted By

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1.0 Physical Features

1.1 Land Area

The Okanogan subbasin (Subbasin) is located in north central Washington and lies in Okanogan County and to a lesser degree, Douglas County. The Subbasin comprises 16.2 percent of the Columbia Cascade Ecoprovince (Ecoprovince) ([Table 1](#)) and consists of 1,490,048 acres (2,328 mi²) and ([Figure 1](#)).

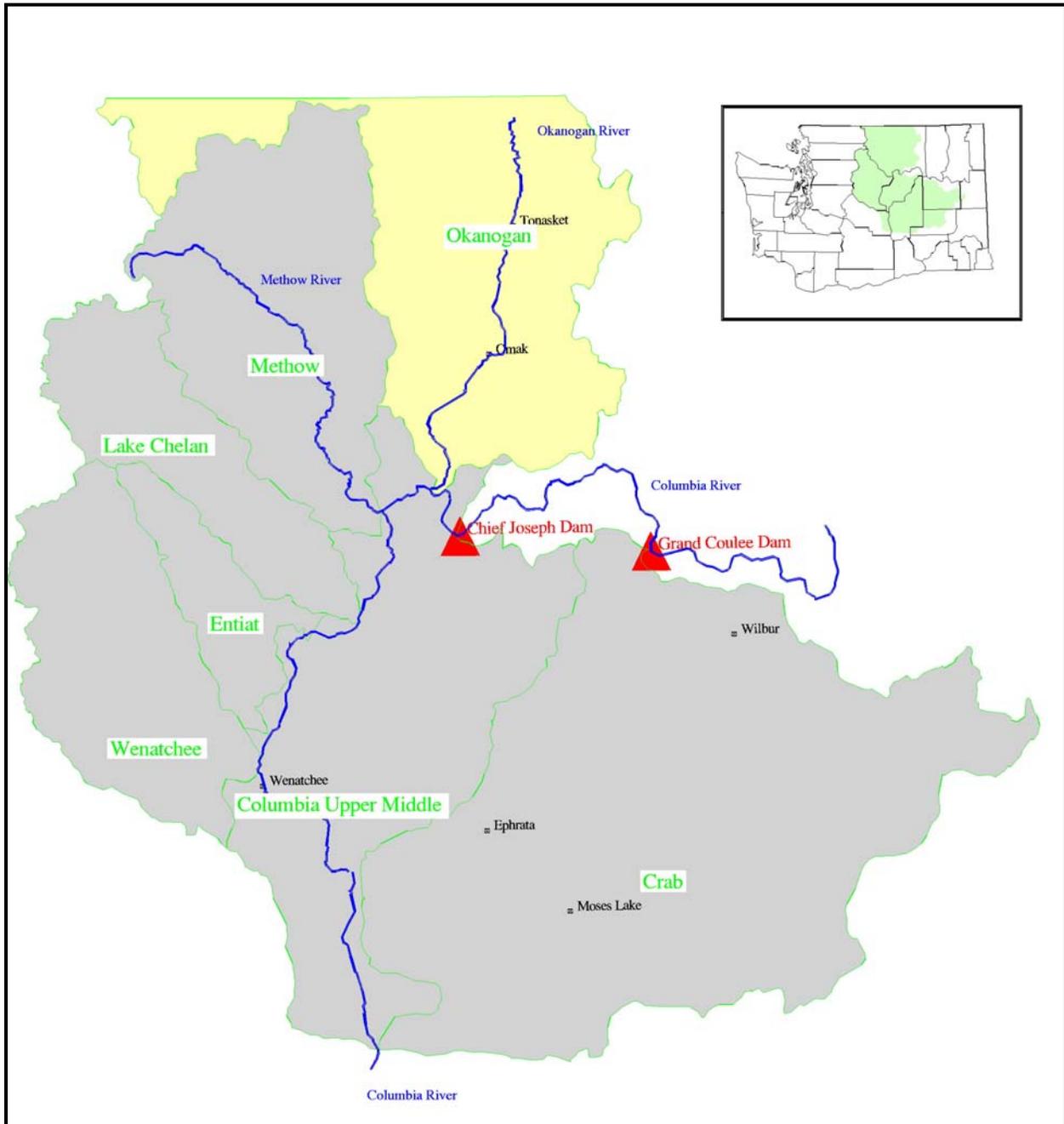


Figure 1. Okanogan subbasin, Washington.

Table 1. Subbasin size relative to the Columbia Cascade Ecoprovince and Washington State (IBIS 2003).

Subbasin	Size		Percent of Ecoprovince	Percent of State
	Acres	Mi ²		
Enitat	298,363	466	3.2	.7
Lake Chelan	599,925	937	6.5	1.4
Wenatchee	851,894	1,333	9.3	2.0
Methow	1,167,795	1,825	12.7	2.8
Okanogan	1,490,079	2,328	16.2	3.5
Upper Middle Mainstem Columbia River	1,607,740	2,512	17.5	3.8
Crab	3,159,052	4,936	34.4	7.4
Total (Ecoprovince)	9,174,848	14,337	100	21.6

1.2 Physiography

The bedrock geology of the basin is composed primarily of granitic, andesitic, metamorphosed sedimentary and basaltic rocks. These rocks form a complex arrangement of geologic terrains that are highly fractured, folded, and faulted.

During the last large-scale glaciation, the entire Okanogan drainage was covered by the Okanogan Lobe of the Cordilleran ice sheet. As the glacier melted, it deposited sequences of silt, sand, gravel, and cobbles. These sequences of unconsolidated materials are present as valley fill and form the walls of terraces. More recently, rivers have scoured the bedrock and glacial deposits and re-deposited them as additional sand and gravel terraces and plains, and volcanic eruptions have deposited ash.

Most of the soils in the valley derived from volcanic ash and glaciation within the last 10,000 years. In that time, there has been accumulation of organic matter and translocation of carbonates, iron, aluminum, and small amounts of clay. Well logs and soil reports indicate that valley fill and terrace deposits may be more than 500 feet thick in areas (WSDOE 1995 in NPPC 2002). There are ash layers from the geologically recent eruptions of Mt. Mazama, Glacier Peak, and Mt. St. Helens. Depth and degree of mixing of the ash mantle varies with aspect and topography.

The Okanogan valley is narrow and steep-walled and many of the soils are loose. The most erosive soils along the Okanogan River are the Colville silt loams and Bosel fine sandy loams. Subbasin soils have been placed into three major groups:

- Soils of steep and very steep mountainous lands. Soils are slightly acid to extremely acid, sandy loam to silt loam soils formed in volcanic ash, glacial materials, and weathered granite, schist, limestone, shale, and gneiss. These soils are predominantly forested.
- Soils of the nearly level to strongly sloping valleys, terraces, plateaus, and till plains. These soils are moderately deep and deep loam, silt loam, and sandy loam formed in glacial outwash, alluvium, ash, and pumice. Some bottomland soils are sandy loam formed in glacial outwash, alluvium and lake sediments. Also included in this group are moderately deep and deep loam soils formed in glacial till with some wind-laid silts, ash, and pumice overlay. These soils are mainly used for forage and crop production; some areas also have shrub and forest cover.
- Soils of gently sloping to steep uplands. These are deep silt loam and loam soils formed in volcanic ash and glacial till and underlain by granite, basalt, andesite, and limestone.

They are primarily in grassland cover (Pacific Northwest River Basins Commission 1977 in NPPC 2002).

2.0 Socio-Political Features

2.1 Land Ownership

Approximately 65 percent of the Subbasin is in federal, state, tribal and local government ownership ([Figure 2](#)), while the remaining 35 percent is privately owned or owned by non-government organizations (NGOs) ([Table 2](#)). The Colville Indian Reservation is comprised of 311,826 acres and makes up 21 percent of the Subbasin).

Table 2. Land ownership of the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Subbasin	Federal Lands (acres)	Tribal Lands (acres)	State Lands (acres)	Local Gov't Lands (acres)	Private Lands (acres)	Water (acres)	Total (Subbasin) (acres)
Entiat	247,064	0	13,629	0	37,670	0	298,363
Lake Chelan	517,883	0	3,549	0	78,493	0	599,925
Wenatchee	682,295	0	11,836	0	159,182	0	853,313
Methow	985,234	0	55,836	0	126,724	0	1,167,794
Okanogan	400,496	311,826	261,598	0	516,159	0	1,490,079
Upper Middle Mainstem Columbia River	124,492	29,507	284,996	0	1,168,744	0	1,607,739
Crab	303,136	0	13,629	25	2,681,363	16,100	3,014,253
Total (Ecoprovince)	3,260,600	341,333	645,073	25	4,768,335	16,100	9,031,466

2.2 Land Use

Major land uses in the Subbasin include timber management, agriculture, livestock grazing, and suburban development. Cropland in the Subbasin is devoted to row crops, close-grown field crops, orchards, rotation hay and pasture, improved hayland, and summer fallow. The valley bottom is dominated by agriculture, primarily orchards and livestock feed. The benches are dominated by livestock grazing, and the lower to mid-upper elevation forests have been harvested for timber and used for livestock grazing. The Subbasin contains six state wildlife areas, a natural preserve in the Loomis Forest, and a portion of the Pasayten Wilderness.

The word “*Okanogan*” is derived from a Salish word which refers to the place on the Okanogan River which marks the furthest ascent of salmon up the river. Okanogan territory stretched from where the Okanogan River flows into the Columbia in the south, to beyond Lake Okanogan in the north. The tribe’s territory stretched east from the crest of the Cascades for one hundred miles. Okanogans did not recognize the United States/Canadian border as a demarcation dividing the tribe, but the boundary has created somewhat different lifestyles for those north and south of the border.

At least five bands of Okanogans lived south of the United States/Canada border in at least twelve villages. Okanogans hunted, fished, and gathered throughout that territory. There were salmon traps at locations near Oroville, Monse, Malott, and Omak. Other fish were caught in various locations inland from the Okanogan River. Bear, deer, mountain goats, rabbits, and other small game, ducks, geese, and grouse were hunted throughout Okanogan territory. Foods gathered included service berries, thorn berries, huckleberries, blueberries, raspberries, strawberries, Oregon grape. Bitterroot was also dug as was some Camas. Various native medicines were also gathered. Soapstone, dyes, and paints were also collected at locations west of the Okanogan River.

Figure 2. Land ownership in the Okanogan subbasin, Washington (IBIS 2003).

[Can Chuck provide this map??]

The Okanogan bands were not parties to any treaty with the United States, and remained relatively isolated from Whites until the Moses Columbia Reservation was established in 1879-80. In 1886 the reservation was opened to non-Indian settlement, but a few Okanogans received allotments west of the Okanogan River and continued to live there. Most Okanogans moved onto the Colville Reservation and became one of the Confederated Colville Tribes. Today there are still a few allotments west of the Columbia River, but most people continue to live on the Colville Reservation. Tribal members continue to utilize their traditional food resources throughout their territory, fishing for salmon, digging camas, and gathering berries within their ancient territory (Hart 2001 in NPPC 2002).

Winter housing sites, located on southern aspects close to water, likely received heavy use, as did the summer housing sites at the fishing grounds. However, these areas were not occupied year around and were likely quite small. In the spring, small family groups dispersed to gather roots (Ray 1933 in NPPC 2002). Due to the dispersed activity and the small group size, root gathering had little to no effect on water quality in the watershed.

Land use within the Subbasin is illustrated in [Figure 3](#). For more information about the effects on wildlife habitat from changes in land use from circa 1850 to today, see section 3.2 (Ashley and Stovall, unpublished report, 2004).

2.3 Protection Status

Approximately 13 percent (199,143 acres) of the lands in the Subbasin have permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events of natural type are allowed to proceed without interference or are mimicked through management (high protection). An estimated 0.8 percent (12,798 acres) of the Subbasin has permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state (medium protection status) ([Figure 4](#)). Approximately 438,793 acres (29 percent) of the Subbasin has permanent protection from conversion of natural land cover for the majority of the area, but is subjected to uses of either a broad, low intensity type or localized intense type (low protection status). Lands owned by WDFW fall within the medium and low protection status categories and include two wildlife management areas ([Table 3](#)). **[Please complete]** The majority of the Subbasin (56 percent; 839,345 acres) has no amount of protection.

Table 3. Wildlife areas owned and managed by the Washington Department of Fish and Wildlife in the Okanogan subbasin, Washington.

Wildlife Area	Size (acres)
Scotch Creek	16,520
Sinlahekin	

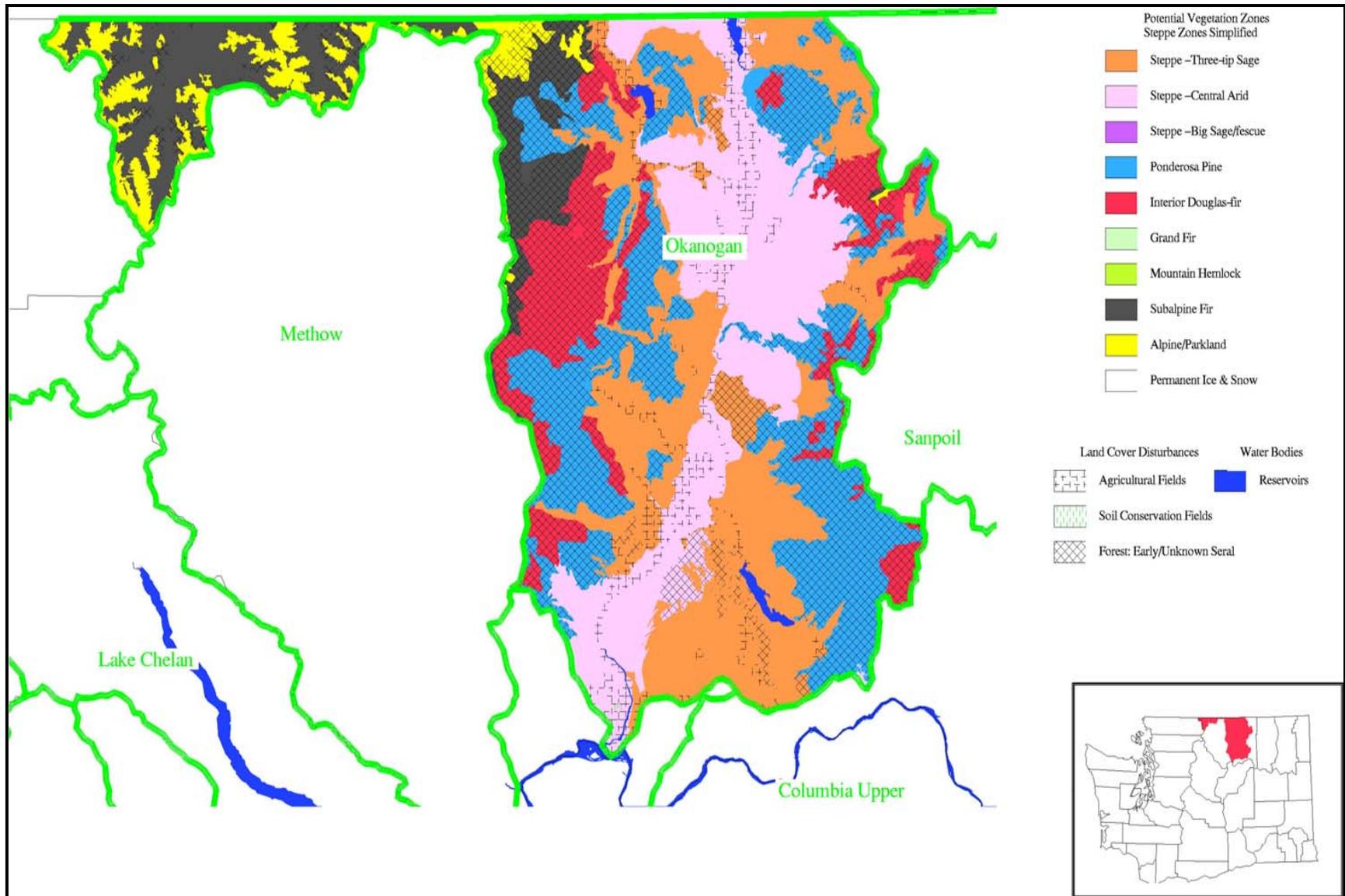


Figure 3. Land use and potential vegetation zones in the Okanogan subbasin, Washington (Cassidy 1997).

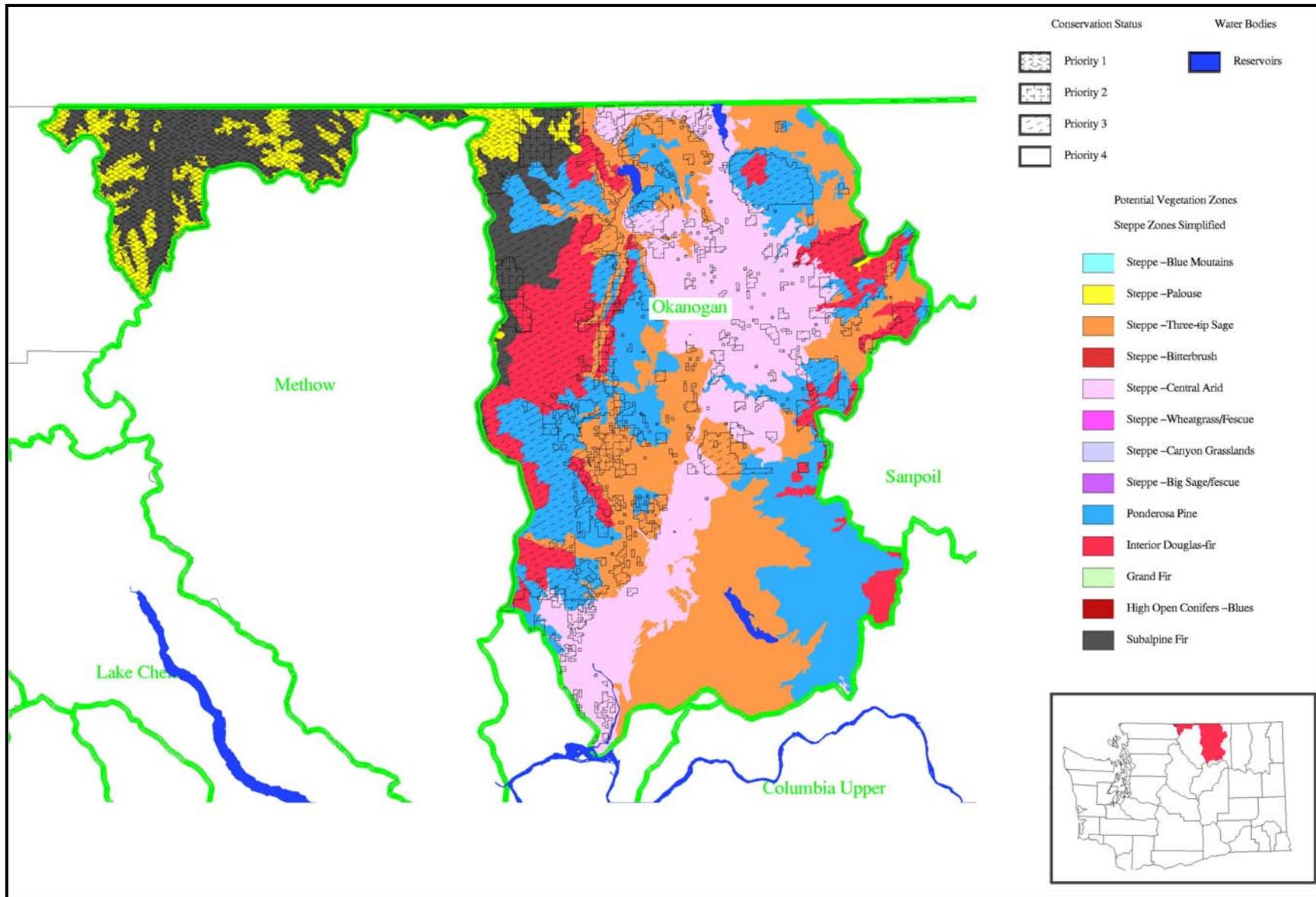


Figure 4. Gap protection status and vegetation zones of the Okanogan subbasin, Washington (Cassidy 1997).

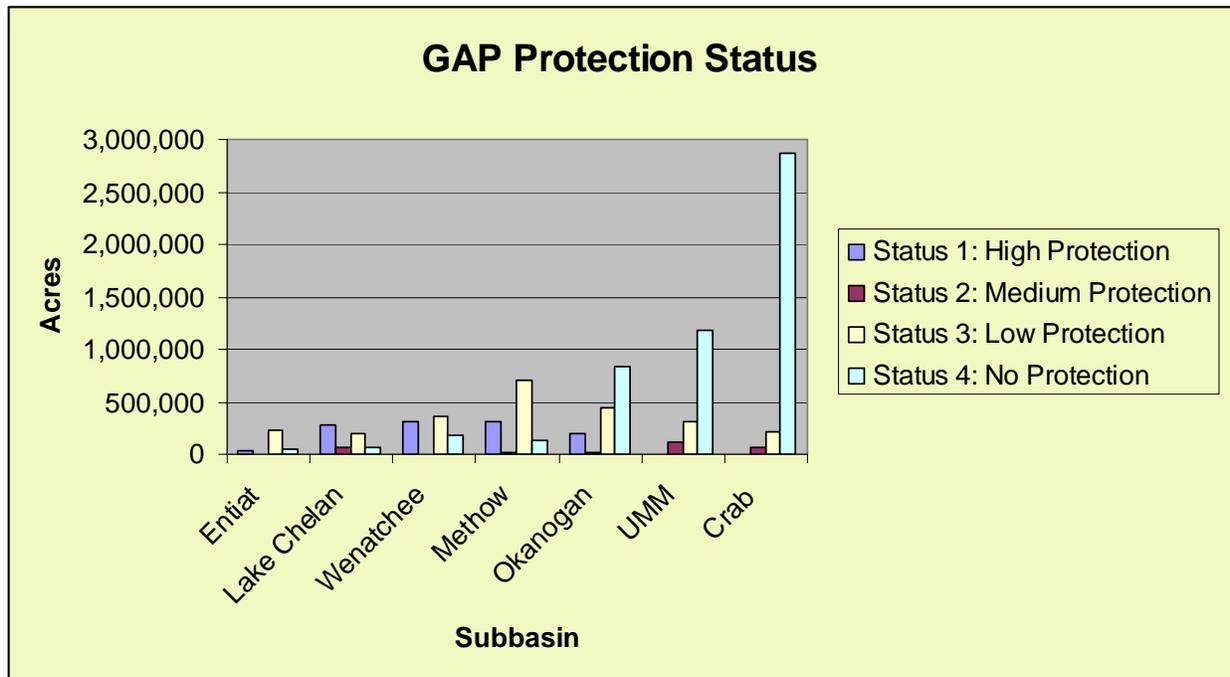


Figure 5. GAP protection status for all Ecoprovince/subbasin habitat types (IBIS 2003).

Additional habitat protection, primarily on privately owned lands, is provided through the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP). The CRP is intended to reduce soil erosion on upland habitats through establishment of perennial vegetation on former agriculture lands. Similarly, CREP conservation practices reduce stream sedimentation and provide protection for riparian/riverine habitats using buffer strips comprised of herbaceous and woody vegetation.

Both programs provide short-term (CRP-10 years; CREP-15 years), high protection of habitats enrolled in either program. The U.S. Congress authorizes program funding /renewal, while the USDA determines program criteria. Program enrollment eligibility and sign-up is decentralized to state and local NRCS offices (R. Hamilton, FSA, personal communication, 2003).

3.0 Ecological Features

3.1 Vegetation

Subbasin vegetation, wildlife habitat descriptions, and changes in habitat quantity, distribution, abundance, and condition are summarized in the following sections. Landscape level vegetation information is derived from the Washington GAP Analysis Project (Cassidy 1997) and IBIS data (2003).

3.1.1 Rare Plant Communities

The Subbasin contains 50 rare plant communities ([Table 16](#)) (Appendix A). Approximately 28 percent of the rare plant communities are associated with shrubsteppe habitat, 16 percent with riparian or wetland habitats, and 56 percent with upland forest habitat. Rare/high-quality plant occurrences and communities are illustrated in [Figure 6](#).

3.1.2 Noxious Weeds

Changes in biodiversity have been closely associated with changes in land use. Grazing, agriculture, and accidents have introduced a variety of exotic plants, many of which are vigorous enough to earn the title “noxious weed.” Twenty-six species of noxious weeds occur in the Okanogan subbasin ([Table 4](#)). **[Modify with correct information]**

Table 4. Noxious weeds in the Okanogan subbasin and their origin (Callihan and Miller 1994).

