Draft

Palouse Subbasin Summary

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Northwest Power Planning Council

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DRAFT: This document has not yet been reviewed or approved by the Northwest Power Planning Council

Palouse Subbasin Summary

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Palouse River Subbasin Description

General Location

Approximately 17% (353,625 acres) of the Palouse River subbasin lies in Idaho (USDA 1978) primarily within Latah County. In Washington, the bulk of the subbasin lies in Whitman County with lesser amounts (less than 25 percent) occurring in Adams County on the west and Spokane County to the north (Figure 1).

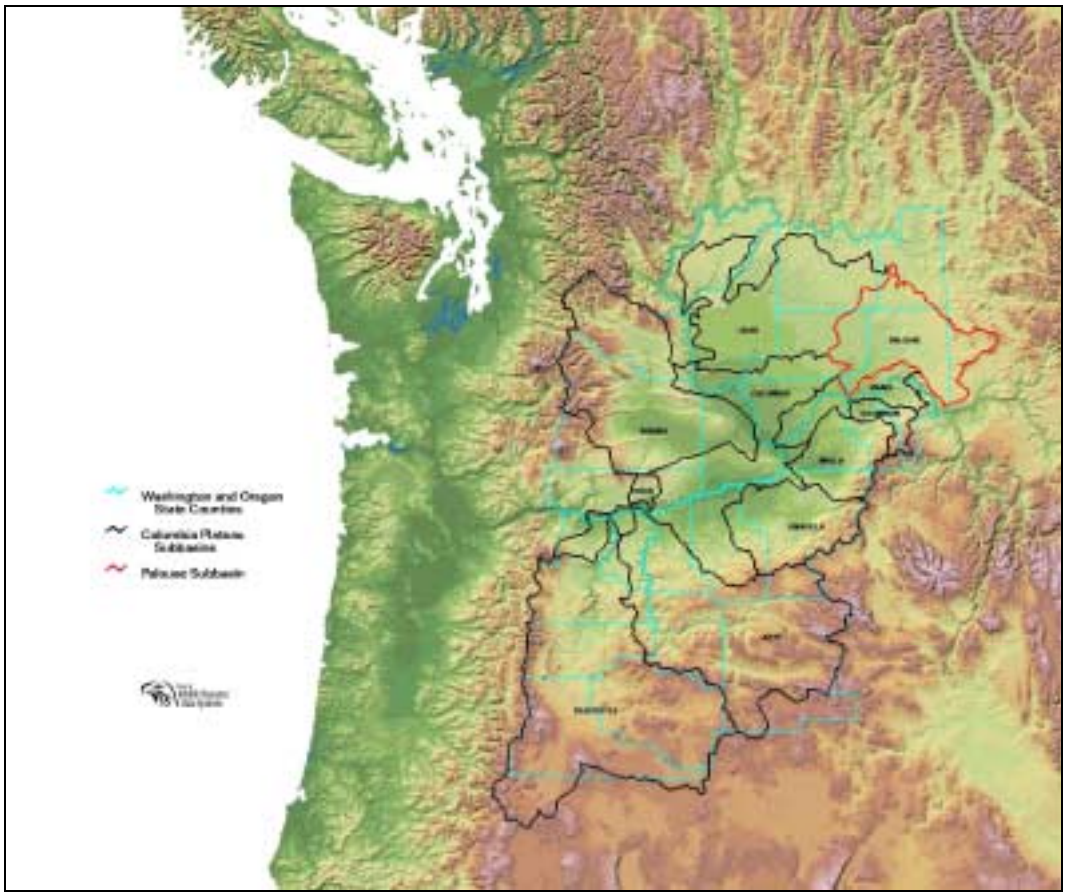

Figure 1. Palouse Subbasin location map.

Drainage Area

The Palouse River drains an area encompassing 2,113,970 acres that includes 398 miles of stream, which have an average annual water yield of 455,000 acre feet per year (Figure 2). The Palouse River originates in the Palouse Mountain Range within the St. Joe National Forest northeast of Moscow, Idaho, and then flows in a westerly direction into eastern Washington, south of the City of Spokane. The river then winds through the rolling farm ground of Latah and Whitman Counties before it enters the Snake River at the Whitman\ Franklin County line. Pine Creek, Rock Creek, and Cow Creek drain large areas within the Whitman County portion of the subbasin. The part of the subbasin that lies in Spokane County drains the Turnbull National Wildlife Refuge.

Climate

The climate in the Palouse Subbasin consists of generally mild winters and summers punctuated by occasional high or low temperatures. The recorded temperatures in the basin range from 36 degrees below zero to 110 degrees F. These extreme temperatures tend to last no more than a few weeks. The soils of the basin can freeze to 30 inches of depth during the more extreme winters. Summers are generally hot with very little precipitation. Most of the precipitation is received from October to May. Precipitation in the basin ranges from 12 inches annually in the west to 46 inches annually in the mountains of Idaho (USDA 1978). Frost events can occur during any month of the year.

Figure 2. Palouse Falls, February 2001

Topography/Geomorphology

High, massive mountains and deep intermountain valleys characterize the eastern portion of the subbasin that lies in the Northern Rocky Mountains of Idaho. The topography is fairly rugged with heavily timbered, steep sided ridges and rounded peaks (Sappington 1989) Precambrian metasedimentary and metamorphic rocks underlie the mountainous portions. Intrusions of granitic deposits in the headwaters of the subbasin attracted gold exploration and mining activities.

Major valleys in the eastern part of the subbasin are filled with alluvial deposits, while the majority of the rest of the subbasin is composed primarily of basalt covered by a thick layer of wind blown loess soil up to 200 feet thick, which forms a 'sand dune' rolling, hilly terrain. The hills are characterized by gently sloping south and west facing slopes, and short steep north and east slopes. The soils of the Palouse are subject to serious erosion problems. This is due to the steep hilly topography and cultivation. In 1976, it was estimated that 360 tons of soil had been lost from every acre in the Palouse through soil erosion, and that 14 tons of soil would continue to be lost per acre per year unless land use practices change (USDA, 1978).

The western portion of the basin contains the channeled scablands. These lands were formed when large ice dams in Montana broke releasing massive torrents of water that crossed the Palouse Region approximately 100,000 years ago. These huge flood events scoured the soil from the land, leaving behind channelized exposed basalt with islands of loess soil not swept away by the floods (USDA 1978). General geological characteristics of the Palouse Subbasin are shown in Figure 3.

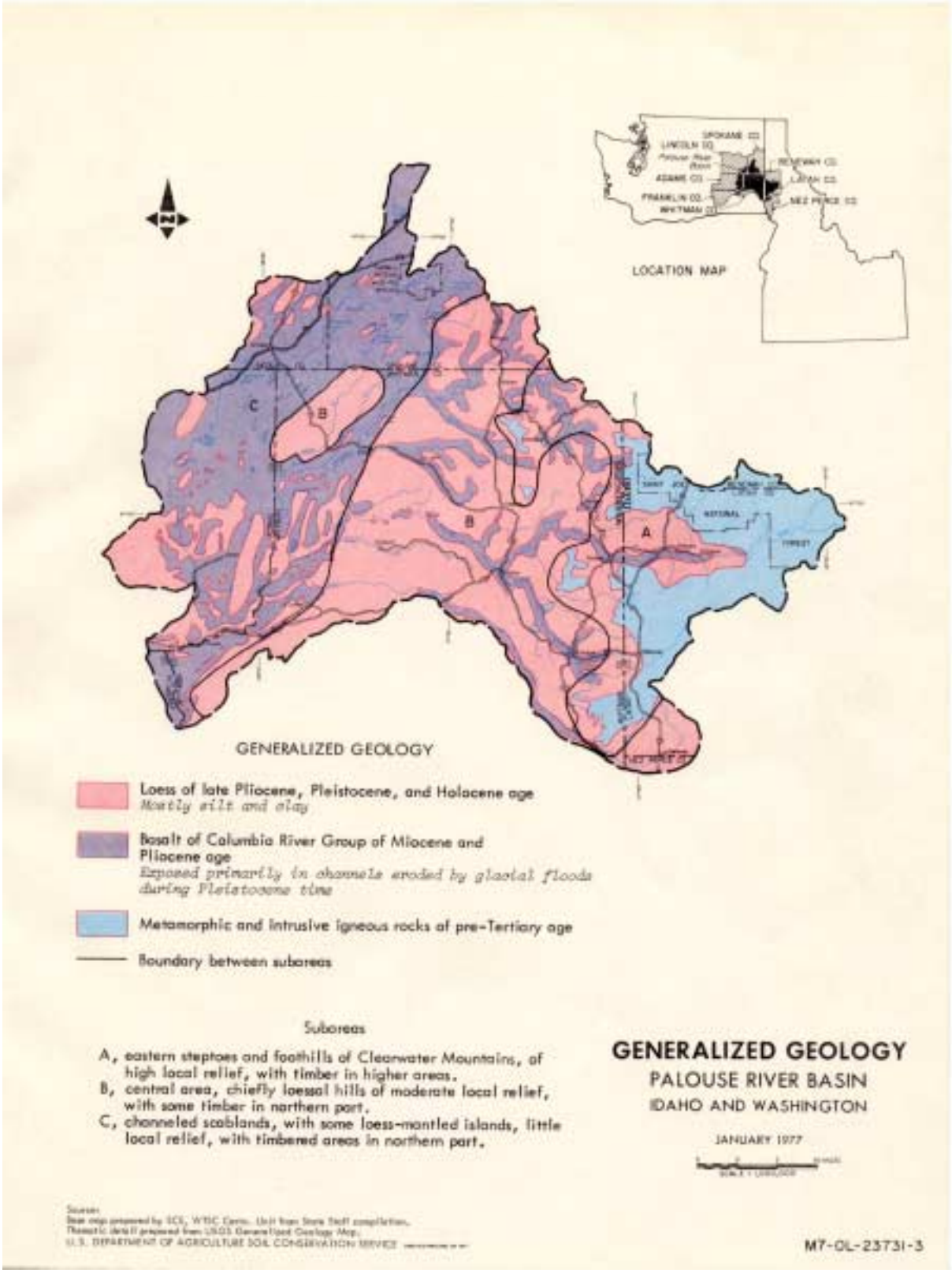

Figure 3. General geology within the Palouse Subbasin.

Hydrology

The Palouse River and its tributaries flow freely to the Snake River with no major man made impoundments. (USDA, 1978) There are a few minor impoundments for irrigation purposes, mostly located on small tributaries. There have been major efforts historically to straighten and keep stream channels clear of vegetation to assist with drainage and control flooding on the tributaries of the Palouse River. In some cases dikes have been installed along streams to reduce flooding, these have disconnected the streams from the riparian and upland zones. Tiling has been used to improve the drainage of wetter areas to open the ground for agricultural purposes; the tiling normally is outletted directly into a stream. Livestock grazing has altered stream channel stability. Farm practices and the removal of wetlands have dramatically reduced the upland water storage capacity of the Palouse Basin. Forest grounds in Idaho have been historically clear-cut reducing water storage potential. Also there has been an increase in the amount of impervious surfaces (primarily urban areas). The Palouse River as it flows through Colfax, Washington, is contained in a concrete aqueduct. These factors have contributed to a 'spiky' hydrologic curve, and several tributary streams becoming intermittent in the summer months. When there is a precipitation event the waters tend to enter the streams quickly and drain to the Snake River quickly. (Palouse C.D., 2000)

The hydrograph of the Palouse River at Potlatch, Idaho (drainage area 317 square miles) peaks during the month of March with an average streamflow of 739 cubic feet per second (cfs). Low flows of around 13 cfs occur from August through October. However, rain and rain-on-snow events can cause large swings in streamflow, with most precipitation occurring December through June. The peak discharge recorded at the Potlatch gauge was 14,600 (cfs) on 2/9/96. The lowest minimum daily flow occurred on 9/24/73 at 0.09 cfs. A change in peak runoff intensity and timing may have occurred due to land management activities in the St. Joe National Forest (CNF 1998).

The discharge of the South Fork Palouse River when it leaves Idaho is several orders of magnitude less than the Palouse River. Highest mean monthly discharge as measured in Pullman, Washington (drainage are 132 square miles) occurs in February (average 131 cfs), rapidly falling off to 4 cfs from July through October

The average streamflow of the Palouse River at the U.S.G.S. gauging station located at Hooper WA, for the years 1929-1976, was approximately 300 cubic ft./second in August, to 1300 cubic ft./second in March. Hooper is located below where most of the tributaries enter on the mainstem of the Palouse River, Cow Creek enters a few hundred yards down stream. A few miles before the Palouse River enters the Snake River there is the Palouse River Falls. The falls are 182 feet high and prevent the upstream migration of fish. The falls however do not stop adverse water quality conditions of the Palouse from entering the Snake River. Reservoir Capacity of the Snake River dams below the Palouse River are built with double the normal capacity for the project life power generation, to handle the excess sediments contributed to the Snake River by the Palouse River Basin. (USDA, 1978).

Land Uses

There are five major land uses in the Palouse Subbasin i.e., cropland, rangeland, mountain forest, forested grassland, and urban. Cropland is the largest land use and encompasses approximately 1,231,000 acres or 58% of the subbasin. Winter wheat is the dominant crop. Other crops include barley, peas, lentils, and an assortment of specialized crops on small acreages (USDA, 1978).

Rangeland, the second largest land use, occurs largely in the channeled scablands in the western portion of the subbasin and is used primarily for livestock pasture. Most of the lakes, permanent ponds, and ephemeral pools are also found in rangeland areas (USDA, 1978). There are 597,000 acres (28% of the basin) of rangeland in the subbasin.

The163,000 acres (approximately 8% of the basin) of mountain forest land is used primarily for forestry products and recreation. All of the mountain forest lies in Idaho including the St. Joe National Forest, which is approximately 54,000 acres. The remainder is either state, corporate, or private land (CNF 1998).

Forested grassland makes up 62,000 acres or 3% of the basin with most occurring in Spokane County in the north portion of the subbasin. Forested grassland is used mainly for livestock grazing. The Turnbull National Wildlife Refuge lies within the forested grassland area. A few of the lakes in the basin are found within the forested grassland land use type (USDA, 1978).

Other lands, including urban, take up the remaining 61,000 acres or 3% of the basin. There are 2 cities with populations over 10,000, 1 city with a population over 3,000, and 10 towns with populations over 200. Private lands followed by state, federal, county, and city ownership dominate land ownership (Figure 4).

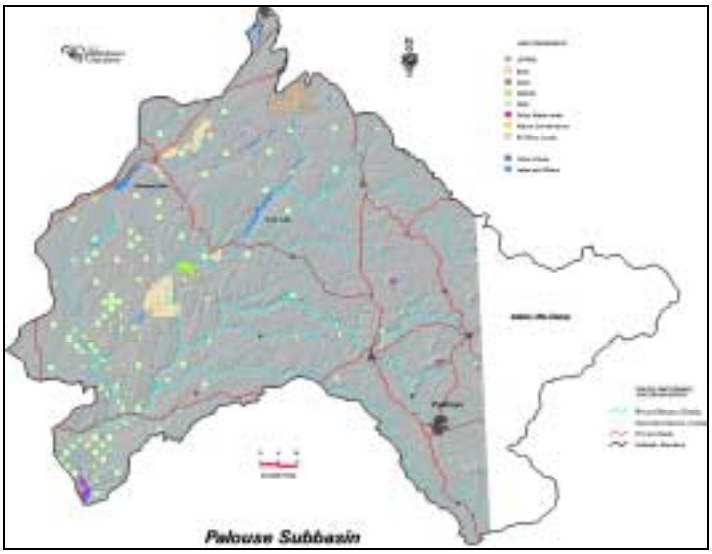

Figure 4. Land ownership map of the Palouse Subbasin.

Impoundments and Irrigation Projects

Water Quality

Interstate waters like the Palouse River and its tributaries are required by the Clean Water Act to meet the receiving state's water quality standards at the state line. Both Idaho and

Washington follow similar standards for water quality (Table 1). The Department of Ecology in Washington (WDOE), and the Department of Environmental Quality in Idaho (IDEQ) are the agencies charged with regulating the water quality with oversight from the U.S. Environmental Protection Agency. The 1972 Federal Clean Water Act authorizes and requires states to establish numeric criteria (water quality standards) for specific pollutants. The numeric criteria are applied to discharges (point source and non-point source) and waterbodies. Waterbodies are rated according to a classification system that determines what water quality standards must be attained. The current classification system (AA, A, B, C, and Lake class) assigns characteristic uses to each class, with lower classes supporting fewer uses. WDOE is required to list waterbodies that do not meet surface water quality standards, every two years in Section 303(d) of the Clean Water Act. WDOE utilizes data collected by agency staff as well as data from tribal, state, local governments, and industries to determine whether or not a waterbody is listed on the 303(d) list. Total Maximum Daily Loads (TMDLs) must be completed for every parameter that exceeds state water quality standards on listed waterbodies. The purpose of the TMDL is to determine the amount of pollution a waterbody can receive and still remain healthy for its intended uses, such as industrial, agriculture, drinking, recreation, and fish habitat. Many TMDLs are required to be completed on the Palouse River and its tributaries. The Palouse River is designated as a class A stream in Washington State, which means the river needs to meet or exceed the beneficial uses listed in WAC 173-201A-30 (Table 2). It currently does not meet the beneficial uses of a class A stream in either Washington of Idaho. (Correspondence from Mimi Wainwright, DOE 2001)

WDOE is currently proposing changes to several numeric surface water quality standards as well as the classification system. The revised standards must be applied so that they support the same uses covered under the current classification structure. Changes to the surface water quality standards will affect many programs, including monitoring, permits, TMDLs, and the 303 (d) list. (Correspondence from Mimi Wainwright, DOE 2001)

Table 1. A comparison of water quality standards

Parameter	Washington Water Quality Standards (listed for Class A – Excellent)	Idaho Water Quality Standards
Fecal Coliform (Pathogens)	Levels shall both not exceed a geometric mean value of 100 colonies/100 ml, and not have more than 10% of all samples obtained for calculating the geometric mean value exceed 200 colonies/100ml.	To protect the designated use of secondary contact recreation, waters are not to contain fecal coliform bacteria in concentrations exceeding 800 colonies/100 ml at any time: and 400 colonies/100 ml in more than 10% of the total samples taken over a thirty day period: and a geometric mean of 200 colonies/100 ml based on a minimum of five samples taken over a thirty day period. To protect the designated use of primary contact recreation, waters are not to contain fecal coliform bacteria in concentrations exceeding: 500 colonies/100 ml: and 200 colonies/100 ml in more than 10% of the total samples taken over a thirty day period: and a geometric mean of 50 colonies/100 ml based on a minimum of five samples taken over a thirty day period.
Water Temperature (Thermal Modifications)	A special condition is set for the SFPR, stating that temperature may not exceed 20 C (68%F) due to human activities. When natural conditions exceed 20 C, no temperature increases will be allowed which raises the receiving water temperature by greater than 0.3 C.	To protect the designated use of *cold-water biota*, water temperature should not exceed 22 C (72 F) with a maximum daily average of no greater than 19 C (66 F).
pH	pH shall be within the range of 6.5 to 8.5 with human- caused variation within a range of less than 0.5 units	pH values should range between 6.5 and 9.5
Dissolved Oxygen	Dissolved oxygen shall exceed 8.0 mg/l.	Dissolved oxygen must exceed 6.0 mg/l at all times.
Ammonia-N (Nutrients)	Ammonia concentrations are calculated in reference to the temperature and pH of the water. No Washington numerical standards exist for nutrients such as Total Phosphorus and Nitrate.	Ammonia concentrations are calculated in reference to the temperature and pH of the water. No Idaho numerical standards exist for nutrients such as Total Phosphorus and Nitrate.
Flow	No Washington numerical standards exist. Water quality shall meet the requirements for characteristic uses, including fish migration, rearing, and spawning, wildlife habitat and recreation.	No Idaho numerical standards exist. Although flow is evaluated to rate the beneficial use support status.
Sediment	No Washington numerical standards exist. Water quality shall meet the requirements for characteristic uses, including fish migration, rearing, and spawning. Washington lists a turbidity criteria, stating that it shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity with the background turbidity is more than 50 NTU.	No Idaho numerical standards exist. Idaho lists a turbidity criteria, suggesting that it doesn't exceed background turbidity by more than 50 NTU instantaneously or more than 25 NTU for more than 10 consecutive days.
Habitat Modifications	No Washington Numerical standards exist. Water quality shall meet the requirements for characteristic uses, including fish migration, rearing and spawning, and wildlife habitat.	No Idaho numerical standards exist. Although the habitat is evaluated to rate the beneficial use support status.

Table 2. Class A Stream Beneficial Uses

Designated Use	**Variable**	**Criteria**
Water Supply	None	N/A
Stock Watering	None	N/A
Rearing, Harvesting, and Other Fish Spawning (Fresh water)	Temperature Dissolved Oxygen PH Toxic Substances	<21 degrees C >6.5mg/L 6.5<pH<8.5 Acute or chronic value
Salmonid and Other Fish Migration (Including fresh water)	Temperature Dissolved Oxygen PH Toxic Substance	<22 degrees C >4.0 mg/L 6.5 <pH<9.0 Acute or chronic value
Wildlife (Including fresh water)	Fish Tissue	DDT & metabolites Total PCB's Mercury
Primary Contact Recreation (fresh water)	Fecal Coliform	<100 orgs/100 mL 30 day geometric mean
Secondary Contact Recreation	Fecal Coliform	<200 orgs/100 mL 30 day geometric mean
Public Health (Fresh water)	Fish Tissue Fecal Coliform Toxic Substances	10 Compounds <230 orgs/100g 69 compounds

(Source DOE, 1992)

Another way that the water quality is evaluated is by pollutant. The states set standards for each pollutant. These pollutants include; metals, pesticides, ammonia, nutrients, temperature, pH, dissolved oxygen, turbidity, pathogen indicators, and noxious aquatic plants. If WDOE determines that a waterbody of the state is impaired because it exceeds the state standard for the pollutant, the waterbody is placed on Washington's 303(d) list and submitted to EPA as being impaired. (Table 3) The Palouse River and its tributaries are currently listed on the states 303(d) list for metals, pesticides, fecal coliform, dissolved oxygen, pH, ammonia-N, sediment, nutrients, temperature, and flow. The most common pollutants affecting the Palouse River and its tributaries are temperature, dissolved oxygen, pH, and fecal coliform. The South Fork of the Palouse River has been rated as having the worst water quality in Washington based on WDOE's water quality ambient monitoring data collected in Pullman. (Palouse C.D., 2000)

Table 3: River and stream pollutant identification table

	Missouri Flat Creek	Paradise Creek	Pine Creek	Rebel Flat Creek	Rock Creek	Union Flat Creek	Palouse River Main Stem	Palouse River South fork
Fecal Coliform	X	X		X			X	X
Dissolved Oxygen	X	X	X	X			X	X
Ammonia-N		X						
Temperature		X	X		X	X	X	X
pH			X		X		X	X
Dieldrin							X	
4,4'-DDE							X	
PCB-1260							X	
Chromium							X	
Heptachlor Epoxide							X	

In Idaho, the Palouse River tributaries of Deep Creek, Flannigan Creek, West Fork Rock Creek, Gold Creek, Hatter Creek, Big Creek, and the South Fork Palouse River are listed as water quality limited for bacteria, flow alteration, habitat alterations, nutrients, sediment and temperature. Cow Creek is listed for habitat alterations, nutrients and temperature. Paradise Creek is the only Idaho stream in the drainage where a Total Maximum Daily Load (TMDL) Implementation Plan has been developed (PCWAG 1999).

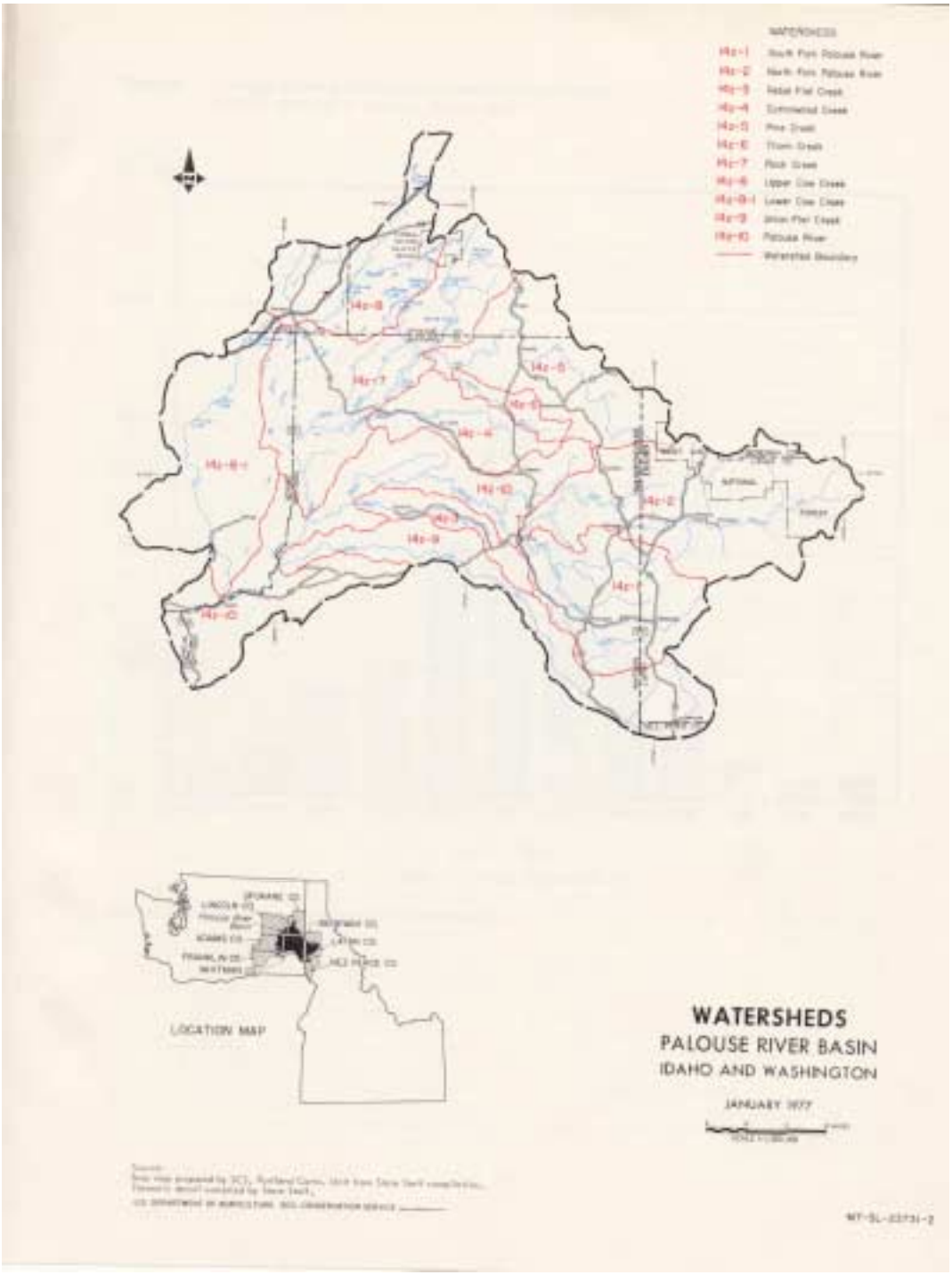

Figure 5. Subwatersheds in the Palouse Basin

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Fish and Wildlife Resources

Fish and Wildlife Status

Fish

Historic Fish Assemblages

The historic fish assemblage in the Palouse River Subbasin prior to European settlement consisted primarily of anadromous and resident salmonids, cyprinids, and catastomids in the lower Palouse River below Palouse Falls, and a diverse assemblage of fish species, primarily composed of cyprinids and catastomids above the falls. The anadromous salmonid fish species noted included Chinook salmon *Oncorhynchus tshawytscha* and steelhead *O. mykiss* (Parkhurst 1950). Although there is a general understanding of what species now exist in the sub-basin, there is a lack of knowledge on what native fish species existed within the subbasin, prior to European immigrant settlement in the area, which are no longer present.

Construction of hydroelectric projects within the Columbia River system have hindered adult and juvenile anadromous fish passage and have contributed to significant declines in anadromous stocks within the Snake River and its tributaries. Prior to the late 1800's there was an annual spawning return (escapement) of Snake River spring/summer chinook salmon that may have exceeded 1.5 million fish (Bevan et al. 1993). By 1975, escapement was down to only 120,000 (WDF 1990), or 8 percent of the historic run. The 1994 return of 1,822 fish, 0.12 percent of the historic run, was the lowest ever recorded. These counts set new record low numbers. All the Snake River spring, summer, and fall chinook were officially listed by the National Marine Fisheries Service (NMFS) as "threatened" species on April 22, 1992. A petition to further list them as endangered is still pending the outcome of proposed changes to the Endangered Species Act (ESA) (Griffin 1995). The Bull trout was officially listed by the U.S. Fish and Wildlife Service as threatened under the Endangered Species Act (ESA) in June of 1998.

Current Fish Assemblages

Fish resources within the Palouse River sub-basin are limited by long standing in-stream, riparian, and up-land habitat conditions, which have contributed to degraded water quality, extreme seasonal fluctuations in water quantity, and subsequent degraded in-stream habitat conditions. The existing fish community in the lower Palouse River (below Palouse Falls) consists of the salmonid species noted previously, as well as native resident species including largescale sucker *Catastomus macrocheilus,* redside shiner *Richardsonius balteatus,* northern pikeminnow *Ptychocheilus oregonensis,* and chiselmouth *Acrocheilus alutaceus*. Recent fish survey work conducted by WDFW below the Palouse Falls (Glen Mendel, per. comm.) have confirmed the presence of sub-adult bull trout *Salvalinus confluensus,* rainbow trout / juvenile steelhead, tench *Tinca tinca,* bluegill *Lepomis*

macrochirus, yellow perch *Perca flavescens*, northern pikeminnow, chiselmouth, redside shiner, and dace spp.

Maughan, et al. (1980) conducted fish surveys at 13 sampling locations within the Palouse River system, including locations below Palouse Falls, and above the falls within the Union Flat Creek, Cow Creek, and South Fork Palouse drainage(s), and the main stem Palouse River (Figure 5). Excluding salmonid species, the majority of fish species observed above and below the falls did not differ greatly. The species composition of the downstream section (below the falls) was composed of eight native species and three exotics, whereas the upstream collections contained eleven native species and nine exotics. These authors did not collect any salmonids below the falls. The only salmonids collected above the falls were observed in the upper reaches of the North Fork Palouse River in Idaho, and identified as rainbow trout and brook trout *Salvelinus fontinalis*. Historic stocks of native species that continue to inhabit the Palouse River above the falls include chiselmouth, northern pikeminnow, largescale sucker *Catostomas macrocheilus*, redside shiner, speckled dace *Rhinichthys osculus*, and cottid species. Thirty-seven fish species have been documented within the Palouse River sub-basin. No ESA listed species have been documented as occurring above the Palouse Falls. A synoptic list of fish species for the Palouse River sub-basin is listed in Table 4. This list was compiled from data obtained from Maughan et al. (1980); Havens 1996; McLellan et al. (2000); Taylor and Scholz (2000); Rabe et al. (1993); Allen Scholz, EWU, pers. comm., Glen Mendel, WDFW, per. comm. (2000); Washington Game Commission (1947); Wilms et al. (1989); Whalen (1989), Robert Peck, WDFW, per. Comm., and the WDFW Streamnet data base (2000).

Table 4. Fish species present in the Palouse Subbasin, Washington.

Species	Origin	Status
Bull trout (*Salvelinus confluentus*) *	N	U
Steelhead trout */ Rainbow trout (*Oncorhynchus mykiss*)	N	O/U
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	N	O/U
Fall Chinook salmon (*Oncorhynchus tshawytscha) *	N	O/S
Mountain whitefish (*Prosopium williamsoni)*	N	O/U
Brook trout (*Salvelinus fontinalis)*	N	O/U
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)	E	O/U
Brown trout (*Salmo trutta*)	E	O/U
Northern pikeminnow (*Ptychocheilus oregonensis)**	N	C/S
Speckled dace (*Rhinichthys osculus)**	N	C/U
Longnose dace (*Rhinichthys cataractae*)*	N	O/U
Redside shiner (*Richardsonius balteatus*)*	N	C/U
Chiselmouth (*Acrocheilus alutaceus*)*	N	O/U
Peamouth (*Mylocheilus caurinus*)	N	O/U
Largescale sucker (*Catostomas macrocheilus*)	N	O/U
Longnose sucker (*Catostomas catostomus)*	N	O/U
Bridgelip sucker (*Catostomas columbianus*)	N	C/S
Mountain sucker (*Catostomas platyrhynchus*)	N	O/U
Tench (*Tinca tinca*)	E	O/U
Walleye (*Stizostedion vitreum*)	E	O/S
Largemouth bass (*Micropterus salmoides*)*	E	O/S
Brown bullhead (*Ictalurus nebulosus*)*	E	O/U
Yellow bullhead (*Ictalurus natalis*)	E	O/U
Smallmouth bass (*Micropterus dolomieui*)*	E	O/S
Slimy sculpin (*Cottus cognatus*)	N	O/D
Mottled sculpin (*Cottus bairdi*)*	N	O/U
Brook stickleback (*Culaea inconstans*)	E	O/I
Piute sculpin (*Cottus beldingi*)* (cottid species identification / location(s) in question)	N	C/U
Torrent sculpin (*Cottus rhotheus*)	N	O/U
Goldfish (*Carassius auratus*)	E	O/U
Yellow perch (*Perca flavescens*)*	E	O/U
Carp (*Cyprinus carpio*)*	E	C/U
Bluegill (*Lepomis macrochirus*)*	E	O/U
Crappie (*Pomoxis spp.*)*	E	O/S
Channel catfish (*Ictaluris punctatus*)	E	O/S
Grass pickerel (*Esox americanus vermiculatus*)	E	O/U
Pumpkinseed (*Lepomis gibbosus*)	E	O/U
E=Exotic, N=Native, A=Abundant, C=Common, O=Occasional, U=Unknown, S=Stable, I=Increasing, D=Decreasing, * denotes presence below Palouse Falls		

Kokanee (Washington)
Koknanee (land locked sockeye salmon) are annually stocked by the WDFW into Chapman Lake, and are known to successfully spawn in Chapman Lake adjacent to spring water influence areas. Kokanee have been observed downstream of Chapman Lake in Rock Lake (McLellan 2000). Suitable habitat conditions and adequate zooplankton production, primarily limited to Chapman, have limited natural kokanee expansion within the watershed below Chapman Lake.

Redband / Rainbow Trout (Washington)
Population densities of rainbow trout in the sub-basin are primarily related to stocking of trout made by past and present fish management agencies in bodies of water such as Chapman Lake, Rock Lake, Sprague Lake, other lowland lakes within the Cow Creek and Rock Creek drainage(s), and Union Flat Creek. Limited natural trout spawning is known to occur in portions of Rock Creek (Scholz per. comm.). Rainbow trout are also known to naturally reproduce in portions of Union Flat Creek (Bob Peck, WDFW, pers. comm.).

Stream habitat usage by resident salmonids is dictated by the extremely few locations within the sub-basin where agriculture, grazing, road building, and logging practices have not significantly altered habitat conditions such that salmonids can survive. There are a small number of tributaries to the Palouse River, which exhibit isolated reaches of relatively intact natural habitats and which contain self-sustaining wild populations of salmonids. The distribution and relative abundance of resident salmonids, including possibly native redband rainbow trout, within the watershed is generally unknown. Rainbow trout from several origins have been introduced throughout the Palouse Sub-basin. WDFW has regularly stocked rainbow trout in to Chapman Lake, Rock Lake, Williams Lake, Hog Canyon Lake, Fish Trap Lake, Sprague Lake and other smaller water bodies within the sub-basin. Please refer to the past and present activities section of this document for current fish management activities. No genetic analysis of resident rainbow trout has been conducted to determine the possible remnant presence of redband rainbow trout.

German Brown Trout (Washington)
Population densities of brown trout and their overall relative distribution within the sub-basin are unknown. Population relative abundance estimates developed for brown trout in Rock Lake by McLellan, (2000) indicate that brown trout represent 23 percent of the fish community composition in this lake. The WDFW regularly stocks approximately 10,000 catchable size brown trout in Rock Lake (WDFW regional stocking records).

Warm Water Game Fish (Washington)
Crappie, bluegill, and yellow perch are present in Chapman Lake, Rock Lake, and Sprague Lake. The establishment of these species in Rock Lake and Chapman Lake were likely the result of illegally planted fish introduced by anglers throughout the years. Sprague Lake has been managed as a mixed species fishery for many years by WDFW. The Department has periodically stocked Sprague Lake with a variety of warm water fish species including black and white crappie, largemouth bass, smallmouth bass, bluegill, walleye, and channel catfish. Population density information on warm water fish species is available for Rock

Lake, (McLellan 2000), and Sprague Lake (Taylor 2000, Wilms 1989, Whalen 1989). Pumpkinseed sunfish and three introduced exotic species of the family Ictaluridae (Brown bullhead, Yellow bullhead, and Channel catfish) also occur within the Palouse subbasin. At least 14 species of fish have been found in the Idaho portion of the Palouse River Subbasin (IPRS). All native species are limited to non-game fish. Behnke (1992) proposed that the only salmonid native to the Palouse was an isolated population of Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) , as Palouse Falls was an effective barrier to redband trout (*Oncorhynchus mykiss*). A relict population of what is believed to be Yellowstone cutthroat occurred just over an imperceptible divide in the Crab Creek Subbasin (Behnke 1992). Stream surveys conducted by the Clearwater National Forest (CNF), Idaho Department of Fish and Game (IDFG), IDEQ, and others have never documented cutthroat trout in the IPRS. If cutthroat trout were ever present, habitat degradation and competition from introduced species may have eliminated them.

Fish species that have been found include brook trout, brown trout, rainbow trout, mottled sculpin, torrent sculpin, redside shiner, speckled dace, longnose dace, northern pikeminnow, bridgelip sucker, largescale sucker, grass carp, pumpkinseed and green sunfish. All of the salmonids were introduced, and the grass carp and sunfish were likely farm pond escapees. Distribution of species varies.

Sculpin (Idaho)

Two species of sculpin, mottled and torrent, are known to occur in the IPRS. Endemic to the IPRS, their sampled distribution suggests that they currently inhabit streams were water temperatures are not limiting.

Brook Trout (Idaho)

Brook trout were first introduced into the Palouse River in 1936 (IA1). Subsequent stocking occurred in Big Sand Creek, Little Sand Creek and the East Fork of Meadow Creek. Brook trout have established themselves in headwater streams where habitat conditions and water temperatures allow their persistence.

Brown Trout (Idaho)

Brown trout were introduced from 1979-1986 in the Palouse River (IA1), primarily near Laird Park. It was hoped that brown trout would be more suited to available habitat and water conditions, and hence provide a sport fishery. The last brown trout sampled through various fish surveys was in 1992, in Hatter Creek. It is believed that stocking failed to establish a population.

Rainbow Trout (Idaho)

The first stocking of rainbow trout occurred in 1950 in the Palouse River. The size of rainbow trout stocked has been "catchable" (8-12 inches), to provide an immediate return to the creel. There is evidence that natural reproduction is occurring, as they have been recently sampled in streams where stocking never occurred, or is no longer occurring (IA1). Stock of rainbow planted has varied over the years depending on egg availability.

Other Species (Idaho)

Smallmouth bass and North Fork Clearwater River (Dworshak) strain steelhead trout have also been stocked in the IPRS (IA1). The number of smallmouth bass stocked was small, and these fish never established a population. The steelhead trout were part of an unfed fry experiment conducted by the United States Fish and Wildlife Service National Biological Survey in the North Fork Palouse River. Fry were sampled at regular intervals and mostly removed from the population during the experiment. It is possible that any survivors have established a resident population.

Wildlife (Washington)

The Palouse Subbasin is home to a diverse assemblage of large and small mammals, amphibians, reptiles, and birds. Many of the wildlife species found in the subbasin are listed by the state of Washington or the U.S. government as sensitive, threatened, endangered or as candidates for listing (Table 5)[1].

In general, "monoculture agriculture" has greatly reduced the distribution and abundance of wildlife species in this subbasin. As agriculture became more common in the Palouse, native wildlife species such as sharp-tailed grouse, sage grouse, and other shrubsteppe dependent neo-tropical migratory birds were extirpated and replaced by introduced species such as pheasants *(Phasianus colchicus*) and Hungarian partridge (*Perdi perdix).* In contrast, species such as Canada geese (*Branta canadensis*) responded positively to agricultural development becoming year round residents (Buss 1965) while sandhill cranes (*Grus canadensis*) became less common except during migration.

Other factors that affect the presence, distribution, and abundance of wildlife throughout the subbasin include hydropower, irrigation, urbanization, road construction, livestock grazing, and introduction of noxious weeds.

Table 5. Wildlife species of interest within the Palouse Subbasin2.

Common Name	Scientific Name	Status[A]	Behavior[B]	Specific References
Mammals:				
Merriam's shrew	*Sorex trowbridgii*	SC	Y, S	WDFW 2000c
Northern grasshopper mouse	*Onychomys leucogaster*		Y, S	WDFW 2000c
Washington ground squirrel	*Spermophilus washingtoni*	C, FC	Y, S	WDFW 2000c
Sagebrush vole	*Lagurus curtatus*		Y, S	WDFW 2000c
White-tailed jackrabbit	*Lepus townsendii*	C	Y, S	WDFW 2000c
Black-tailed jackrabbit	*Lepus californicus*	C	Y, S	WDFW 2000c
Badger	*Taxidea taxus*	G	Y, S	WDFW 2000
Bobcat	*Lynx rufus*	G	Y, S, C	WDFW 2000
Raccoon	*Procyon lotor*	G	Y, R, I, F, G, W	WDFW 2000

[1] This table does not include all wildlife species present in the Palouse Subbasin.

[2] Table data obtained from WDFW's Priority Habitat and Species (PHS) Program.

Common Name	Scientific Name	Status[A]	Behavior[B]	Specific References
Columbian Ground Squirrel	*Citellus columbianus*	G	Y, S	WDFW 2000
Mink	*Mustela vison*	G	Y, R, W	WDFW 2000
Muskrat	*Ondatra zibethica*	G	Y, W, R	WDFW 2000
Beaver	*Castor canadensis*	G	Y, W, R	WDFW 2000
River Otter	*Lutra canadensis*	G	Y, W, R	WDFW 2000
Cougar	*Felix concolor*	G	Y, S, C	WDFW 2000
Black Bear	*Ursus americanus*	G	Y, R, F	WDFW 2000
Mule deer	*Odocoileus hemionus*	G	Y, G	WDFW 2000c
White-tailed deer	*Odocoileus virginianus*	G	Y, G	WDFW 2000c
Myotis bats:				
Little brown bat	*Myotis lucifugus*		M, S, C	WDFW 2000c
Yuma myotis	*Myotis yumanensis*	SC	M, S, C	WDFW 2000c
Keen's myotis	*Myotiz keenii*		M, S, C	WDFW 2000c
Fringed myotis	*Myotis thysanodes*		M, S, C	WDFW 2000c
Small-footed myotis	*Myotis subulatus*		M, S, C	WDFW 2000c
Long-eared myotis	*Myotis evotis*		M, S, C	WDFW 2000c
Fringed myotis	*Myotis thysanodes*		M, S, C	WDFW 2000c
Long-legged myotis	*Myotis volans*		M, S, C	WDFW 2000c
Silver-haired bat	*Lasionycteris noctivagans*		M, S, C	WDFW 2000c
Western pipistrelle	*Pipistrellus hesperus*		M, S, C	WDFW 2000c
Big brown bat	*Eptesicus fuscus*		M, S, C	WDFW 2000c
California myotis	*Myotis californicus*		M, S, C	WDFW 2000c
Pallid bat	*Antrozous pallidus*		M, S, C	WDFW 2000c
Hoary bat	*Lasiurus cinereus*		M, S, C	WDFW 2000c
Townsend's big-eared bat	*Corynorhinus townsendii*	C, SC	M, S, C	WDFW 2000c
Spotted bat	*Euderma maculata*		M, S, C	WDFW 2000c
Birds:				
Common loon	*Gavia immer*	S	M, W	Lewis et al. 2000
American white pelican	*Pelecanus erythrorhynchos*	E	M,W	Doran et al. 2000
Black-crowned night heron	*Nycticorax nycticorax*		M, W, R	Smith et al. 1997
Great blue heron	*Ardea herodias*		M, W, R	Quinn and Milner 2000
American bittern	*Botaurus lentiginosus*		B, W, R	WDFW 2000
Double Crested Cormorant	*Phalacrocorax auritus*		B, W, R, F	WDFW 2000
Common Egret	*Casmerodius albus*		B, W, R, F	WDFW 2000
Western Grebe	*Aechmophorus occidentalis*		B, W	WDFW 2000

Common Name	Scientific Name	Status[A]	Behavior[B]	Specific References
Clarks Grebe			B, W	WDFW 2000
Horned Grebe	*Podiceps auritus*		B, W, R	WDFW 2000
Eared Grebe	*Podiceps caspicus*		B, W, R	WDFW 2000
Black tern	*Chlidonias niger*		M, W	Smith et al. 1997
Caspian tern	*Sterna caspia*		M, W	Smith et al. 1997
Forster's tern	*Sterna forsteri*		B, M, W	WDFW 2000
Sandhill crane	*Grus canadensis*	E	M, D	Bettinger and Milner 2000
Upland sandpiper	*Bartramia longicauda*	E	X, S	Smith et al. 1997, WDFW 2000c
Long-billed curlew	*Numenius americanus*	N	B, S	Smith et al. 1997
Lewis' woodpecker	*Melanerpes lewis*	C	Y, R, S	Smith et al. 1997, WDFW 2000c
Olive-sided flycatcher	*Contopus borealis*	SC	B, R	Smith et al. 1997, WDFW 2000c
Willow flycatcher	*Empidonax traillii*	SC	B, R	Smith et al. 1997, WDFW 2000c
Sage thrasher	*Oreoscoptes montanus*	C	B, S	Smith et al. 1997, WDFW 2000c
Loggerhead shrike	*Lanius ludovicianus*	C, SC	B, S	Smith et al. 1997, WDFW 2000c
Sage sparrow	*Amphispiza belli*	C	B, S	Smith et al. 1997, WDFW 2000c
Brewer's sparrow	*Spizella breweri*		B, S	Smith et al. 1997
Grasshopper sparrow	*Ammodramus savannarum*		B, S	Smith et al. 1997
Swans:				
Tundra Swan	*Cygnus columbianus*	G	M, W, D, I	WDFW 2000c
Trumpeter Swan	*Cygnus buccinator*	G	M, W, D, I	WDFW 2000c
Waterfowl				
Greater white-fronted Goose	*Anser albifrons frontalis*	G	M, W, D, I	WDFW 2000c
Tule white-fronted goose	*Anser albifrons gambelli*	G	M, W, D, I,	WDFW 2000c
Canada goose (multiple subspecies)	*Branta canadensis spp.*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Mallard	*Anas platyrhynchos*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Gadwall	*Anas strepera*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Green-winged teal	*Anas crecca*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
American wigeon	*Anas americana*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Northern pintail	*Anas acuta*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Northern shoveler	*Anas clypeata*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Blue-winged teal	*Anas discors*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c

Common Name	Scientific Name	Status[A]	Behavior[B]	Specific References
Cinnamon teal	*Anas cyanoptera*	G	M, B, W, D, I	Smith et al. 1997, WDFW 2000c
Ruddy duck	*Oxyura jamaicensis*	G	M, B, W	Smith et al. 1997, WDFW 2000c
Canvasback	*Aythya valisineria*	G	M, B, W	Smith et al. 1997, WDFW 2000c
Redhead	*Aythya Americana*	G	M, B, W	Smith et al. 1997, WDFW 2000c
Ring-necked duck	*Aythya collaris*	G	M, B, W	Smith et al. 1997, WDFW 2000c
Lesser scaup	*Aythya affinis*	G	M, B, W	Smith et al. 1997, WDFW 2000c
Raptors				
Bald eagle	*Haleaeetus leucocephalus*	T, FT	Y, G	Smith et al. 1997, WDFW 2000c
Golden eagle	*Aquila chrysaetos*	C	Y, S, C	Smith et al. 1997, WDFW 2000c
Swainson's Hawk	*Buteo swainsoni*		B, S	WDFW 2000
Ferruginous hawk	*Buteo regalis*	T, SC	B, S	Richardson et al. 2000, WDFW 1996
Northern goshawk	*Accipiter gentilis*	C, SC	M, R, F	Smith et al. 1997, WDFW 2000c
Merlin	*Falco columbarius*	C	M, R, F, U	Smith et al. 1997, WDFW 2000c
Peregrine falcon	*Falco peregrinus*	E, SC	Y, C	Hays and Milner 2000
Prairie falcon	*Falco mexicanus*	G[C]	Y, S, C	Hays and Dobler 2000
Gyrfalcons	*Falco rusticolus*	G[D]		WDFW 2000c
Snowy Owl	*Nyctea scandiaca*		M	WDFW 2000
Burrowing owl	*Athene cunicularia*	C, SC	B, S	Smith et al. 1997, WDFW 2000c
Upland birds				
Sharp-tailed grouse	*Tympanuchus phasianellus*	T, SC	Y, S, R, D	WDFW 1995b, Hays et al. 1998b, Schroeder et al. 2000a
Sage grouse	*Centrocercus urophasianus*	T, SC	Y, S, D	WDFW 1995a, Hays et al. 1998a, Schroeder et al. 2000b
Blue grouse	*Dendragapus obscurus*	G	B, S, F	Ware 2000, WDFW 2000c
California Quail	*Lophortyx californicus*	G	Y, S, R, R	WDFW 2000
Gray Partridge	*Perdix perdix*	G	Y, S, D	WDFW 2000
Chukar	*Alectoris chukar*	G	Y, S, C	Ware and Tirhi 2000a
Ring-necked pheasant	*Phasianus colchicus*	G	Y, S, I, R	Ware and Tirhi 2000b
Wild turkey	*Meleagris gallopavo*	G	B, S, D, R, F	Hickman 1998, Ware and Hickman 1999, Morgan et al. 2000
Phalaropes, avocets, and stilts:				
Wilson's phalarope	*Phalaropus tricolor*	N	B, W	Smith et al. 1997
American avocet	*Recurvirostra Americana*	N	B, W	Smith et al. 1997
Black-necked stilt	*Himantopus mexicanus*	N	B, W	Smith et al. 1997

Common Name	Scientific Name	Status[A]	Behavior[B]	Specific References
Reptiles:				
Sagebrush lizard	*Sceloporus graciosus*	SC	Y, S	WDFW 2000c
Striped whipsnake	*Masticophis taeniatus*	C	Y, S	Nordstrom and Whalen 1997
Ringneck Snake	*Diadophis punctatus*	C	S	WDFW 2000
Western Rattlesnake	*Crotalus veridus*		Y, S, C	WDFW 2000
Night Snake	*Hypsiglena torquata*		Y, S, C	WDFW 2000
Amphibians:				
Columbia spotted frog	*Rana luteiventris*	C, SC	Y, W, R	Nordstrom and Milner 1997
Northern leopard frog	*Rana pipiens*	E	Y, W, R	Nordstrom 1997
Western toad	*Bufo boreas*	C, SC	Y, W, R	WA Dep. Fish and Wildl. 2000
Invertebrates				
Yuma skipper	*Ochlodes yuma*	C	W, R	Larsen et al. 1995
Silver-bordered bog fritillary	*Boloria selene atrocostalis*	C	R	Larsen et al. 1995

[A]Status: C = State candidate; T = State threatened; E = State endangered; S = State sensitive; G = Game animal subject to harvest regulations; SC = Federal species of concern; FC = Federal candidate; FT = Federal threatened; and FE = Federal endangered; N=no special status

[B]Behavior and habitat designations: B = Breeding; M = Migratory and/or winter; Y = yearlong resident; X = Extinct in area; S = Shrub steppe; W = Open water; R = Riparian and wetland; C = Cliffs; U = urban; I = Irrigated cropland; D = Non-irrigated cropland; F = forest; and G = General use of most or all habitats.

[C]Take of prairie falcons for recreational purposes (falconry) is by state and federal permits

[D]Take of gyrfalcons for recreational purposes is restricted by state permit to 5 per year, most are taken from the Crab Creek Subbasin.

Wildlife species' population status and general information is provided below. This information is categorized within habitat assemblages or species guilds.

Basalt Cliff Wildlife Assemblages

Steep canyon walls and cliffs provide nesting and roosting habitat, hunting perches, escape and security cover, and hibernacula for wildlife species such as bats, golden eagles, and prairie falcons within the Palouse River Subbasin. Cliffs are relatively infrequent and not specifically managed. Consequently, they are usually not directly impacted by human activities. Indirect impacts, however, are substantial in areas adjacent to cliffs where native habitat has been degraded, converted to agriculture, urbanized, or otherwise altered.

Many species that are associated with cliff habitat appear to be at risk due to the declining quality, quantity, and availability of native habitat near cliffs. This appears to have reduced prey species such as jackrabbits, ground squirrels, and marmots, which are used by golden eagles and other raptors. Similarly, conversion of native habitats adjacent to cliffs to agricultural crops has reduced insect populations that bats depend on for food.

Riparian/Wetland Area Wildlife Assemblages

Protection of riparian areas and wetlands is a top priority for WDFW in this subbasin (WDFW 1986, Intermountain Joint Venture 1997). Riparian and wetland areas are important for waterfowl, furbearers (muskrat, mink, beaver), deer (for fawning areas), neo-

tropical migratory birds, and upland birds (Errington 1961). In addition, common loons, American white pelicans, bald eagles, Wilson's phalaropes, American avocets, black-necked stilts, and spotted frogs also utilize and/or inhabit riparian areas and wetland habitats within the Palouse subbasin.

Although some species such as the willow flycatcher are dependent upon riparian areas, many other species are associated with riparian areas for only specific stages of their annual life history. For example, black-crowned night herons and great blue herons use riparian areas for nesting habitat. In contrast, sharp-tailed grouse use riparian areas for winter habitat. When available, cavity nesters such as woodpeckers and flickers excavate nest cavities in large cottonwood, willow, and pine trees. Upland habitat enhancement activities adjacent to riparian/wetland areas will benefit wetland obligate, facultative, and upland wildlife species alike (Hickman 1984, Hickman 1990).

Timbered Upland Wildlife Assemblages

Several cavity nesting bird species occur in the Palouse subbasin. Bluebirds, woodpeckers, flickers, wrens, swallows, chickadees, and nuthatches are potential nesters if nesting cavities and/or artificial structures are available. Currently, most cavity nesters are far below carrying capacity due to insufficient nest sites in the Palouse subbasin (G J Hickman pers. comm. 2001). Many neo-tropical migratory songbirds, including bluebirds and swallows are dependant on timbered uplands and several other habitat types found in the Palouse (H. Ferguson, pers. comm. 2001).

Agricultural Wildlife Assemblages

Hungarian partridge are a common resident in the agricultural fields of the Palouse country (Yocom and Larrison 1977). This species was introduced from Europe in the early 1900's and is an important upland game species. The lack of winter habitat, consisting of trees and shrubs adjacent to grain fields, may be the primary limiting factor for this species in the Palouse Subbasin (Buss 1965).

Ringneck pheasants were first introduced from Asia in1881 (Bent 1963) and are an important upland game bird species. Pheasants feed primarily on waste grain, weed seeds, wild fruits and berries, succulent forbs and graminoids, and insects. Once common throughout agricultural areas, pheasant numbers declined considerably when fencerows were eliminated from nearly all of the region's agricultural fields (Yocom and Larrison 1977). Winter cover is also a limiting factor for this species in the Palouse subbasin (WDFW 1999). Shrub and tree plantings in riparian areas and uplands along with dense wetland cattail patches may help to increase pheasant winter habitat carrying capacity.

Waterfowl are seasonally abundant in the Palouse River Subbasin. Agricultural lands have had a major positive impact on migratory waterfowl species in the Palouse Subbasin as agricultural crops are an important food source. (Ball et al. 1981) This is especially true when mild fall and winter weather does not force ducks and geese to migrate out of the region (WDFW 1999). Cereal grains and other crops grown in this subbasin are a source of food during both winter and spring waterfowl migrations.