Common Name	Scientific Name	Origin
Feld bindweed	<i>Convolvulus arvensis</i>	Eurasia
Scotchbroom	<i>Cytisus scoparius</i>	Europe
Buffalobur nightshade	<i>Solanum rostratum</i>	Native to the Great Plains of the U.S
Pepperweed whitetop	<i>Cardaria draba</i>	Europe
Common crupina	<i>Crupina vulgaris</i>	Eastern Mediterranean region
Jointed goatgrass	<i>Aegilops cylindrica</i>	Southern Europe and western Asia
Meadow hawkweed	<i>Hieracium caespitosum</i>	Europe
Orange hawkweed	<i>Hieracium aurantiacum</i>	Europe
Poison hemlock	<i>Conium maculatum</i>	Europe
Johnsongrass	<i>Sorghum halepense</i>	Mediterranean
White knapweed	<i>Centaurea diffusa</i>	Eurasia
Russian knapweed	<i>Acroptilon repens</i>	Southern Russia and Asia
Spotted knapweed	<i>Centaurea biebersteinii</i>	Europe
Purple loosestrife	<i>Lythrum salicaria</i>	Europe
Mat nardusgrass	<i>Nardus stricta</i>	Eastern Europe
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	Central United States
Puncturevine	<i>Tribulus terrestris</i>	Europe
Tansy ragwort	<i>Senecio jacobaea</i>	Eurasia
Rush skeletonweed	<i>Chondrilla juncea</i>	Eurasia
Wolf’s milk	<i>Euphorbia esula</i>	Eurasia
Yellow star thistle	<i>Centaurea solstitialis</i>	Mediterranean and Asia
Canadian thistle	<i>Cirsium arvense</i>	Eurasia
Musk thistle	<i>Carduus nutans</i>	Eurasia
Scotch cottonthistle	<i>Onopordum acanthium</i>	Europe
Dalmatian toadflax	<i>Linaria dalmatica</i>	Mediterranean
Yellow toadflax	<i>Linaria vulgaris</i>	Europe

3.1.3 Vegetation Zones

Cassidy (1997) identified six historic (potential) vegetation zones that occur within the Subbasin ([Figure 3](#)). The three-tip sage, central arid steppe, ponderosa pine vegetation zones are described in detail in Ashley and Stovall (unpublished report, 2004). These vegetation zones constitute focal habitat types. Douglas-fir, subalpine fir, and alpine parkland are not focal habitat types, but these vegetation zones occur throughout the Subbasin.

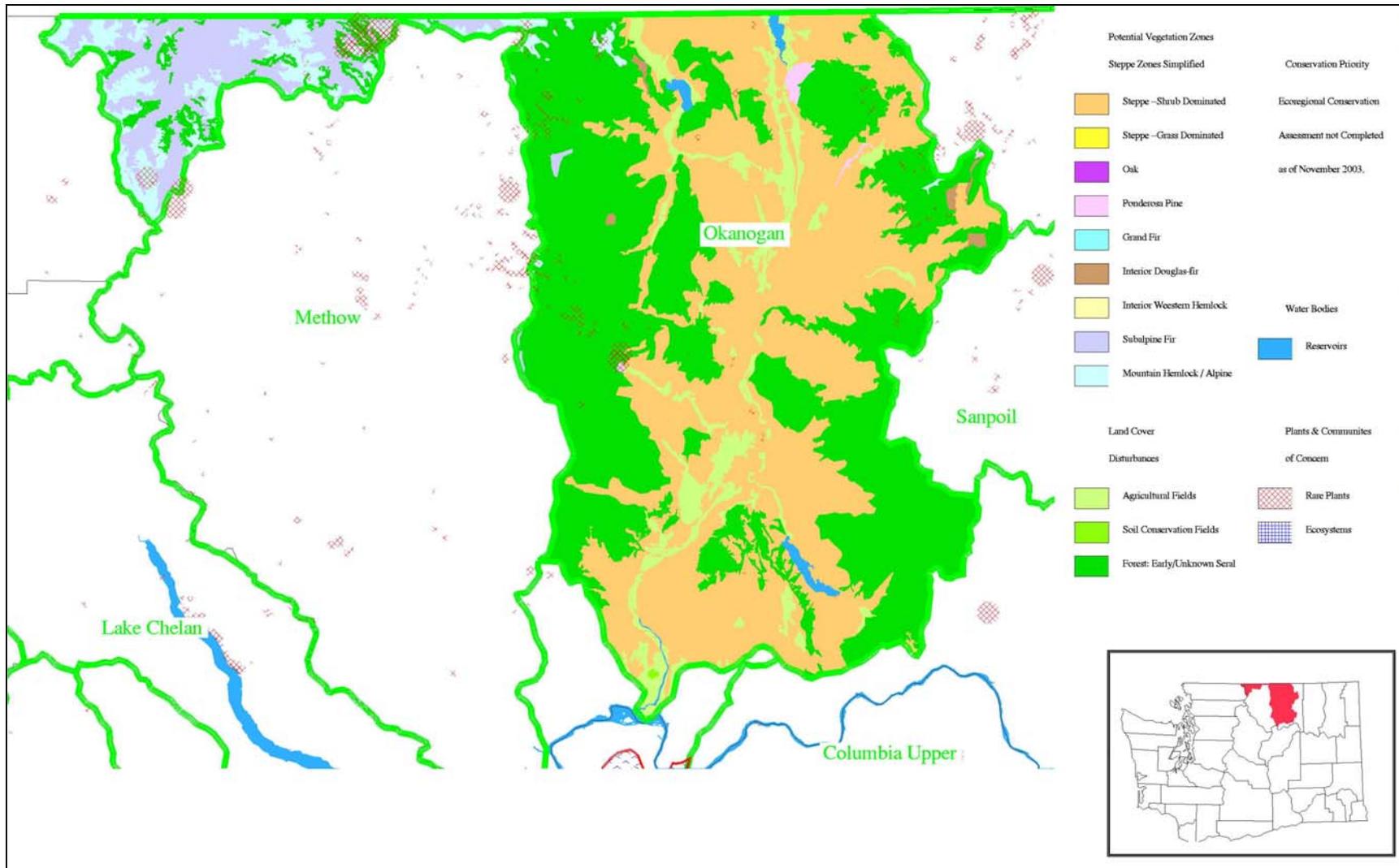


Figure 6. Rare plant occurrence and high-quality plant communities in the Okanogon subbasin, Washington (Cassidy 1997; WNHP 2003).

Vegetation zone status is summarized in [Table 5](#). An estimated 9.3 percent of central arid steppe and 17.7 percent of three-tip sage has been lost to agriculture. Similarly, 23.5 percent of the ponderosa pine vegetation zone has been converted to agriculture.

Table 5. Historic and current extent of GAP vegetation zones in the Okanogan subbasin, Washington (Cassidy 1997).

Status	GAP Vegetation Zone (acres)					
	Alpine Parkland	Subalpine Fir	Douglas-fir	Ponderosa pine	Central Arid Steppe	Three-tip Sage
Historic (Potential)	16,118	3,448	6,213	11,735	47,972	52,464
Agriculture	0	0	0	2,761	4,498	9,299
Current	16,118	3,448	6,213	8,974	341	43,165

3.1.4 Wildlife Habitats

The Okanogan subbasin consists of 15 wildlife habitat types, which are briefly described in ([Table 6](#)). Detailed descriptions of these habitat types can be found in Appendix B of Ashley and Stovall (unpublished report, 2004).

Table 6. Wildlife habitat types within the Okanogan subbasin, Washington (IBIS 2003).

Habitat Type	Brief Description
Montane Mixed Conifer Forest	Coniferous forest of mid-to upper montane sites with persistent snowpack; several species of conifer; understory typically shrub-dominated.
Eastside (Interior) Mixed Conifer Forest	Coniferous forests and woodlands; Douglas-fir commonly present, up to 8 other conifer species present; understory shrub and grass/forb layers typical; mid-montane.
Lodgepole Pine Forest and Woodlands	Lodgepole pine dominated woodlands and forests; understory various; mid- to high elevations.
Ponderosa Pine and Interior White Oak Forest and Woodland	Ponderosa pine dominated woodland or savannah, often with Douglas-fir; shrub, forb, or grass understory; lower elevation forest above steppe, shrubsteppe.
Upland Aspen Forest	Quaking aspen (<i>Populus tremuloides</i>) is the characteristic and dominant tree in this habitat. Scattered ponderosa pine (<i>Pinus ponderosa</i>) or Douglas-fir (<i>Pseudotsuga menziesii</i>) may be present.
Subalpine Parkland	Coniferous forest of subalpine fir (<i>Abies lasiocarpa</i>), Engelmann spruce (<i>Picea engelmannii</i>) and lodgepole pine (<i>Pinus contorta</i>).
Alpine Grasslands and Shrublands	This habitat is dominated by grassland, dwarf-shrubland (mostly evergreen microphyllous), or forbs.
Eastside (Interior) Grasslands	Dominated by short to medium height native bunchgrass with forbs, cryptogam crust.
Shrubsteppe	Sagebrush and/or bitterbrush dominated; bunchgrass understory with forbs, cryptogam crust.
Agriculture, Pasture, and Mixed Environs	Cropland, orchards, vineyards, nurseries, pastures, and grasslands modified by heavy grazing; associated structures.
Urban and Mixed Environs	High, medium, and low (10-29 percent impervious ground) density development.
Open Water – Lakes, Rivers, and Streams	Lakes, are typically adjacent to Herbaceous Wetlands, while rivers and streams typically adjoin Eastside Riparian Wetlands and Herbaceous Wetlands
Herbaceous Wetlands	Generally a mix of emergent herbaceous plants with a grass-like life form (graminoids). Various grasses or grass-like plants dominate or

Habitat Type	Brief Description
	co-dominate these habitats.
Montane Coniferous Wetlands	Forest or woodland dominated by evergreen conifers; deciduous trees may be co-dominant; understory dominated by shrubs, forbs, or graminoids; mid- to upper montane.
Eastside (Interior) Riparian Wetlands	Shrublands, woodlands and forest, less commonly grasslands; often multi-layered canopy with shrubs, graminoids, forbs below.

3.1.5 Changes in Wildlife Habitat

Dramatic changes in wildlife habitat have occurred throughout the Subbasin since pre-European settlement (circa 1850) ([Figure 7](#)) ([Figure 8](#)). The IBIS data indicate that the most significant habitat losses throughout the Subbasin is the loss of 57 percent of ponderosa pine habitat and the loss of 67 percent of interior grasslands (steppe dominated shrublands). Quantitative changes in all Subbasin wildlife habitat types are compared in [Table 7](#) and illustrated in [Figure 9](#).

3.1.6 Focal Habitats

The focal habitat selection and justification process is described in section 4.1.3 (Ashley and Stovall, unpublished report, 2004). Focal habitats selected for the Subbasin include ponderosa pine, shrubsteppe, and riparian wetlands. Neither the IBIS nor the Washington GAP Analysis data recognize the historic presence of riparian wetlands. The current extent of this habitat type as reflected in these databases are suspect at best; however, riparian wetland habitat is a high priority habitat wherever it is found in the Ecoprovince. Ponderosa pine and shrubsteppe habitats are illustrated in [Figure 10](#). Agriculture, a habitat of concern, is not included as a focal habitat type at the subbasin level, nor is it depicted in [Figure 10](#). The amount of extant acres for each focal habitat type is illustrated by subbasin in [Table 8](#).

3.1.7 Focal Habitat Summaries

Focal wildlife habitat types are fully described in section 4.1.7 of Ashley and Stovall (unpublished report, 2004). Only subbasin-specific focal habitat type anomalies and differences are described in this section.

3.1.7.1 Ponderosa pine

The shrubsteppe habitat type is described in section 4.1.7.1 of Ashley and Stovall (unpublished report, 2004). Changes in shrubsteppe distribution in the Subbasin from circa 1850 to 1999 are illustrated in [Figure 7](#) and [Figure 8](#).

Historically in the Subbasin, old-growth ponderosa pine forests occupied large areas between the shrubsteppe zone and moister forest types at higher elevations. Large, widely spaced, fire-resistant trees and an understory of forbs, grasses, and shrubs characterized these forests. Periodic fires maintained this habitat type. With the settlement of the Subbasin, most of the old pines were harvested for timber, and frequent fires have been suppressed. As a result, much of the original forest has been replaced by dense second growth of Douglas-fir and ponderosa pine with little understory.

Extant ponderosa pine habitat within the Subbasin currently covers a wide range of seral conditions. Forest management and fire suppression have led to the replacement of old-growth ponderosa pine forests by younger forests with a greater proportion of Douglas-fir than pine stands (Wright and Bailey 1982).

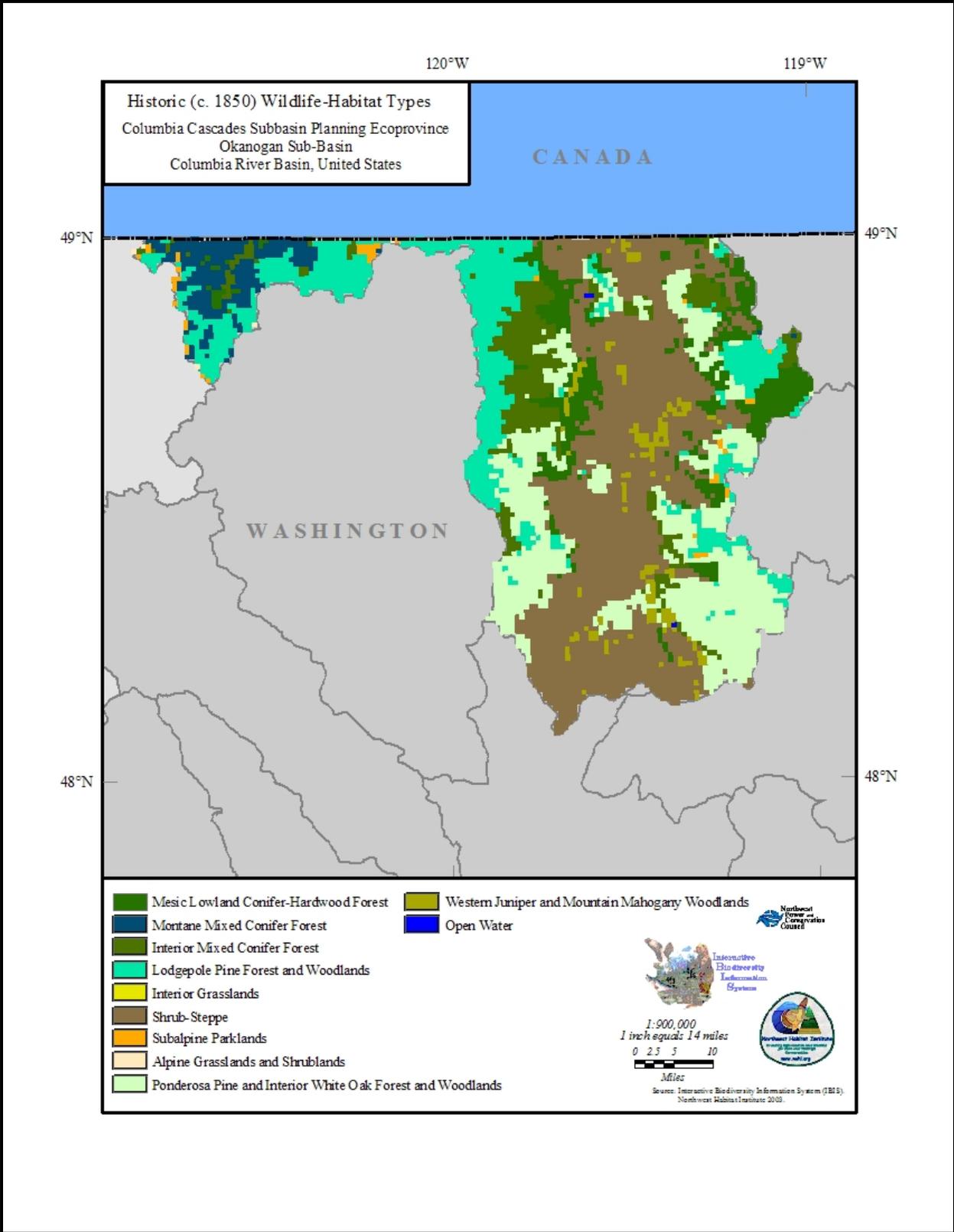


Figure 7. Historic wildlife habitat types of the Okanogon subbasin, Washington (IBIS 2003).

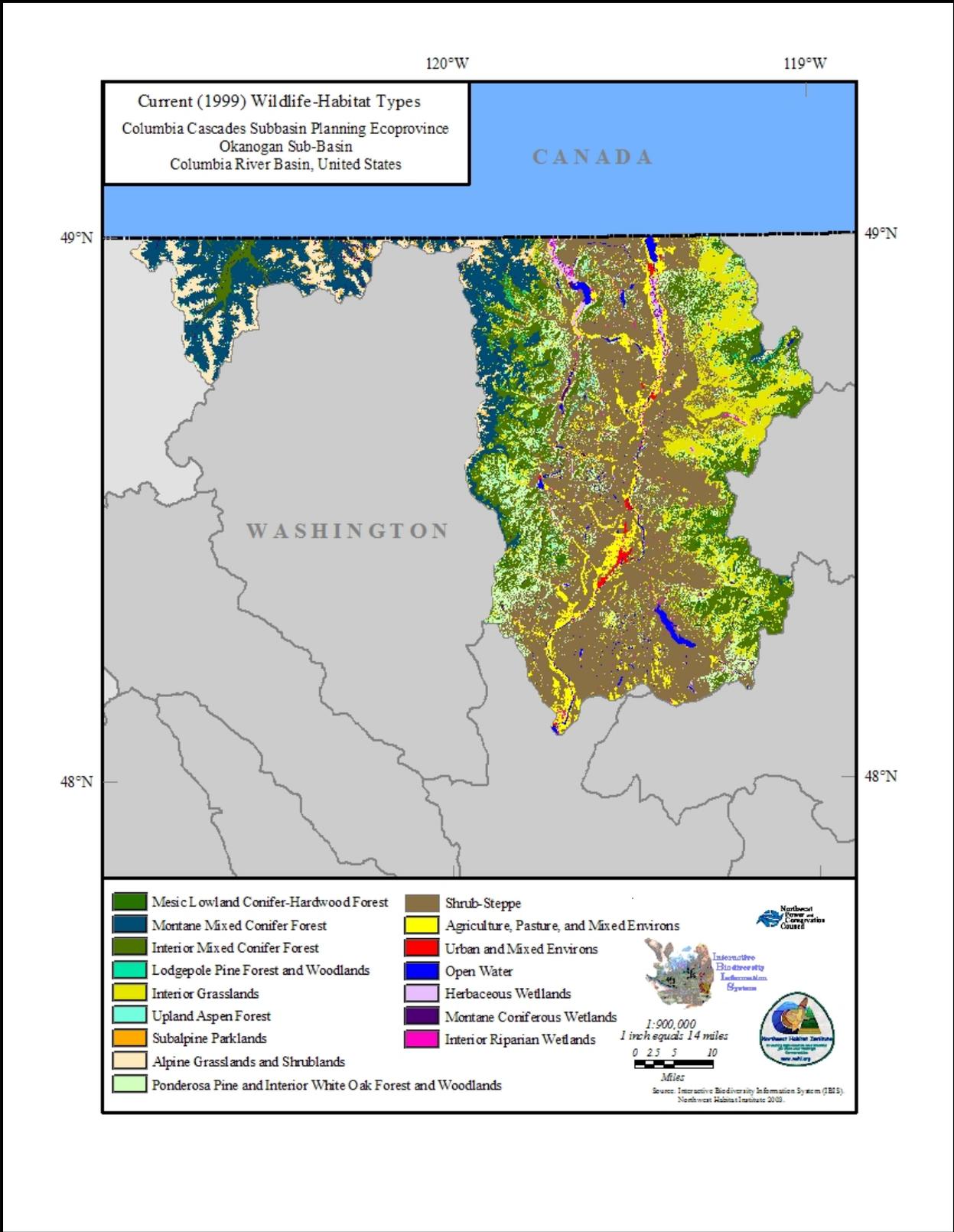


Figure 8. Current wildlife habitat types of the Okanogan subbasin, Washington (IBIS 2003).

Table 7. Changes in wildlife habitat types in the Okanogan subbasin from circa 1850 (historic) to 1999 (current) (IBIS 2003).

Subbasin	Status	Montane Mixed Conifer Forest	Eastside (Interior) Mixed Conifer Forest	Lodgepole Pine Forest and Woodlands	Ponderosa Pine Forest and Woodlands	Upland Aspen Forest	Subalpine Parkland	Alpine Grasslands and Shrublands	Eastside (Interior) Grasslands	Shrubsteppe	Agriculture, Pastures, and Mixed Environs	Urban and Mixed Environs	Open Water – Lakes, Rivers, and Streams	Herbaceous Wetlands	Montane Coniferous Wetlands	Eastside (Interior) Riparian-Wetlands
Okanogan	Historic	66,138	141,407	272,696	328,962	0	19,989	2,221	464,940	139,086	0	0	740	0	0	0
	Current	183,384	219,316	5,559	140,738	19,731	10,574	60,968	151,272	562,763	81,912	4,201	19,683	12,965	7,093	9,920
	Change (acres)	117,246	77,909	-267,137	-188,224	19,731	-9,416	58,747	-313,669	423,577	81,912	4,201	18,943	12,965	7,093	9,920
	Change (percent)	177	55	-98	-57	100	-47	2,645	-67	304	100	100	2,558	100	100	100

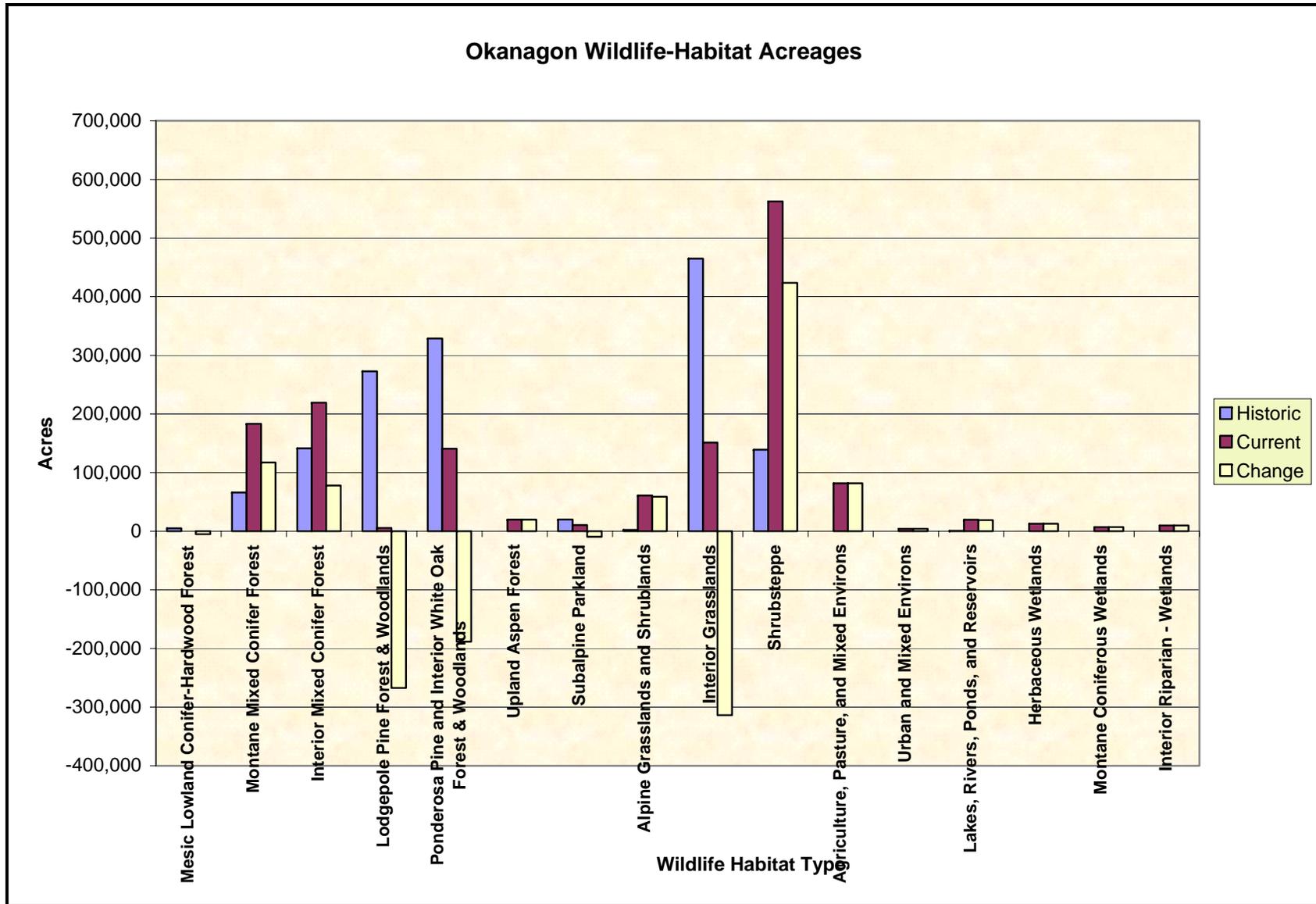


Figure 9. Okanagon subbasin wildlife habitat acreage and associated change (IBIS 2003).