Nesting, staging and pair formation all take place in the streams, lakes, temporary ponds, and vernal pools of the Channeled Scablands (Hudson and Yokum 1954) (WDFW

1999). Grasslands, CRP fields, and shrub-steppe habitats provide nesting habitat for ducks and geese.

Steppe grassland/Shrubsteppe Wildlife Assemblages

The Columbian sharp-tailed grouse is listed as threatened in Washington State. This species was found in the Palouse sub-basin as recently as the 1940's and 1950's (Hudson and Yocom 1954). Yocom states that sharp-tailed grouse are now probably extirpated from the Palouse area. Two populations remain in Eastern Washington: one population in central Lincoln County and the other in Douglas and Okanagan Counties (Hays et al. 1998b). The northwest corner of the subbasin lies within WDFW's Sharp-tailed Grouse Management Zone 4 (Figure 6) (WDFW 1995).

The conversion of grasslands to crop production eliminated critical nesting and brood rearing habitat (Yocom and Larrison 1977). Likewise, elimination of brushy upland draws and deciduous trees in riparian areas, used as winter habitat, also contributed to the sharp-tails' decline within the Palouse Subbasin.

Figure 6. WDFW Sharp-tailed Grouse Management Zones.

The sage grouse is classified as a Threatened species in Washington State. The current population in Washington is estimated to be around 1000, with about 700 of the birds residing in a contiguous subpopulation in Douglas and Grant counties (Hays et al. 1998a). Sage grouse no longer are found in the Palouse Subbasin, but did occur in this area as late as the 1940's (Hudson and Yocom 1954) Sage grouse require large continuous expanses of sagebrush punctuated by wet meadows and grasslands (Yocom and Larrison

1977). Habitat alteration is so extreme that it is unlikely re-introduction is feasible in the Palouse subbasin.

White-tailed jackrabbits and black-tailed jackrabbits are closely associated with shrubsteppe habitats. Consequently, their populations have shown some of the same downward trends as other shrub steppe obligates (Leary 1996). White-tailed jackrabbits tend to be closely associated with the more mesic shrub steppe habitats, and black-tailed jackrabbits with the relatively arid and/or disturbed sites. Although population figures are not available, the long-term declines appear to be dramatic.

Washington ground squirrels are a species endemic to Washington and Oregon (Betts 1990), and have declined dramatically in both states (Betts 1999). They are associated with relatively deep soils within shrub steppe communities (Dobler et al. 1996, Betts 1990, 1999). Because the deep soil habitats were preferred areas for conversion, most are now used for dryland and/or irrigated agriculture. The widespread loss and fragmentation of shrub steppe has resulted in dramatic declines in the statewide population of Washington ground squirrels (Dobler et al. 1996). Most of the known populations of ground squirrels are within the Crab Creek Subbasin. The remaining populations appear to be at risk of extinction due to isolation from each other and the continued risk of habitat conversion, fragmentation, and degradation. Recent research in Grant County may reveal additional information on the species.

Big Game Species Assemblages

Mule deer and white-tailed deer occur primarily in shrubsteppe habitat in the subbasin but use other habitats including CRP fields and cereal crops if the cropland is near shrubsteppe. Both species are important game species in the subbasin. Although neither species appears to have declined in recent years, both species clearly have been impacted by the changing landscape in the Columbia Province in general and the Palouse Subbasin in particular. White-tailed deer, and to a lesser extent mule deer, populations have increased in agricultural areas likely in response to the habitat created as a result of the Conservation Reserve Program. Today, increased hunter harvest is encouraged in agricultural areas of the Washington portion of the Palouse Subbasin in order to reduce deer/crop depredation problems. Hunter harvest figures for deer in Game Management Unit 139, which encompasses most of the Washington portion of the subbasin, are listed on Table 6 (WDFW 2000).

Table 6. 1999 deer harvest by species and sex in Game Management Unit 139.

Species	Bucks	Antlerless	Total
Mule Deer	158	23	181
White-tailed Deer	405	59	464
Total	563	82	645

Whitetail deer in the subbasin are susceptible to Epizootic Hemorrhagic Disease (EHD), and outbreaks occur periodically with varying severity. Due to the susceptibility of whitetail deer to EHD and periodic die-offs, inter-specific competition between whitetail deer and mule deer may be insignificant within the subbasin. Both mule and white-tailed deer are very dependant on the shrub and riparian habitats in this subbasin during snowy winter conditions (WDFW 1999).

Elk were present in the shrub steppe habitats of eastern Washington prior to the arrival of settlers (Coullier et al. 1942, L. Lyman pers. comm., G. Cleveland pers. comm.). The current elk population in the Palouse Subbasin is presumed to result from immigration from north central Idaho (WDFW 2001). This herd ranges over several thousand acres in portions of Lincoln, Whitman, and south Spokane Counties. Small numbers of elk have inhabited the breaks of the Snake River in Whitman County since the 1970s. Recently, elk numbers have increased and elk distribution has changed in south Whitman County (WDFW 1999a). Elk in this subbasin provide significant recreational, aesthetic, and economic opportunities. In 1999, 1,964 hunters harvested 185 elk from this sub-herd (WDFW 2000).

Black bears occur occasionally in the shrubsteppe areas of the Palouse subbasin. The highest concentrations of bears, however, are found in the more timbered, mountainous areas of the subbasin located in Idaho. (Hickman 1984) Even though WDFW's Black Bear Management Plan does refer to black bears in this subbasin, the number of bear in this area is very small (Poelker et al. 1973) (WDFW 1999).

Raptor Species Assemblages

Burrowing owls are classified as a State Candidate species for listing in Washington state. Burrowing owls appear to be associated with open habitats, including shrubsteppe, and are declining within most of their historic range in Washington. Some of the declines appear to be related to long-term loss in availability of potential burrows. However, in some parts of the subbasin burrowing owls have declined at locations where burrows are available. The decline in number of burrows may be an indirect result of declines of mammals including rabbits, badgers, and ground squirrels. Burrowing owls appear to be declining in the Palouse subbasin based on incidental observations and recent inventories.

The ferruginous hawk is classified as a Threatened species in Washington State. Three ferruginous hawk territories occur in the Palouse Subbasin within areas of shrubsteppe habitat (WDFW 1996). The regional decline in abundance of ferruginous hawks has been tied to shrubsteppe habitat alteration and fragmentation associated with cultivation and grazing, and with subsequent declines in abundance of prey species. Information suggests black-tailed jackrabbits, white-tailed jackrabbits, and Washington ground squirrels are important prey for nesting ferruginous hawks in Washington. All three species of mammals currently are candidates for listing within Washington due to their low and/or declining abundance. The Washington ground squirrel is also a candidate for federal listing. Research on the Hanford Nuclear Reservation confirmed that adult ferruginous hawks were flying up to 9.5 miles (15 km) off site to forage for pocket gophers, and smaller alternate prey species (Leary 1996). These long flights to foraging areas may reduce adult nest attendance and potentially may increase mortality of young.

Golden eagles are classified as a state Candidate species for listing in Washington. Golden eagles occur in shrubsteppe habitats throughout Washington State. Data collected

since 1987 suggests that < 50% of 200 historic golden eagle territories in Washington are currently occupied. Two golden eagle territories have been documented in the Palouse Subbasin. Reasons for low site occupancy in the subbasin may be related to low prey abundance in shrubsteppe habitats near nest sites. Principle prey, such as black-tailed jackrabbits, white-tailed jackrabbits, and Washington ground squirrels, have declined dramatically, largely as a result of conversion and degradation of shrubsteppe habitat (Leary 1996). A further concern may be toxic lead poisoning, possibly associated with lead shot or bullets in the carcasses of prey (E. Stauber, Washington State University; T. Talcott, University of Idaho).

Bald eagles primarily winter in the Palouse Subbasin (WDFW 1989). No recent nesting has been recorded in this subbasin. Maintaining high quality habitat for prey species such as fish and waterfowl, enhancing nesting opportunities, and protecting potential winter roost sites are critical if bald eagles are to occupy the subbasin year round. The bald eagle population in Eastern Washington is currently increasing (Hickman pers. comm. 2001).

Furbearer Species Assemblages

Raccoon, coyote, bobcat, badgers, mink, muskrat, beaver, river otter are the primary furbearers in the Palouse Subbasin. All but the coyote and muskrat are significantly lower in abundance than they were historically. In general, the declines appear to be related to an overall decline in habitat quality with an associated decline in food and/or prey base (Errington 1961).

Priority Habitats and Species Assemblages

Meeting or exceeding the needs of wildlife within the Palouse River Subbasin is, and will remain, a major component of any management plan development process. Of particular interest are the needs of priority habitats and species. WDFW's Priority Habitats and Species (PHS) program was developed to provide management recommendations for species and habitats that are of concern in Washington State. Priority species are wildlife species[3] requiring protective measures for their perpetuation as a result of their population status, sensitivity to habitat alteration, and/or recreational importance. PHS species for the Palouse Subbasin are shown on Figure 7.

Priority Habitats are habitat types with unique or significant value to many species. An area classified and mapped as "priority habitat" must have one or more of the following attributes:

1. Comparatively high wildlife density
2. High wildlife species diversity
3. Important wildlife breeding habitat
4. Important wildlife seasonal ranges
5. Important wildlife movement corridors
6. Limited availability

[3] The term "wildlife" is used here to include invertebrates, fish, shellfish, and terrestrial and aquatic vertebrates.

7. High vulnerability to habitat alteration
8. Unique or dependent species

Within the Palouse River Subbasin a subset of these priority habitats are of focused importance and concern and include:

1. Riparian areas
2. Cave habitat
3. In-stream habitat
4. Cliff/talus habitat
5. Snag habitat
6. Wetlands and deep water habitats
7. Old-growth/mature forests
8. Big game winter range (concentration areas) and migration corridors
9. Shrubsteppe and native grasslands

Habitat features that are not classified as priority habitats, but are critical to the diversity, abundance and distribution of wildlife include roadless or restricted access areas, refuges, and isolated “island” habitats. Within the Palouse Subbasin, these are often woodlots, contiguous stands of younger forest, deciduous and mixed forest types, shrublands, grasslands, ravines, fallow fields, and small springs and seeps.

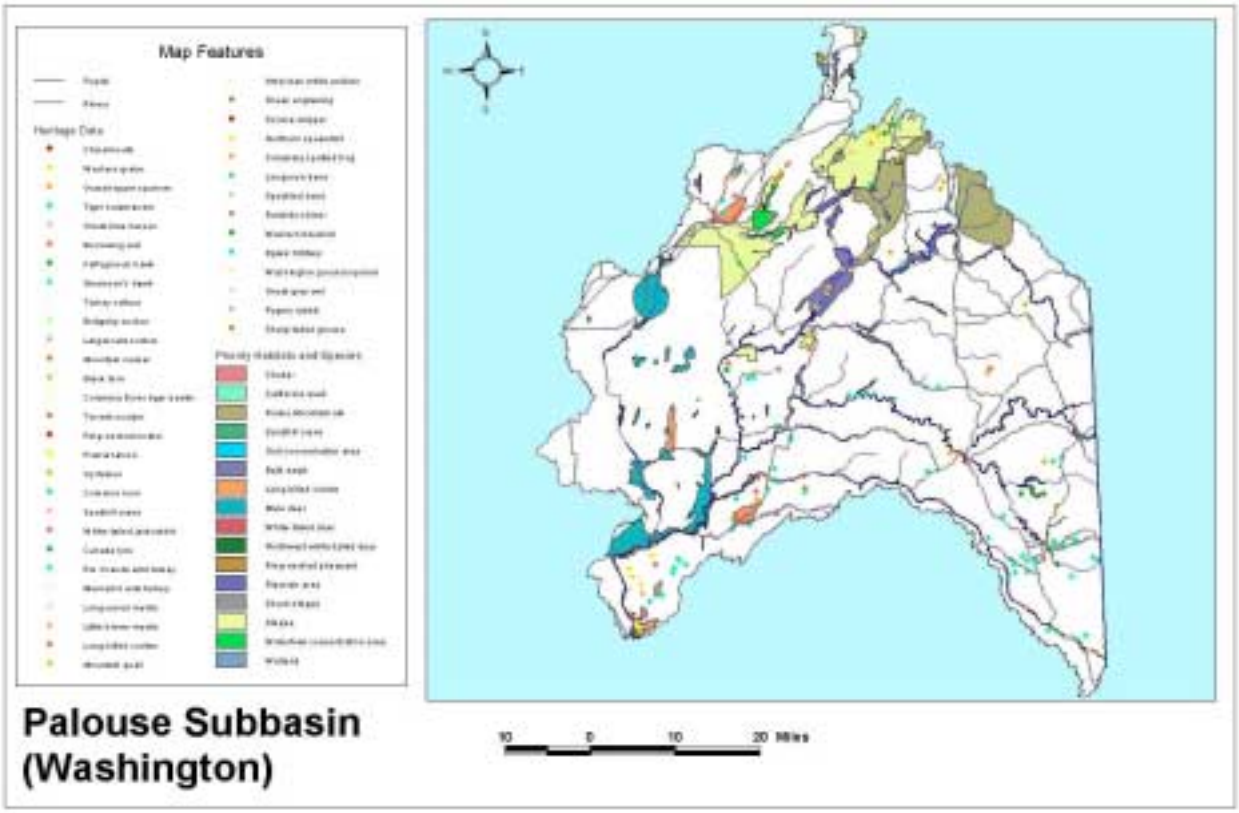

Figure 7. Palouse Subbasin Priority Habitat Species map.

WDFW PHS management recommendations are designed as guidelines to direct, rather than to dictate site-specific activities. Because the recommendations are generalized to cover the entire state, site-specific plans are generally developed to adapt recommendations to best meet local conditions. Prior to implementing PHS management recommendations, applicable resource management agencies and private landowners should be consulted.

Other Species Assemblages

Ten species of bats are found in this subbasin (Howard Ferguson pers. comm. 2001). Basalt cliffs and talus slopes provide both maternity and hibernaculum opportunities. These crepuscular insectivores feed primarily near riparian areas and waterways. Bat species found in the Palouse subbasin are listed in Table 7.

Table 7. Bat species found in the Palouse Subbasin.

Common Name	Genus/Species
Little brown bat	Myotis lucifugus
California myotis	Myotis californicus
Spotted bats	Euderma maculatum
Longlegged myotis	Myotis volans
Big brown bat	Eptesicus focus
Fringed myotis	Myotis thysanodes
Townsend's big-eared bat	Corynorthinus townsendii
Yuma myotis	Myotis yumanensis
Pallid bat	Amtrozous pallidus
Hoary bat	Lasiurus cinereus

Neo-tropical migratory birds are dependant on wetlands, grasslands (shrub-steppe), riparian, and timbered habitats in this subbasin. The mosaic of the landscape determines the distribution and abundance of these songbirds. Agricultural lands have had a huge impact on native migratory species in the Palouse Subbasin (Howard Ferguson pers. comm. 2001) by creating large habitat monocultures (croplands), eliminating habitat corridors, and increasing habitat fragmentation.
Introduced wildlife species include European starling, house sparrow, valley quail, ringneck pheasant, and Hungarian partridge (Hickman 1984, Hickman 1990). The starling and sparrow are detrimental and nuisance species and are non-protected species in Washington (WDFW Hunting Regulations 2000).

Wildlife (Idaho)

In Idaho, a range of habitat types in the IPRS allows for a diversity of wildlife species. According to the Idaho Conservation Data Center (CDC) and Groves et al (1997), IPRS includes 11 species of amphibians, 10 species of reptiles, 141 species of birds, and 63 species of mammals (IA2). This list includes only those animals that breed in the IPRS. There are several species of birds that winter in the IPRS but breed elsewhere. With the

exception of game animals, little funding has been allocated to assess distribution, population trends and limiting factors for most of these species. Therefore, this list is dynamic and should not be considered complete.

Threatened and Endangered Species

Lynx (Federally listed as threatened) have been documented in the IPRS, with the last known sighting of lynx in 1994. No other information on their population status exists. Lynx in Idaho need early successional forests for foraging, and mature forests for denning. Their diet consists of small mammals and birds, particularly snowshoe hares (Groves et al 1997).

Bald eagles (Federally listed as threatened) winter along the Palouse River, but the number is not known. There has been no documented nesting on National Forest System lands in the IPRS (CNF 1998).

Gray wolf, which are listed as an endangered, experimental nonessential population south of Interstate 90 near Couer d'Alene, have not been recently documented in the IPRS but are known to occur in the adjacent Clearwater River subbasin (Groves et al 1997; Nez Perce Tribe 2000).

Grizzly bear, listed as threatened, historically occurred in the IPRS but there have been no recent sightings (CDC 2000). Occupied habitat is generally mostly arctic or alpine tundra and subalpine mountain forests, which are not found in the IPRS.

Rare Species

Rare species are defined for this document as those listed as State Species of Special Concern, Federal Proposed or Listed Threatened or Endangered, or Federal agency sensitive species. These species, their rankings and status are given in IT2.

Mountain quail are native to the IPRS. Found in brushy mountainsides, coniferous forests, forest and meadow edges, and dense undergrowth (Groves et al 1997), sightings as recent as 2000 have been made near Moscow Mountain. The population in Idaho has been declining for the last 30 years, and mountain quail status in the IPRS is unknown.

Sharp-tailed grouse (*Tympanachus phasianellus)* were endemic to the Palouse Prairie prior to the major conversion to agriculture. This species has not been documented in the IPRS since the mid 1950s.

Little is known about the population size and distribution of the remaining rare animals in IT2.

Game Animals

The IDFG manage several species of wildlife as game animals. Those occurring in the IPRS include white-tailed and mule deer, elk, black bear, mountain lion, moose, upland game (wild turkey, ring-necked pheasant, chukar, gray partridge, California quail, blue grouse, ruffed grouse, spruce grouse, mourning dove, rabbits and hare), waterfowl and furbearers (fisher, marten, beaver, otter mink, muskrat, bobcat, red fox, coyote, raccoon and badger). The IPRS lies within Game Management Unit (GMU) 8 and a portion of 8A. Depending on the species, a GMU may be part of a larger Analysis Unit for species management, based on similar habitats and management goals.

White-tailed Deer
Populations of white-tailed deer in the Palouse were low until the early 1900s when settlement and fires changed the landscape. Land was cleared for agricultural purposes, and logging converted dense forests into a mosaic of succession types. Populations probably peaked in the 1940s-1950s, followed by a decline. Given their secretive habits and preference for densely canopied cover, white-tailed deer are extremely difficult to enumerate. Because of this, IDFG has no efficient tool for determining historic population abundance or annual population changes. Harvest levels and hunter effort are estimated using sampling techniques. The population is monitored through harvest surveys, which suggests that the population is increasing.

Mule Deer
Like white-tailed deer, populations were historically low in the IPRS, and populations there remain low. Mule deer prefer more open habitats of grassland-shrub types. This subbasin is on the northern edge of the mule deer distribution in Idaho. As habitat types limit mule deer numbers, the mosaics in habitats including forests, grassland, brushfields and agricultural crops favor white-tailed deer. The population is monitored through harvest surveys. The population appears to be small but static.

Elk
Historically, elk herds were scattered and numbers low in the IPRS. Elk numbers did not significantly change until the wildfires of 1910, 1919 and 1934 burned over large areas, creating winter habitat highly desired by elk. Maturation of brushfields, loss of winter range and increased vulnerability of elk to hunters due to logging and road building, coinciding with either-sex hunting, caused a decline of elk numbers in the 1950s-1970s. Timber harvest in the 1980s and 1990s in much if Unit 8A opened up forests to early successional habitat, and an increased availability of crops such as lentils, rapeseed and grain have bolstered populations. A switch to antlered-only harvest in 1976 with antlerless harvest by controlled permits only increased populations.

For elk management, the IPRS combined with GMU 11A to form the Palouse Zone in 1990. Population criteria are set to represent a reasonable balance between depredation concerns on private lands, and the desire to provide a reasonably large elk population. Unit 8A's trend shows a stable population, suggesting that cow harvest is appropriate. Elk productivity is high (40 calves:100 cows), which justifies a liberal season length and harvest and indicates a resilient population. Late season antlerless only hunts have been effective at controlling the population.

Black Bear
The IPRS falls within two black bear Data Analysis Units (DAU), 1D and 1E. DAU 1D contains GMU 8A, where Western red cedar habitat types, lush forb associations and a variety of berry species have historically, and continue to provide, productive habitat for black bear. Road densities are high, contributing to easy hunter access and high harvest. Recently, most of the harvest has been of subadults, likely dispersing (IDFG 2000). DAU 1E contains GMU 8, where the predominant habitat type is agricultural, and bear habitat is fragmented. Road access is limited, and the harvest rate has been lower. Even though the habitat and landownership is different between the two analysis areas, management

objectives are to maintain current harvest levels. Mandatory hunter check-in of bear, as well as bait station surveys, help determine population size, sex and age structure and aid in setting management goals.

Mountain Lion

It is not known what the historic mountain lion population was in the IPRS. Currently, mountain lion numbers have increased in response to healthy white-tailed deer, elk and other prey populations. The IPRS lies within DAU 2-1. Mandatory hunter check-in of hide and skull provides an index of population size, sex and age structure. Harvest has increased in both units and hunting seasons have been liberalized recently in response to an increase in reported harvest and depredation complaints.

Moose

The historical numbers of moose in the IPRS is not known. However, the population has increased significantly within the last 20 years. Logging, which created favorable shrub response, coupled with bulls-only elk hunting which reduced the number of antlerless moose killed during open seasons, set the stage for increased numbers of moose. Current populations are incidentally surveyed in conjunction with aerial surveys for elk. Consequently, some moose are not counted as the surveys are seldom flown at elevations where moose normally winter. Moose prefer dense subalpine fir (*Abies lasiocarpa)* and pacific yew (*Taxus brevifolia)* plant associations (IDFG 2000), little of which is found in the IPRS. Favored summer habitats include open wet meadows adjacent to forested areas and shrub fields created by disturbance. Moose populations have been managed statewide under controlled hunt, once-in-a-lifetime bulls-only permits. The IPRS is no exception. Permit levels are based on trends in antler spread of harvested moose and hunter success rates of recent permittees. Recently, however, antlerless permits have been initiated in GMU 8 and 8A to increase hunting opportunity and address high cow densities.

Upland Game

Eleven pheasant brood routes are conducted annually in the IDFG Clearwater region to monitor pheasant population trends. Only one lies within the IPRS. Other species recorded in the survey include California quail, gray partridge, mourning dive, cottontail rabbit and raptors. Upland game populations in the region have been at reduced levels since intensive farming practices removed critical habitat. Limiting factors include inadequate winter cover, loss of large blocks of undisturbed nesting cover and available food sources. Most upland birds reside in the lower Palouse River basin associated with agricultural ground and lower snow depth accumulation.

Ruffed and blue grouse and wild turkeys inhabit the timbered regions of the IPRS. Turkey introductions into the IPRS began in the middle 1970s. The IDFG does not have a reliable census method for turkeys, although informal surveys of wintering grounds give some estimate of population numbers and distribution. Population status and trend can be inferred to a limited degree from harvest trend and turkey distribution. This information suggests that numbers are increasing and distribution is expanding through out the area

Furbearers
The IDFG has not conducted any coordinated surveys for furbearers in the IPRS. Instead, furbearer population trends are tracked by mandatory trap harvest reports that are summarized by species. Harvest data for bobcats are the most complete because hunters and trappers are required to have all animals tagged by IDFG. Tooth data have been used to evaluate the sex and age composition of the harvest. As data are only reported by region, the harvest in the IPRS cannot be separated out.

Non-target catches are reported for those animals for which there are no open season. Fisher and lynx are closed to harvest. Otter currently have a regional take quota of 17. There has been a closure to beaver harvest in Latah County since the early 1990s. Trapping participation has dropped due to successive years of low fur prices. Most furbearer animal populations are likely increasing in the IPRS due to reduced harvest, but the extent is not known.

Waterfowl
Waterfowl population surveys are not conducted in the IPRS. Monitoring of Habitat Improvement Program (HIP) waterfowl projects determine the effectiveness of this program in improving habitat to attract more migrating and wintering birds. Increases in local duck and Canada goose production have been documented. The HIP program provides matching funds for construction of ponds of at least one acre and Canada goose nest boxes. Most waterfowl habitat in the IPRS is riparian associated wetlands along the Palouse River and tributary streams. Small isolated wetlands, and seasonally flooded cropland provide little waterfowl habitat. Many small farm ponds have been constructed by private landowners, primarily for recreation (fish ponds) and livestock water resources. These provide marginal waterfowl nesting habitat, though deep ponds do provide some diving duck habitat. Developed and improved wetlands meeting HIP guidelines are providing good nesting and brood-rearing habitat for local ducks and geese.

Other Wildlife
Neo-tropical migratory birds, raptors and bats are important components of the IPRS. While broad-scale distribution maps have been generated based on select large-scale habitat characteristics (Groves et al 1997), little is known about the status of the remaining mammalian, avian, and herp species known to occur in the IPRS. A small number of studies have occurred to try and obtain this information. These include the Northern Region Landbird Monitoring Program, Potlatch Corporation Bird studies, university studies and graduate projects.

Habitat Areas and Quality

Washington
The Palouse Subbasin in Washington State was dominated by bunchgrass steppe vegetation prior to settlement by Europeans (Daubenmire 1970). During the past 125 years the Palouse bioregion has undergone extensive biophysical and anthropogenic induced changes due primarily to advances in agricultural technology. As a result, little of the original Palouse steppe grassland remains (Figure 8 and Figure 9).

Buss (1965) suggested that early pioneers homesteaded in the valleys and canyons and that deep soil grasslands were the first areas to be converted to commercial crop production, followed by steeper slopes as farming became more mechanized. Domestic livestock brought into the Palouse Region by settlers overgrazed riparian zones and rangelands and contributed towards habitat fragmentation.

Today, private lands are the largest component of this subbasin (Figure 4). Over ninety percent of these lands are in grain crops or livestock pasture. The lack of early natural history studies in the subbasin hinders our ability to fully understand the ecological changes that have occurred on the Palouse Prairie.

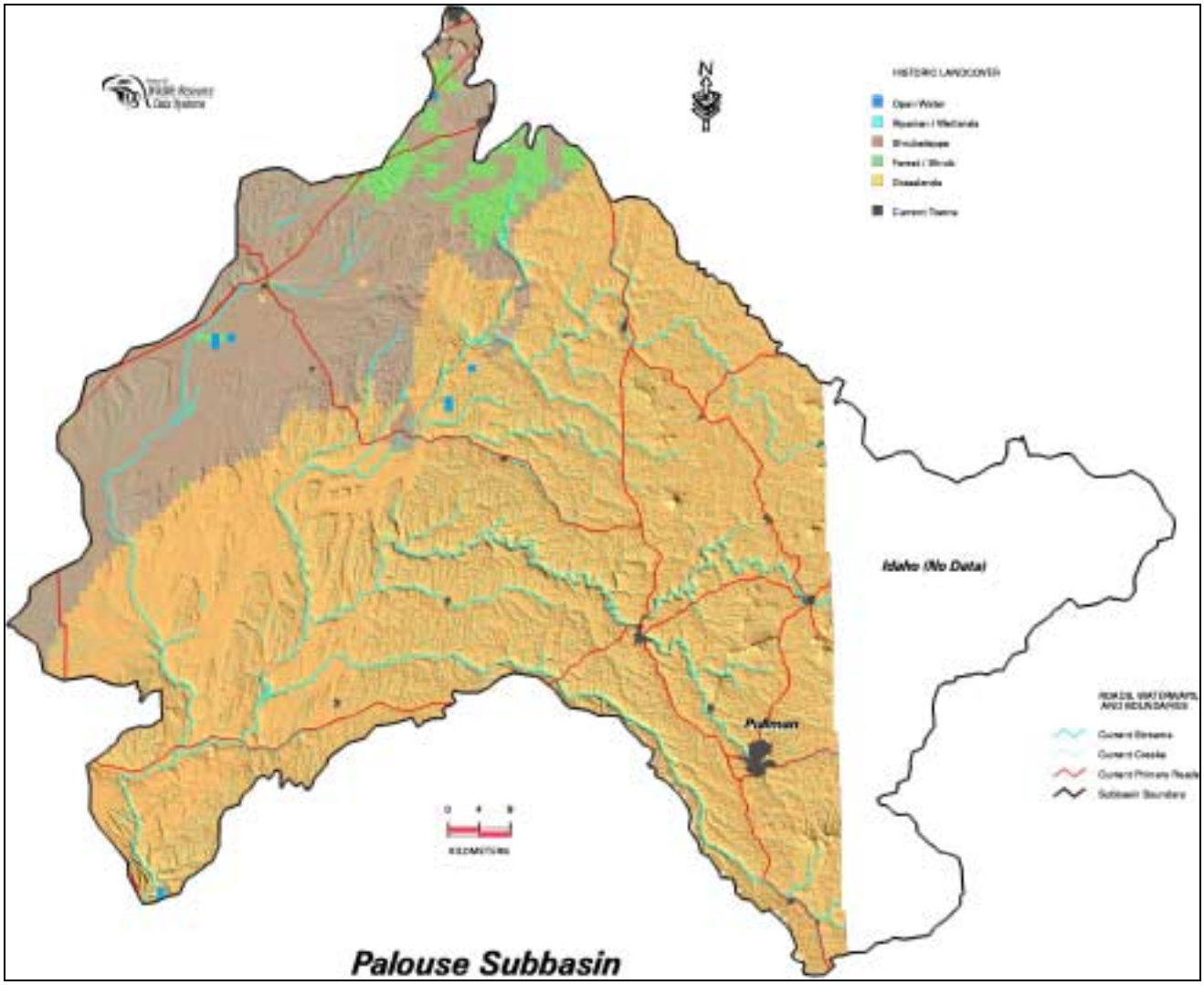

Figure 8. Historic cover types in the Palouse Subbasin.