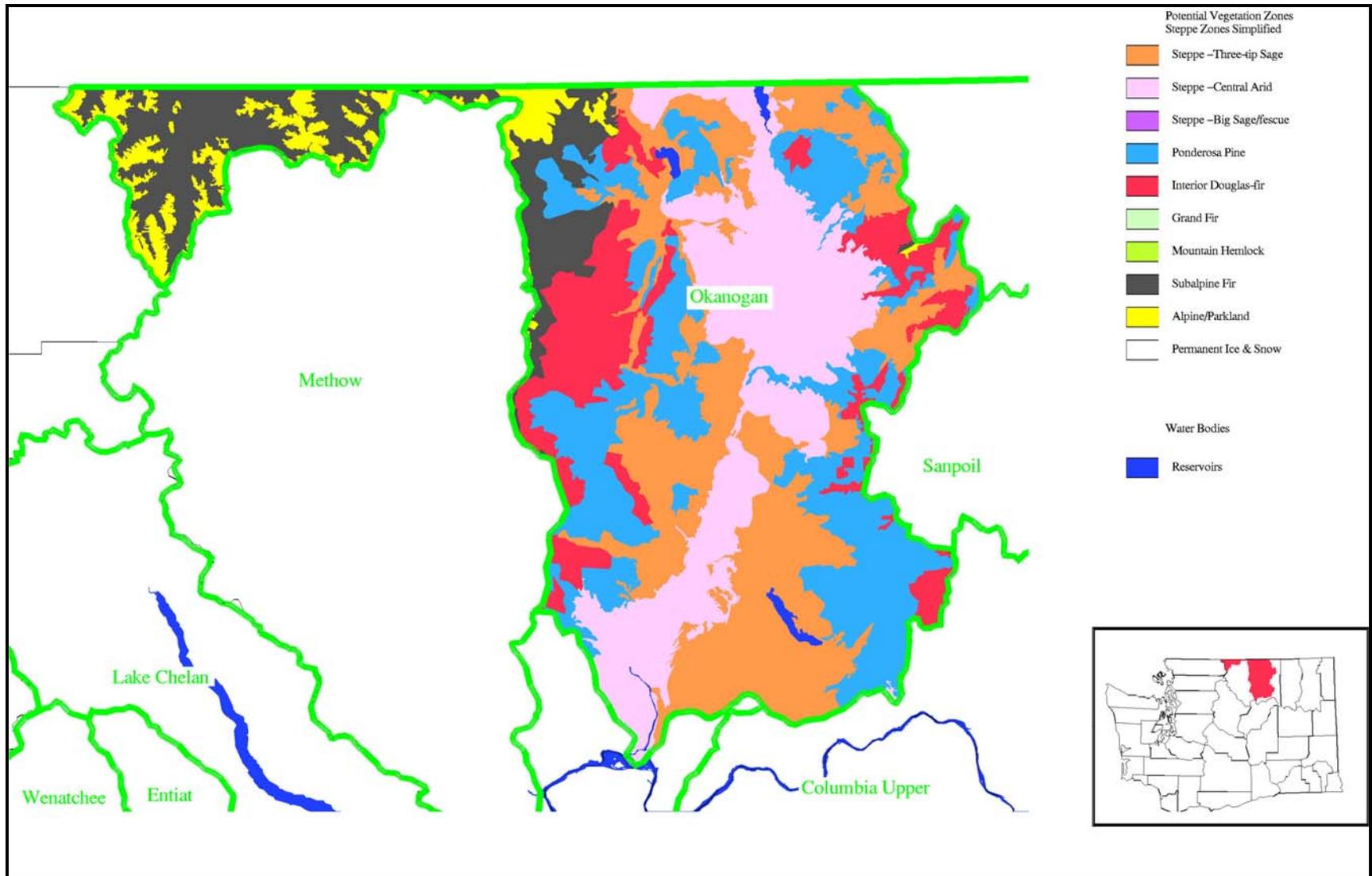


Figure 10. Ponderosa pine and shrubsteppe habitat in the Okanogan subbasin, Washington (Cassidy 1997).

Table 8. A comparison of the amount of current focal habitat types for each subbasin in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Subbasin	Focal Habitat		
	Ponderosa Pine (acres)	Shrubsteppe (acres)	Riparian Wetlands (acres)
Entiat	55,807	32,986	94
Lake Chelan	45,480	45,018	5,079
Wenatchee	51,912	24,248	141
Methow	139,853	107,655	4,232
Okanogan	140,738	562,763	9,920
Upper Middle Mainstem Columbia River	50,843	753,073	3,898
Crab	4,660	991,397	12,227

Currently, much of this habitat has a younger tree cohort of more shade-tolerant species that gives the habitat a more closed, multi-layered canopy. For example, this habitat includes previously natural fire-maintained stands in which grand fir can eventually become the canopy dominant. Large late-seral ponderosa pine and Douglas-fir are harvested in much of this habitat type. Under most management regimes, typical tree size decreases and tree density increases. In some areas, patchy tree establishment at forest-steppe ecotones has created new woodlands.

Introduced annuals, especially cheatgrass and invading shrubs under heavy grazing pressure, have replaced native herbaceous understory species. Four exotic knapweed species (*Centaurea* spp.) are spreading rapidly through the ponderosa pine zone and threatening to replace cheatgrass as the dominant increaser after grazing (Roche and Roche 1988). Dense cheatgrass stands eventually change the fire regime of these stands often resulting in stand replacing, catastrophic fires. Bark beetles, primarily of the genus *Dendroctonus* and *Ips*, kill thousands of pines annually and are the major mortality factor in commercial saw timber stands.

Current and historic acreages and percent change for the ponderosa pine habitat type are compared by subbasin in [Figure 11](#). All subbasins in the Ecoprovince experienced a significant loss (25-75 percent) of ponderosa pine habitat from historic (circa 1850) amounts (IBIS 2003).

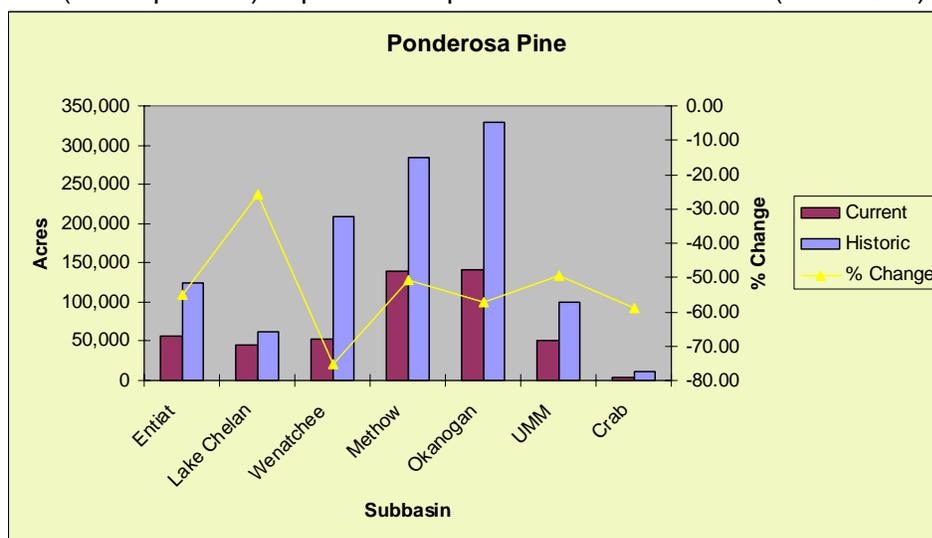


Figure 11. A comparison of the ponderosa pine habitat type in Ecoprovince subbasins (IBIS 2003).

[Add data if available]

3.1.7.1.1 Protection Status

The protection status of ponderosa pine habitat for Ecoprovince subbasins is compared in [Figure 12](#). The protection status of remaining ponderosa pine habitat in all subbasins fall primarily within the “low” to “no protection” status categories. As a result, this habitat type will likely suffer further degradation, disturbance, and/or loss in all Ecoprovince subbasins. Protection status of ponderosa pine habitat within the Okanogan subbasin is illustrated in [Table 9](#).

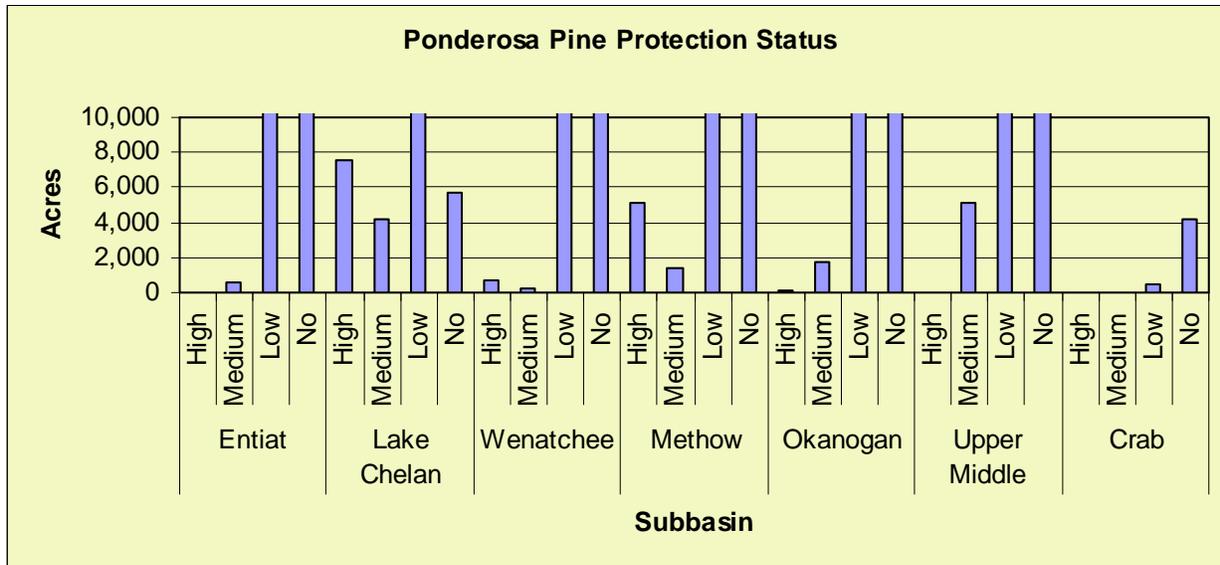


Figure 12. Protection status of ponderosa pine in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Table 9. Ponderosa pine habitat GAP protection status in the Okanogan subbasin, Washington (IBIS 2003).

GAP Protection Status	Acres
High Protection	107
Medium Protection	1,799
Low Protection	66,880
No Protection	72,034

3.1.7.1.2 Factors Affecting Ponderosa Pine Habitat

Factors affecting ponderosa pine habitat are explained in detail in section 4.2.10.1 (Ashley and Stovall (unpublished report, 2004) and are summarized below:

- Timber harvesting, particularly at low elevations, has reduced the amount of old growth forest and associated large diameter trees and snags.
- Urban and residential development has contributed to loss and degradation of properly functioning ecosystems.
- Fire suppression/exclusion has contributed towards habitat degradation, particularly declines in characteristic herbaceous and shrub understory from increased density of small shade-tolerant trees. High risk of loss of remaining ponderosa pine overstories from stand-replacing fires due to high fuel loads in densely stocked understories.
- Overgrazing has resulted in lack of recruitment of sapling trees, particularly pines.
- Invasion of exotic plants has altered understory conditions and increased fuel loads.

- Fragmentation of remaining tracts has negatively impacted species with large area requirements.
- Hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and may be subject to high levels of human disturbance.
- The timing (spring/summer versus fall) of restoration/silviculture practices such as mowing, thinning, and burning of understory removal may be especially detrimental to single-clutch species.
- Spraying insects that are detrimental to forest health may have negative ramifications on lepidopterans and other non-target avian species.

3.1.7.1.3 Recommended Future Condition

Recommended future conditions are described in section 4.1.7.1.3 in Ashley and Stovall (unpublished report, 2004). Recommended conditions for ponderosa pine habitat are summarized in the ensuing paragraphs.

Condition 1a – mature ponderosa pine forest. The white-headed woodpecker represents species that require/prefer large patches (greater than 350 acres) of open mature/old growth ponderosa pine stands with canopy closures between 10 - 50 percent and snags (a partially collapsed, dead tree) and stumps for nesting (nesting stumps and snags greater than 31 inches DBH). Abundant white-headed woodpecker populations can be present on burned or cut forest with residual large diameter live and dead trees and understory vegetation that is usually very sparse. Openness however, is not as important as the presence of mature or veteran cone producing pines within a stand (Milne and Hejl 1989).

Condition 1b – mature ponderosa pine forest. The pygmy nuthatch represents species that require heterogeneous stands of ponderosa pine with a mixture of well-spaced, old pines and vigorous trees of intermediate age and those species that depend on snags for nesting and roosting, high canopy density, and large diameter (greater than 18 inches DBH) trees characteristic of mature undisturbed forests. Connectivity between suitable habitats is important for species, such as pygmy nuthatch, whose movement and dispersal patterns are limited to their natal territories.

Condition 2 – multiple-canopy ponderosa pine mosaic: Flammulated owls represent wildlife species that occupy ponderosa pine sites that are comprised of multiple-canopy, mature ponderosa pine stands or mixed ponderosa pine/Douglas-fir forest interspersed with grassy openings and dense thickets. Flammulated owls nest in habitat types with low to intermediate canopy closure (Zeiner *et al.* 1990), two layered canopies, tree density of 508 trees/acre (9-foot spacing), basal area of 250 ft.²/acre (McCallum 1994), and snags greater than 20 inches DBH 3-39 feet tall (Zeiner *et al.* 1990). Food requirements are met by the presence of at least one snag greater than 12 inches DBH/10 acres and 8 trees/acre greater than 21 inches DBH.

Condition 3 – Pine/shrubsteppe interface: Gray flycatchers represent wildlife species that occupy the pine/shrubsteppe interface (pine savannah) with a shrub/bunchgrass understory. Gray flycatchers require nest trees 18 inches DBH and a tree height of 52 feet for their reproductive life requisites.

3.1.7.2 Shrubsteppe

The shrubsteppe habitat type is described in section 4.1.7.2 of Ashley and Stovall (unpublished report, 2004). Changes in shrubsteppe distribution in the Subbasin from circa 1850 to 1999 are illustrated in [Figure 7](#) and [Figure 8](#).

Historically, sage dominated steppe vegetation occurred throughout the majority of the lower elevations in the Subbasin, and variations of shrubsteppe habitat once occupied most of the non-forested land in eastern Washington. The moister draws and permanent stream courses imbedded in the shrubsteppe landscape supported strands of riparian vegetation dominated by moisture loving shrubs and small trees, including thick stands of water birch, a major component of the winter diet of sharp-tailed grouse. The drastic reduction of water birch in the Subbasin by early settlers is likely a major factor in the decline of sharp-tailed grouse (NPPC 2002).

The greatest changes in shrubsteppe habitat from historic conditions are the reduction of bunchgrass cover in the understory and an increase in sagebrush cover. Soil compaction is also a significant factor in heavily grazed lands affecting water percolation, runoff and soil nutrient content. A long history of grazing, fire, and invasion by exotic vegetation has altered the composition of the plant community within much of the extant shrubsteppe in this region (Quigley and Arbelbide 1997; Knick 1999), and it is difficult to find stands which are still in relatively natural condition.

Fire has relatively little effect on native vegetation in the three-tip sagebrush zone, since three-tip sagebrush and the dominant graminoids resprout after burning. Three-tip sagebrush does not appear to be much affected by grazing, but the perennial graminoids decrease and are eventually replaced by cheatgrass (*Bromus tectorum*), plantain (*Plantago* spp.), big bluegrass (*Poa secunda*), and/or gray rabbitbrush (*Chrysothamnus nauseosus*). In recent years, diffuse knapweed (*Centaurea diffusa*) has spread through this zone and threatens to replace other exotics as the chief increaser after grazing (Roche and Roche 1998).

In areas of central arid steppe with a history of heavy grazing and fire suppression, true shrublands are common and may even be the predominant cover on non-agricultural land. Most of the native grasses and forbs are poorly adapted to heavy grazing and trampling by livestock. Grazing eventually leads to replacement of the bunchgrasses with cheatgrass, Nuttall's fescue (*Festuca microstachys*), eight flowered fescue (*F. octoflora*), and Indian wheat (*Plantago patagonica*) (Harris and Chaney 1984). In recent years, several knapweeds (*Centaurea* spp.), have become increasingly widespread. Russian star thistle (*Centaurea repens*) is particularly widespread, especially along and near major watercourses (Roche and Roche 1988 in Cassidy 1997).

A 1970s rangeland evaluation indicated that 25 percent of rangeland in the Subbasin was in good condition, 34 percent in fair condition, and 41 percent was in poor condition (PNRBC 1977 in NPPC 2002). According to NRCS definitions, rangelands in fair to excellent condition provide adequate ground cover to protect the soil resource. Rangeland in poor to fair condition may not protect the soil, depending on the species composition and density. Areas in poor to fair condition may be prone to accelerated erosion. Accelerated erosion will likely degrade water quality.

Current and historic acreages and percent change for the shrubsteppe habitat type are compared by subbasin in [Figure 13](#). The Upper Middle Mainstem Columbia River and Crab subbasins have experienced considerable losses (39 percent and 67 percent, respectively),

while the remaining subbasins show increases in shrubsteppe habitat ranging from 165 to 462 percent over historic (circa 1850) amounts (IBIS 2003).

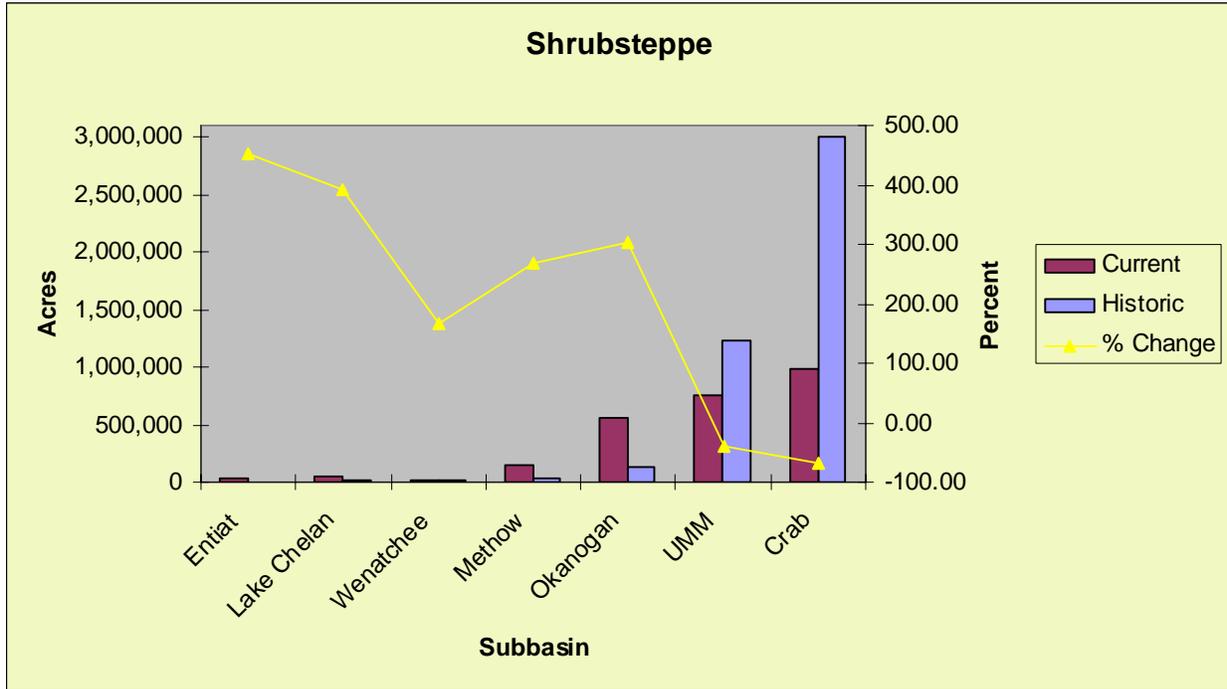


Figure 13. A comparison of the ponderosa pine habitat type in Ecoprovince subbasins (IBIS 2003).

[\[Add data if available\]](#)

3.1.7.2.1 Protection Status

The protection status of shrubsteppe habitat for Ecoprovince subbasins is compared in [Figure 13](#). The protection status of remaining shrubsteppe habitats in all subbasins fall primarily within the “low” to “no protection” status categories. As a result, this habitat type will likely suffer further degradation, disturbance, and/or loss in all Ecoprovince subbasins. Protection status of shrubsteppe habitat within the Okanogan subbasin is illustrated in [Table 10](#).

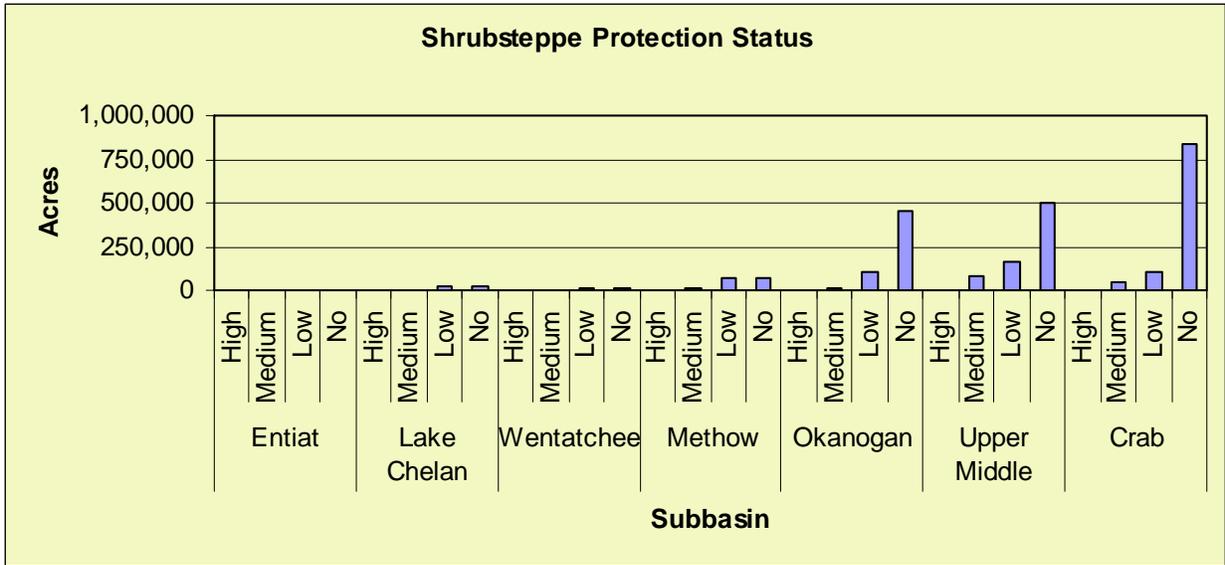


Figure 14. GAP protection status of shrubsteppe habitat in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Table 10. Shrubsteppe habitat GAP protection status in the Okanogan subbasin, Washington (IBIS 2003).

GAP Protection Status	Acres
High Protection	671
Medium Protection	7,863
Low Protection	98,912
No Protection	455,538

3.1.7.2.2 Factors Affecting Shrubsteppe Habitat

Factors affecting shrubsteppe habitat are explained in detail in section 4.2.10.2 (Ashley and Stovall (unpublished report, 2004) and are summarized below:

- Permanent habitat conversions of shrubsteppe/grassland habitats (e.g., approximately 60 percent of shrubsteppe in Washington [Dobler *et al.* 1996]) to other uses (e.g., agriculture, urbanization).
- Fragmentation of remaining tracts of moderate to good quality shrubsteppe habitat.
- Degradation of habitat from intensive grazing and invasion of exotic plant species, particularly annual grasses such as cheatgrass and woody vegetation such as Russian olive.
- Degradation and loss of properly functioning shrubsteppe/grassland ecosystems resulting from the encroachment of urban and residential development and conversion to agriculture. Best sites for healthy sagebrush communities (deep soils, relatively mesic conditions) are also best for agricultural productivity; thus, past losses and potential future losses are great. Most of the remaining shrubsteppe in Washington is in private ownership with little long-term protection (57 percent).
- Loss of big sagebrush communities to brush control (may not be detrimental relative to interior grassland habitats).
- Conversion of CRP lands back to cropland.
- Loss and reduction of cryptogamic crusts, which help maintain the ecological integrity of shrubsteppe/grassland communities.

- High density of nest parasites (brown-headed cowbird) and domestic predators (cats) may be present in hostile/altered landscapes, particularly those in proximity to agricultural and residential areas subject to high levels of human disturbance.
- Agricultural practices that cause direct or indirect mortality and/or reduce wildlife productivity. There are a substantial number of obligate and semi-obligate avian/mammal species; thus, threats to the habitat jeopardize the persistence of these species.
- Fire management, either suppression or over-use.
- Invasion and seeding of crested wheatgrass and other introduced plant species which reduces wildlife habitat quality and/or availability.

3.1.7.2.3 Recommended Future Condition

Recommended future conditions are described in section 4.1.7.2.3 in Ashley and Stovall (unpublished report, 2004). Recommended conditions for shrubsteppe habitat are summarized in the ensuing paragraphs.

3.1.7.2.3.1 Sagebrush-dominated Shrubsteppe:

Condition 1 – Diverse shrubsteppe habitat. Mule deer were selected to represent species that require and prefer diverse, dense (30 to 60 percent shrub cover less than 5 feet tall) shrubsteppe habitats (Ashley and Berger 1999) comprised of bitterbrush, big sagebrush, rabbitbrush, and other shrub species (Leckenby 1969; Kufeld *et al.* 1973; Sheehy 1975; Jackson 1990) with a palatable herbaceous understory exceeding 30 percent cover (Ashley and Berger 1999).

Condition 2 – Sagebrush dominated shrubsteppe habitat. Brewer's sparrow was selected to represent wildlife species that require sagebrush dominated sites. Brewer's sparrow prefers a patchy distribution of sagebrush clumps, 10-30 percent cover (Altman and Holmes 2000), lower sagebrush height (between 20 and 28 inches), (Wiens and Rotenberry 1981), 10 to 20 percent native grass cover (Dobler 1994), less than 10 percent non-native herbaceous cover, and bare ground greater than 20 percent (Altman and Holmes 2000). It should be noted, however, that Johnsgard and Rickard (1957) reported that shrublands comprised of snowberry, hawthorne, chokecherry, serviceberry, bitterbrush, and rabbitbrush were also used by Brewer's sparrows for nesting in southeast Washington. Specific, quantifiable habitat attribute information for this mixed shrub landscape could not be found.

3.1.7.2.3.2 Steppe/Grassland-dominated Shrubsteppe:

Condition 1 – Shrubsteppe habitat with multi-structured deciduous trees and shrubs: Sharp-tailed grouse was selected to represent species that require multi-structured fruit/bud/catkin producing deciduous trees and shrubs dispersed throughout the landscape (10 to 40 percent of the total area). Other habitat conditions include:

- Native bunchgrass greater than 40 percent cover
- Native forbs at least 30 percent cover
- Visual obstruction readings (VOR) at least 6 inches
- At least 75 percent cover deciduous shrubs and trees
- Exotic vegetation/noxious weeds less than 5 percent cover

Condition 2 – Shrubsteppe habitat with native bunch grasses: Grasshopper sparrow was selected to represent species that require healthy steppe habitat dominated by native bunch grasses. Grasshopper sparrow require native bunchgrass cover greater than 15 percent and comprising greater than 60 percent of the total grass cover.

3.1.7.3 Eastside (Interior) Riparian Wetlands

The eastside (interior) riparian wetlands habitat type refers only to riverine and adjacent wetland habitats in both the Ecoprovince and individual subbasins. Historic (circa 1850) and, to a lesser degree, current data concerning the extent and distribution of riparian wetland habitat are a significant data gap at both the Ecoprovince and subbasin level. The lack of data is a major challenge as Ecoprovince and subbasin planners attempt to quantify habitat changes from historic conditions and develop strategies that address limiting factors and management goals and objectives.

Due to the lack of historic riparian wetland data, the IBIS database cannot be relied upon for comparisons in the Ecoprovince and individual subbasins between the historic and current extent of riparian wetlands. According to the IBIS database (2003), there are an estimated 3,898 acres of riparian wetland habitat currently in the Subbasin. Although there are no historic data, the actual number of acres or absolute magnitude of the change is less important than recognizing the loss of riparian habitat and the lack of permanent protection continues to place this habitat type at further risk.

Historically, riparian wetland habitat was characterized by a mosaic of plant communities occurring at irregular intervals along streams and dominated singularly or in some combination by grass-forbs, shrub thickets, and mature forests with tall deciduous trees. Beaver activity and natural flooding are two ecological processes that affected the quality and distribution of riparian wetlands.

The current extent of riparian wetland habitat throughout the Columbia Cascade Ecoprovince is illustrated in [Figure 14](#).

3.1.7.3.1 Protection Status

The protection status of riparian habitat is compared by subbasin in [Figure 15](#). Riparian habitats are provided high protection status predominantly in the Lake Chelan subbasin. The vast majority of Ecoprovince riparian habitat is designated low or no protection status and is at risk for further degradation and/or conversion to other uses. The GAP protection status of riparian wetland habitat in the Okanogan subbasin is depicted in [Table 11](#).

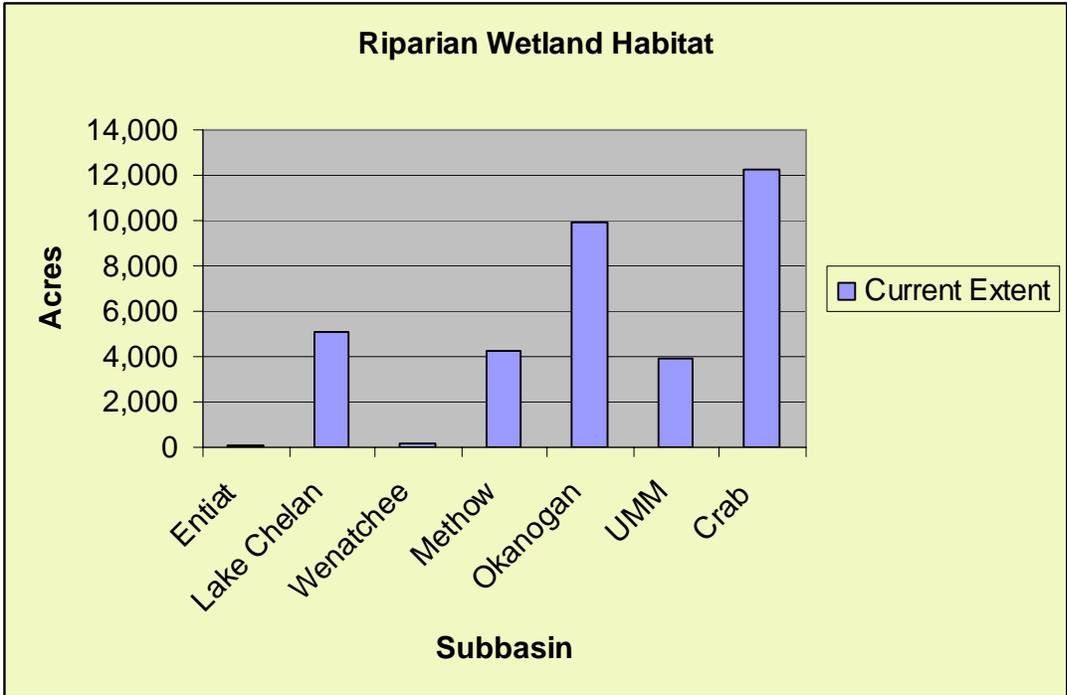


Figure 15. Current extent of riparian wetland habitat in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

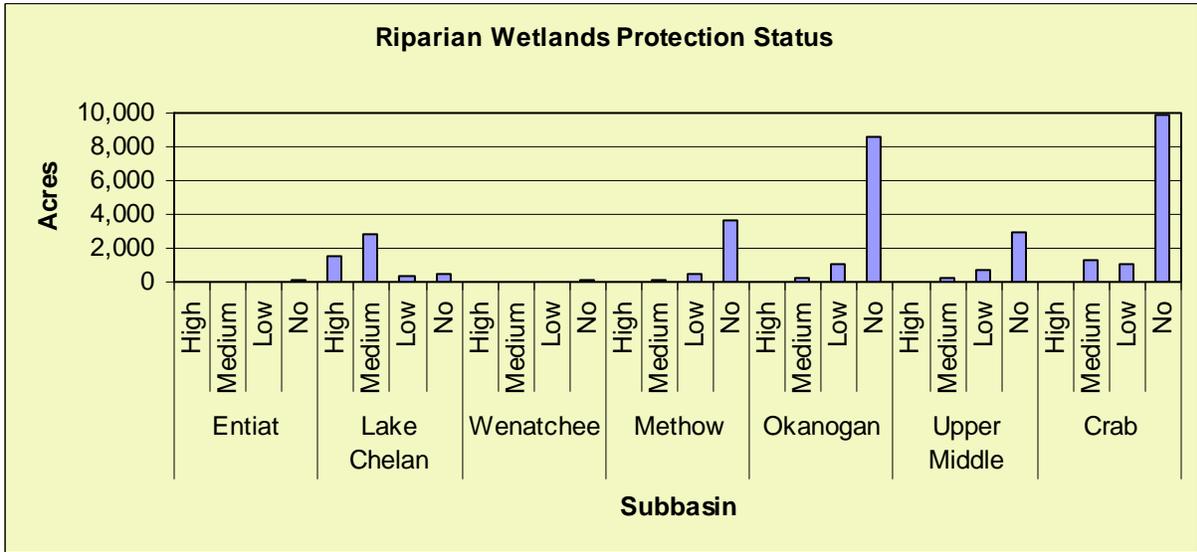


Figure 16. Protection status of riparian wetlands in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Table 11. Eastside (interior) riparian wetlands GAP protection status in the Okanogan subbasin, Washington (IBIS 2003).

GAP Protection Status	Acres
High Protection	17
Medium Protection	288
Low Protection	1,058
No Protection	8,563

3.1.7.3.2 Factors Affecting Eastside (Interior) Riparian Wetland Habitat

Factors affecting grassland habitat are described in section 4.2.10.3 in Ashley and Stovall (unpublished report, 2004) and summarized below:

- Loss of habitat due to numerous factors including riverine recreational developments, inundation from impoundments, cutting and spraying of riparian vegetation for eased access to water courses, gravel mining, etc.
- Habitat alteration from 1) hydrological diversions and control of natural flooding regimes (e.g., dams) resulting in reduced stream flows and reduction of overall area of riparian habitat, loss of vertical stratification in riparian vegetation, and lack of recruitment of young cottonwoods, ash, willows, etc., and 2) stream bank stabilization which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation.
- Habitat degradation from livestock overgrazing which can widen channels, raise water temperatures, and reduce understory cover.
- Habitat degradation from conversion of native riparian shrub and herbaceous vegetation to invasive exotics such as reed canary grass, purple loosestrife, perennial pepperweed, salt cedar, indigo bush, and Russian olive.
- Fragmentation and loss of large tracts necessary for area-sensitive species such as yellow-billed cuckoo.
- Hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and be subject to high levels of human disturbance.
- High energetic costs associated with high rates of competitive interactions with European starlings for cavities may reduce reproductive success of cavity-nesting species such as Lewis' woodpecker, downy woodpecker, and tree swallow, even when outcome of the competition is successful for these species.
- Recreational disturbances (e.g., ORVs), particularly during nesting season, and particularly in high-use recreation areas.

3.1.7.3.3 Recommended Future Condition

Recommended future conditions are described in detail in section 4.1.7.3.3 in Ashley and Stovall (unpublished report, 2004). Recommended conditions for riparian wetland habitat are summarized in the following paragraphs.

Condition 1a – Cottonwood gallery forests with healthy canopy cover: Red-eyed vireo was selected to represent species that require greater than 60 percent canopy closure. For their food and reproductive requirements red-eyed vireo require mature deciduous trees greater than 160 feet tall, and greater than 10 percent of the shrub layer should be young cottonwoods.

Condition 1b – Deciduous riparian zone with high canopy closure: Beaver was selected to represent species that require 40-60 percent tree/shrub canopy closure and shrub height greater than 6.6 feet. Beavers also require trees less than 6 inches DBH.

Condition 2 – Riparian habitat with a dense shrub layer: Yellow-breasted chat was selected to represent species that require riparian habitat with a shrub layer 1-4m tall, 30-80 percent shrub cover, scattered herbaceous openings, and less than 20 percent tree cover.

The change in extent of the riparian wetland habitat type from circa 1850 to 1999 is not included because of inaccurate IBIS (2003) data/GIS products.

3.1.7.4 Agriculture (Habitat of Concern)

Agricultural habitat varies substantially in composition among the cover types it includes. Cultivated cropland includes at least 50 species of annual and perennial plants, and hundreds of varieties ranging from vegetables such as carrots, onions, and peas to annual grains such as wheat, oats, barley, and rye. Row crops of vegetables and herbs are characterized by bare soil, plants, and plant debris along bottomland areas of streams and rivers and areas having sufficient water for irrigation. Annual grains, such as barley, oats, and wheat are typically produced in almost continuous stands of vegetation on upland and rolling hill terrain without irrigation.

Improved pastures are used to produce perennial herbaceous plants for grass seed and hay. Alfalfa and several species of fescue and bluegrass, orchardgrass (*Dactylis glomerata*), and timothy (*Phleum pratensis*) are commonly seeded in improved pastures. Grass seed fields are single-species stands, whereas pastures maintained for haying are typically composed of several species.

The improved pasture cover type is one of the most common agricultural uses in and is produced with and without irrigation. Unimproved pastures are predominantly grassland sites often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications. These sites may or may not be grazed by livestock. Unimproved pastures include rangelands planted to exotic grasses that are found on private land, state wildlife areas, federal wildlife refuges, and CRP sites. Grasses commonly planted on CRP sites include crested wheatgrass (*Agropyron cristatum*), tall fescue (*F. arundinacea*), perennial bromes (*Bromus* spp.), and wheatgrasses.

Intensively grazed rangelands have been seeded to intermediate wheatgrass (*Elytrigia intermedia*), crested wheatgrass to boost forage production, or are dominated by increaser exotics such as Kentucky wheatgrass or tall oatgrass (*Arrhenatherum elatius*). Other unimproved pastures have been cleared and intensively farmed in the past, but are allowed to convert to other vegetation. These sites may be composed of uncut hay, litter from previous seasons, standing dead grass and herbaceous material, invasive exotic plants including tansy ragwort (*Senecio jacobea*), thistle (*Cirsium* spp.), Himalaya blackberry (*Rubus discolor*), and Scot's broom (*Cytisus scoparius*) with patches of native black hawthorn, snowberry, spirea (*Spirea* spp.), poison oak (*Toxicodendron diversilobum*), and various tree species, depending on seed source and environment.

Because agriculture is not a focal wildlife habitat type and there is little opportunity to effect change in agricultural land use at the landscape scale, Ecoprovince and subbasin planners did not conduct a full-scale analysis of agricultural conditions. However, agricultural lands converted to CRP can significantly contribute toward benefits to wildlife habitat and other species that utilize agricultural lands.

Agricultural extent in the Okanogan subbasin is illustrated in [Figure 16](#) and [Figure 17](#).

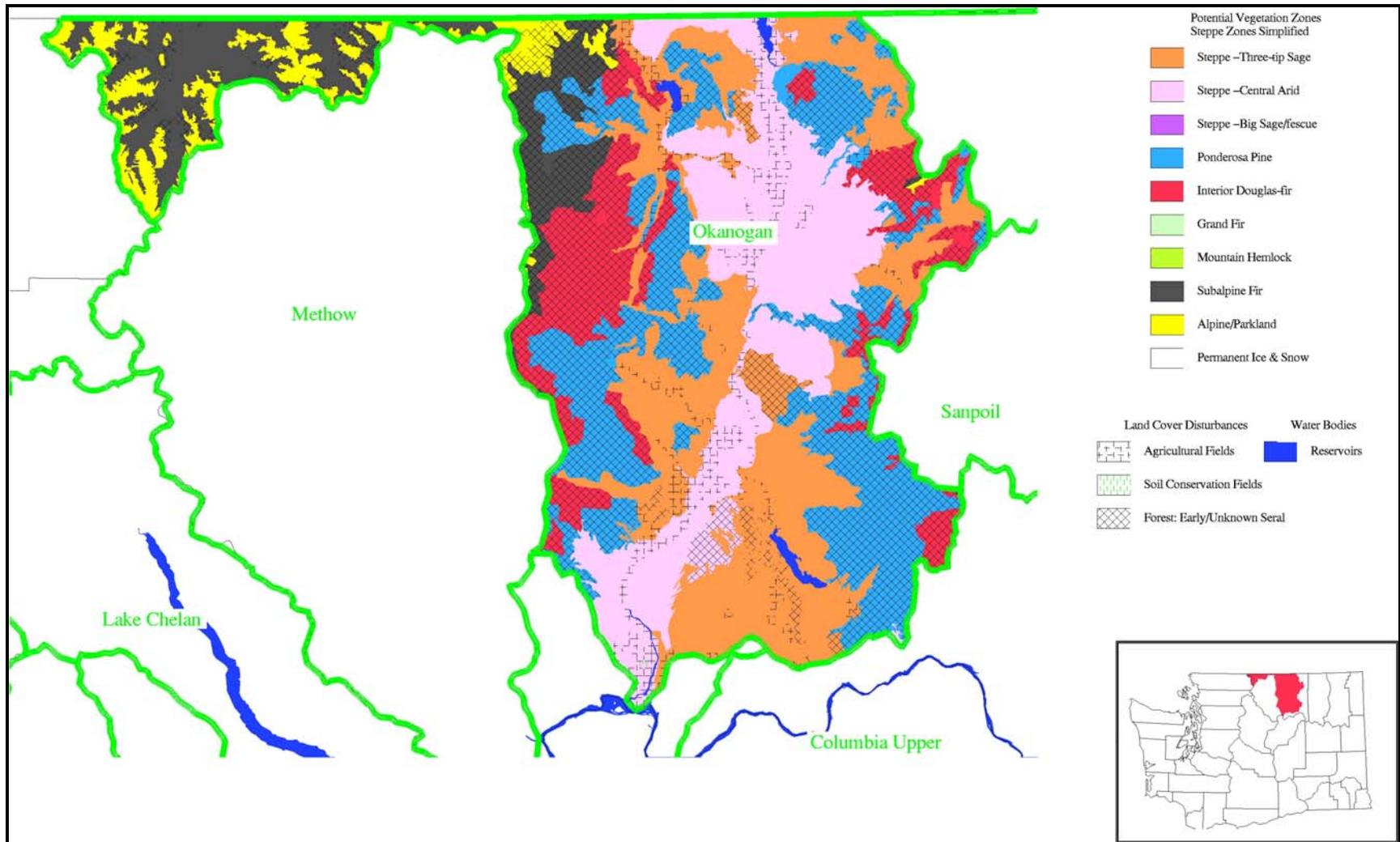


Figure 17. Agricultural extent in the Okanogan subbasin, Washington (Cassidy 1997).

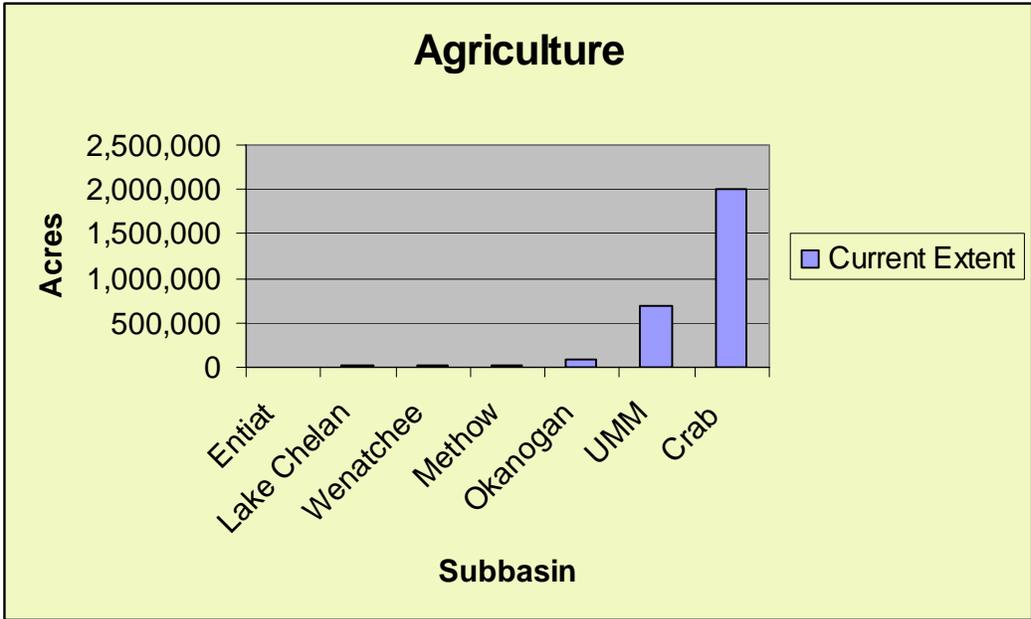


Figure 18. Current extent of agriculture in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

3.1.7.4.1 Protection Status

The protection status of agricultural habitat is compared by subbasin in [Figure 18](#). The IBIS (2003) data clearly indicate that nearly all of this cover type has no protection status across the Ecoprovince. Small amounts of agricultural lands, however, are given low and medium protection status. Low and medium protection is limited to lands enrolled in conservation easements, or those that are under other development restrictions such as county planning ordinances. The GAP protection status of agricultural habitat in the Subbasin is illustrated in [Table 12](#).

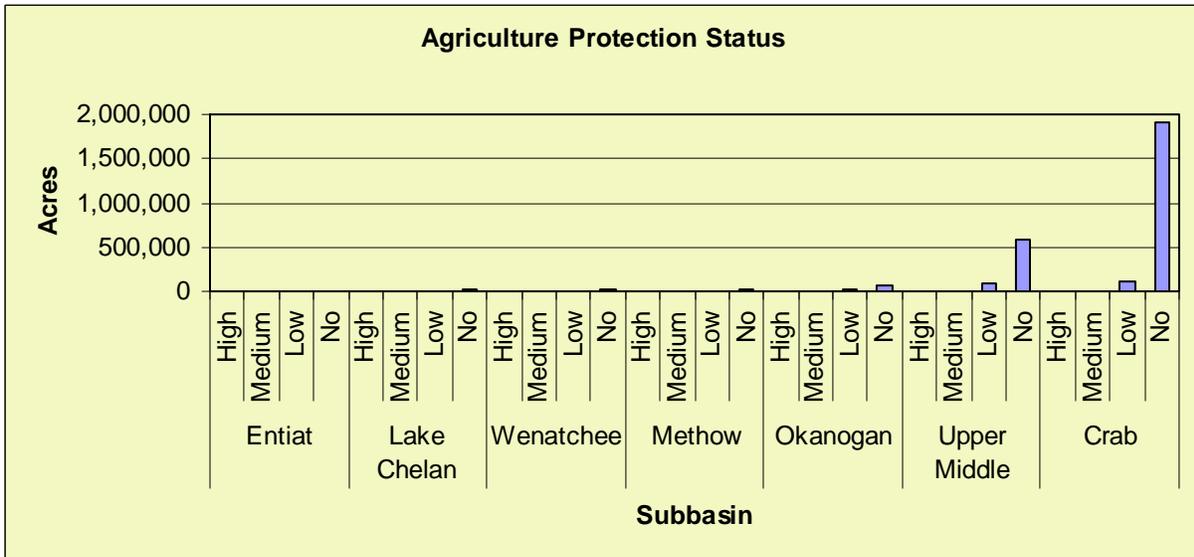


Figure 19. Protection status of agriculture in the Columbia Cascade Ecoprovince, Washington (IBIS 2003).