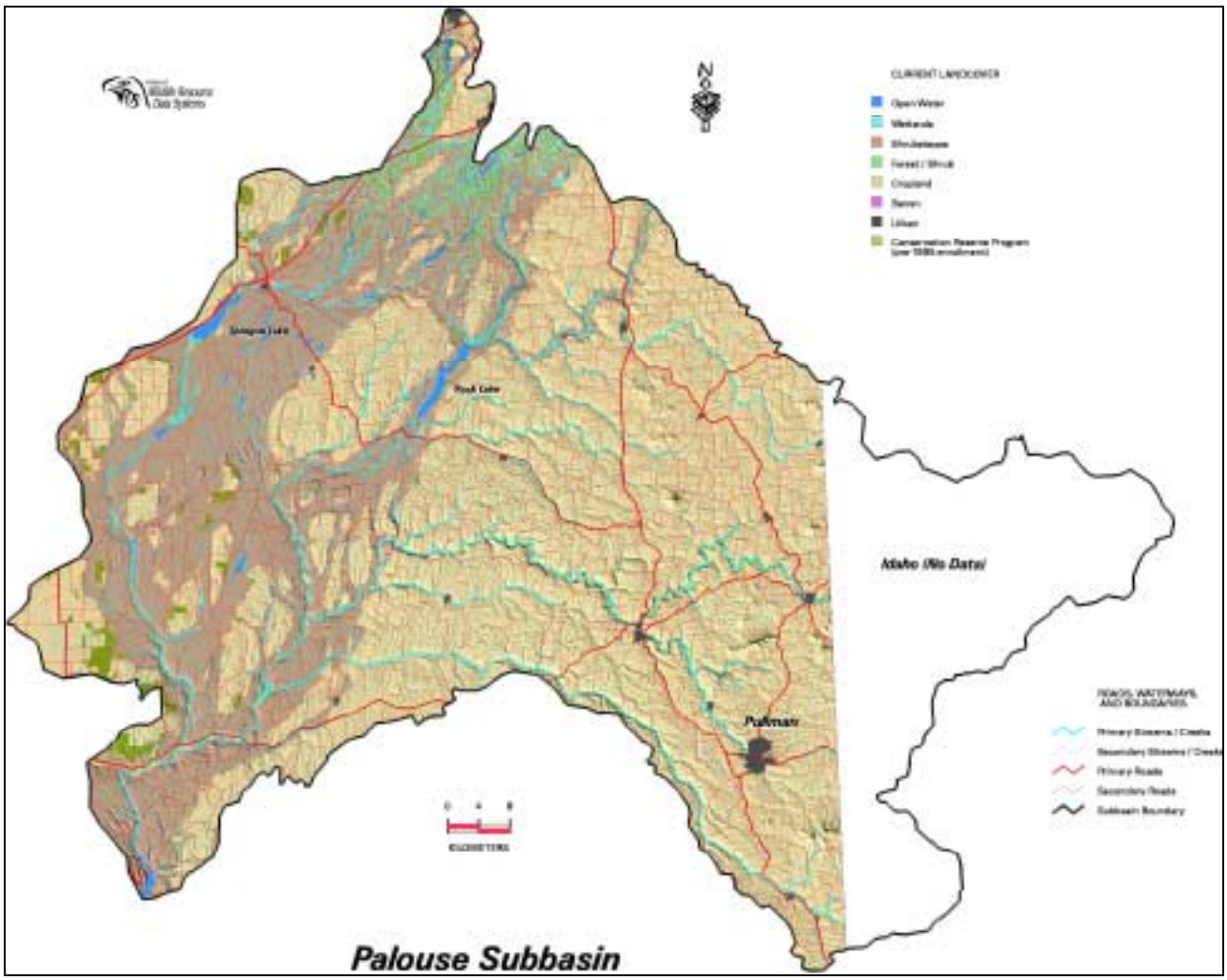

Figure 9. Present cover types in the Palouse Subbasin.

With the onset of Euro-American settlement, and associated activities such as farming, logging, mining, ranching and urbanization, changes have occurred in stream corridors, riparian areas and associated uplands. Currently, aquatic resources in the IPRS are generally fair to poor, due to land management activities and natural events on both public and private land.

On National Forest lands in Idaho, road densities are some of the highest in the area, averaging 4.9 miles of road per square mile, and are believed to be the primary impact on erosional processes (CNF 1998). Debris torrents and numerous landslides have been caused by road fill failures, causing high sediment inputs into many streams. Roads built down riparian and stream corridors have straightened and confined channels. Timber harvest has increased the potential for mass wasting and erosion, while livestock grazing after logging can further exacerbate erosion and bank instability. Mining in several tributaries in the upper watershed totally altered the stream channel by straightening and

moving the stream. Vegetation and woody debris have been removed, increasing water temperatures in the wide, shallow channels. Even though there is evidence that peak flows are increasing in the forest, they are less able to flush sediment and bedload out of the system (CNF 1998). Cobble embeddedness is high in most streams. Surveys conducted by contractors for the CNF show that a number of streams on National Forest lands can be characterized by fair to poor substrate conditions, fair to good riparian conditions, and fair rearing habitats (CNF 1998).

On private land, removal of the original prairie vegetation in the rich loess soil has accelerated surface erosion to extremely high rates compared to historic levels (CNF 1998). Many once-intermittent streams are now farmed, and many perennial streams with large wet meadows adjacent to them are now intermittent or deeply incised, and the adjacent meadows seeded to annual crops (Black et al 1998). Stream channels have been straightened and deepened to reduce flooding of cropland and to make it easier to farm. Livestock grazing in meadow and riparian habitats has decreased bank stability, impacted native vegetation and allowed for the invasion of noxious weeds. Extensive road networks were built to move commodities to elevators and market, increasing erosion risk and fish passage problems. Roads were often built down the middle of the channel, the stream turned into road ditches, and important limited corridors of Douglas hawthorn and alder were removed. Expansion of urban areas affect 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. Nutrient inputs from agricultural and urban lands have had a negative impact on water quality. Changes in floodplain characteristics, the practice of wetland draining and changes in runoff peaks have affected the ability of the aquifer to recharge. Replacement of perennial grasses with annual crops has resulted in more overland flow and less infiltration, which translates at a watershed level to higher peak flows that subside more quickly than in the past. The result is more intense erosion and loss of perennial prairie streams (Black et al 1998).

Low flows in late summer, coupled with high temperatures, sediments and nutrients, affect streams ability to support most beneficial uses. Eight stream segments (Deep, Flannigan, West Fork Rock, Gold, Hatter, Big and Cow creeks and the South Fork Palouse River) are listed by IDEQ as water quality limited. Nine streams within National Forest lands exceed Forest Plan Standards for sediment (CNF 1998). The streams include Gold, Jerome, Blakes Fork, Wepah, Strychnine, Dry Fork, Little Sand and Bonami creeks, and the North Fork Palouse River.

Agricultural Lands

Prior to 1870 the rolling hills of the Palouse Basin in Washington State were covered by grassland prairie (steppe grassland). Virtually all-arable land in the basin was settled from 1870-1885. Early settlers cleared trees in the lowlands, shrubs on the steep north sides, and burned and plowed the prairie grasses to plant crops. In addition, miles of fence were built to contain livestock and act as property boundary markers. Most of the early agricultural production was used to satisfy settler needs.

In the early 1880's, railroads delivered tractors to farmers and returned to eastern markets with valuable agricultural products. The railroad system created a cost effective way to move farm commodities throughout the country. This helped stimulate increased

agriculture production. The use of tractors to cultivate the Palouse changed the lush grasslands to black cropland virtually overnight. Today, there are approximately 1,231,000 acres of cropland in the Palouse River Basin. (USDA, 1978)

Technology and farm practices used for farming the Palouse were the same used to farm the flat lands of the Midwest. As a result, the Palouse hills suffered from severe soil erosion. The soils that eroded from the Palouse hills entered the streams and wetlands causing them to fill with sediments. Unable to hold water from spring run-off and cloudbursts, streams would flood wreaking havoc on settlements and agricultural fields alike. Farmers responded by digging out and channeling the streams to prevent additional flooding and to assist with the further draining of agricultural fields.

Currently, erosion on the Palouse has been estimated at 14 tons per acre per year from all cropland areas (USDA, 1978). This equals approximately 17 million tons per year. Three million tons of that soil ends up in the streams and rivers as sediment leaving the basin. It has also been estimated that all of the topsoil on 10 percent of the cropland has washed away with most going into salmonid bearing rivers such as the Snake and Columbia.

Most streams within the Palouse Subbasin are now managed as drainage ditches and not for wildlife. Farmers have removed riparian vegetation and channelized the streams and rivers leaving no shade to cool water temperatures, no large woody root wads to stabilize stream banks, few in-stream structures, and little wildlife habitat. Moreover, there is no buffer between tilled ground and streams. Tillage occurs up to the water's edge in some cases. Weed control practices designed to improve stream channel drainage and reduce flooding also eliminates riparian habitat. Likewise, adjoining wetlands have been drained allowing wetlands to be farmed. The cumulative impacts of these practices have severely reduced or eliminated the riparian habitat and the wildlife and fish species depending on that habitat.

Today, well-manicured wheat and barley farms cover the rolling hills of the Palouse. The streams have been channelized and the wetlands have been drained. Continuous tillage of the land has either pushed many of the native prairie wildlife species such as jackrabbits, ground squirrels, and sharp-tailed grouse into untilled portions of the basin, or caused their extirpation from the subbasin. Only wildlife species that have been able to adapt to constantly tilled ground with relatively little thermal cover initially thrived in the Palouse, i.e., ringneck pheasant, Hungarian partridge, and certain migratory waterfowl. Pheasant and partridge numbers have declined over time, as intensive "clean" farming practices have increased.

The Conservation Reserve Program (CRP) is responsible for increasing habitat for many wildlife species depressed by agriculture. The Conservation Reserve Program requires farmers to take farm ground out of production for ten years and plant grass and/or trees and shrubs instead of farm commodities. The habitat diversity and increased edge effect provided by CRP fields interspersed within agricultural lands in the Palouse Subbasin has significantly benefited elk, mule deer, white-tailed deer, neo-tropical birds, and upland birds. Fish have also benefited from the CRP because of reduced soil erosion and less sediment entering streams.

Steppe grasslands

Most of the original perennial grass prairie in the Washington Palouse subbasin was eliminated by 1900. Prior to 1900, native grasslands occurred in three zones (Daubenmire 1970). The more mesic zone, located on the wet eastern edge of the Palouse Prairie, was dominated by Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Psuedoregneria spicata*).

The drier western portion of the Palouse Prairie was dominated by bluebunch wheatgrass. A third distinctive community occurred in the Snake River and Clearwater River canyons. These areas were considerably warmer and drier than the prairies and supported a sparse bunchgrass/shrub community. Canyon draws and water seeps supported a wide variety of shrub species including hawthorn (*Crataegus spp.*) and mock orange (*Philadelphus lewisii*).

Native perennial bunchgrasses and shrubs are presently found only on a few "eyebrows" on steep slopes surrounded by wheat fields, or in non-farmed canyon slopes and bottoms within agricultural areas. Where present, alkali sites are still predominantly giant wildrye (*Elymus cinereus*) and salt grass (*Distichlis stricta*). Throughout much of the subbasin, native grasslands have been replaced by agricultural crops or severely reduced as a result of competition from introduced weed species such as cheatgrass (*Bromus tectorum*).

Shrublands

Shrublands were historically associated with two broad habitat classifications: steppe grasslands and shrubsteppe. Steppe grasslands have been converted primarily to cropland while most shrubsteppe areas, traditionally used as livestock pasture, were altered less severely and still support native shrub species.

Climax shrub communities comprised of snowberry *(Symphoricarpos spp*.), black hawthorn (*Crataegus douglasii*), serviceberry (*Amelanchier alnifolia*), currant (*Ribes spp*.) and rose (*Rosa spp*.) grew on the north slopes of many of the loess hills (USDA 1980) throughout the steppe grasslands. Although relatively rare today, shrub communities associated with grasslands can still be found along some of the main drainages such as the Palouse River.

Shrubsteppe habitat is found primarily in the xeric western portion of the subbasin and is comprised of rabbitbrush (*Chrysothamnus spp.*), three-tip sagebrush (*Artemisia tripartita*), big sagebrush (*A. tridentata),* stiff sagebrush (*A. rigida*), and bitterbrush (*Purshia tridentata*) (USDA 1980). In contrast, greasewood (*Sarcobatus vermiculatus*) dominates alkali sites. Under heavy grazing pressure and/or disturbance regimes, rabbitbrush increases and introduced herbaceous vegetation such as cheatgrass supplants native bunchgrasses and forbs (USDA 1980). Although only approximately 16 percent of Whitman County is currently comprised of shrubsteppe habitat (USDA 1980), it is extremely valuable to a myriad of wildlife species.

Climate and edaphic factors that influence shrub community composition include: annual precipitation, soil depth and type, and aspect. Modifying factors such as livestock grazing, fire frequency, brush control, insect activities, drought cycles, management activities, and wildlife utilization impact both seral and climax shrub communities.

Timbered Uplands

Historically, forest communities occupied higher elevation areas within the subbasin. On warmer sites, ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) grew with a shrub understory comprised of oceanspray (*Holodiscus discolor*), ninebark (*Physocarpus malvaceus*), serviceberry (*Amelanchier alnifolia*), snowberry, and wild rose. Cooler north- and west-facing canyons supported western redcedar (*Thuja plicata*), grand fir (*Abies grandis*), and western larch (*Larix occidentalis*) (Daubenmire 1970).

Today, the Palouse subbasin has more than 200,000 acres of forestland with nearly 163,000 acres occurring in Idaho. Mountain forestlands of Idaho include the following five major tree associations: ponderosa pine, western white pine (*Pinus monicola*), western hemlock (*Tsuga heterophylla*), grand fir, and Douglas fir. In comparison, most of the Washington forest is in the northern channel scabland area and is comprised largely of ponderosa pine (USDA 1978) with a bluebunch wheatgrass/Idaho fescue grass understory (bluegrass and cheatgrass are found on disturbed sites).

Elsewhere in the Washington Palouse, forestlands grow in narrow bands along streams where soils are deep enough to support tree growth and where moisture/precipitation is adequate. Ponderosa pine is found on well drained soils while cottonwood, aspen (*Populous tremuloides*), and willow (*Salix spp*.) dominate poorly drained sites (USDA 1978). There are very few forested public lands in the Palouse subbasin and private timberlands are widely dispersed, and in many cases, are over harvested. Less than one percent (<10,000 acres) of Whitman County is currently forest woodland (USDA 1980).

Riparian

True riparian communities were largely limited to the Palouse and Potlatch Rivers and to the broad outwash plains along sections of the Snake and Clearwater Rivers. These riparian zones supported a narrow gallery forest of plains cottonwood (*Populus deltoides*), quaking aspen (*P. tremuloides*), mountain maple (*Acer glabrum*), and red alder (*Alnus rubra*) (Daubenmire 1970). Today, little riparian vegetation can be found in the Palouse subbasin due to intensive land use practices including agriculture and livestock grazing. Palouse subbasin riparian/floodplain habitat is in jeopardy because of timber harvest and overuse by livestock (Buss 1965). Even though the extremely limited remaining riparian habitat is of poor quality and fragmented, its overall importance to wildlife cannot be ignored. Currently, riparian buffers average 9.1 m for Palouse River tributaries (Washington State Forest Practices Board 1988).

Wetlands

Historically, wetlands were important but scattered throughout the Palouse Subbasin (Black, Scott et al.1998). The vegetation was diverse and typically dominated by camas (*Camassia spp.*), a mixture of forbs, and grasses. Wetlands in the Palouse Region of Southeastern Washington were formed under the following geologic, physiographic, and climatic conditions.

The Wanapum and Grande Ronde basalt flows laid down thick layers of basalt over what is now known as the Palouse Region. These basalt layers were covered in most areas with several feet of wind-blown sediment known as loess. This loess came from natural wind erosion on lands located in south-central Washington and north-central Oregon (loess

is characterized as having a silt-loam texture and a high water holding capacity). Loess was deposited in undulating dunes from ten to hundreds of feet high. The texture of the loess exhibited a higher sand content in the southwestern portion of the Palouse and higher clay content along the downwind edge (Personal communication, Jim Johnson, 2001).

Palouse wetland soils exhibit different properties than soils found on more xeric sites. Soils deprived of oxygen change through the movement of ions, especially iron and manganese to form mottles (or more correctly redox indicators). Wetland scientists use mottles to help identify wetlands. The Palouse loess has high amounts of iron and does not readily show mottles in wetland areas.

Annual precipitation varies in this region from 10 – 23 inches. In late winter and early spring, there is often rain accompanied by sudden snow thaws resulting in high runoff events and flooding of areas adjacent to streams and rivers. Most wetlands are ephemeral and are filled by flooding along streams and rivers and/or melted snow (shrubsteppe areas). These wetlands are recharged by surface flood events instead of ground water recharge.

Occasionally, springs form and flow from either basalt outcrops or perched water tables. Water retained by soils infiltrates through the loess and cracks in the basalt into aquifers. Localized springs can emanate from water trapped between two basalt flows, or in the areas of higher clay content, perched water tables (a shallow clay layer (argillic horizon) forms and serves to perch infiltrating water).

Native wetland vegetation initially consisted of hairgrass (*Deschampsia spp*.), camas, sedges (*Carex spp.*), rushes (*Juncus spp.*), shrub and tree willows (*Salix spp*.), aspen and cottonwood. Recently this vegetation has been replaced by Reed canary-grass (*Phalaris arundinacea*). Grazing along riparian areas reduces the incidence of canary-grass and increases Kentucky bluegrass (*Poa pratensis*) (Personal communication, Jim Johnson, 2001)

Most of the crops grown in the Palouse do not tolerate flooding. Many streams along cropland have been straightened and dredged, or tiled to lower the water table and facilitate production of small grains. This coupled with removal of riparian/wetland vegetation, that filtered water going into streams and rivers, and clean farming methods results in high sediment loading and water temperatures, which reduce fish spawning opportunities in the Palouse River and its tributaries.

In the Palouse Region an estimated 98% of the wetlands have been drained or altered by drainage ditches, tile lines, tree and shrub removal, and straightening of natural watercourses. Of the 97,000 acres of wetlands in parts of Lincoln, Spokane, Adams, Whitman and Latah Counties, 95,000 acres have been converted to farmland.

Urban Areas

While urban areas comprise only a small percentage of the land base within the Palouse subbasin (<3%), their habitat impact is 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. Changes in vegetation, associated with landscaping, eliminates habitat for some wildlife species such as cavity nesters and shrub-steppe species, while enhancing habitat for others (eg. robins, finches, English sparrows, skunks, raccoons). Similarly, anthropogenic induced disturbances such as noise, increased vehicle traffic, and household pets also negatively impacts some wildlife species.

As the human population increases, additional impacts to riparian areas and other habitats are inevitable.

Idaho

Historically, the landscape was dominated by mixed grass prairie, composed of many species of perennial bunchgrasses, and which supported a high proportion of forbs and shrubs (Daubenmire 1942, Weaver 1917, Davis 1952, Kuchler 1966). On more developed soils, Idaho Fescue/Snowberry association dominated and included Idaho fescue (*Festuca idahoensis),* big bluegrass (*Poa sandbergii),* and minor amounts of bluebunch wheatgrass (*Pseudoroegneria spicata*, formerly *Agropyron spicatum*), together with shrubs such as common snowberry (*Symphoricarpos albus*), serviceberry (*Amelanchier alnifolia*), and rose (*Rosa woodsii*, *Rosa nutkana, and Rosa gymnocarpa*). On drier sites, the grassland was dominated by the Bluebunch/Idaho Fescue community, which was characterized by bluebunch wheatgrass with Idaho fescue and junegrass (*Koeleria cristata*). Forbs typically provided a high proportion of cover on the Palouse Prairie; typical forb species included yarrow (*Achillea millefolium*), prairiestar (*Lithophragma* spp.), prairie cinquefoil (*Potentilla gracilis*), sticky purple geranium (*Geranium viscosissimum),* little sunflower *(Helianthella uniflora),* arrowleaf balsamroot (*Balsamorhiza sagittata*), silky lupine (*Lupinus sericeus*), and Spalding's milkvetch (*Astragalus spaldingii*).

Much of the area formerly dominated by prairie has been converted into cropland. The grasslands intergrade into other important types of vegetation: poorly drained low areas historically dominated by common camas (*Camassia quamash*), and deciduous stringers along intermittent and perennial waterways, dominated by red-osier dogwood (*Cornus sericea*), black cottonwood (*Populus trichocarpa*), Douglas hawthorn (*Crataegus douglasii*), and cow-parsnip (*Heracleum lanatum*). Drier and lower forested areas are dominated by ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesi*), grand fir (*Abies grandis),* with understory dominants of ninebark (*Physocarpos malvaceus*), ocean-spray (*Holodiscus discolor*), Rocky Mountain maple (*Acer glabrum*), and Scouler's willow (*Salix scouleriana*). Herbaceous vegetation in these forests includes elk sedge (Carex geyeri) and blue wildrye (*Elymus glaucus*). Higher, moister elevations supported western white pine (*Pinus monticola),* lodgepole pine (*Pinus contorta),* and western larch (*Larix occidentalis),* while western red cedar (*Thuja plicata*) was present in colder drainages. A mosaic of age, structure and successional classes characterizes all these forests. Plant communities were strongly influenced by recurrent fire, which sustained the diversity of habitats and species.

Currently, six major vegetation types are recognized in the Palouse Range (Sappington 1989). These include cultivated fields, marshes, grasslands (including steppe and meadow steppe), brush lands, Ponderosa pine forests and mountain forests. The six vegetative types can be divided into 23 habitat types by use of subdominant vegetation, amount of moisture and other factors (Francq 1962 in Sappington 1989). Species mix is influenced by soil type, aspect, moisture, elevation, successional type and disturbance through fire, agriculture, flooding, disease and insect outbreaks, and logging. Dominant forest vegetation includes western white pine, larch, grand fir, Rocky Mountain Douglas Fir, Ponderosa pine, and lodgepole pine. Shrub species include willow, *Salix spp.;* and Rocky Mountain maple.

The combination of soils, climate and aspect in the historic Palouse Prairie resulted in a unique plant community that has for the most part disappeared, primarily due to conversion to cropland. Since 1900, 94% of the grasslands and 97% of the wetlands in the Palouse Bioregion have been converted to crop, hay or pasturelands (Black et al 1998). Noss et al (1995) stated that 99.9% of the Palouse Prairie throughout its range in Idaho, Oregon and Washington has been lost to agriculture. In fact, the Palouse Prairie may currently be the rarest prairie ecosystem in North America (Noss 1997). U.S.D.A. Natural Resources Conservation Service (NRCS) has designated Palouse Prairie as a Critically Endangered (>98 Percent Decline) Ecosystem under the Rare and Declining Habitat practice, a practice designation with the purpose of restoring the functions and values of critically endangered, endangered, and threatened habitats. Those plants that remain and are considered rare are listed in IT2 . One such plant, water howellii, *Howellia aquatillis*, is restricted to glacial potholes, oxbow sloughs, and ponds where water is present only in the spring. It is known to occur at one site on private land in the Palouse River Subbasin. (Lichtart and Moseley, 2000, CDC 2000, CNF 1998). Another rare plant, Palouse goldenweed, has also been found in an undisturbed area of the Palouse (CDC 2000).

Approximately 63% of the lands in forest cover in 1900 were forested in 1990, 9% were grasslands, and 7% were regenerating forest or shrub vegetation. The remaining 21% of previously forested lands have been converted to agriculture or urban areas (Black et al 1998). Remnant native riparian bottomland, Palouse Prairie and cedar groves exist in the IPRS, but they occupy a very small portion of the landscape and are for the most part unprotected.

The most important ecological changes in the subbasin in Idaho have been the conversion of prairie/shrublands to agricultural uses, the introduction of white pine blister rust to white pine forests, and the alteration of disturbance regimes, particularly the suppression of wildfires (CNF 1998). The introduction of non-native species such as commodity crops and noxious weeds has altered vegetation communities. Timber harvest has replaced fire as the dominant vegetation disturbance process, but has not sustained the diversity of pattern, composition, and structure of vegetation communities and habitats that existed historically (CNF 1998). Fire suppression has resulted in a loss of mature ponderosa pine habitat. This loss of mature and late seral vegetation on forested lands has had a negative affect on those species dependent on them, such as pileated woodpecker, marten, fisher and Northern goshawk (CNF 1998). Those species needing mature Ponderosa pine forests include white-headed woodpecker, flammulated owl and mountain quail. Fire suppression also results in a loss of aspen patches, which are important to moose, grouse and cavity nesting birds. While occupying a minor area of the landscape, aspen patches are important forage and cover for a variety of wildlife species. Creation of early successional habitat has favored white-tailed deer, elk, lynx and several neo-tropical birds. Current estimates of vegetation successional stage on National Forest System lands are 26% early seral, 56% mid seral and mature, and 18% late seral (CNF 1998).

There has been a loss of wildlife security areas in forested habitats due to road and trail access and increasing human use. Expanding urbanization and the loss of riparian vegetation has decreased the amount and diversity of habitat available for several species. When agriculture was pioneered in Idaho, early farming practices left hedgerows, fencerows, windbreaks and odd brushy areas. Prior to powerful gasoline-powered tillage equipment, (pre-World War II), Douglas hawthorn and alder dominated draws were not

cultivated. Wetlands not easily drained supported a number of local waterfowl as well. As farming practices changed in the interest of greater efficiency in the last two decades or so, critical upland and waterfowl habitat was lost. Areas previously left intact were plowed for crop production. Wetlands that provided nesting for waterfowl and wintering areas for upland birds were tiled, and disappeared. More fall burning and seasonal plowing removed residual vegetation that was used for foraging and cover. Game bird numbers plummeted, and other species that needed those habitats declined.