Table 12. Agriculture GAP protection status/acres in the Okanogan subbasin, Washington (IBIS 2003).

GAP Protection Status	Acres
High Protection	90
Medium Protection	756
Low Protection	11,960
No Protection	69,154

3.1.7.5 Changes in Focal Wildlife Habitats (Summary)

Changes in the extent of focal habitats within the Subbasin are summarized in [Table 13](#) and compared to other Ecoprovince subbasins in [Figure 19](#). Ponderosa pine and wetland habitats within the Subbasin have decreased significantly since 1850¹. Only the Upper Middle Mainstem Columbia River and Crab subbasins show a decrease in the extent of shrubsteppe habitat.

Table 13. Changes in focal wildlife habitat types in the Okanogan subbasin from circa 1850 (historic) to 1999 (current) (IBIS 2003).

Focal Habitat Type	Historic Acres	Current Acres	Acre Change	Percent Change
Ponderosa pine	328,962	140,738	-188,224	-57
Shrubsteppe	139,186	562,763	423,577	304
Eastside (Interior) Riparian Wetlands	0	9,920	9,920	100
Agriculture	0	81,912	81,912	100

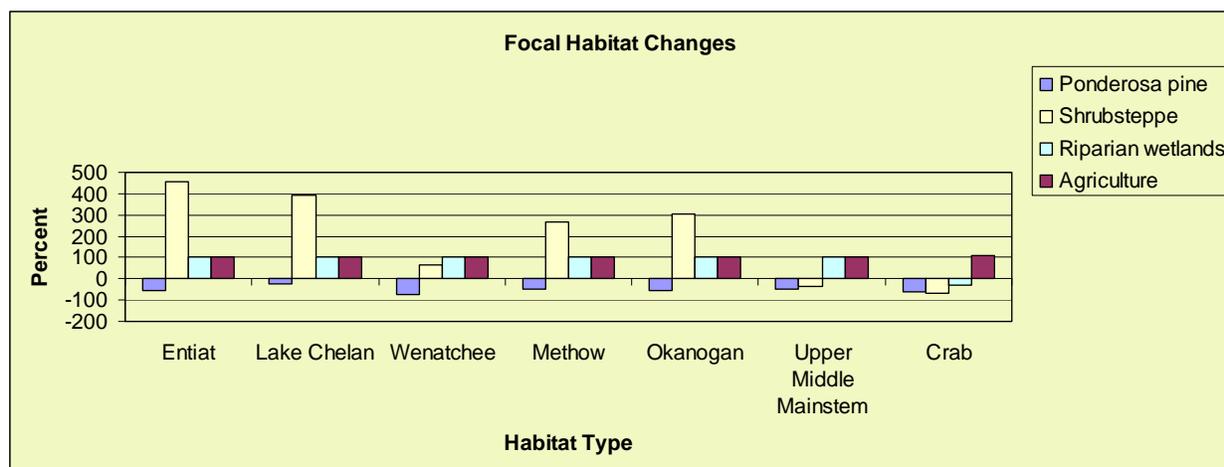


Figure 20. Changes in focal wildlife habitat types in the Columbia Cascade Ecoprovince (IBIS 2003).

It is highly unlikely that the extent of riparian wetland and herbaceous habitats is now greater than what occurred historically in the Ecoprovince. Ecoprovince planners have little confidence in IBIS historic riparian wetland data. For additional information regarding focal habitat changes throughout the Ecoregion, see section 4.1.7 in Ashley and Stovall (unpublished report, 2004).

Grazing largely accounts for the increase in shrubsteppe habitat (IBIS 2003). Wetland habitat data are incomplete and limited in value. As a result, riparian and herbaceous wetland habitats are not well represented in IBIS maps (accurate habitat type maps, especially those detailing

¹ Ecoprovince and subbasin planners assume that all wetland habitats have decreased since European settlement (circa 1850) (see Ashley and Stovall, unpublished report, 2004).

riparian and herbaceous wetland habitats, are needed to improve assessment quality and support management strategies/actions). Subbasin wildlife managers, however, believe that significant physical and functional losses have occurred to these important wetland habitats from hydroelectric facility construction and inundation, agricultural development, and livestock grazing.

3.1.7.6 Summary of Factors Affecting Focal Habitats and Wildlife Species

The presence, distribution, and abundance of wildlife species in the Okanogan subbasin have been affected by habitat losses due primarily to:

- Agricultural development
- Residential development
- Livestock grazing
- Exotic species
- Hydropower development and operation

3.1.7.6.1 Agricultural Development

Agricultural development in the Subbasin has altered or destroyed vast amounts of native shrubsteppe habitat and fragmented riparian/floodplain habitat. Agricultural operations have increased sediment loads and introduced herbicides and pesticides into streams. Conversion to agriculture has decreased the overall quantity of habitat for many native species, but loss of specific communities may be particularly critical for habitat specialists.

3.1.7.6.2 Residential Development

Residential development has resulted in the loss of large areas of habitat and increased the harassment of wildlife. Urban sprawl has eliminated large areas of lowland wintering range of native wildlife. As the human population continues to grow, residential areas continue to spread into once wild areas that may have been prime habitat for wildlife. Disturbance by humans in the form of highway traffic, noise and light pollution, and various recreational activities have the potential to displace wildlife and force them out of their native areas or forces them to use less desirable habitat.

While urban areas comprise only a small percentage of the land base within the Subbasin (0.5 percent), their habitat impacts are significant. Cities and towns within the Subbasin are largely built along creeks and rivers. Channelization and development along water courses has eliminated riparian and wetland habitats. Expansion of urban areas affects drainage, and homes built along streams have affected both water quality and the ability of the floodplain to function normally. Removal of woody, overhanging vegetation along stream corridors has increased stream temperatures to the point that they are unable to support coldwater biota.

3.1.7.6.3 Livestock Grazing

Livestock grazing can result in the reduction of cover that is used by wildlife such as rodents, birds, deer and elk. In grazing areas near water sources, the riparian vegetation is often trampled down and soils have become compacted resulting in a loss of habitat for wildlife that utilize these areas. Bank erosion may also be increased with riparian livestock grazing, resulting in increased sedimentation in streams.

3.1.7.6.4 Exotic Species

The spread of non-native plant and wildlife species poses a threat to wildlife habitat quality and to wildlife species themselves. For example, noxious weeds can threaten the abundance of native plant species fed upon by wildlife, and introduced wildlife species can compete with native wildlife for resources, potentially leading to the decline of the native species. Eurasian

water milfoil surveys conducted by the Chelan County Public Utility District during the mid 1980s found that milfoil is infiltrating native aquatic weed beds and displacing these native plant species (NPPC 2002).

3.1.7.6.5 Hydropower Development and Operation

The development and operation of the hydropower system has resulted in widespread changes in riparian, riverine, and upland habitats in the Subbasin. Biological effects related to hydropower development and operations on wildlife and its habitats may be direct or indirect. Direct effects include stream channelization, inundation of habitat and subsequent reduction in some habitat types, degradation of habitat from water level fluctuations and construction and maintenance of power transmission corridors. Indirect effects include the building of numerous roads and railways, presence of electrical transmissions and lines, the expansion of irrigation, and increased access to and harassment of wildlife.

4.0 Biological Features

4.1 Focal Species/Assemblages

4.1.1 Focal Wildlife Species Assemblage Selection and Rationale

The focal species selection process is described in section 5.1 in Ashley and Stovall (unpublished report, 2004) while important habitat attributes are summarized in Ashley and Stovall (unpublished report, 2004) (Table 20). Ecoprovince and subbasin planners identified focal species assemblages for each focal habitat type (Table 14). Focal species selected for the Okanogan subbasin are highlighted in <bold> text.

Table 14 Focal species selection matrix for the Columbia Cascade Ecoprovince, Washington.

Common Name	Focal Habitat ¹	Status ²		Native Species	PHS	Partners in Flight	Game Species
		Federal	State				
Sage thrasher	SS	n/a	C	Yes	Yes	Yes	No
Brewer's sparrow		n/a	n/a	Yes	No	Yes	No
Grasshopper sparrow		n/a	n/a	Yes	No	Yes	No
Sharp-tailed grouse		SC	T	Yes	Yes	Yes	No
Sage grouse		C	T	Yes	Yes	No	No
Pygmy rabbit		E	E	Yes	Yes	No	No
Mule deer	RW	n/a	n/a	Yes	Yes	No	Yes
Willow flycatcher		SC	n/a	Yes	No	Yes	No
Lewis woodpecker		n/a	C	Yes	Yes	Yes	No
Red-eyed vireo		n/a	n/a	Yes	No	No	No
Yellow-breasted chat		n/a	n/a	Yes	No	No	No
American beaver		n/a	n/a	Yes	No	No	Yes
Pygmy nuthatch	PP	n/a	n/a	Yes	No	No	No
Gray flycatcher		n/a	n/a	Yes	No	No	No
White-headed woodpecker		n/a	C	Yes	Yes	Yes	No
Flammulated owl		n/a	C	Yes	Yes	Yes	No
Red-winged blackbird	HW	n/a	n/a	Yes	No	No	No

¹ SS = Shrubsteppe; RW = Riparian Wetlands; PP = Ponderosa pine; HW = Herbaceous Wetlands
² C = Candidate; SC = Species of Concern; T = Threatened; E = Endangered

Nine bird species and two mammalian species were selected to represent three priority habitats in the Subbasin. Life requisite habitat attributes for each species assemblage were pooled to characterize a "range of management conditions", to guide planners in development of future habitat management strategies, goals, and objectives.

General habitat requirements, limiting factors, distribution, population trends, and analyses of structural conditions, key ecological functions, and key ecological correlates for individual focal species are included in Ashley and Stovall (unpublished report, 2004). The reader is further encouraged to review additional focal species life history information in Appendix F in Ashley and Stovall (unpublished report, 2004).

Establishment of conditions favorable to focal species will benefit a wider group of species with similar habitat requirements. Wildlife species associated with focal habitats including agriculture are listed in [Table 17](#) (Appendix B).

4.2 Wildlife Species

There are an estimated 328 wildlife species that occur in the Okanogan subbasin ([Table 18](#)) (Appendix B). Of these species, 104 (90 percent) are closely associated with riparian and wetland habitat and 71 (86 percent) consume salmonids during some portion of their life cycle. Eight wildlife species that occur in the Subbasin are listed federally and 42 species are listed in Washington as Threatened, Endangered, or Candidate species ([Table 19](#)) (Appendix B). A total of 98 bird species are listed as Washington State Partners in Flight priority and focal species ([Table 20](#)) (Appendix B). A total of 57 wildlife species are managed as game species in Washington ([Table 21](#)) (Appendix B).

Eighty-nine percent of the wildlife species that occur in the Ecoprovince occur in the Subbasin ([Table 15](#)). In addition, 53 percent of the amphibian species and 68 percent of the reptile species that occur in the Ecoprovince occur in the Subbasin.

Table 15. Species richness and associations for the Okanogan subbasin, Washington (IBIS 2003).

Class	Okanogan	% of Total	Total (Ecoprovince)
Amphibians	9	53	17
Birds	222	95	234
Mammals	86	89	97
Reptiles	13	68	19
Total	328	89	367
Association			
Riparian Wetlands	73	94	78
Other Wetlands (Herbaceous and Montane Coniferous)	31	84	38
All Wetlands	104	90	116
Salmonids	71	86	82

5.0 Assessment Synthesis

Subbasin assessment conclusions are identical to those found at the Ecoprovince level for focal habitat types and species. An assessment synthesis is included in section 6 in Ashley and Stovall (unpublished report 2004).

6.0 Inventory

[Considerably more development of this section is needed by local biologists. Please provide summaries of projects that affect focal habitats/species and describe how they address limiting factors.]

This section includes information on current management activities, programs, regulatory measures, and plans designed to protect and/or restore wildlife habitats and populations within the Subbasin. Although many government agencies and non-governmental organizations (NGOs) have a keen interest in the Subbasin, the focus of this section will be on the organizations and programs that have the greatest impact on addressing factors that affect wildlife habitats, limiting wildlife populations, and supporting subbasin strategies, goals, and objectives. Additional inventory information is provided in the *Okanogan Subbasin Summary* (NPPC 2002).

6.1 Local Level

Local groups involved in fish and wildlife protection projects within the Subbasin include:

- Conservation Districts
- Agricultural Community
- County Government
- [\[Modify or add to this list...\]](#)

6.1.1 Conservation Districts

6.1.1.1 Okanogan Conservation District

The Okanogan Conservation District is responsible for identifying natural resource concerns and developing programs that bring voluntary technical and financial assistance to landowners and land occupiers in the District.

6.1.1.2 Agricultural Community

Private landowners manage the vast majority of ponderosa pine, shrubsteppe, and riparian wetland habitats in the Subbasin. Many landowners protect, enhance, and maintain privately owned/controlled steppe communities and riparian habitats through active participation in the USDA's CRP and CREP programs.

Agriculturalists apply Best Management Practices (BMPs) to croplands to reduce the amount of soil leaving these areas. The BMPs include: upland sediment basins designed to catch sediment; terraces to direct runoff to sediment basins or grassed waterways and filter strips; strip cropping; and direct seeding of crops reducing summer-fallow acres and reducing erosion by 95 percent on those acres. Landowners also control noxious weeds, which severely affect wildlife habitats and populations.

6.1.1.3 County Government

6.1.1.3.1 Okanogan County

[\[Need information\]](#)

6.2 State Level

At the state level, many agencies are involved in protection of fish and wildlife habitats within the Subbasin, including:

- Washington Department of Fish and Wildlife
- Washington Priority Habitat and Species Program
- Washington State Conservation Commission
- Washington Department of Natural Resources
- Washington Department of Ecology
- [\[Modify or add to this list...\]](#)

6.2.1 Washington Department of Fish and Wildlife

6.2.1.1 Upland Restoration Program

The WDFW has worked with private landowners to restore habitat within the Subbasin. The Habitat Development Program established small (0.5 to 3 acres) habitat plots primarily for upland game birds on unfarmed areas usually on poor or rocky soils. In the 1980s, partnerships between WDFW, NRCS, conservation districts, and private landowners made possible habitat restoration projects at the watershed scale. Today, this multi-agency/private landowner partnership continues to enhance, protect, maintain, and increase wildlife habitat throughout the Subbasin.

Through cooperative agreements with private landowners, Upland Restoration Program biologists improve and restore riparian, upland, and shrubsteppe habitats used by both resident and migratory wildlife species within the Subbasin. Projects typically include establishing riparian grass buffers, planting shrubs and trees (for thermal and escapement cover), seeding wildlife food plots, developing water sources (e.g., guzzlers, ponds, spring developments), and maintaining winter game bird feeders.

The CRP has provided WDFW with another opportunity to work with local conservation agencies and landowners to improve wildlife habitat throughout the subbasin. Washington Department of Fish and Wildlife biologists assist landowners with selecting and/or planting herbaceous seed mixes, trees, and shrubs.

While habitat restoration is WDFW's main priority within the Subbasin, the Upland Restoration Program requires all cooperators to sign public access agreements in conjunction with habitat projects. Landowners voluntarily open their land to hunting, fishing, and/or wildlife viewing in return for habitat enhancements. The Upland Restoration Program, in conjunction with CREP and CRP, has increased the extent and/or protection and enhancement of riparian wetlands and shrubsteppe habitats within the Subbasin.

6.2.1.2 Scotch Creek Wildlife Area

The 16,250-acre Scotch Creek Wildlife Areas (SCWA) is located in Okanogan County, Washington and is comprised of five parcels (Units) owned and/or managed by WDFW. The SCWA includes the 8,694-acre Scotch Creek Unit, the 1,196-acre Pogue Mountain Unit, the 920-acre Mineral Hill Unit, the 1,399-acre Tunk Valley Unit, and the 4,311-acre Chesaw Unit. The SCWA is predominantly shrubsteppe habitat and was acquired to promote recovery of sharp-tailed grouse as well as to protect/provide habitat for other shrubsteppe obligate species.

The SCWA compliments and supports sharp-tailed grouse and shrubsteppe recovery efforts at the Sagebrush Flat Wildlife Area, Swanson Lakes Wildlife Area, and on the Colville Confederated Tribes Reservation ([Figure 20](#)).

Sharp-tailed grouse were historically found in shrubsteppe and deciduous shrub habitats throughout eastern Washington, but have declined 94 percent between 1960 and 2000 (Schroeder *et al.* 2000). The current population in Washington is estimated to be around 600 (Schroeder *et al.* 2000). Today, sharp-tailed grouse are found in eight relatively small, isolated, subpopulations. Subpopulations are separated from adjacent subpopulations by at least 12.5 miles. Sharp-tailed grouse are continuing to decline in Washington due to long-term effects of habitat conversion, degradation, fragmentation, and population isolation (Hays *et al.* 1998, Schroeder *et al.* 2000).

Sharp-tailed grouse limiting factors include the lack of and/or availability of shrubsteppe habitat dominated by herbaceous cover (grasses and forbs), the distribution of riparian habitats dominated by deciduous shrubs (winter habitat), and habitat fragmentation. Reduction of

riparian forest habitats along the Columbia River as a result of construction of Grand Coulee and Chief Joseph Dams eliminated sharp-tailed grouse wintering habitat (Howerton 1986).

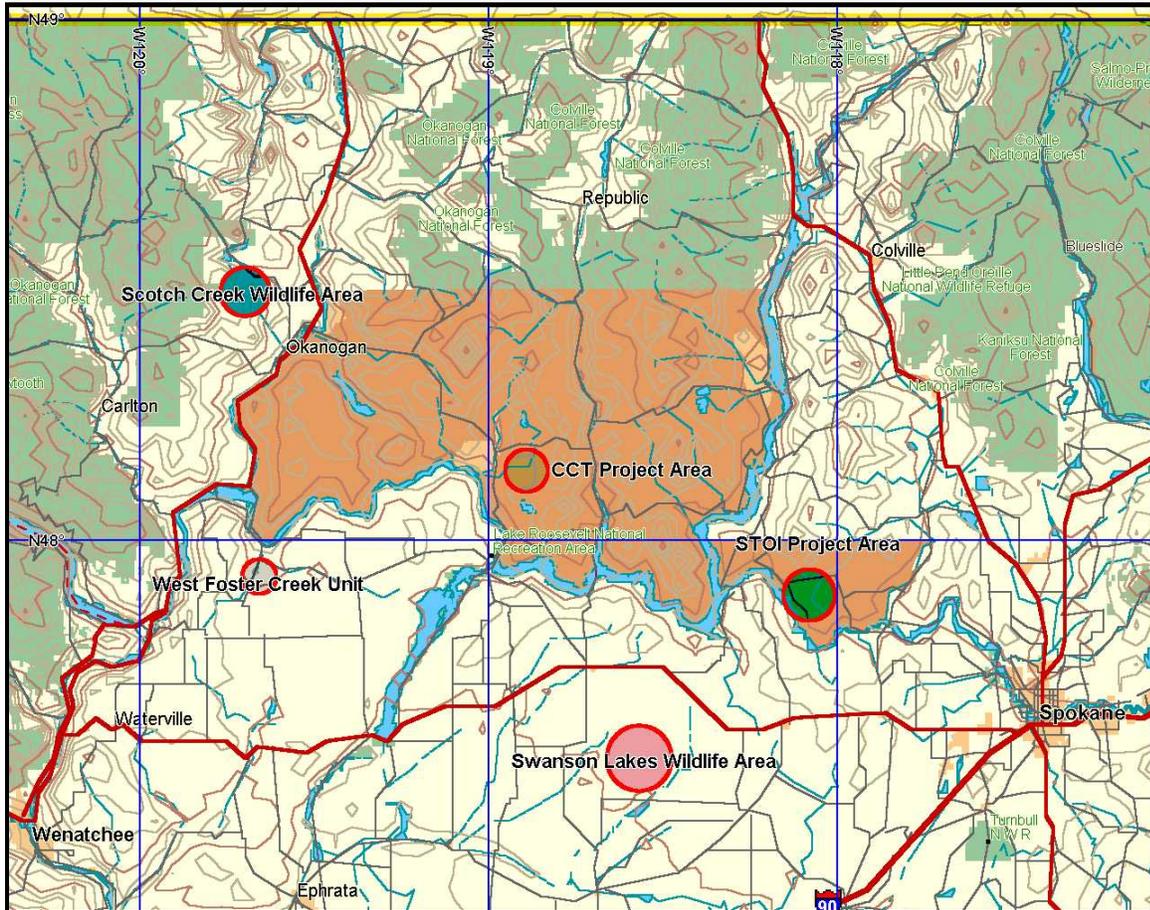


Figure 21. Sharp-tailed grouse cooperative project sites .

Daubenmire (1970) suggested the vast majority of the Subbasin historically consisted of shrubsteppe habitat. Changes in the landscape related to habitat conversion that have affected shrubsteppe wildlife include: fragmentation of extant shrubsteppe habitat, loss of deep soil communities, and alteration of the vegetation community resulting from grazing by livestock, invasion by exotic plants, and increased fire frequencies (Vander Haegen *et al.* 2001). Wildlife Area management activities address these landscape level habitat concerns as follows:

- **Habitat fragmentation:** The approximately 13,000 acres of wildlife protected shrubsteppe habitats are adjoined by WDNR, and BLM lands to permanently protect both Silver Hill and Happy Hill ridge tops.
- **Loss of deep soil communities:** Over 1,700 acres of native vegetation has been re-established on deep soils formerly used as agricultural fields.
- **Alteration of plant community (grazing):** Grazing has been discontinued and will only be used in the future as a management tool. The SCWA is fenced to protect habitats from trespass livestock grazing and to control vehicle access.
- **Alteration of plant community (exotic plant species):** Approximately 800 acres are treated annually to reduce non-native weedy vegetation. Treatments include herbicides,

cultural measures, and biological agents (insects). Where appropriate, native perennial bunchgrasses are planted in treated areas to supplant weedy vegetation.

- **Alteration of plant community (increased fire frequencies):** Uncontrolled wildfires can significantly alter the landscape by eradicating woody plant species which shrubsteppe obligate species depend upon for both food and cover. Sharp-tailed grouse depend on this cover type for winter food and cover. Fire fighting contracts with local fire districts and the WDNR are in place at SCWA to ensure timely response to wildfires.

Scotch Creek Wildlife Area management strategies address several critical landscape level limiting factors such as shrubsteppe habitat conversion, degradation, and fragmentation (Hays *et al.* 1998; Schroeder *et al.* 2000) as well as species-specific limiting factors. Management activities that have been implemented to address habitat conversion and degradation factors include seeding agricultural fields to native-like vegetation, removing livestock, protecting and maintaining existing habitat, and controlling introduced vegetation. These activities and strategies also address factors that limit local populations of sharp-tailed grouse such as quality and availability of nesting and wintering habitat (WDFW 1995a WDFW 1995b).

The following major enhancement, protection, and maintenance activities have been accomplished at the SCWA:

1. Over 58 miles of new fence has been constructed to protect and maintain critical shrubsteppe habitat for sharp-tailed grouse, mule deer, and other shrubsteppe obligate species. An additional 20 miles of existing fence has also been restored. Approximately 30 miles of interior fencing has been removed to reduce potential wildlife injury/mortality due to entanglement and collision with unneeded barbed wire. Approximately 16.5 miles of new fencing is needed to protect recent/projected acquisitions. Fencing primarily protects habitat against trespass livestock grazing and vehicular traffic that reduces herbaceous cover used for nesting and foraging and/or creates disturbance, which promotes the spread of undesirable weedy vegetation.
2. Over 80,000 deciduous shrubs and trees have been planted to provide winter habitat for sharp-tailed grouse, increase vegetative diversity across the landscape, and to replace the shrub component that was severely impacted by decades of livestock grazing. Shrub/tree survival is approximately 25 percent in non-irrigated upland habitats and 75 percent when planted in fabric mulch blankets. Adkins (1980) rated 25 percent survival as “fair” for non-irrigated upland wildlife shrub/tree plantings in xeric areas of eastern Washington. Between 6,000 and 12,000 shrubs/trees will be needed in the future to fill gaps on existing project lands and for future acquisitions. The actual number planted will be largely predicated on site specific edaphic features and water table, stream, and/or pond fluctuations/levels.
3. Approximately 2,000 acres of agricultural land have been converted to native grasslands. Disking and summer fallow are combined with a dormant seeding of native perennial grasses and forbs in November. This practice has been very successful over the past decade to provide the nesting cover required by Sharp-tailed grouse as well as provide competition for noxious weeds. Continued disturbance treatments such as mowing, harrowing, or controlled burns to increase vegetation diversity, improve nesting cover, and/or increase plant vigor will be practiced on the SCWA

6.2.1.3 Sinlahekin Wildlife Area

[\[Need information\]](#)

6.2.1.3 Washington Priority Habitats and Species (PHS)

The Washington PHS Program is a guide to management of fish and wildlife "critical areas" on all state and private lands as they relate to the Growth Management Act of 1990. The recommendations address upland as well as riparian habitat and place emphasis on managing for the most critical species and their habitats.