Watershed Assessment

Several reports describe the IPRS, fish and wildlife species, and the landscape in Idaho. An excellent overview of historic and current biodiversity and land use is described in *Biodiversity and Land-Use History of the Palouse Bioregion: Pre-European to Present* (Black et al 1998). Other reports include the *Palouse Subbasin Ecosystem Analysis at the Watershed Scale* (CNF 1998), *the Paradise Creek Use Attainability Assessment Final Report* (Wertz 1994), the *Paradise Creek TMDL Water Body Assessment and Total Maximum Daily Load* (IDEQ 1997), the *Paradise Creek Total Maximum Daily Load Implementation Plan* (PCWAG 1999), the *FISH sampling, 1995 and 1997, in the Cow Creek, Idaho and Union Flat Creek, Washington Waterway* (Havens 1998), the *White-tailed Deer, Mule Deer and Elk Management Plan* (IDFG 1999) and the *Idaho Department Of Fish and Game Five Year Fish Management Plan*, 2001-2005, (IDFG in press). Annual reports by IDFG, funded by Sport Fish Restoration Funds and Pittman-Robertson funds, focus on fish and wildlife populations occurring in the Palouse River Subbasin. Beneficial Use Reconnaissance Surveys (BURP) conducted by IDEQ have identified fish species distributions and water quality parameters in several streams. The Clearwater National Forest (CNF), through agency and contract surveys, has described fish distribution and habitat characteristics within National Forest lands in the IPRS. An archaeological and general description of the area is given by Sappington in *Reconnaissance Report, Palouse River Basin, Idaho and Washington* (COE 1989).

Limiting Factors

Fish Limiting Factors (WDFW)

Fish population densities and distribution are dependent upon prevailing habitat conditions, both aquatic and terrestrial. The native habitat conditions within the Palouse sub-basin have been altered extensively since the early 1800s. The severely impacted present state of wetlands, springs, seeps, and in-stream habitats within the sub-basin are the result of cumulative impacts from land use activities such as agriculture, grazing, logging and road building. What exists now, in terms of fish species assemblages are the end result of these alterations. Species composition reflects persistent habitat conditions.

Fish resources within the Palouse River sub-basin are limited by long standing in-stream, riparian, and upland habitat conditions which have contributed to degraded water quality, water quantity, and in-stream habitat conditions. The Palouse sub-basin is now a region of fractured, tiled, and channeled waterways, which are void of many of the vegetation types, and seasonal water storage components that once protected water quality and quantify, and moderated flow release.

Several factors have led to general declines in healthy fish populations including: elevated seasonal stream temperatures, sedimentation, and limited quantity and quality of pools and cover, much of which are perpetuated by degraded riparian habitat (WDOE 1999). These factors include:

- High summer water temperatures due to the loss of riparian vegetation from agricultural or livestock practices, logging, roads and floods, or flood repairs.
- Loss of available spawning and rearing habitat from elevated water temperatures and channelization of the riverbed to protect agriculture, structures, and roads.
- Fine sediment input from roads, logging, agricultural and livestock management.
- Reduced channel stability, and loss of natural channel configuration.
- Limited quantity and quality of pools.
- Lack of cover and large woody debris.
- Reduced seasonal water quantity.
- Reduced water quality.

In the Palouse River, and its associated tributaries, many of the aquatic habitat degradations are related to water quality conditions. Elevated water temperature, low dissolved oxygen concentrations, elevated pH concentrations, high turbidity, and elevated levels of nutrients and pesticides all are parameters of water quality within the sub-basin, which adversely affect fish resources. These deficiencies have been identified on the 1998 Washington State Department of Ecology 303(d) list for impaired water quality within the Palouse River watershed (DOE 1999). The Washington State Department of Ecology (WDOE 2000) has identified Pine Creek, a tributary to Rock Creek and Rock Lake, as a major source of turbidity and sediment loading affecting Rock Creek. Rock Lake exhibits low primary and secondary productivity relative to documented levels of elevated phosphorous and nitrates entering the lake from tributary sources. Seasonal high turbidity within Rock Lake has been identified as a primary limiting factor for fish production (McLellan 2000). Such adverse habitat quality factors impact fish populations and invertebrate populations creating a negative synergistic effect on the aquatic community.

Low base flows are the product of altered land use practices in headwater areas since the late 1880s. Land uses over the last 100 plus years have resulted in an increasing number seasonal run off events resulting in peak flows that occur relatively rapidly rather than a more gradual run off with lower peak flows (USGS 2001). This situation creates low late summer base flows, limiting habitat area and complexity. Additionally, low base flows contribute to degraded water quality conditions such as increased water temperature and reduced dissolved oxygen (EPA 1986).

Introduced non-native species which have shown better adaptability to degraded habitat conditions are maximizing available habitats and in some cases providing recreational opportunities; however, it is likely that the native assemblage has been displaced by the presence of exotic species better adapted for the available habitats. Knowledge regarding the status of native stocks and distributions throughout the sub-basin is limited in nature. The genetic profile, distribution and life history strategies of native stocks are largely unknown. This lack of information regarding species distribution and stock composition of resident fish species creates problems including: regulating sport anglers and harvest, applying regulatory actions under the Washington State Hydraulic

Code, and prioritizing conservation and restoration activities that are consistent with prudent native fish conservation, and fish resource management.

Stream channels have been highly isolated and fragmented due to many of the land use practices mentioned previously. Activities such as stream channeling, draining and tiling of spring fed creeks, riparian vegetation removal and hard fix bank protection projects have all contributed to elimination and / or separation of established continuous watercourses. These habitat altering practices have led to development, or exasperation, of thermal fish passage barriers and seasonal de-watered stream segment problems. (Bob Peck per. Comm., WDOE 1998).

Fish Limiting Factors (IDFG)

The two primary limiting factors for fish, wildlife and the associated habitats in the IPRS in Idaho are habitat loss and degradation, and urban/human conflict. Habitat loss can occur in a variety of ways, but it generally involves the loss of quality, quantity, diversity and connectivity. Many environmental and managed activities can contribute to these limiting factors, which are not equally distributed across the basin, or the same for all species. Several limiting factors are described further in more detail.

Key factors limiting fish populations in the IPRS are described in the *Palouse Subbasin Ecosystem Analysis at the Watershed Scale* (CNF 1998), *the Paradise Creek Use Attainability Assessment Final Report* (Wertz 1994), the *Paradise Creek TMDL Water Body Assessment and Total Maximum Daily Load* (IDEQ 1997), the *Paradise Creek Total Maximum Daily Load Implementation Plan* (PCWAG 1999), the *Fish Sampling, 1995 and 1997, in the Cow Creek, Idaho and Union Flat Creek, Washington Waterway* (Havens 1998), *Idaho Department Of Fish and Game Five Year Fish Management Plan*, 2001-2005, (IDFG in press), CNF reports and IDFG reports.

Limiting factors for streams in the IPRS on National Forest lands include constricted, channelized and widened streams, lack of large organic woody debris, removal of riparian and streambank vegetation, fish passage limitations including culverts, sediment and cobble embeddedness, streambank instability, low summer stream flows and high water temperatures (CNF 1998). All of these factors are directly related to past mining, logging, road building and grazing activities, some dating back to the 1860s.

On private property, limiting factors include low or intermittent stream flows, high water temperatures, lack of streambank vegetation, channelized streams, streambank instability, passage problems, floods, floodplain development, nutrients and sediment. These factors are related to agricultural development, urbanization, road construction and floodplain alteration. The use of more powerful, gasoline-powered cultivation equipment since World War II have accelerated the loss of riparian areas and health through stream channelization and wetland conversion.

The end result of these limiting factors is the inability to support coldwater biota and salmonid spawning throughout most of the IPRS. Most salmonid populations occur in the upper watershed, on National Forest land. The Clearwater National Forest Plan (CNF 1987) lists brook trout and rainbow trout as a beneficial use for several streams in the IPRS.

Wildlife Limiting Factors (WDFW)

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

1. Conversion of native habitats to agricultural crops and livestock grazing pasture
2. Habitat fragmentation
3. Proliferation of introduced vegetation
4. Urbanization and road construction
5. Timber harvest in upland and riparian areas
6. Hydropower development
7. Other natural and anthropogenic induced events

Agricultural conversion has decreased the overall quantity of habitat for many native species, but loss of specific communities may be particularly critical for habitat specialists. The elimination of native Palouse prairie and Palouse transition habitats has resulted in extirpation of numerous wildlife species such as sharp-tailed grouse.

Habitat fragmentation has severely reduced habitat for area-sensitive species. Sage sparrows, for example, are generally found only in blocks of shrubsteppe greater than 1000 ha (2470 acres) (Vander Haegen et al. 2001). Populations of species with small home ranges and limited dispersal capabilities are likely to become isolated and vulnerable to extirpation. Wildlife populations in fragmented habitats may be more vulnerable to predation. In Washington, Brewer's sparrows, lark sparrows, and sage thrashers had greater nest predation rates in fragmented habitats than in continuous habitats (WDFW, unpublished data). Habitat fragmentation, due to road construction and improper culvert placement, has also prevented migration of fish and amphibian species within and/or between some subbasin tributaries.

The Palouse River subbasin in Whitman County has grown in popularity as a preferred area for primary residential and secondary recreational home sites. As the human population increases, more impacts to riparian areas and water quality are inevitable. Loss of wetlands, spring creeks, and ephemeral waters have significantly impacted all shorebirds and wetland dependent species including avocets, black-necked stilts, sandpipers, and marsh wrens. Currently, residential development is growing in all communities in this subbasin. Wildlife habitat adjacent to Rock Lake and habitat along river breaks is being lost and/or altered significantly because of the development of homes, recreational sites, and other anthropogenic activities. In addition, increased vehicle traffic/collisions may be a significant mortality factor on some localized white-tailed deer populations (WDFW 1999, WDFW 2000).

Other factors limiting both wildlife and fish in this sub-basin include past and present riparian timber harvests, lack of structure in streams and rivers, pesticides, disease (EHD), illegal harvest, and poor water quality resulting from sedimentation, pollution, and high water temperatures. The lack of historical data on most wildlife and fish species within the Palouse subbasin limits the ability of resource agencies to adequately evaluate and/or address impacts resulting from construction of dams on the Snake and Columbia Rivers and associated tributaries.

Wildlife Limiting Factors (IDFG)

In Idaho, changes in habitat directly affect the presence, distribution and abundance of wildlife species in the IPRS. Logging has created large tracts of seedtree cuts or

clearcuts, with meadows and early successional brushfields providing excellent summer and winter range. Farmland provides high quality forage for white-tailed deer and elk, but also results in damage to the crops grown. As big game populations have grown, so have the number of depredation complaints on alfalfa, grains, tree plantations, and orchards. New home site construction has decreased available winter ranges, limited hunter access and increased conflicts with humans and pets. Hunter numbers have grown in response to increasing white-tailed deer populations, resulting in more landowner/hunter conflicts. It is becoming difficult to balance big game populations with available habitat and changing human demographics.

With only 18% late seral successional habitat, there is cause for concern for those species dependent on those vegetation communities. Fire disturbance or low-volume, repeated-entry selective logging can maintain or enhance Douglas fir and mature ponderosa pine forests.

Residential development and the practice of wetland draining, floodplain protection, channel ditching and vegetation removal are likely the greatest threats to amphibians, waterfowl, upland game, aquatic furbearers and neotropical birds. The abundance and quality of nesting, brood rearing and foraging habitat, as well as linear deciduous vegetation such as Douglas hawthorn thickets and corridors, can be positively impacted through programs that provide incentives for setting aside sensitive areas and encourage less aggressive tillage methods. One such program is the Environmental Quality Incentives Program (EQIP), which helps cooperators make the shift from inversion tillage to no-till. The Palouse Subbasin is included as one of a couple of priority areas in Idaho for this program.

Artificial Production

Three WDFW hatchery facilities, including the Spokane Hatchery, Ford Hatchery, and to a limited extent, the Lyons Ferry Hatchery produce trout utilized for stocking fish into lowland lakes, and selected stream reaches within the Palouse subbasin. The primary goal of stocking efforts is to provide recreational fishing opportunity.

In Idaho, there are no artificial fish production facilities in the IPRS. Fish are stocked to provide angler recreation and harvest opportunity in the Palouse River near Laird Park, Camp Grizzly and Hordeman ponds. The most recent stockings have been of "catchable" rainbow trout (IA1).

Existing and Past Efforts

Summary of Past Efforts

Upland Wildlife Restoration

The Washington Department of Fish and Wildlife (WDFW) has worked with private landowners to restore habitat within the Palouse Subbasin since the early 1960's. This early program (WDFW's Habitat Development Program) involved establishing small[4] habitat plots on unfarmed areas usually on poor or rocky soils (Figure 10). In the 1980's partnerships between WDFW, Natural Resources Conservation Service (NRCS), local Conservation Districts, and private landowners made watershed scale habitat restoration

[4] Plots ranged from 0.5 to 3 acres-most were less than 1 acre. These habitat plots were established primarily for upland game bird use.

projects possible. 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 Wildlife Restoration Program biologists improve and restore riparian, upland, and shrubsteppe habitats used by both resident and migratory wildlife species within the Palouse Subbasin. Projects typically include establishing riparian grass buffers, planting shrubs and trees (for thermal and escapement cover), seeding wildlife foodplots, developing water sources (i.e., guzzlers, ponds, spring developments), and maintaining winter game bird feeders.

Like WDFW's Upland Wildlife Restoration Program, USDA's Conservation Reserve Program has provided WDFW with another opportunity to work with local conservation agencies and landowners to improve wildlife habitat throughout the Palouse Subbasin. WDFW biologists assist landowners with selecting and/or planting herbaceous seed mixes, trees, and shrubs. WDFW in conjunction with the Palouse Rock Lake Conservation District, Department of Natural Resources/Department of Corrections inmate labor, Washington Conservation Corps (WCC), and volunteers has planted over 1,000,000 trees and shrubs within the subbasin since the early 1980s.

While habitat restoration is WDFW's main priority, the Upland Wildlife 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. Currently, WDFW biologists work with 72 cooperators who have opened 72,928 acres to public hunting within the Palouse Subbasin under the "hunting by permission" and "feel free to hunt" programs.

Figure 10. Typical Channeled Scablands shallow, rocky, soil type.

Summary of Agreements:

Cooperative Habitat and Access Agreements

Cooperators	72
Acres	72,928

Cooperative Habitat Agreements

Cooperators	61

Acres	88,029

Total Managed

Cooperators	133
Acres	160,957

WDFW Revere Property

The 2,290 acre Revere property was purchased under the Lower Snake River Compensation Plan primarily for upland game bird habitat and includes 150 acres of irrigated cropland (Figure 11). The property lies within the channeled scablands south of Lamont, Washington (Figure 12) and supports a typical shrubsteppe plant community and wildlife assemblage that includes mule deer, pheasant, quail, raptors, waterfowl and a myriad of other wildlife species (Figure 13).

Figure 11. Rock Creek at the Revere Property, February 2001

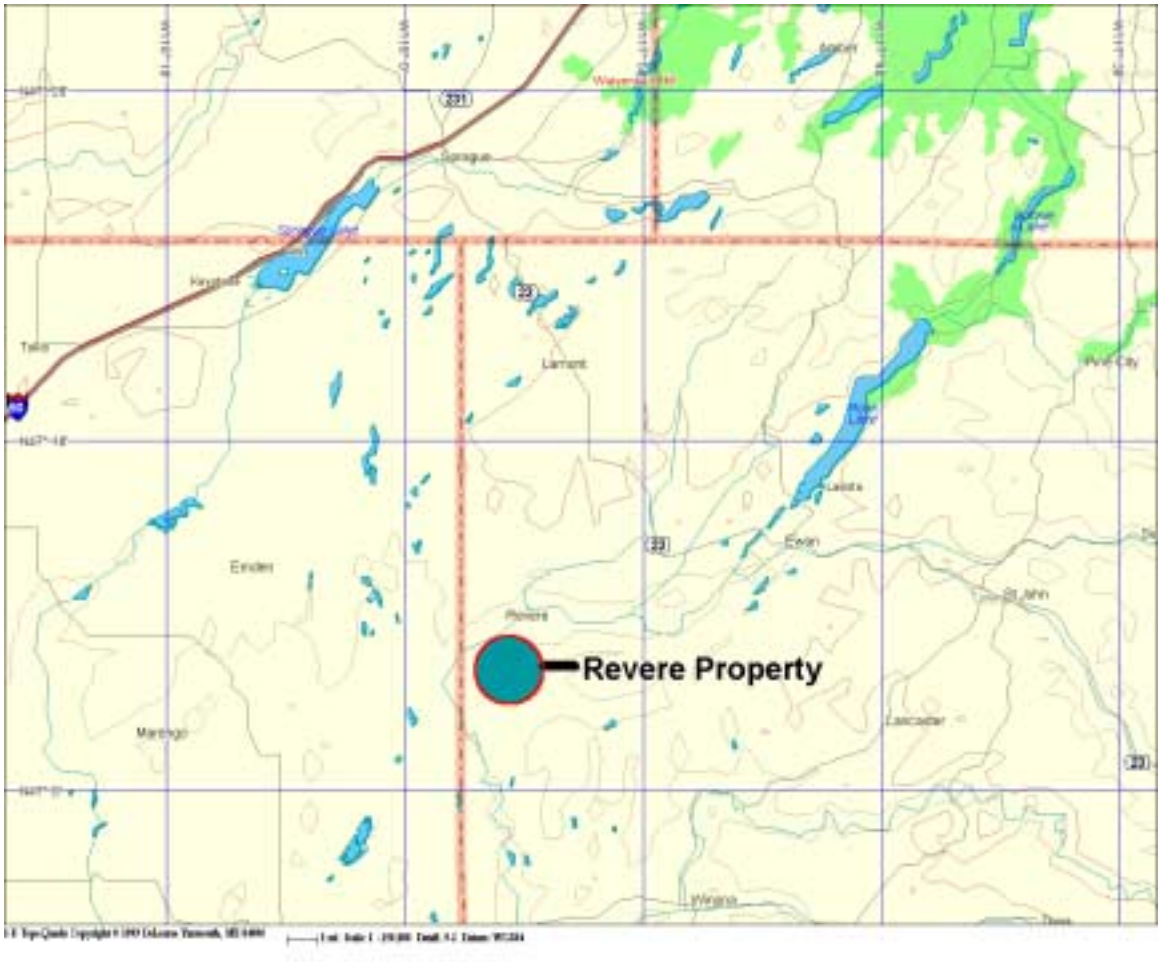

Figure 12. Location map for the Revere property.

Figure 13. Mule Deer in Channeled Scablands, Feb. 2001

Extensive habitat enhancements have been implemented to meet mitigation goals and include:

1. Planting 35 acres of trees and shrubs in quarter acre plots along three miles of Rock Creek and in upland ravines.
2. Seeding 42 acres of a grass and forbs for nesting cover.
3. Maintaining eight acres of annual food plots.

Current and future enhancements are being funded by sportsman groups (i.e., Inland Northwest Wildlife Council, Ducks Unlimited) and grant proposals. Proposals are currently underway for additional nesting cover and wetland developments.

Idaho Efforts Funded by BPA through the Columbia Basin Fish and Wildlife Program

There have been no studies funded by BPA for research or monitoring in the IPRS that directly pertain to the IPPS.

Idaho Efforts Funded Outside of the Columbia Basin Fish and Wildlife Program

A number of "on-the-ground" projects have been undertaken to improve the watershed conditions that sustain fish and wildlife populations, directly improve habitat, or provide protection for fish and wildlife through education and financial incentives.

State of Idaho - Idaho Department of Environmental Quality

Beneficial Use Reconnaissance Project

IDEQ completed Beneficial Use Reconnaissance Project (BURP) surveys on 28 streams in the Palouse subbasin for §303(d) list development and assessment. The IDEQ will be developing a TMDL for the Palouse River Subbasin, which is due to be completed in December, 2003.

Paradise Creek Total Maximum Daily Load Implementation Plan

In 1997, the IDEQ developed the Paradise Creek Water Body and Total Maximum Daily Load (TMDL) (IDEQ 1997), which was approved by the Environmental Protection Agency (EPA) in 1998. From this, the Paradise Creek Watershed Advisory Group (PCWAG), through the Latah Soil Water Conservation District (LSWCD), wrote the Paradise Creek TMDL Implementation Plan (PCWAG 1999). This document outlines activities, structures, treatment facilities, and nonpoint source management practices designed to achieve desired load reductions. The plan lists potential funding sources, estimated completion schedules, anticipated effectiveness of treatment measures and lead responsible management entities where known. The plan was successful in securing approximately $1 million from the EPA 319 funds to match with other funds to implement specific practices that achieve load reductions on forest land, agricultural land, roads, confined animal operations and urban land. Program implementation is being coordinated by the LSWCD.

Implementation tasks include Agricultural and Forestry Best Management Practices (BMP), Urban Riparian Restoration, Animal Waste Prevention, Roadside Erosion Control, Rural Riparian Restoration and Wetlands Restoration. There are multiple government and private partners involved, including the LSWCD, City of Moscow, University of Idaho, IDEQ, EPA, Idaho Soil Conservation Commission (IISCC), Natural Resources

Conservation Service (NRCS), North Latah County Highway District (NLCHD), Idaho Association of Soil Conservation Districts (IASCD), private landowners, Palouse-Clearwater Environmental Institute (PCEI), Bennett Tree Farms, Wildlife Habitat Institute, Bonterra and other private companies.

Idaho Department of Fish and Game - Habitat Improvement Program

The Habitat Improvement Program (HIP) is a program administered by IDFG to create and improve habitat for upland game and waterfowl on public and private land. Initiated in 1987, the program is designed primarily to help private landowners in their desire to use their property to the benefit of upland game birds and waterfowl. Funded by fees collected from upland bird and state waterfowl hunting validations, landowners are provided with financial assistance for waterfowl nesting structures, wildlife ponds, irrigation systems, fence materials, food plots, and herbaceous, shrub and tree plantings to provide food, and nesting, brood-rearing and winter cover.

In Latah County, from 1987-1999, 4,430 acres had been improved through HIP, 3,961 acres for upland birds, and 469 acres for waterfowl. Nesting cover, woody cover, food plots, ponds and nest structures were the main practices implemented. The database currently does not allow a breakout by watershed, but it is estimated that 3,410 acres and 249 acres for upland birds and waterfowl, respectively, are in the IPRS.

The IDFG is working with the University of Idaho Landscape Lab to map critical wildlife habitat and vertebrate species richness. This information can be used by the Latah County Planning Commission to identify which habitats are most critical to protect, and where conservation of soil, water and open space resources is most critical, and where and how restoration efforts might be most effective (Black et al 1998).

Conservation Data Center

Studies conducted by the CDC have documented rare plant communities or surveyed preserves. Recommendations were made to protect these unique areas.

Harvard-Palouse River Bottomland - surveyed one of the last intact native riparian bottomland zones in the Palouse River. Comprised of 226 acres, it contains the water howellii and possibly Palouse tauschia (*Tauschia tenuissima)*.

Moscow Mountain Old Growth Cedar - an old growth western cedar grove was found and the surrounding area surveyed. Western cedar up to 10 feet in diameter and over 800 years old occupy the area. The site is owned by the Idaho Department of Lands with a lease to the Nature Conservancy.

Idler's Rest - owned by the Nature Conservancy, this preserve contains a cedar grove with trees 24 inches in diameter and over 110 feet tall.

South End Paradise Ridge - documented excellent condition Idaho fescue grassland with an occurrence of a rare plant association and rare plant species.

Cameron Prairie - found an unplowed north slope "eyebrow" of Palouse Prairie, with high community and floristic diversity. An Idaho fescue-snowberry association and the Palouse goldenweed can be found there.

University of Idaho

The University of Idaho (UI) has been directly involved several activities addressing fish, wildlife and water quality issues.

In conjunction with the Paradise Creek TMDL Implementation Plan, the UI has proposed or completed a stormwater pollution prevention plan, a wetland treatment facility, channel realignment and streambank vegetation project, and animal waste biofiltration system.

The Idaho GAP Analysis Lab has summarized the Biodiversity and Land-use History of the Palouse Bioregion (Black et al 1998) and is the repository for GIS data for the IPRS. It is actively working with Latah County to protect critical wildlife, plant, water and open space resources through land use planning and zoning. The main objectives of GAP are to map current land cover, predict the distribution of vertebrate species, document the representation of vertebrate species and land cover types in areas managed for the long-term maintenance of biodiversity, and provide this data to the public. This is accomplished through the cooperation of many state and federal organizations.

The University of Idaho Experimental Forest is a multiple-use, working forest of over 7,000 acres administered by the College of Natural Resources. Activities such as timber, watershed, wildlife and range management, as well as many types of recreation, take place on the forest. Objectives of the forest are to provide students at the university a field laboratory in which to observe and practice what they have learned in the classroom, to provide an area in which to demonstrate to the public the latest forest land management techniques, to provide a land base for research projects conducted by faculty and students of the college.

Student chapters of professional societies, such as the American Fisheries Society, the Wildlife Society, and Society of American Foresters, actively participate in surveys, educational outreach and watershed improvement activities.

Idaho Soil Conservation Commission

The Idaho Soil Conservation Commission (IISCC) has provided a great deal of funding through direct grants, grants and loans through the Resource Conservation and Rangeland Development Program (RCRDP), and through financial incentives under the Water Quality Program for Agriculture (WQPA), all of which supplement the EPA 319 funds on agricultural lands

The purpose of the RCRDP is to improve those rangeland and riparian areas with the greatest public benefit. Financial assistance is available with an equal or greater match from the landowner.

The WQPA protects and enhances the quality and value of Idaho's waters by controlling and abating water pollution from agricultural lands. The program provides financial assistance to Soil Conservation Districts who conduct water quality planning studies and implement water quality projects. Water quality goals are achieved by farmers and ranchers who apply appropriate Best Management Practices (BMPs) from the Idaho Agricultural Pollution Abatement Plan. The plan specifies BMPs for irrigated and nonirrigated cropland, grazing land, animal waste management and riparian/wetlands areas.

The IISCC administers the Natural Resources Conservation Income Tax Credit. Landowners are eligible for tax credits for conservation practices that address at least one of four categories. These include Threatened and Endangered Species, Total Maximum Daily Load (TMDL), Riparian Fencing or Fish Barrier Removal. A special emphasis is water quality improvement and rare species conservation.

Idaho Association of Soil Conservation Districts (IASCD)
The Idaho Association of Soil Conservation Districts, through the LSWCD fund water quality monitoring at several stations in Paradise Creek.

Federal
Several programs administered by the USDA Farm Service Administration and the Natural Resources Conservation Service provide technical and financial assistance to landowners to implement conservation measures on their property. Practices are summarized by county, and there is currently no database to break out the practice type and acreages involved within the IPRS.

USDA Farm Services Administration - Conservation Reserve Program (CRP)
Currently there are over 44,800 acres enrolled in either CRP or Continuous Conservation Reserve Program (CCRP) in Latah County. Currently the database does not delineate between watersheds, so some of this acreage is outside of the Palouse River Subbasin.

The enrollment of cropland into CRP has removed highly erodable land from commodity production, instead putting it into permanent herbaceous or woody vegetation to reduce soil and water erosion. CRP contracts are for a minimum of 10 years, so have resulted in a tremendous increase in wildlife habitat. Practices that occur under CRP include planting vegetative cover, such as introduced or native grasses, wildlife cover plantings, conifers, filter strips, grassed waterways, riparian forest buffers and field windbreaks.

Continuous Conservation Resource Program
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 erodable land, as is required for the Conservation Reserve Program (CRP), and carries a longer contract period (10-15 years), higher installation reimbursement rate and higher annual rental rate.

USDA Natural Resources Conservation Service - Wildlife Habitats Incentive Program
The Wildlife Habitat Incentives Program (WHIP) provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and USDA agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. USDA and program participants enter into a cost-share agreement for wildlife habitat development. This agreement generally lasts a minimum of 10 years from the date that the contract is signed.

Environmental Quality Incentive Program
The Environmental Quality Incentives Program (EQIP) 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 provides assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourages environmental enhancement.

The program is funded through the Commodity Credit Corporation. The purposes of the program are achieved through the implementation of a conservation plan that includes structural, vegetative, and land management practices on eligible land. Five- to ten-year contracts are made with eligible producers. Cost-share payments may be made to implement one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more land management practices, such as nutrient management, pest management, and grazing land management.

Wetland Reserve Program
The Wetlands Reserve Program (WRP) is a voluntary program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30-year duration, or 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 for a minimum 10-year 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.