6.2.1.4 Washington Conservation Commission

The Washington State Conservation Commission (WCC) supports conservation districts in Washington; promoting conservation stewardship by funding natural resource projects. The WCC provides basic funding to conservation districts as well as implementation funds, professional engineering grants, and Dairy Program grants and loans to prevent the degradation of surface and ground waters. The Agriculture Fish and Wildlife Program (AFWP) is a collaborative process aimed at voluntary compliance. The AFWP involves negotiating changes to the existing NRCS Field Office Technical Guide and the development of guidelines for irrigation districts to enhance, restore, and protect habitat for endangered fish and wildlife species, and address state water quality needs. This two-pronged approach has developed into two processes, one involving agricultural interests and the second concerning irrigation districts across the state.

6.2.1.5 Washington Department of Natural Resources

The Washington Department of Natural Resources (WDNR) manages state land throughout the Subbasin. These lands are located in sections 16 and 36 within each township. The main goal of the WDNR is to maximize monetary returns from state lands in order to fund schools. The WDNR also enforces and monitors logging practice regulations on private lands.

6.2.1.6 Washington Department of Ecology (WDOE)

The WDOE's mission is to protect, preserve, and enhance Washington's environment and promote the wise management of air, land, and water for the benefit of current and future generations. The agency monitors and sets regulatory standards for water quality within the subbasin. The WDOE is also responsible for water resource management, instream flow rule development, shoreline management, floodplain management, wetland management, and provides support for watershed management in the Subbasin.

6.3 Federal Level

At the federal level, many agencies are involved in protection of fish and wildlife habitats within the Subbasin including:

- Natural Resources Conservation Service
- Bonneville Power Administration
- U.S Forest Service
- [\[Modify or add to this list...\]](#)

6.3.1 Natural Resource Conservation Service

One of the purposes of the NRCS is to provide consistent technical assistance to private land users, tribes, communities, government agencies, and conservation districts. The NRCS assists in developing conservation plans, provides technical field-based assistance including project design, and encourages the implementation of conservation practices to improve water quality and fisheries habitat. Programs include the CRP, River Basin Studies, Forestry Incentive Program, Wildlife Habitat Improvement Program, the Environmental Quality Incentives Program, and Wetlands Reserve Program. The USDA Farm Services Administration (FSA) and the NRCS administer and implement the federal CRP and Continuous CRP.

6.3.1.1 Conservation Reserve Program (CRP)

The enrollment of agricultural land with a previous cropping history into CRP has removed highly erodible land from commodity production. The land is converted into permanent herbaceous or woody vegetation to reduce soil and water erosion. Conservation Reserve Program contracts are for a maximum of 10 years per sign-up period (the contracts may be extended) and have resulted in an increase in wildlife habitat. Cover Practices (CP) that occur under CRP include planting introduced or native grasses, wildlife cover, conifers, filter strips, grassed waterways, riparian forest buffers, and field windbreaks.

Conservation Reserve Program contract approval is based, in part, on the types of vegetation landowners are willing to plant. Cover Practice planting combinations are assigned points based on the potential value to wildlife. For example, cover types more beneficial to wildlife are awarded higher scores. Seed mixes containing diverse native species generally receive the highest scores (FSA 2003).

There are currently an estimated 4,064 acres enrolled in CRP in Okanogan County ([Appendix C](#)). Conservation Reserve Program and associated cover practices that emphasize wildlife habitat increase the extent of shrubsteppe habitat, provide connectivity/corridors between extant native shrubsteppe and other habitat types, reduce habitat fragmentation, contribute towards control of noxious weeds, increase landscape habitat diversity and edge effect, reduce soil erosion and stream sedimentation, and provide habitat for a myriad of wildlife species.

6.3.1.2 Continuous Conservation Reserve Program (CCRP)

The CCRP focuses on the improvement of water quality and riparian areas. Practices include shallow water areas with associated wetland and upland wildlife habitat, riparian forest buffers, filter strips, grassed waterways and field windbreaks. Enrollment for these practices is not limited to highly erodible land, as is required for the CRP, and carries a longer contract period (10 - 15 years), higher installation reimbursement rate, and higher annual annuity rate.

6.3.1.3 Conservation Reserve Enhancement Program (CREP)

The CREP, established in 1998, is a partnership between USDA and the State of Washington, and is administered by FSA and the WCC. The CREP provides incentives to restore and improve salmon and steelhead habitat on private land. Program participation is voluntary. Under 10 or 15-year contracts, landowners remove fields from production, remove grazing, and plant trees and shrubs to stabilize stream banks. This also provides wildlife habitat, reduces sedimentation, shades stream corridors, and improves riparian wetland function. Landowners receive annual rent, incentive and maintenance payments, and cost share for practice installations. Payments made by FSA and WCC, can result in no cost to the landowner for participation. Both the CRP and CREP utilize herbaceous seedings, shrubs, and trees to accomplish conservation measures that provide short-term high protection for wildlife habitats. It is unknown how many acres in the Subbasin are protected by CREP.

6.3.1.4 Wildlife Habitat Incentive Program (WHIP)

The WHIP is administered and implemented by NRCS and provides financial incentives to develop wildlife habitat on private lands. Participants agree to implement a wildlife habitat development plan and NRCS agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. The NRCS and program participants enter into a cost-share agreement for wildlife habitat development. This agreement generally

lasts a minimum of 10 years. It is unknown how many acres in the Subbasin are protected by WHIP.

6.3.1.5 Environmental Quality Incentives Program (EQIP)

The EQIP is administered and implemented by the NRCS and provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program assists farmers and ranchers with federal, state, and tribal environmental compliance, and encourages environmental stewardship. The program is funded through the Commodity Credit Corporation.

Program goals and objectives are achieved through the implementation of a conservation plan that incorporates structural, vegetative, and land management practices on eligible land. Eligible producers commit to 5 to 10-year contracts. Cost-share payments are paid for implementation of one or more eligible structural or vegetative practices such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Furthermore, incentive payments are made for implementation of one or more land management practices such as nutrient management, pest management, and grazing land management. It is unknown how many acres in the Subbasin are protected by EQIP.

6.3.1.6 Wetlands Reserve Program (WRP)

The WRP is also administered and implemented by the NRCS. This voluntary program is designed to restore wetlands. Participating landowners can establish permanent or 30-year conservation easements, or they can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land and 100 percent of the restoration costs for restoring the wetlands. The 30-year easement payment is 75 percent of what would be provided for a permanent easement on the same site and 75 percent of the restoration cost. The voluntary agreements are a minimum of 10 years in duration and provide for 75 percent of the cost of restoring the involved wetlands. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement. It is unknown how many acres in the Subbasin are protected by WRP.

6.3.1.7 The Public Law 566 Small Watershed Program (PL 566)

The Public Law 566 Small Watershed Program can be leveraged with other federal, state, or local program funds to provide wildlife and fisheries protection. Soil and water conservation districts using other project funding sources leverage NRCS program resources in combination to concentrate conservation within watersheds of concern.

6.3.2 Bonneville Power Administration

The BPA is a federal agency established to market power produced by the federal dams in the Columbia River basin. The BPA provides funding for fish and wildlife protection and enhancement to mitigate for the loss of habitat resulting from hydroelectric construction and operations.

6.3.3 U.S. Forest Service

[\[Need information\]](#)

6.4 Native American Tribes

- Confederated Tribes of the Colville Reservation
- Yakama Indian Nation

6.4.1 Confederated Tribes of the Colville Reservation

6.4.1.1 Habitat Conservation Plan for Wells, Rocky Reach and Rock Island
Hydroelectric Projects

[Need information]

6.4.1.2 Omak Creek Upland Restoration

[Need information]

6.4.2 Yakama Indian Nation

[Need information]

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Appendix A: Rare Plants

Table 16. Known high-quality or rare plant communities and wetland ecosystems of the Okanogan subbasin (WNHP 2003).

SCIENTIFIC NAME	COMMON NAME
ABIES AMABILIS / ACHLYS TRIPHYLLA FOREST	PACIFIC SILVER FIR / VANILLALEAF
ABIES AMABILIS COVER TYPE	PACIFIC SILVER FIR FOREST
ABIES LASIOCARPA / CALAMAGROSTIS RUBESCENS FOREST	SUBALPINE FIR / PINEGRASS
ABIES LASIOCARPA / LEDUM GLANDULOSUM FOREST	SUBALPINE FIR / GLANDULAR LABRADOR-TEA
ABIES LASIOCARPA / RHODODENDRON ALBIFLORUM WOODLAND	SUBALPINE FIR / CASCADE AZALEA
ABIES LASIOCARPA / VACCINIUM SCOPARIUM FOREST	SUBALPINE FIR / GROUSEBERRY
ABIES LASIOCARPA COVER TYPE	SUBALPINE FIR FOREST
ALNUS VIRIDIS SSP. SINUATA SHRUBLAND (PROVISIONAL)	SITKA ALDER
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION	WYOMING BIG SAGEBRUSH / BLUEBUNCH WHEATGRASS
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / STIPA COMATA SHRUBLAND	WYOMING BIG SAGEBRUSH / NEEDLE-AND-THREAD
ARTEMISIA TRIPARTITA / FESTUCA IDAHOENSIS SHRUB HERBACEOUS VEGETATION	THREETIP SAGEBRUSH / IDAHO FESCUE
ARTEMISIA TRIPARTITA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION	THREETIP SAGEBRUSH / BLUEBUNCH WHEATGRASS
ARTEMISIA TRIPARTITA / STIPA COMATA SHRUB HERBACEOUS VEGETATION	THREETIP SAGEBRUSH / NEEDLE-AND-THREAD
CAREX COVER TYPE	SEDGE SPP. GRASSLAND
CAREX SCOPULORUM HERBACEOUS VEGETATION	HOLM'S ROCKY MOUNTAIN SEDGE
CAREX UTRICULATA HERBACEOUS VEGETATION	NORTHWEST TERRITORY SEDGE
DANTHONIA INTERMEDIA HERBACEOUS VEGETATION	TIMBER OATGRASS
DRYAS OCTOPETALA DWARF-SHRUB HERBACEOUS VEGETATION	EIGHT PETAL MOUNTAIN-AVENS
FESTUCA IDAHOENSIS – ERIOGONUM HERACLEOIDES HERBACEOUS VEGETATION	IDAHO FESCUE – PARSNIP-FLOWER BUCKWHEAT

INLAND SALINE WETLAND CB	INLAND SALINE WETLAND CB
LARIX LYALLII ASSOCIATION	SUBALPINE LARCH COMMUNITY
LARIX OCCIDENTALIS COVER TYPE	WESTERN LARCH FOREST
PICEA ENGELMANNII – ABIES LASIOCARPA COVER TYPE	ENGELMANN SPRUCE – SUBALPINE FIR FOREST
PICEA ENGELMANNII / EQUISETUM ARVENSE FOREST	ENGELMANN SPRUCE / FIELD HORSETAIL
PINUS ALBICAULIS – ABIES LASIOCARPA COVER TYPE	WHITE-BARK PINE – SUBALPINE FIR FOREST
PINUS ALBICAULIS COVER TYPE	WHITE-BARK PINE FOREST
PINUS CONTORTA COVER TYPE	LOGEPOLE PINE FOREST
PINUS PONDEROSA – PSEUDOTSUGA MENZIESII / PSEUDOROEGNERIA SPICATA SSP. INERMIS WOODLAND	PONDEROSA PINE – DOUGLAS-FIR / BLUEBUNCH WHEATGRASS
PINUS PONDEROSA – PSEUDOTSUGA MENZIESII / PURSHIA TRIDENTATA WOODLAND	PONDEROSA PINE – DOUGLAS-FIR / BITTERBRUSH
PINUS PONDEROSA – PSEUDOTSUGA MENZIESII COVER TYPE	PONDEROSA PINE – DOUGLAS-FIR FOREST
PINUS PONDEROSA / CALAMAGROSTIS RUBESCENS FOREST	PONDEROSA PINE / PINEGRASS
PINUS PONDEROSA / PURSHIA TRIDENTATA WOODLAND	PONDEROSA PINE / BITTERBRUSH
PINUS PONDEROSA COVER TYPE	PONDEROSA PINE FOREST
POPULUS TREMULOIDES / SYMPHORICARPOS ALBUS FOREST	QUAKING ASPEN / COMMON SNOWBERRY
POPULUS TREMULOIDES COVER TYPE	QUAKING ASPEN FOREST
PSEUDOROEGNERIA SPICATA COVER TYPE	BLUEBUNCH WHEATGRASS GRASSLAND
PSEUDOTSUGA MENZIESII / ARCTOSTAPHYLOS UVA-URSI – PURSHIA TRIDENTATA FOREST	DOUGLAS-FIR / KINIKINNICK – BITTERBRUSH
PSEUDOTSUGA MENZIESII / ARCTOSTAPHYLOS UVA-URSI CASCADIAN FOREST	DOUGLAS-FIR / KINIKINNICK CASCADIAN FOREST
PSEUDOTSUGA MENZIESII / CALAMAGROSTIS RUBESCENS FOREST	DOUGLAS-FIR / PINEGRASS
PSEUDOTSUGA MENZIESII / SYMPHORICARPOS ALBUS FOREST	DOUGLAS-FIR / COMMON SNOWBERRY

PURSHIA TRIDENTATA / FESTUCA IDAHOENSIS SHRUB HERBACEOUS VEGETATION	BITTERBRUSH / IDAHO FESCUE
PURSHIA TRIDENTATA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION	BITTERBRUSH / BLUEBUNCH WHEATGRASS
PURSHIA TRIDENTATA / STIPA COMATA SHRUB HERBACEOUS VEGETATION	BITTERBRUSH / NEEDLE-AND-THREAD
RHUS GLABRA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION	SMOOTH SUMAC / BLUEBUNCH WHEATGRASS
SALIX DRUMMONDIANA / CAREX SCOPULORUM VAR. PRIONOPHYLLA SHRUBLAND	DRUMMOND'S WILLOW / HOLM'S ROCKY MOUNTAIN SEDGE
SALIX PLANIFOLIA / CAREX SCOPULORUM SHRUBLAND	TEA-LEAF WILLOW / HOLM'S ROCKY MOUNTAIN SEDE
SCIRPUS MARITIMUS HERBACEOUS VEGETATION	SEACOAST BULRUSH
STIPA COMATA COVER TYPE	NEEDLE-AND-THREAD GRASSLAND
SUBALPINE FRESHWATER WETLAND EC	SUBALPINE FRESHWATER WETLAND EC
SUBALPINE RIPARIAN WETLAND EC	SUBALPINE RIPARIAN WETLAND EC

Appendix B: Wildlife Species

Table 17. Wildlife species occurrence by wildlife habitat type in the Okanogan subbasin, Washington (IBIS 2003).

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
American Avocet	American Badger	Great Blue Heron	American Badger
American Badger	American Beaver	Tundra Swan	American Beaver
American Crow	American Crow	American Wigeon	American Crow
American Goldfinch	American Dipper	Blue-winged Teal	American Goldfinch
American Kestrel	American Goldfinch	Cinnamon Teal	American Kestrel
American Robin	American Kestrel	Swainson's Hawk	American Marten
Bank Swallow	American Marten	Red-tailed Hawk	American Robin
Barn Owl	American Redstart	Gray Partridge	Bank Swallow
Barn Swallow	American Robin	Ring-necked Pheasant	Barn Swallow
Barrow's Goldeneye	American Tree Sparrow	Killdeer	Barred Owl
Big Brown Bat	American Wigeon	Solitary Sandpiper	Big Brown Bat
Black Bear	Bank Swallow	Long-billed Curlew	Black Bear
Black-billed Magpie	Barn Owl	Long-billed Dowitcher	Black Swift
Black-chinned Hummingbird	Barn Swallow	Wilson's Snipe	Black-backed Woodpecker
Black-necked Stilt	Barred Owl	Rock Dove	Black-billed Magpie
Black-tailed Jackrabbit	Belted Kingfisher	Mourning Dove	Black-capped Chickadee
Black-throated Sparrow	Big Brown Bat	Barn Owl	Black-chinned Hummingbird
Blue Grouse	Black Bear	Short-eared Owl	Black-headed Grosbeak
Bobcat	Black Swift	Loggerhead Shrike	Blue Grouse
Brewer's Blackbird	Black-backed Woodpecker	Northern Shrike	Bobcat
Brewer's Sparrow	Black-billed Magpie	Black-billed Magpie	Brewer's Blackbird
Brown-headed Cowbird	Black-capped Chickadee	American Crow	Brewer's Sparrow
Bullfrog	Black-chinned Hummingbird	Barn Swallow	Brown Creeper
Burrowing Owl	Black-crowned Night-heron	European Starling	Brown-headed Cowbird
Bushy-tailed Woodrat	Black-headed Grosbeak	American Pipit	Bullfrog
California Myotis	Black-tailed Deer	Vesper Sparrow	Bushy-tailed Woodrat
California Quail	Black-throated Gray Warbler	Savannah Sparrow	California Myotis
Canada Goose	Blue Grouse	Grasshopper Sparrow	California Quail
Canyon Wren	Bobcat	Lazuli Bunting	Calliope Hummingbird
Chipping Sparrow	Bobolink	Bobolink	Canyon Wren
Chukar	Bohemian Waxwing	Western Meadowlark	Cascade Golden-mantled Ground Squirrel
Cliff Swallow	Brewer's Blackbird	Brewer's Blackbird	Cassin's Finch
Columbia Spotted Frog	Brown Creeper	Brown-headed Cowbird	Cassin's Vireo

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
Columbian Ground Squirrel	Brown-headed Cowbird	House Finch	Cedar Waxwing
Common Garter Snake	Bullfrog	House Sparrow	Chipping Sparrow
Common Nighthawk	Bullock's Oriole	Virginia Opossum	Clark's Nutcracker
Common Poorwill	Bushy-tailed Woodrat	Big Brown Bat	Cliff Swallow
Common Porcupine	California Myotis	Eastern Fox Squirrel	Coast Mole
Common Raven	California Quail	Northern Pocket Gopher	Columbia Spotted Frog
Cooper's Hawk	Calliope Hummingbird	Deer Mouse	Columbian Ground Squirrel
Coyote	Canada Goose	Bushy-tailed Woodrat	Common Garter Snake
Deer Mouse	Canyon Wren	Montane Vole	Common Nighthawk
Eastern Kingbird	Cascade Frog	House Mouse	Common Poorwill
European Starling	Cassin's Finch	Raccoon	Common Porcupine
Ferruginous Hawk	Cassin's Vireo		Common Raven
Fringed Myotis	Cedar Waxwing		Cooper's Hawk
Golden Eagle	Chipping Sparrow		Coyote
Golden-mantled Ground Squirrel	Chukar		Dark-eyed Junco
Gopher Snake	Cliff Swallow		Deer Mouse
Grasshopper Sparrow	Coast Mole		Downy Woodpecker
Gray Flycatcher	Columbia Spotted Frog		Dusky Flycatcher
Gray Partridge	Columbian Ground Squirrel		Eastern Kingbird
Great Basin Pocket Mouse	Columbian Mouse		Ermine
Great Basin Spadefoot	Common Garter Snake		European Starling
Great Horned Owl	Common Merganser		Evening Grosbeak
Greater Yellowlegs	Common Nighthawk		Fisher
Hoary Bat	Common Porcupine		Flammulated Owl
Horned Lark	Common Raven		Fox Sparrow
Killdeer	Common Redpoll		Fringed Myotis
Lark Sparrow	Common Yellowthroat		Golden Eagle
Least Chipmunk	Cooper's Hawk		Golden-crowned Kinglet
Lesser Yellowlegs	Cordilleran Flycatcher		Golden-mantled Ground Squirrel
Little Brown Myotis	Coyote		Gopher Snake
Loggerhead Shrike	Creeping Vole		Gray Flycatcher
Long-billed Curlew	Dark-eyed Junco		Gray Jay
Long-eared Myotis	Deer Mouse		Gray Wolf
Long-eared Owl	Double-crested Cormorant		Great Basin Spadefoot
Long-legged Myotis	Downy Woodpecker		Great Gray Owl
Long-tailed Vole	Dusky Flycatcher		Great Horned Owl
Long-tailed Weasel	Eastern Cottontail		Grizzly Bear
Long-toed Salamander	Eastern Fox Squirrel		Hairy Woodpecker
Mallard	Eastern Kingbird		Hammond's Flycatcher
Merriam's Shrew	Ermine		Hermit Thrush

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
Mink	European Starling		Hoary Bat
Montane Vole	Evening Grosbeak		House Finch
Mountain Bluebird	Fisher		House Wren
Mourning Dove	Flammulated Owl		Killdeer
Nashville Warbler	Fox Sparrow		Lark Sparrow
Night Snake	Fringed Myotis		Lazuli Bunting
Northern Flicker	Golden Eagle		Least Chipmunk
Northern Goshawk	Golden-crowned Kinglet		Lewis's Woodpecker
Northern Grasshopper Mouse	Golden-mantled Ground Squirrel		Little Brown Myotis
Northern Harrier	Gopher Snake		Long-eared Myotis
Northern Leopard Frog	Gray Catbird		Long-eared Owl
Northern Pocket Gopher	Gray Jay		Long-legged Myotis
Northern Rough-winged Swallow	Great Basin Spadefoot		Long-tailed Vole
Northern Shrike	Great Blue Heron		Long-tailed Weasel
Nuttall's (Mountain) Cottontail	Great Egret		Long-toed Salamander
Orange-crowned Warbler	Great Horned Owl		Macgillivray's Warbler
Osprey	Greater Yellowlegs		Masked Shrew
Pacific Chorus (Tree) Frog	Green-winged Teal		Mink
Painted Turtle	Grizzly Bear		Montane Vole
Pallid Bat	Hairy Woodpecker		Mountain Bluebird
Prairie Falcon	Harlequin Duck		Mountain Chickadee
Pygmy Rabbit	Heather Vole		Mountain Lion
Racer	Hermit Thrush		Mourning Dove
Red-tailed Hawk	Hoary Bat		Mule Deer
Ringneck Snake	Hooded Merganser		Nashville Warbler
Ring-necked Pheasant	House Finch		Night Snake
Rock Dove	House Wren		Northern Alligator Lizard
Rock Wren	Killdeer		Northern Flicker
Rough-legged Hawk	Lazuli Bunting		Northern Flying Squirrel
Rough-skinned Newt	Least Chipmunk		Northern Goshawk
Rubber Boa	Lesser Yellowlegs		Northern Pocket Gopher
Sage Grouse	Lewis's Woodpecker		Northern Pygmy-owl
Sage Sparrow	Lincoln's Sparrow		Northern Rough-winged Swallow
Sage Thrasher	Little Brown Myotis		Northern Saw-whet Owl
Sagebrush Lizard	Long-eared Myotis		Olive-sided Flycatcher
Sagebrush Vole	Long-eared Owl		Orange-crowned Warbler
Savannah Sparrow	Long-legged Myotis		Osprey