USDA Forest Service
Habitat conditions and fish populations have been surveyed in almost 60 miles of stream on the CNF since 1990 (CNF 1998). Eight water temperature, one sediment, and ten channel morphology monitoring stations have been established in the Palouse River drainage on National Forest lands. In addition, three habitat and biological assessment stations are in place in Palouse River tributaries to monitor land use effects. Riparian mitigation measures such as road obliteration (approximately 19 miles) have accelerated recovery of the Palouse River and many of its tributaries. The CNF conducted an Ecological Assessment of the Upper Palouse Subbasin in 1998 that identified watershed improvement projects and suggested revisions to the Forest Plan that will also help watershed recovery (CNF 1998).

US Fish and Wildlife Service
The USFWS administers the Partners for Wildlife Program. The purpose of the program is to restore and enhance fish and wildlife habitat on private lands through partnerships. A special emphasis is placed on the restoration of riparian areas, wetlands and native plant communities, especially if they benefit rare plant and animal species. Cost share partners can include WHIP, EQIP, WRP and state and private programs.

Palouse Clearwater Environmental Institute
PCEI is working with the community and local agencies to restore the watersheds within the Palouse. Since 1992, PCEI has worked to enable local communities to realize the value and function of riparian and wetland systems.

Local interest in water quality led PCEI to initiate the community-based Paradise Creek Adopt-A-Stream Project. Six phases of highly visible work on Paradise Creek have been undertaken, involving over 100 area community groups.

Sweet Ave Restoration Project

In 1998, PCEI and the University of Idaho completed a joint project to address stormwater runoff issues, re-meander a straight section of Paradise Creek, and to recreate much-needed floodplain along Paradise Creek. To accomplish these goals, small "pocket wetlands" were created and planted with hydrophytes (wetland plants) to naturally clean stormwater runoff from a nearby soon-to-be-built parking lot. The deeply incised straight channel was re-meandered, and the streambanks were pulled back and resloped to recreate floodplain that would create additional water storage area during heavy storm or spring melt-off events. Streambanks along this segment of Paradise Creek were stabilized using bioengineering techniques. In the spring (1999), trees and shrubs were planted along Paradise Creek to provide wildlife habitat, enhance aesthetics, and to improve the water quality of the stream

1999 Riparian revegetation project

In 1999, volunteers helped to plant native woody vegetation along Paradise Creek to shade the creek, provide habitat for fish and wildlife, and to enhance the outdoor recreational value of the area. Volunteers used both rooted stock and cuttings to revegetate riparian areas along Paradise Creek. An estimated 3000 cuttings and 1000 trees and shrubs were planted during 1999.

Backyard Bank Stabilization / Revegetation Projects

PCEI works with landowner within the Paradise Creek watershed to help them reduce erosion on their property and improve water quality through implementation of streambank revegetation and/or stabilization activities.

In 1999, PCEI worked with urban landowners to construct log wall revetment and coir log terraces. Riparian vegetation was then planted to provide shade, pollutant filtering, and wildlife habitat benefits.

In 1999, PCEI, a private landowner, and governmental agencies worked together to create a riparian demonstration project for land stewards in the Palouse. The project involved re-meandering and revegetating 3/4 mile of Paradise Creek, a stream that is highly degraded and channelized from numerous agricultural and urban sources. Additionally, wetlands were created adjacent to the creek to provide flood storage, water quality, and groundwater recharge benefits to the watershed. These areas will also provide habitat for waterfowl and other wildlife that rely on wetlands for survival.

Conservation Districts have been involved with conserving our renewable resources in the Palouse River basin for over 60 years. Projects implemented include waterways, terraces, channel stabilization, riparian plantings, upland plantings, reduced tillage, no till, nutrient management, and many other programs. Districts work closely with the Natural Resources Conservation Service (NRCS), and are often co-located. The Washington State Department of Fish and Wildlife also have two people located in the St. John office who work closely with the Palouse Rock Lake Conservation District (PRLCD).

Upland tree plantings has been an on going program of Districts. An average of 80,000 trees and shrubs have been planted every year for the last 8 years by PRLCD, the highest being 200,000 planted. The program began in the mid 1980's and has continued to date. The plantings are designed to fill a need for thermal cover and food source for upland wildlife, deer, elk, pheasant, songbirds, etc. Species of trees and shrubs typically planted include; ponderosa pine, caragana, douglas hawthorne, serviceberry, woods rose, and other native species. The earlier plantings are producing cover and forage value to the target wildlife species now. There have been two studies on the survival of the planting done by the University of Idaho, these studies are available from the PRLCD upon request.

From the beginning Districts have assisted landowners and users with the implementation of Best Management Practices (BMP's). The main purpose of these BMP's is to reduce erosion and improve water quality. The BMP's include; grassed waterways, terraces, channel stabilization, strip cropping, dividing slopes, grass plantings on critical areas, drop structures, sediment basins, livestock management, watershed planning, etc. The BMP's have all been installed to NRCS Field Office Technical Guide (FOTG) standards, to ensure that the practices will perform as they were intended. Districts work closely with NRCS to provide technical assistance to the landowners and users for implementation of the BMP's. In addition to technical assistance, Districts have provided financial assistance for the installation of BMP's when money was available. Districts still assists landowners/users with the installation of BMP's to conserve our natural resources.

PRLCD maintains a soil lab to test soils for nutrients. Farmers are encouraged to soil test before fertilizing to ensure that nutrients are being used wisely and not leached into streams and lakes. The soil lab is open in the early spring before spring fertilizing begins and stays open until the fall fertilizing season is over.

Districts are also involved with watershed planning on the Palouse River Basin. The Palouse Conservation District has sponsored four watershed planning efforts on Missouri Flat Creek Watershed, Paradise Creek Watershed, South Fork Palouse River Watershed, and the North Fork Palouse River Watershed. Adams Conservation District has been involved with watershed planning on the Cow Creek Watershed. Districts often hold Watershed meetings with landowners/users within their Districts to discuss concerns, and educate the public about practices that can help abate their concerns.

USDA, NRCS

Payments to growers with commodity crops have been, and still are a significant part of most farm budgets. Commodity crops are commonly defined as annually cropped food and fiber crops. Resource treatment options as a requirement for federal payments has varied greatly.

Prior to 1985, deficiency payments had limited conservation requirements. Set-aside or noncropped acres had a minimum cover requirement; cropped acreage had no conservation requirement. Conservation Practices were implemented under what was called the "Agricultural Conservation Program"(ACP). ACP made costshare available for individual practices. These practices included, waterways, tree planting, ponds, terraces, etc. ACP is no longer available.

Currently, limited cost-share funds are offered through the "Environmental Quality Incentives Program" (EQIP). Under this program growers are contracted to install a

conservation system of practices, rather than an individual practice. The conservation needs are evaluated on a total farm basis. Contracts are awarded on a bid basis. While this can be a good buy for USDA, EQIP has had limited grower acceptance. This is partially due to a lack of funding for EQIP at the federal level. As a comparison, the expired ACP program helped a lot of growers on a practice-by-practice basis; the current EQIP program helps a limited number of growers on a system of practices.

The most significant federal program over the past 15 years has been, and still is the "Conservation Reserve Program." Under this program growers get paid on an annual per acre basis to keep land in grass. Contracts can be for 10 to 15 years depending on the practices involved. There are two types of sign-ups; a standard sign-up, which is on a bid basis, and during a designated sign-up period; the other option is a special practice sign-up, which can be signed up at any time. The special practice sign-up is for specific areas and often includes native grass, trees, and shrubs. The CRP program has achieved significant conservation and wildlife habitat treatment. Within the Palouse River Basin nearly 150,000 acres are currently under this program. In addition to the grass cover, several thousand acres of trees and shrubs have been planted under this program. Most of this is within Whitman County. In addition to the grass cover, several thousand acres of trees and shrubs have been planted with CRP funding. Although this program is significant, it only represents approximately 10% of the cropland in the Palouse River Basin.

Presently the Palouse River Basin has no endangered species priority funding for growers. The Palouse River does empty into the Snake River System where salmon are a concern; however, Palouse Falls prevents anadramous fish from entering the Palouse River System.

In the past two PL566 watershed projects with federal funding for conservation were implemented; Pleasant Valley watershed near St. John, and another in the Rebel Flat Creek Watershed near Endicott. These projects provide cost-share or incentive payments for growers to install practices on a complete farm basis. Funding for this effort ended about 1990.

Future federal programs for conservation will depend on legislation. The current Farm Bill has been in place since 1995 and is scheduled to cover programs until 2002. Most growers are willing to protect natural resources, however actual application of practices is dependent on funding. Many protection practices such as grass, trees, and shrubs are a cost or liability in a short-term farm budget. It is expected that most future USDA payment programs will be coupled with a resource treatment requirement.

Lake Management Activities conducted by WDFW

Lowland lakes within the sub-basin which have been managed by WDFW utilizing rotenone lake rehabilitation treatments include: Fishtrap, Hog Canyon, Amber, Badger, Williams, Hallen, Fennel, Sprague, Silver, and North Silver. Rotenone is an organic compound derived from the root of the derris plant, which is native to South America. It has been used in the State of Washington since 1940s to control and / or remove undesirable fish populations in lakes. Rotenone works at the cellular level by preventing gill breathing organisms from utilizing oxygen within the water for respiration. The lake rehabilitation program within Washington has been utilized primarily for trout fishery management in lowland lakes.

Fishtrap Lake has been treated with rotenone to enhance trout management in 1958, 1961, 1969, 1976, 1983, 1989, and 1998. The lake has been planted with approximately 100,000 rainbow trout fry yearly and has been one of the best producers of trout in the state of Washington.

Sprague Lake was treated with rotenone once in 1984. Extensive studies of this lake have been conducted by Taylor and Scholz (2000); Wilms et al. (1989); Whalen (1989). Sprague Lake has an extensive fish stocking history under both the former WA Department of Fisheries and WDFW. It has been a top producer of Lahonton cutthroat trout and rainbow trout. It is now managed, and has become, one of the best warm water fisheries in Washington.

Rock Lake has 21 of the 37 fish species documented within the Palouse sub-basin as described by McLellan (2000) during fishery evaluation work conducted during 1999-2000. This lake has been annually stocked for the past several years with 10,000 to 15,000 rainbow trout and 6,000 German brown trout. The drainage surrounding Rock Lake is primarily agricultural and prone to erosion. The Washington State Department of Ecology (WDOE 2000) has identified Pine Creek, a tributary to Rock Creek and this lake, as a major source of turbidity and sediment loading affecting Rock Creek. The lake exhibits low primary and secondary productivity relative to documented levels of elevated phosphorous and nitrates entering the lake from tributary sources. Seasonal high turbidity within Rock Lake has been identified as a primary limiting factor for fish production (McLellan 2000).

Hog Canyon Lake has historically been rehabilitated in conjunction with Fishtrap Lake, and has been managed as a rainbow trout fishery, receiving approximately 17,000 rainbow trout fry each Spring.

Badger Lake was treated with rotenone in 1950, 1958, 1978, and 1995. This lake has been managed as a rainbow and cutthroat trout lake and is annually stocked with approximately 20,000 cutthroat and 80,000 rainbow trout fry each spring.

Chapman Lake has never been rehabilitated and has been managed as a mixed species fishery. This lake is annually stocked with approximately 12,000 catchable sized rainbow trout, and kokanee fry. There is natural kokanee production in the lake as well. Largemouth bass and sunfish are also harvested from this lake.

Bonnie Lake has been managed as a mixed species lake and is primarily known for its bass and crappie fishing.

Williams Lake is managed as a trout fishery and has been treated with rotenone in 1955, 1962, 1971, 1982, 1988, and 1995. This lake receives an annual spring stocking of approximately 20,000 cutthroat trout fry and 80,000 rainbow trout fry.

Finnel and Hallen lakes within the Cow Creek drainage were rehabilitated with rotenone in 1984 in association with Sprague Lake. These lakes were initially stocked back with trout fry, but are now managed as mixed species lakes.

Amber Lake is managed as a trout fishery and has been treated with rotenone in 1952, 1963, 1982, and 1987. This lake is managed under selective fishery regulations. The lake receives approximately 5000 rainbow trout fry each spring.

Silver Lake has historically been managed as a trout fishery, and has been treated with rotenone in 1955, 1959, 1967, 1976, 1981, and 1987. The WDFW ahs evaluated this lake as a candidate to promote a fishery for warm water fish species. Currently the lake is managed as a mixed species fishery for largemouth bass, black crappie, and trout.

North Silver Lake is separated from Silver Lake by an impoundment causeway and lies directly north of Silver Lake. North Silver Lake has historically been managed as a trout fishery and was treated with rotenone in 1967, 1976, and 1987. This lake is now managed as a mixed species fishery with selective fishery regulations permitting fly fishing only.

Until relatively recently few projects have been initiated that have been of benefit to stream fish habitat resources within the Palouse Sub-basin. Existing and past efforts to protect and / or improve stream habitats have largely been ineffective. The Revere project (WDFW) and Esqure Ranch project (BLM) are two examples that have begun implementing habitat enhancement projects with promising results. The expansion of federal programs such as CREP and CRP are also showing promising reductions in soil erosion rates and sediment delivery into streams.

On-going WDFW work within the Palouse Subbasin

- State regulation enforcement of fish and wildlife laws.
- Habitat enhancement and protection through the WA State Hydraulics Code and other applicable regulations, for wetland, riparian, instream, and other habitat types.
- Limited fish population assessments within sub-basin lowland lakes and streams for fish management purposes.
- Sport fishing and regulation development.
- Water quality monitoring.
- Coordination with federal, state, tribal, and local government entities for land use land application and development for protection of fish and wildlife resources.
- Out reach educational efforts for fish, wildlife, and habitat issues.

Present Subbasin Management

Existing plans, policies and guidelines that govern management of fish, wildlife and their habitats population and habitat protection are described primarily in federal and state agency management plans. These are described briefly below.

Federal

USDA Farm Service Administration (FSA)

The FSA was set up when the U.S. Department of Agriculture was reorganized in 1994, to incorporate programs from several agencies. Though the FSA name has changed over the years, the agency's relationship with farmers goes back to the 1930s. Through FSA, Federal farm programs are administered locally. Farmers who are eligible to participate in these programs elect a committee of three to five representatives to review county office operations and make decisions on federal farm program applications. Conservation program payments that FSA administers include CRP, CCRP, and EQIP. The staff of the NRCS provides technical assistance, when requested, regardless of program enrollment.

USDA Natural Resources Conservation Service

The NRCS provides technical support to landowners to design and implement practices that reduce soil erosion, improve water quality and provide wildlife habitat. Several programs are administered by NRCS, often with funding assistance, for landowners wishing to control erosion, improve fish and wildlife habitat (WHIP), minimize nutrient runoff sources (CRP, CCRP, WHIP and EQIP), and protect and restore wetlands on private land (WRP).

USDA Forest Service, Clearwater National Forest and Idaho Panhandle National Forests

The USFS manages approximately 54,000 acres of the PRS, all of it in Idaho. The CNF administers that portion of the IPNF in the Palouse Subbasin. The 1987 CNF Forest Plan is the primary documents guiding Federal forest management in the subbasin. In 1996 the Inland Native Fish (INFISH) strategy was adopted by the CNF to protect species associated with streams and riparian areas. Watershed monitoring programs have been developed with regularly scheduled sampling activities conducted as budgets allow. Management recommendations were made when an Ecosystem Analysis was conducted for the Palouse Subbasin (CNF 1998). If implemented, they would go a long way towards reducing sediment input into the watershed, and improving riparian and instream habitat.

U.S Fish and Wildlife Service

The USFWS administers the ESA, and provides funding through the Partners in Wildlife Program that emphasizes restoration of riparian areas, wetlands and native plant communities, especially if rare plant and animal species benefit.

Army Corps of Engineers

The Army Corps of Engineers is the agency responsible for issuing the federal Clean Water Act Section 404 permit for the placement of dredged or fill material into waters of the United States, including wetlands. Under Section 401 of this act, the Idaho Department of Environmental Quality is required to issue a water quality certification for these permitted projects. The water quality certification sets conditions to the permit to assure that the activity will comply with state water quality standards.

Environmental Protection Agency

The EPA administers the federal Clean Water Act. Section 303(d) of the Clean Water Act requires states to develop a list of water bodies that do not meet water quality standards. This section further requires TMDLs be prepared for listed waters. Both the list and the TMDLs are subject to EPA approval.

The federal Clean Water Act Section 319 grant program is an EPA funding program for water quality restoration work. In Idaho, the Department of Environmental Quality is the lead agency for implementation of the §319 program. IDEQ administers the Idaho Nonpoint Source Management Program and insures the §319 requirements of the Clean Water Act are met. Local, regional and statewide nonpoint source pollution control projects, such as the Paradise Creek TMDL implementation plan, have received §319 funding.

State Government

Idaho Department of Environmental Quality

The IDEQ is responsible for implementing the 1972 federal Clean Water Act and ensuring whether a person, entity or discharge is in compliance with state Water Quality Standards and Waste Water Treatment Requirements for protection of aquatic life and other beneficial uses. Section 303(d) of the Clean Water Act requires states to develop a list of water bodies that do not meet water quality standards. The IDEQ conducts biological and physical habitat surveys of water bodies under the Beneficial Use Reconnaissance Project (BURP), the primary purpose of which is to determine the support status of designated and existing beneficial uses.

Idaho Department of Fish and Game

The IDFG has statutory responsibility for "preserving, protecting and perpetuating" Idaho's fish and wildlife for present and future generations, and is responsible for managing the fish and wildlife populations in the Palouse River Subbasin in Idaho. Idaho Department of Fish and Game management plans and policies relevant to fish and wildlife and their habitat in the Palouse Subbasin include the *A Vision for the Future: Idaho Department of Fish and Game Policy Plan, 1990-2005*; the *Idaho Department of Fish and Game Five Year Fish Management Plan: 2001-2005*; *White-tailed Deer, Mule Deer and Elk Management Plan* (IDFG 1999); the *Black Bear Management Plan 2000-2010* (IDFG 1998); the *Nongame Plan 1991-1995*; the *Upland Game Plan 1991-1995*; the *Waterfowl Plan 1991-1995*; the *Moose, Sheep and Goat Plan 1991-1995*; the *Mountain Lion Plan 1991-1995* and the *Furbearer Plan 1991-1995*.

Idaho Soil Conservation Commission

The ISCC was created by the Idaho legislature in 1939 and consists of five members appointed to five-year terms by the Idaho Governor. Twenty-seven ISCC staff and four staff contracted through the Idaho Association of Soil Conservation Districts provide technical and administrative support to the 51 soil conservation districts in Idaho. Technical support is provided for districts managing state funded (through the IISCC) Water Quality Program for Agriculture (WQPA) projects. The IISCC manages the Resource Conservation and Rangeland Development Program (grant and loan). ISCC is a designated agency for the Natural Resources Conservation Income Tax Credit (63-3024B Idaho Code).

Latah County Soil and Water Conservation District

Seven elected volunteer board members govern the Latah County Soil and Water Conservation District (LSWCD). The board develops local natural resource conservation programs with established goals and objectives. It receives limited funds from local and state government, and may receive additional funds such as those provided by the WQPA for local projects. Working cooperatively, with other entities, they provide federal technical assistance to farmers and ranchers based on long standing agreements with the NRCS and the ISCC.

The LSWCD has developed and operates under a Five-Year Plan. The plan outlines procedures and methods, prioritizes current needs and identifies future expectations. It also provides a means of focusing the District's human and monetary resources, allowing the

District Board to measure progress and results, promote responsible resource management, and encourage cooperation among involved parties (LSWCD 2000).

The LSWCD have been active in several water quality and natural resource issues. They administer the Paradise Creek TMDL Implementation Program, coordinating planning, implementation, and funding. They also support the Paradise Creek Watershed Advisory Group (PCWAG), are involved in public education about natural resource issues, particularly water quality, print a bi-monthly newsletter and offer the Sixth Grade Environmental Awareness Days at Spring Valley Reservoir to expose the youth of Latah County to natural resource issues.

Idaho Department of Lands

The Idaho Department of Lands (IDL) manages several thousand acres of timberland in the Palouse River Subbasin and administers the Idaho Forest Practices Act. They assist private landowners with developing timber management plans that comply with site-specific best management practices in several tributary watersheds. The IDL administers the Forest Improvement Program (FIP) and the Stewardship Program (SIP). The IDL is also responsible for administering surface mining laws.

The IDL is responsible for enforcing the Idaho Lake Protection Act, which requires permits for work on or above the lake bed and below the ordinary high water mark. This includes riprap, breakwaters, and aids to navigation such as docks, piers, pilings, buoys and boat ramps. State agencies, including the IDEQ and IDFG, have the opportunity to review and comment on the potential environmental effects of the projects.

Idaho Department of Water Resources

The Idaho Department of Water Resources (IDWR) is responsible for enforcing the Stream Channel Protection Act, which requires permits for in-channel work or developments. State agencies, including the IDEQ and IDFG, have the opportunity to review and comment on the potential environmental effects of the projects. IDWR also manages Idaho's water rights program.

Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) has identified general fish and wildlife goals and strategies for eastern Washington, including areas encompassed by the Columbia Plateau Province and its associated sub-basins. The WDFW is responsible for preserving, protecting, and perpetuating populations of fish and wildlife. Washington State laws, policies or guidance that WDFW uses to carry out its responsibilities include:

Hydraulic Code (RCW 75.20.100-160): This law requires that any person, organization, or government agency that conducts any construction activity in or near state waters must comply with the terms of a Hydraulic Project Approval permit issued by WDFW. State waters include all marine waters and fresh waters. The law's purpose is to ensure that needed construction is done in a manner that prevents damage to the state's fish, shellfish, and their associated habitat(s).

Strategy to Recover Salmon (part of Extinction is not an Option): The strategy is intended to be a guide, and it articulates the mission, goals, and objectives for salmon recovery. The goal is to restore salmon, steelhead, and trout populations to healthy harvestable levels and improve those habitats on which the fish rely. The early action plan identifies specific activities related to salmon recovery that state agencies will undertake in the 1999-2001 biennium and forms the first chapter in a long-term implementation plan

currently under development. The early actions are driven by the goals and objectives of the Strategy. Many of the expected outcomes from the early actions will directly benefit regional and local recovery efforts.

The Bull Trout and Dolly Varden Management Plan: Describes the goal, objectives and strategies to restore and maintain the health and diversity of self-sustaining bull trout and Dolly Varden stock and their habitats.

The Wild Salmonid Policy for Washington: Describes the direction the WDFW will take to protect and enhance native salmonid fish. The document includes proposed changes in hatchery management, general fish management, habitat management and regulation/enforcement.

The Draft Steelhead Management Plan: Describes the goals, objectives, policies and guidelines to be used to manage the steelhead resource.

Washington Priority Habitats and Species (PHS): A guide to management of fish and wildlife "critical areas" habitat 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 its habitat.

The Draft Snake River Wild Steelhead Recovery Plan: This plan is an assessment of problems associated with the continuing decline in natural steelhead populations within the Snake River basin and includes recommendations to reverse the decline. The WDFW manages fisheries and fish populations to provide diverse recreational opportunity and conserve or enhance indigenous populations.

The Lower Snake River Compensation Plan: This program is funded by BPA and the USFWS through the LSRCP office, and the WDFW administers and implements the Washington portion of the program. The program mitigates for the loss of fish populations and recreational opportunities resulting from construction of the four lower Snake River dams. Specific mitigation goals include “in-place” and “in-kind” replacement of adult salmon and steelhead. The WDFW developed implementation plans as part of the LSRCP program and include:

The Fishery Management and Evaluation Plan (FMEP): A plan required by NMFS for all fisheries in the Snake River and its tributaries in Washington. The plan is an assessment of fisheries effects on listed anadromous salmonids.

Local Government

Latah County Planning and Zoning Commission oversees development in Latah County. The North and South Latah County Highway Districts are responsible for road construction and maintenance for county roads.

Clearwater Basin Advisory Group

Basin advisory groups (BAG) were created by state water quality code (Idaho Code §39-3613). The duties of each BAG are specified by Idaho Code §39-3614. The BAGs were designated by the director of the Idaho Department of Health and Welfare to advise the director on water quality objectives for each river basin in the state. The Clearwater BAG is composed of ten members representing industries and interests affected by the implementation of water quality programs within the Clearwater basin. The BAGs make recommendations to IDEQ concerning monitoring, designated beneficial use status

revisions, prioritization of impaired waters, and solicitation of public input. Although the Palouse River is not part of the Clearwater River basin, water quality issues in the Palouse River drainage are part of the Clearwater BAG responsibilities.

Paradise Creek Watershed Advisory Group

Watershed advisory groups are created by state water quality code (Idaho Code §39-3615). WAGs were formed to provide advice to the Idaho Department of Heath and Welfare (via the Department of Environmental Quality) for specific actions needed to control point and nonpoint sources of pollution within watersheds where designated beneficial uses are not fully supported. WAG duties are specified in Idaho Code §39-3616.

The code specifically calls for creation of WAGs for water bodies that were labeled as "high priority" on the Total Maximum Daily Load schedule established for Idaho State. Although the Palouse River was not listed as a "high priority" for the TMDL development due in 2003, it is anticipated that a WAG will be named because the Palouse River is an interstate watershed and includes a diverse ownership distribution.

Clearwater Resource Conservation and Development Agency

The Clearwater Resource Conservation and Development agency (CRC&D) is involved in development and protection of natural resources through such projects as cooperating in improvement of Spring Valley Reservoir, and Moscow City Parks; supports the Clearwater Basin Weed Advisory Group and the Alternative Forest Products Advisory Group and provides low-cost trees for conservation plantings.

Idaho Association of Soil Conservation Districts

The Idaho Association of Soil Conservation Districts (IASCD) is a voluntary, non-profit association of Idaho's 51 soil conservation districts cooperating in the management of Idaho's natural resources. In conjunction with districts from other states, they form a part of a national network, the National Association of Conservation Districts (NACD, comprising approximately 3,000 districts and over 15,000 individual directors.

The IASCD was organized in 1944 to provide a unified voice for conservation in Idaho. It's members' work closely with the State Soil Conservation Commission on problems of policy and natural resource concerns. The IASCD also provides a forum for discussion of common problems, including erosion and sediment control, water quality, forestry, research, conservation and environmental education, resource planning, wildlife and pasture and range. It informs the State Legislature and Congress of its views on these natural resource concerns.

Idaho Association of Counties

The Idaho Association of Counties (IAC) was founded in 1976 and is a non-partisan, non-profit service organization dedicated to the improvement of county government. IAC serves as a spokesman for counties at the state and national levels and acts as a liaison between counties and other levels of government - through research, training and lobbying.

Palouse Land Trust

The Palouse Land Trust was formed in 1995 to help landowners and communities in the Palouse conserve and protect unique and open areas. The major mechanism in accomplishing this is through conservation easements. Most activities so far have focused on community outreach about the Land Trust, but future plans including obtaining grants and monies for conservation easements. The Nature Conservancy may also turn over their small holdings in the Palouse Subbasin to the Palouse Land Trust.

The goals of the PCEI are to improve water quality, function, and stewardship of ecosystems situated within the Palouse; provide communities with a sense of empowerment that they can make a positive difference toward restoring, protecting, and/or preserving the environment for enjoyment by future generations; improve habitat for fish and wildlife; enhance appreciation of cultural diversity through projects that encourage diverse groups of people to work together; enhance outdoor-based educational and recreational opportunities for the community.

Existing Goals, Objectives, and Strategies

The Palouse River Subbasin provides diverse fish and wildlife populations and habitats that are significant ecologically, aesthetically, and economically to the citizens of Washington and Idaho and the Northwest. The overall goal is to provide for healthy, sustainable populations of fish and wildlife that will provide for the ecological, economic, cultural, recreational and aesthetic benefits to the region. This goal will likely be reached by maintaining the functions and attributes of healthy populations of the ecosystem, and working with modified aspects of the ecosystem to restore lost ecological components or replace them with other components that produce desirable outputs.

General Fisheries Goals for the Palouse Subbasin (WDFW)
To restore and maintain the health and diversity of native fish stocks and their associated habitats within the Palouse Subbasin, and to pursue harvest utilization of these stocks, as well as other desirable resident and/or non-native fish stocks, within appropriate habitats and within sound resource protection guidelines, which will not cause detrimental impacts upon native fish stock restoration efforts.

Note: Quantitative objective values for sub-basin goals will be fully developed within the evolving planning process for the Palouse Subbasin.

Objective 1 Evaluate 50 miles of Palouse River tributary stream(s) per year through 2005 to assess resident fish stocks composition and relative abundance - with primary emphasis on assessment of sensitive native stocks, and also assess stream habitat conditions and fish passage barriers. These self-sustaining populations can provide recreational, ecological and sociological benefits.

Strategy 1. Conduct fish stock assessments and population inventories to estimate population strength and population dynamics.
Strategy 2. Evaluate in-stream habitat and riparian habitat conditions in Palouse River tributaries, with emphasis on Cow Creek and Rock Creek, and Union Flat Creek to identify beneficial habitat and fish passage improvements.
Strategy 3. Pursue funding for fish passage, in-stream, and riparian habitat improvement projects.

Strategy 4. Monitor the effectiveness of in-stream habitat improvements, passage improvements, and riparian enhancement efforts, in improving fish species relative abundance and distribution.

Strategy 5. Inventory and evaluate natural and man made fish passage barriers and identify which ones could be mitigated to facility fish passage, such that future funding for fish passage and habitat improvement work can be focused upon point location fish habitat deficiencies.

Objective 2 Evaluate 50 miles of Palouse River tributary stream(s) per year through 2005 to document and identify wild salmonid populations in the Palouse River and its tributaries. Primary emphasis will be on conservation of sensitive wild stocks, by identifying native / wild stocks through DNA analysis, and mapping native / wild salmonid stock distributions.

Strategy 1. Conduct genetic DNA evaluation of potentially distinct stocks of resident redband rainbow trout and whitefish within the Palouse system to assist with development of appropriate management plans.

Objective 3 Create and sustain fisheries that over the next 20 years will support and maintain traditional harvest needs (including tribal subsistence and ceremonial) and quality recreational fisheries as partial substitution for lost anadromous fishing opportunity within Snake River tributaries, including the Palouse River subbasin. A salmonid sport catch objective for WDFW for lowland lakes within the Palouse sub-basin is 2 fish, per angler, per angler trip.

Appropriate use of hatcheries will be critical to the success of providing recreational and applicable subsistence resource fisheries. Artificial production is a useful tool for entities managing fish resources to meet such objectives

Strategy 1. Stock appropriate trout stocks into suitable stream habitats and lowland lakes within the Cow Creek and Rock Creek watersheds within the Palouse Subbasin.

Strategy 2. Conduct angler surveys to estimate fishery utilization, and fishery quality over time (catch per unit of effort, angler days of utilization).

Strategy 3. Create and / or maintain quality warm water sport fisheries in appropriate habitats, which will not cause detrimental impacts upon native fish populations.

Strategy 4. Monitor and evaluate the effects of fish management actions.

Strategy 5. Assess the feasibility of establishing habitat protection / enhancement projects within tributaries of the Palouse river to enhance the survival and production of several resident fish species through increased water quality protection, juvenile rearing habitat, and adult late summer and winter holding habitat.

Strategy 6. Seek funding for maintenance and operation of WDFW hatchery facilities utilized to provide fish for recreational fishing within the subbasin.

Specific Fisheries / Habitat Goals (WDFW)

Fish habitat / land management goals of the Palouse subbasin incorporate a balanced approach between fish habitat needs within the sub-basin and land use practices that are compatible with natural riverine and riparian functions. Cooperators will need to work to accomplish this goal through on the ground implementation of focused objectives and strategies that facilitate the improvement of habitat conditions to support viable anadromous (below Palouse Falls) and resident fish populations, while maintaining the economic sustainability of the local agricultural economy.

Objective 1 Increase natural stream stability and instream pool quality and quantity.

Intent:

- Create large, high quality pools for adult holding areas and rearing habitat for juveniles.
- Improve gravel sorting and stability for improved spawning, insect production, and survival of over-wintering fish.
- Improve cover (i.e. logs, roots, undercuts, overhanging vegetation, turbulence and boulders).
- Reduce loss of fish habitat to sedimentation impacts.
- Reduce damage to structures (i.e. bridges, roads, houses, etc.) caused by floods and flood repairs.

Strategy 1. Work with Interdisciplinary team(s) to design, using bio-engineered structures, corrective actions to meet site-specific identified needs.

Strategy 2. Work with county road department(s) and the NRCS to improve water and sediment conveyance along roads and under bridges.

Strategy 3. Coordinate the USDA Conservation Reserve Enhancement Program (CREP) to restore riparian buffer function.

Strategy 4. Work to reduce the extent of riparian and wetland habitat loss in the upper Palouse watershed, with emphasis on sub-watersheds such as Pine Creek, to assist in expansion of target fish populations and reduce sediment contributions to down stream habitats, the Palouse River, and ultimately the Snake River.

Goal: Reduce the weekly average of the daily maximum water temperature to meet Federal Clean Water Act standards within major tributaries (Cow Creek, Union Flat Creek, North and South Fork) of the Palouse River.

Objective 2. Reduce the weekly average of the daily maximum water temperature to meet WA State Class A water standards at the confluence of Cow Creek and the Palouse River and Union flat creek and the Palouse River by 2010. Reduce width-to-depth ratio by 20 percent on public land and at least 5 percent on private land. Improve irrigation efficiency to at least 70 percent.

Intent:

- Reduce the weekly average of the daily maximum water temperature for each month in the summer to 70EF in the major tributaries of the Palouse River to make them habitable for the historic native fish assemblage, including salmonids.

Strategy 1. Continue temperature data collection and monitoring to identify thermal barrier limiting factors.

Strategy 2. Design and implement site-specific actions to narrow channel flow during low flow months.

Strategy 3. Work with landowners to identify water withdrawal efficiency and screening needs.

Strategy 4. Develop and implement water withdrawal modification and management plans.

Strategy 5. Prioritize the upper reaches of streams for treatment towards the lower reaches.

Goal: Reduce erosion and sedimentation rates to meet Class A water quality standards for turbidity, and lower the percent fines in spawning gravel to less than 15 percent.

Intent:

- Improve or maintain spawning success and juvenile salmonid overwintering.
- Improve insect production.
- Improve water clarity for feeding.
- Improve respiration.
- Reduce gill abrasion.

Objective 3. Reduce turbidity to the state standard (not to exceed 5 NTUs over background levels) by 2010. Reduce fines in the gravel to less than 15 percent of the substrate. Strive for 8 mg/L DO in the spawning gravel. Reduce streambank erosion to 15 percent of the streambank length. Reduce sediment delivery rates to 10 percent. Improve and stabilize water diversions to eliminate the need to rebuild loose-rock diversions or diversion ditches every year.

Strategy 1. Coordinate implementation of the USDA CREP program to restore riparian habitats and function.

Strategy 2. Encourage maintaining CRP acreage through continuous program signups.

Strategy 3. Work with landowners to continue increasing agricultural acreages under direct seed systems.

Strategy 4. Work with landowners to continue implementation of upland BMP's.

Strategy 5. Work with the Weed Board to control noxious weed infestations.

Strategy 6. Work with agencies and landowners to improve range and forest health.

Strategy 7. Develop sub-basin specific recommended conservation practices to reduce erosion and sedimentation.

Strategy 8. Work with Interdisciplinary team(s) to design, using bio-engineered structures, corrective actions to meet site-specific identified needs.

Strategy 9. Work with county road department(s) and the NRCS to improve water and sediment conveyance along roads and under bridges.

Strategy 10. Coordinate the USDA Conservation Reserve Enhancement Program (CREP) to restore riparian buffer function.

Strategy 11. Purchase critical watershed areas for protection and restoration of native fish species and their habitat.

Strategy 12. Design, construct, and maintain habitat improvements to address limiting factors in tributary streams for native and non-native Salmonids and warm water fish. [e,g, riparian planting, fencing, instream structures].

Strategy 13. Use offsite mitigation as a method to fund projects on Pine Creek, which would benefit the Rock Lake system, the Palouse system, and the Snake River as a whole. Work with DNR, BLM, and the Soil conservation district, identify beneficial implementation area(s).

Goal: Utilize cost-effective and efficient ways to treat identified resource problems.

Intent:

- Work on the highest priority resource problems first.
- Favor the use of low-cost alternatives to treat those resource problems that are long term in nature.
- Use treatments that will contribute toward stream channel stability and increased fish habitat.

Objective 4. Empower a Palouse Watershed Council / Lead Entity to develop protocols for prioritizing proposed project(s), and annually reviewing the protocol(s) and proposed projects, by 2002.

Strategy 1. Establish and Utilize a Watershed Council / Lead Entity to prioritize projects.

Strategy 2. Use Interdisciplinary teams to design and engineer identified projects.

Strategy 3. Increase interaction and coordination between a Palouse Watershed Council and the Palouse Rock Lake Conservation District.

Strategy 4. Clarify, define, and establish the role of a Citizens Advisory Group (CAG) and Technical Advisory Group (TAG) in project direction and prioritization.

Strategy 5. Continue to maintain and improve the good working relationship between the landowners and natural resource agencies.

Goal: Improve and re-establish riparian vegetation to reduce water temperature, increase stream channel stability and improve fish habitat.

Intent:

- Improve the canopy cover over the stream.
- Reduce streambank erosion and sedimentation.
- Increase filtration of potential pollutants.
- Increase overhanging cover.

- Increase large woody debris recruitment for improved complexity, quantity and quality of instream fish habitat.

Objective 5 Decrease length of eroding streambank to 15 percent of the total streambank length. Reduce maximum water temperature to meet Clean Water Act standards for Class A waters in major Palouse River tributaries by 2010. Reduce fecal bacteria counts to meet the state standard for Class A waters (100 colonies/100ml). Increase species and age class diversity of riparian vegetation., to approach 75% canopy cover along identified sections of Pine Creek.

Strategy 1. Implement a two-year water quality monitoring project for all major tributaries to the Palouse.
Strategy 2. Coordinate implementation of the USDA CREP program.
Strategy 3. Revegetate riparian areas at instream project sites, with emphasis in Pine Creek, and other upper watershed tributaries.
Strategy 4. Revegetate other identified riparian areas.
Strategy 5. Develop a native vegetation stock nursery donor site.
Strategy 6. Work with landowners to develop alternative livestock water systems, riparian grazing management plans, and fencing programs.
Strategy 7. Increase riparian canopy cover to at least 50 percent overhead coverage in selected impact stream reaches.

Objective 6 Improve and maintain rangeland condition to reduce negative impacts to fish.

Intent:

- Improve rangeland condition and minimize the negative impacts of rangeland use on fish.

Strategy 1. Work through existing federal programs to promote funding for riparian fencing projects to restrict livestock from stream bank areas.
Strategy 2. Promote best management practices, particularly within identified high erosion prone sub-watersheds, for grazing / rest rotation practices.

Goal: Improve and maintain instream flow levels to improve conditions for fish

Intent:

- Increase useable habitat for fish
- Improve instream temperature conditions

Objective 7 By 2004 establish IFIM process to develop a consensus target flow for fish in main Palouse River and Union Flat Creek and Rock Creek. Improve surface water irrigation efficiency to a minimum of 70 percent.

Strategy 1. Pursue targeted and appropriate water purchases and leases for trust in-stream water rights as a method to meet IFIM flows.
Strategy 2. Meter existing water diversions consistent with the overall metering strategy for water Resource Inventory Area 34.
Strategy 3. Conduct appropriate IFIM data collection and analyses.

Strategy 4. Limit issuance of any new water rights within the sub-basin to those proposals, which will not impair existing flow of surface water.

Goal: Complete TMDLs for temperature, pH, dissolved oxygen, fecal coliform, specific pesticides and herbicides, and turbidity in the Palouse River and its tributaries as defined by WDOE.

Intent:

- Meet Washington State surface water quality standards for the Palouse River and its tributaries.

Objective 8 Complete an implementation plan that will serve to meet TMDL allocations within 2 years of TMDLs being established for specific parameters.

Strategy 1. Complete and implement a monitoring plan that will determine the success of the implementation plan for established TMDLs.

Fisheries Goals, Objectives, and Strategies (IDFG)

Goal: Restore and enhance aquatic habitat within the Palouse River Subbasin to support coldwater biota and native fishes.

Objective 1 Reduce sediment and nutrient sources on Federal and private land.

Strategy 1. Develop and implement Total Maximum Daily Load and Best Management Practices (BMP) in the Palouse River Subbasin.

Strategy 2. Obliterate abandoned and unneeded tertiary roads and upgrade long-term roads.

Strategy 3. Reclaim old mine tailings on Federal lands.

Strategy 4. Reduce nonpoint source sediment and nutrient sources on private, state and urban land.

Recommended Actions

- Through local Watershed Advisory Groups and Technical Advisory Teams, develop, enact, encourage or enforce BMPs that target nonpoint source pollution in the Palouse River Subbasin. Provide technical and financial assistance to implement BMPs. Develop goals and timelines for recovery.
- Work with the USFS and other timberland owners to identify and remove failing roads and correct other problems that are negatively impacting stream habitat, floodplain function and watershed condition.
- In cooperation with the Idaho Department of Transportation and the North and South Latah County Highway districts, stabilize road cuts and fills with shaping to reduce steep slopes, and plant with native woody and herbaceous vegetation; and correct water conveyance problems by installing culverts and improving road drainage and ditches.
- Restore slopes and recontour and revegetate streambanks with native species to control erosion and provide riparian cover
- Work with the NRCS, landowners, ISCC, IASCD, LSWCD, FSA, PCEI and IDEQ to identify and implement BMPs that reduce erosion and storm water runoff. These

would include vegetative practices (riparian and filter strips, herbaceous field borders, road cut planting, streambank re-vegetation and stabilization, slope protection), structural practices (grassed waterways, sediment basins, gully plugs, construction erosion control) and agronomic practices that keep surface cover over soil (residue management in a direct seed system).

- Cooperate with USFS, IDL, and landowners to implement BMPs identified in the Idaho Forest Practices Act (FPA) that reduce erosion, such as native grass seeding, drainage structures, surface rock on roads, and tree planting for permanent forest cover.
- Encourage local governments to establish ordinances that limit floodplain development and alteration. Encourage riparian buffer strips and building setbacks that allow the floodplain to function naturally.
- Provide technical assistance and cost sharing on streambank stabilization, flood control and stream crossing projects to ensure landowners and other entities do projects that are benign or beneficial.

Objective 2 Reconstruct stream channels to their original channel location and channel type where mining or other activities have altered them.

Strategy 1. Identify high priority streams where fish habitat and channel stability could be restored on Federal lands.

Strategy 2. Identify stream reaches on private lands where stream restoration could be incorporated into the land use plan.

Recommended Actions

- Work cooperatively with the USFS to design and implement channel reconstruction that will restore natural stream and floodplain form and function.
- Artificially place large organic debris to create pools and other desired fish habitat.
- Revegetate streambanks and floodplain to speed the recovery of riparian areas and provide material for the recruitment of large organic debris.
- Work with NRCS, ISCC. IASCD, LSWCD, FSA, USFWS, PCEI and landowners to implement WHIP, WRP or Partners in Flight programs on their property. Provide technical and secure funding for financial assistance.
- Discourage the practice of stream straightening and "ditching." Work with NRCS, ISCC, IASCD, LSWCD and FSA to design and implement agronomic practices that increase productivity without harming riparian and wildlife habitat, and provide incentives to implement.
- Encourage wetland development or restoration that will provide a more stable hydrograph, increase stream channel stability and lower water temperatures.
- Work with private landowners, NRCS, LSWCD and FSA to minimize ground cover disturbances that have a negative effect on water yield and the hydrograph.

Objective 3 Lower summer water temperatures throughout the Palouse River Subbasin so that coldwater biota will be fully supported.

Strategy 1. Identify high priority reaches where riparian vegetation would provide thermal cover, bank stabilization, water storage and wildlife habitat.

Recommended Actions

- On Federal lands, work with the USFS to plant the appropriate native vegetation within riparian areas and floodplains. Use fast-growing species to provide shade, cover and bank stability.
- Work with NRCS, LSWCD, ISCC, IASCD, PCEI and others to provide technical and financial assistance for landowners to plant riparian areas and ditches with native woody plants.

Goal: Maintain and enhance fishing opportunities in the Palouse River Subbasin

Objective 1 Develop sportfishing opportunity that presents a minimum ecological risk to native species.

Strategy 1. Evaluate feasibility of stocking cutthroat trout in areas where habitat has been restored and there is minimal risk of competition from brook trout.

Wildlife Goals, Objectives, and Strategies

Wildlife (WDFW)

The primary wildlife goal for the Palouse Subbasin is to protect, enhance, restore, maintain wildlife habitat and increase wildlife populations, including native, PHS, and T&E species, to viable or management objective levels for ecological, social, recreational, and aesthetic purposes.

Numerous wildlife species occur within the subbasin, including those identified by WDFW as threatened, endangered, species of concern, or Priority Habitat Species. General goals and strategies are described below followed by species-specific goals, objectives, and/or strategies.

Objective 1 Protect and enhance big game winter range habitat along and associated with the Palouse River and its tributaries.

Strategy 1. Develop cooperative conservation agreements with public and private landowners.

Strategy 2. Acquire through purchase and/or easement critical habitat areas.

Strategy 3. Educate the public and landowners on the value of wildlife habitats.

Strategy 4. Protect habitat through enforcement of land use ordinances such as county critical areas ordinances enacted through the Washington State Growth Management Act.

Objective 2 Protect and enhance big game travel and migration corridors.

Strategy 1. Protect and enhance important white-tailed deer travel corridors and winter range along the North Fork of the Palouse, South Fork of the Palouse and Union Flat Creek drainages.

Strategy 2. Develop cooperative agreements with private and public landowners and/or acquire key habitat sites.

Objective 3 Design and implement forest practices to better meet the needs of fish and wildlife and protect sensitive species.

Strategy 1. Protect old-growth/mature cottonwood forest habitat used by neo-tropical migrants, goshawks, bald eagles, and other species of concern. Protect eagle and other raptor nesting, perching, and roost sites.

Strategy 2. Provide buffers and corridors between adjacent forest harvest units and regeneration stands.

Strategy 3. Promote snag and downed log recruitment.

Strategy 4. Reduce road densities and re-vegetate closed roads.

Objective 4 Protect and enhance riparian areas and wetlands for all wildlife species.

Strategy 1. Leave adequate buffers along all watercourses and wetlands to reduce water sediment loads.

Strategy 2. Enhance riparian areas and wetlands with shrub and tree plantings and herbaceous seedings.

Strategy 3. Protect existing and potential snag trees adjacent to streams, rivers, lakes, and wetlands. Facilitate snag recruitment.

Strategy 4. Improve in-stream structure by installing down woody material in waterways (caution must be exercised to prevent flooding croplands and urban areas.

Waterfowl

Ducks and geese are an important component of the wildlife community throughout the Palouse Subbasin. Protection of wetlands and riparian habitats is critical to maintain waterfowl production at or near maximum levels (WDFW 1986, Intermountain Joint Venture 1997)

WDFW has protected, enhanced, and created waterfowl habitat in the Palouse Subbasin. Funds from the Washington State Duck Stamp Program have been used to enhance waterfowl habitat on public (WDFW, BLM, DNR) and private lands alike.

Status: State game species**.**

Limiting factors: Lack of permanent open water for nesting, brood rearing and feeding activities; lack of upland waterfowl nesting habitat, and nest predation may limit waterfowl production in some areas within the subbasin.

Objective 1 Increase habitat for ducks, geese and other migratory birds in the Palouse Subbasin.

Strategy 1. Enhance and develop riparian habitat and wetlands within the Palouse Subbasin.

Strategy 2. Improve riparian habitat along Pine Creek and Rock Creek.

Ferruginous Hawk
Persecution by early settlers reduced the number of ferruginous hawks throughout the west. Today, WDFW's statewide goal is to establish a population of at least 60 breeding pairs with 40 pairs in the Central Recovery Zone and 10 in the North Recovery Zone (WDFW 1996). The Palouse subbasin falls within these two zones.

Status: State threatened and Federal Species of Concern

Limiting Factors: Loss of shrub steppe habitat and prey species, illegal takings, and competition for nesting sites.

Goal: Maintain a viable ferruginous hawk population within the Palouse subbasin.

Objective 1 Increase nesting pairs within the subbasin to 3 within the next ten years.
Strategy 1. Establish cliff nesting or pole platforms.
Strategy 2. Improve prey base and abundance.

Burrowing Owl
WDFW's statewide goal for this species is to maintain burrowing owls as a component of the wildlife community throughout Eastern Washington. WDFW has established burrowing owl management zones and established breeding population goals for each zone. The Palouse Subbasin lies within WDFW's North Recovery Zone for burrowing owls.

Status: State species of concern.

Limiting factors: Lack of burrow sites and small mammals such as ground squirrels and badgers to dig burrows (artificial burrows can be substituted).

Goal: Establish at least 40 breeding pairs in the Central Recovery Zone and 10 breeding pairs in the North Recovery Zone (Smith 1997).

Objective 1 Establish six artificial burrowing owl nest sites in the Lacrosse, Washington area by the end of 2004.
Strategy 1. Survey the Lacrosse area of Washington State for sites where artificial nest burrows can be established near currently breeding pairs of burrowing owls.

Sharp-tailed Grouse
Once plentiful throughout the Palouse Subbasin, this native grouse is now extirpated. Re-establishing a resident population is questionable unless relatively large blocks of contiguous shrubsteppe/grassland steppe habitat, ≥ 10,000 acres in size, (WDFW 1995) can be protected, maintained, and enhanced within the Palouse Subbasin.

Status: State Threatened, Federal Species of Concern

Limiting Factors: Loss of shrub steppe habitat. Sharp-tails extirpated, no viable population from which to build (Yocom and Larrison 1977).

Goal: Re-establish a viable Columbian Sharp-tailed grouse population in the Palouse Subbasin (Schroeder 2000a).

Objective 1 Determine the potential for reintroducing Columbia sharp-tailed grouse by 2003.

- Strategy 1. Identify potential re-introduction sites and conduct habitat quality assessments of sites.
- Strategy 2. Improve habitat quality of CRP lands for sharp-tails by increasing vegetation diversity (plant legumes within CRP).
- Strategy 3. Locate a source of grouse to be used as transplant stock and re-introduce sharp-tailed grouse.
- Strategy 4. Establish six leks within the subbasin.
- Strategy 5. Use artificial leks to establish breeding sites.
- Strategy 6. Monitor sharp-tailed grouse population and habitat/grouse interactions.

Mule Deer

Mule deer are an important big game species throughout the Palouse Subbasin (WDFW 2000a). Seasonal mule deer habitat within the subbasin is not capable of supporting significant population increases when severe winter or significant drought conditions occur (WDFW 1999). Loss of shrub-steppe and riparian habitats is a major contributing factor limiting current population levels of mule deer. As in many areas, urban/rural development and growth also continues to impact seasonal deer ranges. Recent enrollment of marginal agricultural land in the Conservation Reserve Program has been beneficial to mule deer (WDFW 1999).

Status: State game species.

Limiting Factors: Mule deer populations have declined due to fire suppression, habitat degradation, urban encroachment, and predation. (WDFW1999, WDFW 2000).

Goal: Maintain mule deer populations at current levels

Objective 1 Maintain mule deer populations at levels that are not detrimental to agricultural crops.

- Strategy 1. Improve mule deer/shrubsteppe habitat by controlling noxious weeds and enhancing habitat.
- Strategy 2. Improve mule deer habitat on public and private lands through cooperative agreements.

Rocky Mountain Elk

Elk populations have increased in some areas within the subbasin due to improved habitat conditions as a result of the Conservation Reserve Program. In the northern portion of the subbasin, elk venture from the Turnbull National Wildlife Refuge into agricultural/urbanized areas to become nuisance wildlife as well as become involved in collisions with vehicles resulting in property damage and injuries (Hickman pers. comm. 2001).

Status: State game species.

Limiting Factors: Cover (thermal/security) and/or forage may be limiting to elk particularly on winter ranges and calving/fawning habitats along riparian zones. Crop depredation conflicts have resulted in localized "hot spot" hunts to eliminate elk in specific areas. Road densities exceeding 1.5 miles of road per square mile are common in this subbasin and limits elk habitat utilization (Thomas 1979).

Objective 1 Manage the elk population at a level that is biologically and socially acceptable.

- Strategy 1. Maintain a wintering elk population of 450 animals in Game Management Units 127 and 130 through recreational harvest (WDFW 2001).
- Strategy 2. Improve hunting seasons to minimize damage complaints from landowners.
- Strategy 3. Improve elk hunter harvest opportunities on the Turnbull NWR and private lands in the area.
- Strategy 4. Improve elk habitat on public lands.

Neo-tropical birds

Neo-tropical migratory birds are dependant on wetlands, grasslands (shrubsteppe), riparian, and timbered habitats. During the breeding season, 15 or more species of birds will nest in the Palouse subbasin while 75 to 80 species will stop, rest, feed, and/or establish staging areas in this subbasin during migrations (Howard Ferguson pers. comm.).

Status: State and Federal Protected Species, some are listed as species of concern.

Limiting factors: Loss of riparian habitat, wetlands, forests, grasslands, and shrubsteppe, in the Palouse subbasin.

Objective 1 Increase and maintain neo-tropical migratory bird populations in the subbasin.

- Strategy 1. Enhance, protect, maintain, and develop riparian, wetland, grasslands, shrubsteppe, and forested habitats through acquisitions, easements, and/or cooperative agreements.

Wildlife (IDFG)

Goal: Protect, restore, enhance and sustain populations of wildlife for ecological, aesthetic, cultural, and recreational values.

Objective 1 Maintain bald eagle populations at or above present levels.

Status: Threatened (Federal); Endangered (Idaho).

Limiting Factors: Loss of winter roost sites and disturbance from development and other anthropogenic activities.

Strategy 1. Identify and map winter roosting areas.
Strategy 2. Protect bald eagle winter roost sites by securing existing and potential roosting areas.
Strategy 3. Monitor and research water quality and prey abundance and production.

Objective 2 Restore and maintain viable lynx populations in the Palouse River Subbasin.

Status: Threatened (Federal); Species of Concern (Idaho)

Limiting Factors: Winter prey base, forest management practices, habitat fragmentation, fire suppression and lynx harvest management (Stinson 2000).

Strategy 1. Determine distribution, abundance, population trend, and limiting factors for lynx in the subbasin based on literature reviews, habitat modeling and direct investigation.
Strategy 2. Coordinate survey, monitoring and management activities with affected land management agencies to assist in lynx recovery.
Strategy 3. Conduct prey species research to evaluate prey base limitations on lynx populations.
Strategy 4. Conduct intensive radio-telemetry studies of lynx populations to better evaluate limiting factors.
Strategy 5. Investigate lynx habitat use and travel patterns in relation to human activities such as snowmobile use, ORV use and skiing.
Strategy 6. Investigate potential competition between lynx and other carnivores, and the possible role of habitat changes.

Recommended Actions

- Cooperate with BLM, USFS and major logging companies to secure funding to allow research on distribution, abundance, trend and limiting factors influencing lynx populations.
- Establish coordination protocols between agencies for surveys and monitoring activities to assess impacts of management activities.

Objective 3 Protect, restore and sustain state and federal species of concern, federal candidate species, BLM sensitive species, and USFS indicator species, including fisher, black-backed woodpecker, common barn owl, fringed myotis, great gray owl, long-eared myotis, long-legged myotis, wolverine, northern alligator lizard, pygmy nuthatch, pygmy shrew, ringneck snake, tailed frog, Townsend's big-eared bat, white-headed woodpecker, Woodhouse's toad and yuma myotis.

Strategy 1. Determine distribution abundance, population trend, and limiting factors for these species based on literature reviews, habitat modeling and direct investigation.

Strategy 2. Address limiting factors through appropriate research.

Strategy 3. Identify priority zones for habitat protection, restoration, and enhancement activities with a priority on areas affected by development.

Strategy 4. Protect, enhance and maintain critical habitats from development and other land use threats.

Recommended Actions

- Cooperate with BLM, USFS, IDL universities and major logging companies to secure funding for research investigations.
- Work with local planning commissions to protect key wildlife habitat from development, and to mitigate for that habitat already lost.