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
Say's Phoebe	Long-tailed Vole		Pacific Chorus (Tree) Frog
Sharp-shinned Hawk	Long-tailed Weasel		Pacific Jumping Mouse
Sharp-tailed Grouse	Long-toed Salamander		Painted Turtle
Short-eared Owl	Macgillivray's Warbler		Pallid Bat
Short-horned Lizard	Mallard		Pileated Woodpecker
Side-blotched Lizard	Masked Shrew		Pine Siskin
Snow Bunting	Meadow Vole		Prairie Falcon
Solitary Sandpiper	Mink		Pygmy Nuthatch
Spotted Bat	Montane Shrew		Racer
Spotted Sandpiper	Montane Vole		Red Crossbill
Striped Whipsnake	Moose		Red Fox
Swainson's Hawk	Mountain Bluebird		Red Squirrel
Tiger Salamander	Mountain Chickadee		Red-breasted Nuthatch
Townsend's Big-eared Bat	Mountain Lion		Red-breasted Sapsucker
Townsend's Ground Squirrel	Mourning Dove		Red-naped Sapsucker
Townsend's Solitaire	Muskrat		Red-tailed Hawk
Turkey Vulture	Nashville Warbler		Ring-necked Pheasant
Vagrant Shrew	Northern Alligator Lizard		Rock Wren
Vesper Sparrow	Northern Flicker		Rocky Mountain Elk
Washington Ground Squirrel	Northern Flying Squirrel		Rough-legged Hawk
Western Fence Lizard	Northern Goshawk		Rubber Boa
Western Harvest Mouse	Northern Harrier		Ruby-crowned Kinglet
Western Kingbird	Northern Leopard Frog		Ruffed Grouse
Western Meadowlark	Northern Pocket Gopher		Rufous Hummingbird
Western Pipistrelle	Northern Pygmy-owl		Sagebrush Lizard
Western Rattlesnake	Northern River Otter		Say's Phoebe
Western Skink	Northern Rough-winged Swallow		Sharp-shinned Hawk
Western Small-footed Myotis	Northern Saw-whet Owl		Short-horned Lizard
Western Terrestrial Garter Snake	Northern Waterthrush		Silver-haired Bat
Western Toad	Northwestern Salamander		Snowshoe Hare
White-crowned Sparrow	Olive-sided Flycatcher		Song Sparrow
White-tailed Jackrabbit	Orange-crowned Warbler		Spotted Bat
White-throated Swift	Osprey		Spotted Owl
Woodhouse's Toad	Pacific Chorus (Tree) Frog		Spotted Towhee
Yellow-bellied Marmot	Pacific Jumping Mouse		Steller's Jay
Yuma Myotis	Pacific Water Shrew		Striped Skunk

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
	Painted Turtle		Tailed Frog
	Pallid Bat		Three-toed Woodpecker
	Pied-billed Grebe		Tiger Salamander
	Pileated Woodpecker		Townsend's Big-eared Bat
	Pine Siskin		Townsend's Solitaire
	Prairie Falcon		Townsend's Warbler
	Pygmy Nuthatch		Tree Swallow
	Raccoon		Trowbridge's Shrew
	Racer		Turkey Vulture
	Red Crossbill		Vagrant Shrew
	Red Fox		Varied Thrush
	Red-breasted Nuthatch		Vaux's Swift
	Red-breasted Sapsucker		Violet-green Swallow
	Red-eyed Vireo		Warbling Vireo
	Red-naped Sapsucker		Western Bluebird
	Red-tailed Hawk		Western Fence Lizard
	Red-winged Blackbird		Western Gray Squirrel
	Ring-necked Duck		Western Jumping Mouse
	Ring-necked Pheasant		Western Kingbird
	Rough-legged Hawk		Western Pipistrelle
	Rough-skinned Newt		Western Rattlesnake
	Rubber Boa		Western Screech-owl
	Ruby-crowned Kinglet		Western Skink
	Ruffed Grouse		Western Small-footed Myotis
	Rufous Hummingbird		Western Tanager
	Savannah Sparrow		Western Terrestrial Garter Snake
	Say's Phoebe		Western Toad
	Sharptail Snake		Western Wood-pewee
	Sharp-tailed Grouse		White-breasted Nuthatch
	Shrew-mole		White-crowned Sparrow
	Silver-haired Bat		White-headed Woodpecker
	Snowshoe Hare		White-throated Swift
	Solitary Sandpiper		Wild Turkey
	Song Sparrow		Williamson's Sapsucker
	Southern Alligator Lizard		Willow Flycatcher
	Southern Red-backed Vole		Wilson's Warbler
	Spotted Bat		Yellow-bellied Marmot
	Spotted Sandpiper		Yellow-pine Chipmunk

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
	Spotted Towhee		Yellow-rumped Warbler
	Steller's Jay		Yuma Myotis
	Striped Skunk		
	Swainson's Hawk		
	Swainson's Thrush		
	Tailed Frog		
	Three-toed Woodpecker		
	Tiger Salamander		
	Townsend's Big-eared Bat		
	Townsend's Solitaire		
	Townsend's Warbler		
	Tree Swallow		
	Trowbridge's Shrew		
	Turkey Vulture		
	Vagrant Shrew		
	Vaux's Swift		
	Veery		
	Violet-green Swallow		
	Virginia Opossum		
	Warbling Vireo		
	Water Shrew		
	Water Vole		
	Western Bluebird		
	Western Harvest Mouse		
	Western Jumping Mouse		
	Western Pipistrelle		
	Western Rattlesnake		
	Western Screech-owl		
	Western Small-footed Myotis		
	Western Tanager		
	Western Terrestrial Garter Snake		
	Western Toad		
	Western Wood-pewee		
	White-breasted Nuthatch		
	White-crowned Sparrow		
	White-headed Woodpecker		
	White-tailed Jackrabbit		
	White-throated Swift		
	Wild Turkey		

Shrubsteppe	Eastside (Interior) Riparian Wetlands	Agriculture	Ponderosa Pine
	Williamson's Sapsucker		
	Willow Flycatcher		
	Wilson's Warbler		
	Winter Wren		
	Wood Duck		
	Woodhouse's Toad		
	Yellow Warbler		
	Yellow-bellied Marmot		
	Yellow-breasted Chat		
	Yellow-pine Chipmunk		
	Yellow-rumped Warbler		
	Yuma Myotis		

Table 18. Wildlife species occurrence for the Okanogan subbasin, Washington (IBIS 2003).

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
Amphibians					
	Tiger Salamander	<i>Ambystoma tigrinum</i>		Yes	
	Long-toed Salamander	<i>Ambystoma macrodactylum</i>		Yes	
	Tailed Frog	<i>Ascaphus truei</i>		Yes	
	Great Basin Spadefoot	<i>Scaphiopus intermontanus</i>		Yes	
	Western Toad	<i>Bufo boreas</i>		Yes	
	Pacific Chorus (Tree) Frog	<i>Pseudacris regilla</i>		Yes	
	Cascades Frog	<i>Rana cascadae</i>			
	Columbia Spotted Frog	<i>Rana luteiventris</i>		Yes	
	Bullfrog	<i>Rana catesbeiana</i>		Yes	
	Total Amphibians:	9	Total:	0	8
Birds					
	Common Loon	<i>Gavia immer</i>	Yes		Yes
	Pied-billed Grebe	<i>Podilymbus podiceps</i>	Yes		Yes
	Red-necked Grebe	<i>Podiceps grisegena</i>	Yes		Yes
	Eared Grebe	<i>Podiceps nigricollis</i>			Yes
	American Bittern	<i>Botaurus lentiginosus</i>			Yes
	Great Blue Heron	<i>Ardea herodias</i>	Yes	Yes	
	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	Yes	Yes	
	Turkey Vulture	<i>Cathartes aura</i>	Yes		
	Canada Goose	<i>Branta canadensis</i>			Yes
	Tundra Swan	<i>Cygnus columbianus</i>			
	Wood Duck	<i>Aix sponsa</i>		Yes	
	Gadwall	<i>Anas strepera</i>			Yes
	American Wigeon	<i>Anas americana</i>			Yes
	Mallard	<i>Anas platyrhynchos</i>	Yes	Yes	
	Blue-winged Teal	<i>Anas discors</i>			Yes
	Cinnamon Teal	<i>Anas cyanoptera</i>			Yes
	Northern Shoveler	<i>Anas clypeata</i>			Yes
	Northern Pintail	<i>Anas acuta</i>			Yes
	Green-winged Teal	<i>Anas crecca</i>	Yes		Yes
	Canvasback	<i>Aythya valisineria</i>	Yes		Yes
	Redhead	<i>Aythya americana</i>			Yes
	Ring-necked Duck	<i>Aythya collaris</i>			
	Greater Scaup	<i>Aythya marila</i>	Yes		

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Harlequin Duck	<i>Histrionicus histrionicus</i>	Yes	Yes	
	Barrow's Goldeneye	<i>Bucephala islandica</i>	Yes		
	Hooded Merganser	<i>Lophodytes cucullatus</i>	Yes	Yes	
	Common Merganser	<i>Mergus merganser</i>	Yes	Yes	
	Ruddy Duck	<i>Oxyura jamaicensis</i>			Yes
	Osprey	<i>Pandion haliaetus</i>	Yes		
	Northern Harrier	<i>Circus cyaneus</i>			
	Sharp-shinned Hawk	<i>Accipiter striatus</i>			
	Cooper's Hawk	<i>Accipiter cooperii</i>			
	Northern Goshawk	<i>Accipiter gentilis</i>			
	Swainson's Hawk	<i>Buteo swainsoni</i>			
	Red-tailed Hawk	<i>Buteo jamaicensis</i>	Yes		
	Rough-legged Hawk	<i>Buteo lagopus</i>			
	Golden Eagle	<i>Aquila chrysaetos</i>	Yes		
	American Kestrel	<i>Falco sparverius</i>			
	Gyr Falcon	<i>Falco rusticolus</i>	Yes		
	Prairie Falcon	<i>Falco mexicanus</i>			
	Chukar	<i>Alectoris chukar</i>			
	Gray Partridge	<i>Perdix perdix</i>			
	Ring-necked Pheasant	<i>Phasianus colchicus</i>		Yes	
	Ruffed Grouse	<i>Bonasa umbellus</i>		Yes	
	Spruce Grouse	<i>Falcipennis canadensis</i>			
	White-tailed Ptarmigan	<i>Lagopus leucurus</i>			
	Blue Grouse	<i>Dendragapus obscurus</i>		Yes	
	Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>		yes	
	Wild Turkey	<i>Meleagris gallopavo</i>			
	California Quail	<i>Callipepla californica</i>			
	Virginia Rail	<i>Rallus limicola</i>			Yes
	Sora	<i>Porzana carolina</i>			Yes
	American Coot	<i>Fulica americana</i>			Yes
	Killdeer	<i>Charadrius vociferus</i>	Yes		
	American Avocet	<i>Recurvirostra americana</i>			Yes

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Greater Yellowlegs	<i>Tringa melanoleuca</i>	Yes		
	Lesser Yellowlegs	<i>Tringa flavipes</i>			
	Solitary Sandpiper	<i>Tringa solitaria</i>		Yes	
	Spotted Sandpiper	<i>Actitis macularia</i>	Yes		
	Long-billed Curlew	<i>Numenius americanus</i>			
	Semipalmated Sandpiper	<i>Calidris pusilla</i>			
	Western Sandpiper	<i>Calidris mauri</i>			
	Least Sandpiper	<i>Calidris minutilla</i>			
	Baird's Sandpiper	<i>Calidris bairdii</i>			
	Pectoral Sandpiper	<i>Calidris melanotos</i>			
	Stilt Sandpiper	<i>Calidris himantopus</i>			
	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>			
	Common Snipe	<i>Gallinago gallinago</i>			Yes
	Wilson's Phalarope	<i>Phalaropus tricolor</i>			Yes
	Red-necked Phalarope	<i>Phalaropus lobatus</i>			
	Ring-billed Gull	<i>Larus delawarensis</i>	Yes		
	California Gull	<i>Larus californicus</i>	Yes		
	Herring Gull	<i>Larus argentatus</i>	Yes		
	Thayer's Gull	<i>Larus thayeri</i>	Yes		
	Glaucous Gull	<i>Larus hyperboreus</i>	Yes		
	Black Tern	<i>Chlidonias niger</i>			Yes
	Rock Dove	<i>Columba livia</i>			
	Mourning Dove	<i>Zenaida macroura</i>		Yes	
	Barn Owl	<i>Tyto alba</i>			
	Flammulated Owl	<i>Otus flammeolus</i>			
	Western Screech-owl	<i>Otus kennicottii</i>		Yes	
	Great Horned Owl	<i>Bubo virginianus</i>			
	Snowy Owl	<i>Nyctea scandiaca</i>	Yes		
	Northern Pygmy-owl	<i>Glaucidium gnoma</i>			
	Burrowing Owl	<i>Athene cunicularia</i>			
	Spotted Owl	<i>Strix occidentalis</i>			
	Barred Owl	<i>Strix varia</i>			
	Great Gray Owl	<i>Strix nebulosa</i>			
	Long-eared Owl	<i>Asio otus</i>		Yes	
	Short-eared Owl	<i>Asio flammeus</i>			Yes
	Boreal Owl	<i>Aegolius funereus</i>			
	Northern Saw-whet Owl	<i>Aegolius acadicus</i>			
	Common Nighthawk	<i>Chordeiles minor</i>			

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Common Poorwill	<i>Phalaenoptilus nuttallii</i>			
	Black Swift	<i>Cypseloides niger</i>			
	Vaux's Swift	<i>Chaetura vauxi</i>			
	White-throated Swift	<i>Aeronautes saxatalis</i>			
	Black-chinned Hummingbird	<i>Archilochus alexandri</i>			
	Calliope Hummingbird	<i>Stellula calliope</i>			
	Rufous Hummingbird	<i>Selasphorus rufus</i>			
	Belted Kingfisher	<i>Ceryle alcyon</i>	Yes	Yes	
	Lewis's Woodpecker	<i>Melanerpes lewis</i>			
	Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>			
	Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>		Yes	
	Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>			
	Downy Woodpecker	<i>Picoides pubescens</i>			
	Hairy Woodpecker	<i>Picoides villosus</i>			
	White-headed Woodpecker	<i>Picoides albolarvatus</i>			
	Three-toed Woodpecker	<i>Picoides tridactylus</i>			
	Black-backed Woodpecker	<i>Picoides arcticus</i>			
	Northern Flicker	<i>Colaptes auratus</i>			
	Pileated Woodpecker	<i>Dryocopus pileatus</i>			
	Olive-sided Flycatcher	<i>Contopus cooperi</i>			
	Western Wood-pewee	<i>Contopus sordidulus</i>			
	Willow Flycatcher	<i>Empidonax traillii</i>	Yes	Yes	
	Hammond's Flycatcher	<i>Empidonax hammondii</i>			
	Gray Flycatcher	<i>Empidonax wrightii</i>			
	Dusky Flycatcher	<i>Empidonax oberholseri</i>			
	Pacific-slope Flycatcher	<i>Empidonax difficilis</i>			
	Cordilleran Flycatcher	<i>Empidonax occidentalis</i>		Yes	
	Say's Phoebe	<i>Sayornis saya</i>			

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Western Kingbird	<i>Tyrannus verticalis</i>			
	Eastern Kingbird	<i>Tyrannus tyrannus</i>			
	Loggerhead Shrike	<i>Lanius ludovicianus</i>			
	Northern Shrike	<i>Lanius excubitor</i>			
	Cassin's Vireo	<i>Vireo cassinii</i>			
	Warbling Vireo	<i>Vireo gilvus</i>		Yes	
	Red-eyed Vireo	<i>Vireo olivaceus</i>		Yes	
	Gray Jay	<i>Perisoreus canadensis</i>	Yes		
	Steller's Jay	<i>Cyanocitta stelleri</i>	Yes		
	Clark's Nutcracker	<i>Nucifraga columbiana</i>			
	Black-billed Magpie	<i>Pica pica</i>	Yes	Yes	
	American Crow	<i>Corvus brachyrhynchos</i>	Yes		
	Northwestern Crow	<i>Corvus caurinus</i>	Yes		
	Common Raven	<i>Corvus corax</i>	Yes		
	Horned Lark	<i>Eremophila alpestris</i>			
	Tree Swallow	<i>Tachycineta bicolor</i>	Yes	Yes	
	Violet-green Swallow	<i>Tachycineta thalassina</i>	Yes		
	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Yes	Yes	
	Bank Swallow	<i>Riparia riparia</i>	Yes	Yes	
	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Yes	Yes	
	Barn Swallow	<i>Hirundo rustica</i>	Yes	Yes	
	Black-capped Chickadee	<i>Poecile atricapillus</i>			
	Mountain Chickadee	<i>Poecile gambeli</i>			
	Chestnut-backed Chickadee	<i>Poecile rufescens</i>			
	Boreal Chickadee	<i>Poecile hudsonicus</i>			
	Red-breasted Nuthatch	<i>Sitta canadensis</i>			
	White-breasted Nuthatch	<i>Sitta carolinensis</i>			
	Pygmy Nuthatch	<i>Sitta pygmaea</i>		Yes	
	Brown Creeper	<i>Certhia americana</i>			
	Rock Wren	<i>Salpinctes obsoletus</i>			
	Canyon Wren	<i>Catherpes mexicanus</i>			
	House Wren	<i>Troglodytes aedon</i>			

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Winter Wren	<i>Troglodytes troglodytes</i>	Yes		
	Marsh Wren	<i>Cistothorus palustris</i>			Yes
	American Dipper	<i>Cinclus mexicanus</i>	Yes	Yes	
	Golden-crowned Kinglet	<i>Regulus satrapa</i>			
	Ruby-crowned Kinglet	<i>Regulus calendula</i>			
	Western Bluebird	<i>Sialia mexicana</i>			
	Mountain Bluebird	<i>Sialia currucoides</i>			
	Townsend's Solitaire	<i>Myadestes townsendi</i>			
	Veery	<i>Catharus fuscescens</i>		Yes	
	Swainson's Thrush	<i>Catharus ustulatus</i>			
	Hermit Thrush	<i>Catharus guttatus</i>			
	American Robin	<i>Turdus migratorius</i>	Yes		
	Varied Thrush	<i>Ixoreus naevius</i>	Yes		
	Gray Catbird	<i>Dumetella carolinensis</i>		Yes	
	Sage Thrasher	<i>Oreoscoptes montanus</i>			
	European Starling	<i>Sturnus vulgaris</i>		Yes	
	American Pipit	<i>Anthus rubescens</i>			
	Bohemian Waxwing	<i>Bombycilla garrulus</i>			
	Cedar Waxwing	<i>Bombycilla cedrorum</i>		Yes	
	Orange-crowned Warbler	<i>Vermivora celata</i>			
	Nashville Warbler	<i>Vermivora ruficapilla</i>			
	Yellow Warbler	<i>Dendroica petechia</i>		Yes	
	Yellow-rumped Warbler	<i>Dendroica coronata</i>			
	Townsend's Warbler	<i>Dendroica townsendi</i>			
	American Redstart	<i>Setophaga ruticilla</i>		Yes	
	Northern Waterthrush	<i>Seiurus noveboracensis</i>		Yes	
	Macgillivray's Warbler	<i>Oporornis tolmiei</i>			
	Common Yellowthroat	<i>Geothlypis trichas</i>		Yes	
	Wilson's Warbler	<i>Wilsonia pusilla</i>			
	Yellow-breasted Chat	<i>Icteria virens</i>		Yes	

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Western Tanager	<i>Piranga ludoviciana</i>			
	Spotted Towhee	<i>Pipilo maculatus</i>	Yes		
	American Tree Sparrow	<i>Spizella arborea</i>			
	Chipping Sparrow	<i>Spizella passerina</i>			
	Brewer's Sparrow	<i>Spizella breweri</i>			
	Vesper Sparrow	<i>Poocetes gramineus</i>			
	Lark Sparrow	<i>Chondestes grammacus</i>			
	Sage Sparrow	<i>Amphispiza belli</i>			
	Savannah Sparrow	<i>Passerculus sandwichensis</i>			
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>			
	Fox Sparrow	<i>Passerella iliaca</i>		Yes	
	Song Sparrow	<i>Melospiza melodia</i>	Yes		
	Lincoln's Sparrow	<i>Melospiza lincolnii</i>		Yes	
	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>			
	Dark-eyed Junco	<i>Junco hyemalis</i>			
	Lapland Longspur	<i>Calcarius lapponicus</i>			
	Snow Bunting	<i>Plectrophenax nivalis</i>			
	Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>			
	Lazuli Bunting	<i>Passerina amoena</i>		Yes	
	Bobolink	<i>Dolichonyx oryzivorus</i>			
	Red-winged Blackbird	<i>Agelaius phoeniceus</i>			Yes
	Western Meadowlark	<i>Sturnella neglecta</i>			
	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>			Yes
	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>			
	Brown-headed Cowbird	<i>Molothrus ater</i>			
	Bullock's Oriole	<i>Icterus bullockii</i>		Yes	
	Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>			
	Pine Grosbeak	<i>Pinicola enucleator</i>			
	Cassin's Finch	<i>Carpodacus cassinii</i>			
	House Finch	<i>Carpodacus mexicanus</i>			

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Red Crossbill	<i>Loxia curvirostra</i>			
	White-winged Crossbill	<i>Loxia leucoptera</i>			
	Common Redpoll	<i>Carduelis flammea</i>			
	Pine Siskin	<i>Carduelis pinus</i>			
	American Goldfinch	<i>Carduelis tristis</i>			
	Evening Grosbeak	<i>Coccothraustes vespertinus</i>			Yes
	House Sparrow	<i>Passer domesticus</i>			
	Total Birds:	220	Total:	47	42
Mammals					28
	Masked Shrew	<i>Sorex cinereus</i>	Yes		
	Vagrant Shrew	<i>Sorex vagrans</i>	Yes		
	Montane Shrew	<i>Sorex monticolus</i>	Yes		
	Water Shrew	<i>Sorex palustris</i>	Yes	Yes	
	Trowbridge's Shrew	<i>Sorex trowbridgii</i>	Yes		
	Merriam's Shrew	<i>Sorex merriami</i>			
	Coast Mole	<i>Scapanus orarius</i>			
	California Myotis	<i>Myotis californicus</i>			
	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>		Yes	
	Yuma Myotis	<i>Myotis yumanensis</i>		Yes	
	Little Brown Myotis	<i>Myotis lucifugus</i>			
	Long-legged Myotis	<i>Myotis volans</i>		Yes	
	Fringed Myotis	<i>Myotis thysanodes</i>			
	Long-eared Myotis	<i>Myotis evotis</i>			
	Silver-haired Bat	<i>Lasionycteris noctivagans</i>			
	Western Pipistrelle	<i>Pipistrellus hesperus</i>		Yes	
	Big Brown Bat	<i>Eptesicus fuscus</i>		Yes	
	Hoary Bat	<i>Lasiurus cinereus</i>			
	Spotted Bat	<i>Euderma maculatum</i>			
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>			
	Pallid Bat	<i>Antrozous pallidus</i>		Yes	
	American Pika	<i>Ochotona princeps</i>			
	Nuttall's (Mountain) Cottontail	<i>Sylvilagus nuttallii</i>			
	Snowshoe Hare	<i>Lepus americanus</i>		Yes	
	White-tailed Jackrabbit	<i>Lepus townsendii</i>			

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Black-tailed Jackrabbit	<i>Lepus californicus</i>			
	Least Chipmunk	<i>Tamias minimus</i>			
	Yellow-pine Chipmunk	<i>Tamias amoenus</i>			
	Townsend's Chipmunk	<i>Tamias townsendii</i>			
	Yellow-bellied Marmot	<i>Marmota flaviventris</i>			
	Hoary Marmot	<i>Marmota caligata</i>			
	Columbian Ground Squirrel	<i>Spermophilus columbianus</i>			
	Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>			
	Cascade Golden-mantled Ground Squirrel	<i>Spermophilus saturatus</i>			
	Eastern Fox Squirrel	<i>Sciurus niger</i>			
	Western Gray Squirrel	<i>Sciurus griseus</i>			
	Red Squirrel	<i>Tamiasciurus hudsonicus</i>			
	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Yes		
	Northern Pocket Gopher	<i>Thomomys talpoides</i>			
	Great Basin Pocket Mouse	<i>Perognathus parvus</i>			
	American Beaver	<i>Castor canadensis</i>		Yes	
	Western Harvest Mouse	<i>Reithrodontomys megalotis</i>		Yes	
	Deer Mouse	<i>Peromyscus maniculatus</i>	Yes	Yes	
	Columbian Mouse	<i>Peromyscus keeni</i>			
	Northern Grasshopper Mouse	<i>Onychomys leucogaster</i>			
	Bushy-tailed Woodrat	<i>Neotoma cinerea</i>		Yes	
	Southern Red-backed Vole	<i>Clethrionomys gapperi</i>		Yes	
	Heather Vole	<i>Phenacomys intermedius</i>			
	Meadow Vole	<i>Microtus pennsylvanicus</i>		Yes	
	Montane Vole	<i>Microtus montanus</i>			Yes
	Long-tailed Vole	<i>Microtus longicaudus</i>		Yes	

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
	Creeping Vole	<i>Microtus oregoni</i>			
	Water Vole	<i>Microtus richardsoni</i>		Yes	
	Sagebrush Vole	<i>Lemmiscus curtatus</i>			
	Muskrat	<i>Ondatra zibethicus</i>		Yes	
	Northern Bog Lemming	<i>Synaptomys borealis</i>			Yes
	Norway Rat	<i>Rattus norvegicus</i>			
	House Mouse	<i>Mus musculus</i>			
	Western Jumping Mouse	<i>Zapus princeps</i>		Yes	
	Pacific Jumping Mouse	<i>Zapus trinotatus</i>		Yes	
	Common Porcupine	<i>Erethizon dorsatum</i>			
	Nutria	<i>Myocastor coypus</i>			Yes
	Coyote	<i>Canis latrans</i>	Yes		
	Gray Wolf	<i>Canis lupus</i>	Yes		
	Red Fox	<i>Vulpes vulpes</i>	Yes		
	Black Bear	<i>Ursus americanus</i>	Yes		
	Grizzly Bear	<i>Ursus arctos</i>	Yes		
	Raccoon	<i>Procyon lotor</i>	Yes	Yes	
	American Marten	<i>Martes americana</i>	Yes		
	Fisher	<i>Martes pennanti</i>	Yes		
	Ermine	<i>Mustela erminea</i>			
	Long-tailed Weasel	<i>Mustela frenata</i>	Yes		
	Mink	<i>Mustela vison</i>	Yes	Yes	
	Wolverine	<i>Gulo gulo</i>	Yes		
	American Badger	<i>Taxidea taxus</i>			
	Striped Skunk	<i>Mephitis mephitis</i>	Yes		
	Northern River Otter	<i>Lutra canadensis</i>	Yes	Yes	
	Mountain Lion	<i>Puma concolor</i>	Yes		
	Lynx	<i>Lynx canadensis</i>			
	Bobcat	<i>Lynx rufus</i>	Yes		
	Elk	<i>Cervus elaphus</i>			
	Mule Deer	<i>Odocoileus hemionus</i>			
	White-tailed Deer	<i>Odocoileus virginianus</i>			
	Moose	<i>Alces alces</i>			
	Mountain Goat	<i>Oreamnos americanus</i>			
	Bighorn Sheep	<i>Ovis canadensis</i>			
	Total Mammals:	86	Total:	22	3

	Common Name	Scientific Name	Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
Reptiles					
	Painted Turtle	<i>Chrysemys picta</i>			
	Northern Alligator Lizard	<i>Elgaria coerulea</i>			
	Short-horned Lizard	<i>Phrynosoma douglassii</i>			
	Sagebrush Lizard	<i>Sceloporus graciosus</i>			
	Western Fence Lizard	<i>Sceloporus occidentalis</i>			
	Western Skink	<i>Eumeces skiltonianus</i>			
	Rubber Boa	<i>Charina bottae</i>			
	Racer	<i>Coluber constrictor</i>			
	Night Snake	<i>Hypsiglena torquata</i>			
	Gopher Snake	<i>Pituophis catenifer</i>			
	Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	Yes		
	Common Garter Snake	<i>Thamnophis sirtalis</i>	Yes	Yes	
	Western Rattlesnake	<i>Crotalus viridis</i>			
	Total Reptiles:	13	Total:	2	1
					0
	Total Species:	328	Total:	71	73
					31

Table 19. Threatened and endangered species of the Okanogan subbasin, Washington (IBIS 2003).

	Common Name	Scientific Name	State Status		Federal Status
Amphibians					
	Dunn's Salamander	<i>Plethodon dunni</i>	WA	Candidate Species	
	Western Toad	<i>Bufo boreas</i>	WA	Candidate Species	
	Columbia Spotted Frog	<i>Rana luteiventris</i>	WA	Candidate Species	
	Northern Leopard Frog	<i>Rana pipiens</i>	WA	Endangered	
	Total Listed Amphibians:	4			
Birds					
	Common Loon	<i>Gavia immer</i>	WA	Sensitive	
	Western Grebe	<i>Aechmophorus occidentalis</i>	WA	Candidate Species	
	Northern Goshawk	<i>Accipiter gentilis</i>	WA	Candidate Species	
	Ferruginous Hawk	<i>Buteo regalis</i>	WA	Threatened	
	Golden Eagle	<i>Aquila chrysaetos</i>	WA	Candidate Species	
	Sage Grouse	<i>Centrocercus urophasianus</i>	WA	Threatened	Anticipated Candidate
	Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	WA	Threatened	
	Marbled Murrelet	<i>Brachyramphus marmoratus</i>	WA	Threatened	Threatened
	Flammulated Owl	<i>Otus flammeolus</i>	WA	Candidate Species	
	Burrowing Owl	<i>Athene cunicularia</i>	WA	Candidate Species	
	Spotted Owl	<i>Strix occidentalis</i>	WA	Endangered	Threatened
	Vaux's Swift	<i>Chaetura vauxi</i>	WA	Candidate Species	
	Lewis's Woodpecker	<i>Melanerpes lewis</i>	WA	Candidate Species	
	White-headed Woodpecker	<i>Picoides albolarvatus</i>	WA	Candidate Species	
	Black-backed Woodpecker	<i>Picoides arcticus</i>	WA	Candidate Species	
	Pileated Woodpecker	<i>Dryocopus pileatus</i>	WA	Candidate Species	
	Loggerhead Shrike	<i>Lanius ludovicianus</i>	WA	Candidate Species	
	Horned Lark	<i>Eremophila alpestris</i>	WA	Candidate Species	Candidate
	White-breasted Nuthatch	<i>Sitta carolinensis</i>	WA	Candidate Species	
	Sage Thrasher	<i>Oreoscoptes montanus</i>	WA	Candidate Species	
	Vesper Sparrow	<i>Poecetes gramineus</i>	WA	Candidate Species	
	Sage Sparrow	<i>Amphispiza belli</i>	WA	Candidate	

	Common Name	Scientific Name	State Status		Federal Status
				Species	
Total Listed Birds:		22			
Mammals					
	Merriam's Shrew	<i>Sorex merriami</i>	WA	Candidate Species	
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	WA	Candidate Species	
	Pygmy Rabbit	<i>Brachylagus idahoensis</i>	WA	Endangered	Endangered
	White-tailed Jackrabbit	<i>Lepus townsendii</i>	WA	Candidate Species	
	Black-tailed Jackrabbit	<i>Lepus californicus</i>	WA	Candidate Species	
	Washington Ground Squirrel	<i>Spermophilus washingtoni</i>	WA	Candidate Species	Anticipated Candidate
	Western Gray Squirrel	<i>Sciurus griseus</i>	WA	Threatened	
	Northern Pocket Gopher	<i>Thomomys talpoides</i>	WA	Candidate Species	
	Gray Wolf	<i>Canis lupus</i>	WA	Endangered	Endangered
	Grizzly Bear	<i>Ursus arctos</i>	WA	Endangered	Threatened
	Fisher	<i>Martes pennanti</i>	WA	Endangered	
	Wolverine	<i>Gulo gulo</i>	WA	Candidate Species	
	Lynx	<i>Lynx canadensis</i>	WA	Threatened	Threatened
	White-tailed Deer	<i>Odocoileus virginianus</i>	WA	Endangered	Endangered
Total Listed Mammals:		14			
Reptiles					
	Sharptail Snake	<i>Contia tenuis</i>	WA	Candidate Species	
	Striped Whipsnake	<i>Masticophis taeniatus</i>	WA	Candidate Species	
Total Listed Reptiles:		2			
Total Listed Species:		42			

Table 20. Partners in Flight species of the Okanogan subbasin, Washington (IBIS 2003).

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
Northern Harrier	<i>Circus cyaneus</i>			Yes
Swainson's Hawk	<i>Buteo swainsoni</i>		MO (Intermountain West, Prairies)	Yes
Ferruginous Hawk	<i>Buteo regalis</i>			Yes
Rough-legged Hawk	<i>Buteo lagopus</i>		PR (Arctic)	
American Kestrel	<i>Falco sparverius</i>			Yes
Gyrfalcon	<i>Falco rusticolus</i>		PR (Arctic)	
Sage Grouse	<i>Centrocercus urophasianus</i>		MA (Intermountain West, Prairies)	
Spruce Grouse	<i>Falcapennis canadensis</i>		PR (Northern Forests)	
White-tailed Ptarmigan	<i>Lagopus leucurus</i>		MO (Arctic)	
Blue Grouse	<i>Dendragapus obscurus</i>		MA (Pacific, Intermountain West)	
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>		MO (Prairies)	Yes
Long-billed Curlew	<i>Numenius americanus</i>	Yes		
Stilt Sandpiper	<i>Calidris himantopus</i>	Yes		
Flammulated Owl	<i>Otus flammeolus</i>		MO (Pacific, Intermountain West, Southwest)	Yes
Snowy Owl	<i>Nyctea scandiaca</i>		PR (Arctic)	
Northern Pygmy-owl	<i>Glaucidium gnoma</i>		PR (Pacific)	
Burrowing Owl	<i>Athene cunicularia</i>			Yes
Spotted Owl	<i>Strix occidentalis</i>		IM (Pacific, Intermountain West, Southwest)	
Great Gray Owl	<i>Strix nebulosa</i>			Yes
Short-eared Owl	<i>Asio flammeus</i>	Yes	MA (Arctic, Northern Forests, Intermountain West, Prairies)	Yes
Common Poorwill	<i>Phalaenoptilus nuttallii</i>			Yes
Black Swift	<i>Cypseloides niger</i>	Yes	IM (Pacific, Intermountain West)	Yes
Vaux's Swift	<i>Chaetura vauxi</i>			Yes
White-throated Swift	<i>Aeronautes saxatalis</i>		MA (Intermountain West, Southwest)	Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
Calliope Hummingbird	<i>Stellula calliope</i>		MO (Intermountain West)	Yes
Rufous Hummingbird	<i>Selasphorus rufus</i>	Yes	MA (Pacific, Intermountain West)	Yes
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Yes	MO (Intermountain West, Prairies)	Yes
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>		MO (Intermountain West)	Yes
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>		MO (Intermountain West)	Yes
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>		MO (Pacific)	Yes
Downy Woodpecker	<i>Picoides pubescens</i>			Yes
White-headed Woodpecker	<i>Picoides albolarvatus</i>	Yes	PR (Pacific, Intermountain West)	Yes
Three-toed Woodpecker	<i>Picoides tridactylus</i>		PR (Northern Forests)	
Black-backed Woodpecker	<i>Picoides arcticus</i>		PR (Northern Forests)	Yes
Pileated Woodpecker	<i>Dryocopus pileatus</i>			Yes
Olive-sided Flycatcher	<i>Contopus cooperi</i>		MA (Pacific, Northern Forests, Intermountain West)	Yes
Western Wood-pewee	<i>Contopus sordidulus</i>			Yes
Willow Flycatcher	<i>Empidonax traillii</i>		MA (Prairies, East)	Yes
Hammond's Flycatcher	<i>Empidonax hammondii</i>			Yes
Gray Flycatcher	<i>Empidonax wrightii</i>		PR (Intermountain West)	Yes
Dusky Flycatcher	<i>Empidonax oberholseri</i>		MA (Intermountain West)	Yes
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>		PR (Pacific)	Yes
Loggerhead Shrike	<i>Lanius ludovicianus</i>			Yes
Northern Shrike	<i>Lanius excubitor</i>		PR (Northern Forests)	
Warbling Vireo	<i>Vireo gilvus</i>			Yes
Red-eyed Vireo	<i>Vireo olivaceus</i>			Yes
Gray Jay	<i>Perisoreus canadensis</i>		PR (Northern Forests)	
Clark's Nutcracker	<i>Nucifraga columbiana</i>		PR (Intermountain)	Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
			West)	
Horned Lark	<i>Eremophila alpestris</i>			Yes
Bank Swallow	<i>Riparia riparia</i>			Yes
Chestnut-backed Chickadee	<i>Poecile rufescens</i>		PR (Pacific)	
Boreal Chickadee	<i>Poecile hudsonicus</i>		MA (Northern Forests)	
White-breasted Nuthatch	<i>Sitta carolinensis</i>			Yes
Brown Creeper	<i>Certhia americana</i>			Yes
House Wren	<i>Troglodytes aedon</i>			Yes
Winter Wren	<i>Troglodytes troglodytes</i>			Yes
American Dipper	<i>Cinclus mexicanus</i>			Yes
Western Bluebird	<i>Sialia mexicana</i>			Yes
Mountain Bluebird	<i>Sialia currucoides</i>		PR (Intermountain West)	
Townsend's Solitaire	<i>Myadestes townsendi</i>			Yes
Veery	<i>Catharus fuscescens</i>			Yes
Swainson's Thrush	<i>Catharus ustulatus</i>			Yes
Hermit Thrush	<i>Catharus guttatus</i>			Yes
Varied Thrush	<i>Ixoreus naevius</i>			Yes
Sage Thrasher	<i>Oreoscoptes montanus</i>		PR (Intermountain West)	Yes
American Pipit	<i>Anthus rubescens</i>		PR (Arctic)	Yes
Bohemian Waxwing	<i>Bombycilla garrulus</i>		MA (Northern Forests)	
Orange-crowned Warbler	<i>Vermivora celata</i>			Yes
Nashville Warbler	<i>Vermivora ruficapilla</i>		PR (Northern Forests)	Yes
Yellow Warbler	<i>Dendroica petechia</i>			Yes
Yellow-rumped Warbler	<i>Dendroica coronata</i>			Yes
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>		MO (Pacific)	Yes
Townsend's Warbler	<i>Dendroica townsendi</i>			Yes
Hermit Warbler	<i>Dendroica occidentalis</i>	Yes	MO (Pacific)	Yes
Macgillivray's Warbler	<i>Oporornis tolmiei</i>			Yes
Wilson's Warbler	<i>Wilsonia pusilla</i>			Yes
Yellow-breasted Chat	<i>Icteria virens</i>			Yes
Western Tanager	<i>Piranga ludoviciana</i>			Yes
Chipping Sparrow	<i>Spizella passerina</i>			Yes
Brewer's Sparrow	<i>Spizella breweri</i>	Yes	MA (Intermountain West)	Yes
Vesper Sparrow	<i>Pooecetes gramineus</i>			Yes
Lark Sparrow	<i>Chondestes grammacus</i>			Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
Black-throated Sparrow	<i>Amphispiza bilineata</i>			Yes
Sage Sparrow	<i>Amphispiza belli</i>	Yes	PR (Intermountain West)	Yes
Grasshopper Sparrow	<i>Ammodramus savannarum</i>		MA (Prairies)	Yes
Fox Sparrow	<i>Passerella iliaca</i>			Yes
Lincoln's Sparrow	<i>Melospiza lincolni</i>		PR (Northern Forests)	Yes
Lapland Longspur	<i>Calcarius lapponicus</i>		PR (Arctic)	
Snow Bunting	<i>Plectrophenax nivalis</i>		PR (Arctic)	
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>			Yes
Bobolink	<i>Dolichonyx oryzivorus</i>	Yes		
Western Meadowlark	<i>Sturnella neglecta</i>			Yes
Bullock's Oriole	<i>Icterus bullockii</i>			Yes
Pine Grosbeak	<i>Pinicola enucleator</i>		MO (Northern Forests)	
Purple Finch	<i>Carpodacus purpureus</i>			Yes
Cassin's Finch	<i>Carpodacus cassinii</i>		MA (Intermountain West)	
Red Crossbill	<i>Loxia curvirostra</i>			Yes
White-winged Crossbill	<i>Loxia leucoptera</i>		PR (Northern Forests)	
Total Species:	98			

Table 21. Wildlife game species of the Okanogan subbasin, Washington (IBIS 2003).

	Common Name	Scientific Name	WA
Amphibians			
	Bullfrog	<i>Rana catesbeiana</i>	Game Species
	Total Game Amphibians:	1	
Birds			
	Canada Goose	<i>Branta canadensis</i>	Game Bird
	Wood Duck	<i>Aix sponsa</i>	Game Bird
	Gadwall	<i>Anas strepera</i>	Game Bird
	American Wigeon	<i>Anas americana</i>	Game Bird
	Mallard	<i>Anas platyrhynchos</i>	Game Bird
	Blue-winged Teal	<i>Anas discors</i>	Game Bird
	Cinnamon Teal	<i>Anas cyanoptera</i>	Game Bird
	Northern Shoveler	<i>Anas clypeata</i>	Game Bird
	Northern Pintail	<i>Anas acuta</i>	Game Bird
	Green-winged Teal	<i>Anas crecca</i>	Game Bird
	Canvasback	<i>Aythya valisineria</i>	Game Bird
	Redhead	<i>Aythya americana</i>	Game Bird
	Ring-necked Duck	<i>Aythya collaris</i>	Game Bird
	Greater Scaup	<i>Aythya marila</i>	Game Bird
	Harlequin Duck	<i>Histrionicus histrionicus</i>	Game Bird
	Barrow's Goldeneye	<i>Bucephala islandica</i>	Game Bird
	Hooded Merganser	<i>Lophodytes cucullatus</i>	Game Bird
	Common Merganser	<i>Mergus merganser</i>	Game Bird
	Ruddy Duck	<i>Oxyura jamaicensis</i>	Game Bird
	Chukar	<i>Alectoris chukar</i>	Game Bird
	Gray Partridge	<i>Perdix perdix</i>	Game Bird
	Ring-necked Pheasant	<i>Phasianus colchicus</i>	Game Bird
	Ruffed Grouse	<i>Bonasa umbellus</i>	Game Bird
	Spruce Grouse	<i>Falcapennis canadensis</i>	Game Bird
	White-tailed Ptarmigan	<i>Lagopus leucurus</i>	Game Bird
	Blue Grouse	<i>Dendragapus obscurus</i>	Game Bird
	Wild Turkey	<i>Meleagris gallopavo</i>	Game Bird
	California Quail	<i>Callipepla californica</i>	Game Bird
	American Coot	<i>Fulica americana</i>	Game Bird
	Common Snipe	<i>Gallinago gallinago</i>	Game Bird
	Mourning Dove	<i>Zenaida macroura</i>	Game Bird
	Total Game Birds:	31	
Mammals			
	Eastern Cottontail	<i>Sylvilagus floridanus</i>	Game Mammal
	Nuttall's (Mountain) Cottontail	<i>Sylvilagus nuttallii</i>	Game Mammal
	Snowshoe Hare	<i>Lepus americanus</i>	Game Mammal
	White-tailed Jackrabbit	<i>Lepus townsendii</i>	Game Mammal
	Black-tailed Jackrabbit	<i>Lepus californicus</i>	Game

			Mammal
	American Beaver	<i>Castor canadensis</i>	Game Mammal
	Muskrat	<i>Ondatra zibethicus</i>	Game Mammal
	Red Fox	<i>Vulpes vulpes</i>	Game Mammal
	Black Bear	<i>Ursus americanus</i>	Game Mammal
	Raccoon	<i>Procyon lotor</i>	Game Mammal
	American Marten	<i>Martes americana</i>	Game Mammal
	Ermine	<i>Mustela erminea</i>	Game Mammal
	Long-tailed Weasel	<i>Mustela frenata</i>	Game Mammal
	Mink	<i>Mustela vison</i>	Game Mammal
	American Badger	<i>Taxidea taxus</i>	Game Mammal
	Northern River Otter	<i>Lutra canadensis</i>	Game Mammal
	Mountain Lion	<i>Puma concolor</i>	Game Mammal
	Bobcat	<i>Lynx rufus</i>	Game Mammal
	Elk	<i>Cervus elaphus</i>	Game Mammal
	Rocky Mountain Elk	<i>Cervus elaphus nelsoni</i>	Game Mammal
	Mule Deer	<i>Odocoileus hemionus</i>	Game Mammal
	Black-tailed Deer (estside)	<i>Odocoileus hemionus columbianus</i>	Game Mammal
	Moose	<i>Alces alces</i>	Game Mammal
	Mountain Goat	<i>Oreamnos americanus</i>	Game Mammal
	Bighorn Sheep	<i>Ovis canadensis</i>	Game Mammal
	Total Game Mammals:	25	
	Total Game Species:	57	

Appendix C: Conservation Reserve Program

U.S. DEPARTMENT OF AGRICULTURE -- FARM SERVICE AGENCY
CONSERVATION RESERVE PROGRAM - MONTHLY CONTRACT REPORT
SUMMARY FOR ACTIVE CONTRACTS FOR ALL PROGRAM YEARS (1986-2004)

COUNTY NAME	TOTAL NO. OF CONTRACTS	TOTAL CRP ACRES	AVERAGE RENTAL RATE	CONTINUOUS CREP ACRES	CONTINUOUS NON-CREP ACRES	WETLAND SYSTEMS ACREAGE	MARGN PASTRLND ACRES	TREE PRACTICE ACRES	AVERAGE EROSION INDEX
ADAMS	1,696	212,463.9	\$50.17	.0	17,206.1	207.0	.0	54.0	5
ASOTIN	144	29,145.6	\$54.28	760.5	111.6	.0	852.3	907.1	11
BENTON	402	74,265.9	\$39.93	.0	5,896.3	.0	.0	.0	9
CHELAN	8	1,372.7	\$47.01	4.5	.0	.0	.0	4.5	6
CLALLAM	6	34.3	\$159.03	34.3	.0	.0	33.3	34.3	3
CLARK	7	76.7	\$145.65	62.3	14.4	.0	76.7	76.7	76
COLUMBIA	306	38,583.8	\$61.87	1,424.9	507.1	.0	1,714.0	2,841.2	15
COWLITZ	2	14.8	\$163.96	14.8	.0	.0	14.8	14.8	1
DOUGLAS	1,076	187,711.0	\$45.36	.0	747.5	533.7	60.5	150.0	5
FERRY	17	1,090.7	\$55.01	.0	25.4	.0	.0	14.5	13
FRANKLIN	776	104,426.7	\$50.35	.0	12,727.8	.0	4.6	8.1	5
GARFIELD	464	44,655.1	\$65.80	650.9	2,493.9	89.9	2,027.8	2,225.2	14
GRANT	405	60,715.5	\$43.85	.0	1,117.8	.0	.0	.0	7
GRAYS HARBOR	11	105.0	\$183.46	74.7	30.3	.0	77.2	105.0	1
JEFFERSON	9	97.2	\$220.10	97.2	.0	.0	76.5	97.2	15
KING	1	5.3	\$204.40	5.3	.0	.0	5.3	5.3	1
KITSAP	1	5.0	\$199.60	5.0	.0	.0	5.0	5.0	243
KITTITAS	19	3,294.2	\$50.62	.0	.0	.0	.0	.0	18
KLICKITAT	360	58,407.9	\$44.03	47.5	4,598.3	.0	4,130.4	4,378.0	9
LEWIS	24	515.8	\$188.17	436.4	79.4	.0	449.5	498.9	1
LINCOLN	955	86,270.7	\$46.18	.0	1,644.1	857.7	16.9	388.4	8
MASON	6	37.3	\$191.68	37.3	.0	.0	37.3	37.3	1
OKANOGAN	50	4,064.6	\$49.11	33.9	50.0	2,737.3	.0	83.9	4
PACIFIC	3	41.4	\$211.16	41.4	.0	.0	41.4	41.4	1
PIERCE	4	18.5	\$164.94	3.0	15.5	.0	5.5	18.5	10
SKAGIT	66	443.4	\$268.69	443.4	.0	.0	203.8	443.4	2
SNOHOMISH	12	135.6	\$229.49	111.8	23.8	.0	127.0	135.6	5
SPOKANE	459	31,768.2	\$56.76	.0	758.2	2,239.6	268.6	746.0	11
STEVENS	40	3,516.4	\$48.84	.0	.0	784.4	.0	184.9	10
THURSTON	5	33.4	\$215.55	33.4	.0	.0	33.4	33.4	8
WAHKIAKUM	13	374.4	\$158.56	87.6	286.8	.0	273.8	374.4	40
WALLA WALLA	539	149,966.2	\$53.06	1,501.2	2,573.0	.0	1,496.9	1,728.1	10
WHATCOM	87	1,021.5	\$347.06	1,021.5	.0	.0	858.3	1,021.5	1
WHITMAN	1,720	138,802.3	\$74.16	.0	32,203.6	456.5	754.0	1,061.7	12
YAKIMA	185	53,341.3	\$39.58	147.2	497.7	.0	235.0	235.0	10
STATE TOTAL:	9,878	1,286,822.3	\$52.14	7,080.0	83,608.6	7,906.1	13,879.8	17,953.3	8

TOTAL NUMBER OF COUNTIES WITH CONTRACTS: 35

<http://www.fsa.usda.gov/crpstorpt/08Approved/r1sumyr/wa.htm>