Objective 4 Protect, restore, enhance and sustain populations of big game species such as elk, white-tailed deer, mule deer, moose, black bear, and mountain lion.

Limiting Factors: Wildlife habitat is threatened by subdivisions at low and mid-elevations, by extensive thinning and removal of closed canopy, low elevation winter ranges, fire suppression in the middle and upper elevation ranges, recreation on key winter ranges, increasing vehicular access and other land-use practices.

Strategy 1. Determine distribution, abundance, population trend, and limiting factors for these species based on reviews on literature, habitat modeling and field studies.

Strategy 2. Identify priority zones for habitat protection, restoration, and enhancement activities with a priority on areas affected by development.

Strategy 3. Protect, enhance and maintain critical habitats from development and other land use threats.

Strategy 4. Enhance a minimum of 400 ha annually through prescribed burns, other forest management practices and other habitat improvement projects.

Strategy 5. Determine how predators, hunting and inter-specific competition from sympatric species impact ungulate populations in the subbasin by 2010.

Strategy 6. Reduce negative impacts of successive road mileage that prevails on the landscape.

Recommended Actions

- Secure matching funds from other sources to enhance IDFG research to meet identified strategies.
- Secure funds to develop protocols through advisory groups for prescribed fire and other habitat improvement plans.
- Secure funds to implement proposed habitat improvement prescriptions.
- Work with land management agencies to reduce mileage of open-roads to reduce wildlife disturbances and vulnerability.
- Work with local planning commissions to protect key wildlife habitat from development, and to mitigate for that habitat already lost.
- Secure funds for protecting habitats through conservation easements.

Objective 5 Protect, restore, enhance and sustain populations of waterfowl, upland game and furbearers.

Strategy 1. Determine distribution, abundance, population trends and limiting factors for these species based on reviews of literature, habitat modeling and research.

Strategy 2. Identify priority zones for habitat protection, restoration, and enhancement activities with a priority on areas affected by adverse development.

Strategy 3. Protect, enhance and maintain critical habitats from development and other land use threats.

Recommended Actions

- Coordinate subbasin activities with appropriate agencies and organizations in adjacent subbasins.
- Work with county zoning boards to prevent loss of critical habitats.
- Establish an interagency advisory group to identify priority zones and develop protocols for habitat protection, restoration and enhancement projects.

Objective 6 Enhance neo-tropical migrant bird populations within present use areas and identify limiting factors for populations within the subbasin.

Limiting Factors: Loss of riparian, shrub, steppe and old growth forested habitats.

Strategy 1. Determine distribution, abundance, population trends, and limiting factors for these species based on reviews of literature, habitat modeling and field research.

Strategy 2. Identify limiting factors associated with different neo-tropical bird species.

Strategy 3. Identify priority zones, such as riparian, wetlands, and grasslands, for neo-tropical bird habitat protection, restoration and enhancement activities.

Strategy 4. Protect, enhance, and maintain neo-tropical bird habitats.

Strategy 5. Augment existing broad-scale efforts to establish and analyze trends of neo-tropical birds through a system of breeding bird surveys.

Recommended Actions

- Fund research projects to meet identified strategies.
- Establish advisory groups to develop protocols for protection and enhancement of neo-tropical habitats.
- Secure funding to enhance neo-tropical bird habitat and provide incentives to landowners to protect and enhance remaining native habitats.

Objective 7 Enhance herp populations within present use areas and identify limiting factors within the subbasin.

Limiting factors: Unknown

Strategy 1. Determine distribution, abundance, population trends, and limiting factors for these species based on review of literature, habitat modeling and field research.

Strategy 2. Identify and map priority zones, such as riparian, wetlands and grasslands, for herp habitat protection, restoration and enhancement activities.

Strategy 3. Protect, enhance and maintain herp habitats.

Recommended Actions

- Fund research projects to meet identified strategies needed for each species.
- Fund projects to locate and map priority zones necessary for herp species.

Goal: Protect, enhance and restore native wildlife habitats on a landscape level and establish ecological security for native and introduced wildlife populations.

Objective 1 Restore the diversity, block size and spatial arrangement of habitat types needed to sustain wildlife populations at ecologically sound levels.

Limiting Factors: Unknown. Major influences include agricultural practices, wetland draining, human encroachment and activities, livestock grazing, recreational activities and forest management practices.

Strategy 1. Develop a consolidated habitat map for the subbasin, with special emphasis on critical plant communities.

Strategy 2. Investigate and analyze historic losses of key habitat types, biological functions, and performance associated with changes in habitat diversity, block size and spatial arrangement. Relate to changes in wildlife diversity and abundance.

Strategy 3. Protect habitat through conservation easements, fee-title acquisition and long-term agreements.

Strategy 4. Coordinate efforts to develop comprehensive plans for protection, restoration and enhancement of key habitat types in the subbasin.

Strategy 5. Coordinate efforts to restore natural disturbance regimes in key habitats in the subbasin.

Strategy 6. Identify and address human impacts to key habitats and use adaptive management techniques to address those impacts.

Recommended Actions

- Establish and fund an inter-agency working group to map the subbasin emphasizing critical habitats.
- Fund a GAP analysis project to quantify historic habitat losses and quantify changes in habitat diversity, block size and spatial arrangement to predict changes in wildlife diversity and abundance.
- Provide funds to protect identified critical habitats and plant communities through conservation easements, fee-title acquisitions or long-term agreements.
- Establish working groups to develop comprehensive plans for protection, restoration and enhancement of key habitat types.
- Establish working groups to develop protocols for restoration of natural disturbance regimes within key habitat types.
- Establish working groups to identify human impacts and develop strategies using adaptive management to reduce and/or mitigate these impacts.

Objective 2 Restore the connectivity of habitat types needed to sustain wildlife populations at the landscape level.

Limiting Factors: Unknown. Major influences include human encroachment and activities, highway corridors, recreational activities and forest management practices.

Strategy 1. Identify critical wildlife travel corridors in the subbasin and between subbasins.

Strategy 2. Protect travel corridors between blocks of habitat and minimize impacts at highway crossings.

Recommended Actions

- Fund a project to identify and map critical wildlife travel corridors.
- Provide funds for protecting travel corridors through conservation easements or fee-title acquisition to maintain habitat connectivity.

Conservation Districts Goals , Objectives, and Strategies

Conservation Districts are charged with conserving and protecting the natural resources in their areas. The main focus of the Districts in the Palouse Basin is water quality. Districts within the basin also focus on habitat, and agronomic issues. Below are listed the goals and objectives listed in the Annual Plans and the Long Range Plans of a few of the Conservation Districts in the Palouse Subbasin.

Objective 1 Meet the water quality standards set forth by the State of Washington on surface waters within the Palouse Basin.

Strategy 1. Complete a Total Maximum Daily Loads for dissolved Oxygen and Fecal Coliform (and/or the current bacteria standard) on Missouri Flat Creek.

Strategy 2.	Complete load allocation and waste load allocations for DO and Fecal Coliform in the segment of Missouri Flat Creek located from the mouth, at the Palouse River, to the Idaho border.
Strategy 3.	Complete and implement a monitoring plan that will determine the success of the implementation plan.
Strategy 4.	Complete a Total Maximum Daily Load for pH, Temperature, Dissolved Oxygen, Fecal Coliform (and/or the current bacteria standard), on the Palouse River.
Strategy 5.	Complete load allocation and waste load allocation for temperature, pH, DO, Fecal Coliform in the segment of the Palouse River located from the mouth , at the Snake River, to the Idaho border.
Strategy 6.	Complete an implementation plan that will serve to meet temperature, pH DO, and Fecal Coliform load allocations and waste load allocations.
Strategy 7.	Complete and implement a monitoring plan that will determine the success of the implementation plan.
Strategy 8.	Complete a Total Maximum Daily Loads for DO, Fecal Coliform, NH3, and Temperature in Paradise Creek.
Strategy 9.	Complete load Allocations and Waste load Allocations for Temperature, DO, Fecal Coliform, NH3, pH, in the segment of the Paradise Creek. Located from the mouth, at the S.F. Palouse River, to Idaho Border.
Strategy 10.	Complete an implementation plan that will serve to meet Temperature, Fecal Coliform, NH3, pH, load allocations and waste load allocations.
Strategy 11.	Complete and implement a monitoring plan that will determine the success of the implementation plan.
Strategy 12.	Complete a Total Maximum Daily Load for temperature, pH, Dissolved Oxygen on Pine Creek.
Strategy 13.	Complete load allocations and waste load allocations for Temperature, pH, DO, in the segment of Pine Creek located from the mouth, at Rock Creek, to the confluence of NF and SF at Farmington.
Strategy 14.	Complete an implementation plan that will serve to meet Temperature, pH, DO, load allocations and waste load allocations.
Strategy 15.	Complete and implement a monitoring plan that will determine the success of the implementation plan.
Strategy 16.	Complete a Total Maximum Daily Load for Fecal Coliform (and/or the current bacteria standard), and DO on the Rebel Flat Creek.
Strategy 17.	Complete load allocations and waste load allocations for Fecal Coliform, DO in the segment of Rebel Flat Creek located from the mouth, at the Palouse River, to headwaters.
Strategy 18.	Complete an implementation plan that will serve to meet Fecal Coliform, DO load allocations and waste load allocations.
Strategy 19.	Complete and implement a monitoring plan that will determine the success of the implementation plan.
Strategy 20.	Complete a Total maximum Daily Load for pH, Temperature on Rock Creek.

Strategy 21. Complete load allocations and waste load allocations for Temperature, PH in the segment of Rock Creek located from the mouth, at the Palouse River, to Rock Lake outlet.

Strategy 22. Complete an implementation plan that will serve to meet Temperature, and pH load allocations and waste load allocations.

Strategy 23. Complete and implement a monitoring plan that will determine the success of the implementation plan.

Strategy 24. Complete a Total Maximum Daily Load for Temperature on Union Flat Creek.

Strategy 25. Complete load allocations and waste load allocations for Temperature in the segment of Union Flat Creek located from the mouth, at the Palouse River, to Idaho Border.

Strategy 26. Complete an implementation plan that will serve to meet Temperature load allocations and waste load allocations.

Strategy 27. Complete and implement a monitoring plan that will determine the success of the implementation plan.

Strategy 28. Implement Best Management Practices to reduce sedimentation into streams, lakes, and Rivers.

Strategy 29. Assist landowners/cooperators with the installation of BMPs, by securing cost-share, grants, and technical assistance.

Strategy 30. Reduce soil erosion cause by tillage.

Strategy 31. Encourage and demonstrate no-till systems for the growing of agricultural crops.

Strategy 32. Encourage and demonstrate reduces tillage systems for the growing of agricultural crops.

Objective 2 Improve the quality of the upland habitat in the Palouse River Subbasin.

Strategy 1. Increase the thermal cover for upland wildlife.

Strategy 2. Plant trees and shrubs native to the Palouse on ground idled by farmers through the Conservation reserve program. Roughly 600 acres per year.

Strategy 3. Plant trees and shrubs native to the Palouse on riparian areas.

Strategy 4. Increase food available to upland wildlife.

Strategy 5. Encourage producers to leave crop residues set over winter.

Strategy 6. Assist landowners/cooperators with planting food plots to benefit upland wildlife.

Research, Monitoring and Evaluation Activities

Non-BPA Funded Projects - WDFW

WDFW conducts the following surveys and research activities within the Palouse Subbasin. The USFWS assists with waterfowl brood counts. WDFW also monitors the annual harvest of big game and upland game bird species through hunter bag checks, questionnaires, and harvest report cards. There are currently no BPA wildlife projects in this subbasin.

1. Eastern Washington mule deer study

2. Annual pre-season deer classification surveys
3. Annual post-season deer classification surveys
4. Annual pre-season elk classification surveys
5. Annual post-season elk classification surveys
6. Annual waterfowl pair surveys
7. Annual waterfowl brood counts
8. Periodic golden eagle nest surveys
9. Periodic Burrowing owl surveys
10. Periodic Ferruginous nest occupancy and production surveys
11. Ferrugionous ecology study
12. Neo-tropical bird surveys
13. Wetland enhancement projects funded by Ducks Unlimited

BPA Funded Research, Monitoring and Evaluation Activities - Idaho
There are currently no BPA funded activities pertaining to the IPRS.

Non-BPA Funded Research, Monitoring and Evaluation Activities

Idaho Fish and Game

IDFG License and Federal Aid to Fish and Wildlife Restoration Program
Regular efforts by IDFG to monitor wildlife in the Palouse River Subbasin include elk sightability surveys every five years, annual pheasant brood counts, and harvest data collected from hunters. The IDFG regularly cooperates with government agencies, private landowners and private organizations to improve fish and wildlife habitat and populations. This is accomplished through HIP cost share agreements, comments on land management activities, identifying critical habitat areas and treatments, enforcement of fish and game rules, technical and financial assistance for depredation and habitat issues.

Conservation Data Center
The Idaho Conservation Data Center (CDC) is the central repository for information related to the state's rare plant and animal populations. The operating philosophy of the CDC is to provide accurate, comprehensive, and timely information on Idaho's rare species to decision makers at the earliest stages of land management planning. The CDC has serviced thousands of information requests during the past decade, quietly eliminating or minimizing potential conflicts.

The staffs of the CDC are also involved with rare plant and natural area surveys and the development of conservation strategies. These activities assist government agencies and private organizations in protecting unique areas from disturbance and development.

Idaho Department of Environmental Quality
USFS
Northern Region Landbird Monitoring Program
The Northern Region Landbird Monitoring Program (NRLMP) was initiated in 1994 to establish long-term monitoring and habitat analyses for most landbird species across all

lands administered by the USFS Northern Region and adjacent lands administered by program partners. Two levels of monitoring occur. Level I is designed to provide a picture of bird distributions across the region and to estimate the overall population trends of a variety of diurnal landbird species. Level II is designed to allow an assessment of habitat relationships for species that generate a meaningful number of observations. At least nine transects are surveyed every two years in the IPRS.

Ecosystem Assessment of the Upper Palouse River

The CNF has scheduled an Ecosystem Assessment of the Upper Palouse River in 2001. The assessment will evaluate watershed conditions and recommend specific restoration activities.

Other Activities

Potlatch Corporation conducts bird surveys similar to the NRLMP on their ownership. They often collect more intensive information on a watershed and habitat scale.

Graduate studies through the UI and Idaho State University.

Statement of Fish and Wildlife Needs

Fisheries (WDFW)

- Conduct baseline fish resource assessments of the Palouse River system, including its major tributaries, for fish stock assessments and population inventories to estimate population strength and population dynamics, such that fish management plans can be developed which will guide future enhancement and management activities.
- Evaluate in-stream habitat and riparian habitat conditions along the Palouse River system, including its major tributaries, to identify beneficial habitat and fish passage improvements, such that future funding for fish passage and habitat improvement work can be focused at addressing sub-basin and point location fish habitat deficiencies.
- Conduct genetic evaluation of endemic fish species within the Rock Creek, Cow Creek, and upper North and South forks of the Palouse watersheds to provide population information to assist with native fish stock management.

Fisheries (IDFG)

- Obliterate abandoned and unneeded tertiary roads, and upgrade long-term roads.
- Reclaim old mine tailings.
- Reconstruct stream channels to original location and channel type.
- Revegetate streambanks and floodplains to improve floodplain stability, aquifer recharge and lower stream temperatures.
- Fund projects identified in the Paradise Creek TMDL Implementation Plan and in upcoming TMDL plans for other water quality limited streams.
- Stabilize road cuts and fills and plant with native vegetation.
- Fund road stabilization and hard surfacing projects.
- Purchase conservation easements in remaining Palouse River Bottom habitats and other key riparian areas.

- Fund wetland restoration projects to stabilize flow regime, lower water temperature and provide habitat for aquatic vertebrates.

Wildlife (WDFW)

1) Restore riparian habitat along stream/river corridors, wetlands, and lakes.
2) Restore habitat on steep uplands to reduce soil erosion and sediment loads in waterways and to improve habitat conditions for wildlife.
3) Monitor ferruginous hawk nesting populations and productivity.
4) Increase ferruginous hawk nesting opportunities including installation of nesting platforms.
5) Inventory potential sharp-tail grouse habitat.
6) Acquire, protect, and maintain sharp-tailed grouse habitat.
7) Re-introduce sharp-tail grouse into the subbasin.
8) Inventory waterfowl needs.
9) Maintain waterfowl surveys.
10) Increase neotropical bird surveys.
11) Enhance, protect, and maintain deer habitat throughout the subbasin.
12) Control the spread of noxious weeds within the subbasin.
13) Develop water sources and protect/increase in-stream water flows to help prevent EHD outbreaks.
14) Improve in-stream structure throughout the subbasin.
15) Improve water quality in all waters throughout the subbasin.

Wildlife (IDFG)

- Construct a detailed GIS-based fish and wildlife habitat map for the entire subbasin. Include providing personnel and equipment to search available databases for existing coverage, digitizing existing fish and wildlife information currently not available in GIS layers, and identifying key habitat areas.
- Fund the establishment of techniques, surveys and programs to assess health and trend of wildlife and wildlife habitat in the subbasin. Existing wildlife management surveys are inadequate to assess distribution, establish abundance, or evaluate trends for most species are the subbasin level to allow BPA to evaluate progress towards goals stated in this summary.
- Enhance the existing system of breeding bird surveys across the subbasin.
- Initiate assessment of listed species or those likely to become listed as threatened or endangered by federal or state governments.
- Protect known critical habitats through conservation easement or fee-title acquisition.
- Restore natural disturbance regimes in key habitats in the subbasin. Protect and maintain mature ponderosa pine habitats.
- Control the spread of noxious weeds in the subbasin

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Needs of the Palouse River Subbasin and its Wildlife (Conservation Districts)

Wetlands/Riparian

The wetlands and riparian areas in the basin are extremely degraded. Wetlands need to be restored in the Palouse Basin. By restoring the wetland the hydrologic curve could be extended over time reducing the flooding potential, and keeping the streams flowing at a more consistent rate. Currently the wetlands in the Palouse are tiled, drained, and farmed whenever possible. Restoring wetlands in the Palouse would benefit wildlife such as, neo-tropical birds, migratory waterfowl, and many others.

The riparian zones in the Palouse have been affected by years of channel straightening and stream clean-outs. Buffers along the streams and rivers need to be installed to keep agricultural run-off out of the streams. Currently tillage practices occur, in some cases, right to the waters edge. Grass buffers with trees and shrubs would keep the tillage away from the streams and keep the water cooler with shade producing canopies.

Uplands

The upland habitats in the Palouse have been degraded from the introduction of agriculture. All of the trees and shrubs on the cropland area have been removed. There are currently CRP programs designed to take out the steepest ground, which has had the most erosion, and plant grasses, trees, and shrubs. The tree and shrub habitat is needed by all of the wildlife in the Palouse Basin. Tree and shrub planting need to continue on the Palouse, even if the CRP program is canceled in the future.

New and innovative methods for growing crops such as no-till need to be evaluated on a continuous basis. The use of no-till to grow crops almost eliminates the soil erosion, which is clogging our streams and rivers with sediments. No-till is risky for farmers to get into, because of the lack of technology, so incentives are often needed to off-set some of the risk to encourage farmers to try the no-till systems.

Aquatic

The streams, rivers, and lakes in the Palouse Subbasin would benefit from the upland, riparian, and wetland needs mentioned above. Water quality problems such as Temperature, pH, and sediments are symptoms of problems occurring on the uplands. Fencing cattle off of the streams and rivers is also needed to reduce the Fecal Coliform counts on some of the streams. Municipal sewer systems also need to meet state and federal requirements for water quality. In-stream practices such as adding meander or changing riffle/pool ratios could possibly help the aquatic habitat, but more study is needed to determine the exact limiting factors affecting aquatic wildlife.

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Appendix Table 1A1. Summary of Fish Stocked in the Palouse River Subbasin, Idaho.

WATER	SPECIES	SIZE	NUMBER
Big Sand Cr.	Brook Trout	Catchable	5,130
	Rainbow Trout	Catchable	85
Camp Grizzly Pond	Rainbow Trout	Catchable	500
		Catchable	500
		Catchable	500
		Catchable	530
		Catchable	500
		Catchable	512
		Catchable	515
		Catchable	525
		Catchable	500
		Catchable	500
EF Meadow Cr.	Brook trout	Fingerling	1,044
Hordeman Pond	Rainbow trout	Catchable	716
		Catchable	623
		Catchable	280
		Catchable	540
		Catchable	1,000
		Catchable	275
		Catchable	250
		Catchable	253
		Catchable	416
		Catchable	750
Little Sand Cr.	Brook trout	Fry	6,840
		Fingerling	1,044
	Rainbow trout	Catchable	49
		Catchable	660
		Catchable	180
Meadow Cr.	Rainbow trout	Catchable	750
NF Palouse R.	Rainbow trout	Catchable	620
		Catchable	600
		Catchable	49
		Catchable	990
	N Fk Steelhead	Egg	30,000
		Fry	80,000
		Fry	67,700
		Fry	42,048
		Fry	36,380
		Fry	74,478

WATER	SPECIES		SIZE	NUMBER
Palouse R	Brook trout	1936	Not specified	30,000
		1937	Not specified	30,000
		1938	Not specified	46,000
		1940	Not specified	6,222
		1946	Not specified	12,850
		1946	Fry	32,245
		1947	Catchable	5,130
		1950	Catchable	10,338
	Rainbow trout	1950	Catchable	3,893
		1951	Catchable	1,552
		1953	Catchable	1,328
		1968	Catchable	4,200
			Fingerling	2,200
		1969	Catchable	5,530
		1970	Catchable	4,450
		1971	Catchable	2,780
		1972	Adult	1,950
		1973	Catchable	13,640
		1974	Catchable	3,205
		1975	Catchable	2,930
		1976	Catchable	4,420
		1977	Catchable	2,690
		1978	Catchable	7,930
		1979	Catchable	4,940
		1980	Catchable	4,780
		1981	Catchable	6,218
		1982	Catchable	2,820
			Fingerling	765
		1983	Catchable	3,010
			Fingerling	1,060
		1984	Catchable	4,184
		1985	Catchable	2,970
		1986	Catchable	3,819
		1987	Catchable	4,392
		1988	Catchable	1,982
		1989	Catchable	3,869
			Adult	112
		1990	Catchable	2,000
		1991	Catchable	1,500
		1992	Catchable	1,815
		1993	Catchable	3,030
		1994	Catchable	2,000
		1995	Catchable	1,996
		1996	Catchable	1,756
		1997	Fingerling	15,050
			Catchable	1,036
		1998	Catchable	1,494
		1999	Catchable	2,000

WATER	SPECIES		SIZE	NUMBER
	Brown trout	1979	Fingerling	29,600
		1980	Fry	34,985
			Fingerling	37,200
		1981	Fingerling	18,620
		1982	Fingerling	27,625
		1983	Fingerling	29,745
		1984	Fry	15,400
		1985	Fingerling	15,000
Palouse R	Brown trout	1986	Fingerling	15,027
	N Fk Steelhead	1986	Egg	48,000
	Smallmouth Bass		Fingerling	125
Strychnine Cr	Rainbow trout	1984	Catchable	49
	Rainbow trout	1985	Catchable	415
	N Fk Steelhead	1986	Egg	18,000

Appendix Table IA2. Species list of breeding wildlife in the Idaho portion of the Palouse Subbasin.

			Management	Population Status	
Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
Native Amphibians					
Idaho Giant Salamander	*Dicamptodon aterrimus*	N	UN	G3	S3
Tailed Frog	*Ascaphus truei*	N	UN	G4	S3
Woodhouse's Toad	*Bufo woodhousii*	N	UN	G5	S3
Great Basin Spadefoot	*Spea intermontanus*	N	UN	G5	S4
Spotted Frog	*Rana pretiosa*	N	PN	G4	S4
Western Toad	*Bufo boreas*	N	PN	G4	S4/SC
Long-toed Salamander	*Ambystoma macrodactylum*	N	UN	G5	S5
Pacific Chorus Frog	*Pseudacris regilla*	N	UN	G5	S5
Tiger Salamander	*Ambystoma tigrinum*	N	UN	G5	S5
Introduced Amphibians					
Bull frog	*Rana catesbeiana*	E	G	G5	G5
Native Reptiles					
Ringneck Snake	*Diadophis punctatus*	N	UN	G5	S1/SC
Northern Alligator Lizard	*Elgaria coerulea*	N	UN	G5J	S2
Painted Turtle	*Chrysemys picta*	N	UN	G5	S4
Common Garter Snake	*Thamnophis sirtalis*	N	UN	G5	S5
Gopher Snake	*Pituophis melanole*	N	UN	G5	S5
Racer	*Coluber constrictor*	N	UN	G5	S5
Rubber Boa	*Charina bottae*	N	UN	G5	S5
Western Rattlesnake	*Crotalus viridis*	N	UN	G5	S5
Western Skink	*Eumeces skiltonianus*	N	UN	G5	S5
Western Terrestrial Garter Snake	*Thamnophis elegans*	N	UN	G5	S5
Native Birds					
Nongame					
American Bittern	*Botaurus lentiginosus*	N	PN	G4	S4

			Management	Population Status	
Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
American Coot	*Fulica americana*	N	G	G5	S5
American Dipper	*Cinclus mexicanus*	N	PN	G5	S5
American Goldfinch	*Carduelis tristis*	N	PN	G5	S5
American Kestrel	*Falco sparverius*	N	PN	G5	S5
American Redstart	*Setophaga ruticilla*	N	PN	G5	S4
American Robin	*Turdus migratorius*	N	PN	G5	S5
Bank Swallow	*Riparia riparia*	N	PN	G5	S5
Barn Swallow	*Hirundo rustica*	N	PN	G5	S5
Barred Owl	*Strix varia*	N	PN	G5	S4
Belted Kingfisher	*Ceryle alcyon*	N	PN	G5	S5
Black-backed Woodpecker	*Picoides arcticus*	N	PN	G5	S3
Black-billed Magpie	*Pica pica*	N	PN	G5	S5
Black-capped Chickadee	*Parus atricapillus*	N	PN	G5	S5
Black-chinned Hummingbird	*Archilochus alexandri*	N	PN	G5	S5
Black-headed Grosbeak	*Pheucticus melanocephalus*	N	PN	G5	S5
Bobolink	*Dolichonyx oryzivorus*	N	PN	G5	S4
Brewer's Blackbird	*Euphagus cyanocephalus*	N	PN	G5	S5
Brown Creeper	*Certhia americana*	N	PN	G5	S5
Brown-headed Cowbird	*Molothrus ater*	N	PN	G5	S5
Bullock's Oriole	*Icterus bullockii*	N	PN	G5	S5
Calliope Hummingbird	*Stellula calliope*	N	PN	G5	S5
Canyon Wren	*Catherpes mexicanus*	N	PN	G5	S5
Cassin's Finch	*Carpodacus cassinii*	N	PN	G5	S5
Cedar Waxwing	*Bombycilla cedrorum*	N	PN	G5	S5
Chestnut-backed Chickadee	*Parus rufescens*	N	PN	G5	S4
Chipping Sparrow	*Spizella passerina*	N	PN	G5	S5
Cliff Swallow	*Hirundo pyrrhonota*	N	PN	G5	S5
Common Barn-Owl	*Tyto alba*	N	PN	G5	S3
Common Nighthawk	*Chordeilus minor*	N	PN	G5	S5
Common Raven	*Corvus corax*	N	PN	G5	S5

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Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
Cooper's Hawk	*Accipiter cooperii*	N	PN	G4	S4
Cordilleran Flycatcher	*Empidonax occidentalis*	N	PN	G5	S4
Dark-eyed Junco	*Junco hyemalis*	N	PN	G5	S5
Downy Woodpecker	*Picoides pubescens*	N	PN	G5	S5
Dusky Flycatcher	*Empidonax oberholseri*	N	PN	G5	S5
Eastern Kingbird	*Tyrannus tyrannus*	N	PN	G5	S4
Evening Grosbeak	*Coccothraustes vespertinus*	N	PN	G5	S5
Fox Sparrow	*Passerella iliaca*	N	PN	G5	S5
Golden Eagle	*Aquila chrysaetos*	N	PN	G5	S5
Golden-crowned Kinglet	*Regulus satrapa*	N	PN	G5	S5
Grasshopper Sparrow	*Ammodramus savannarum*	N	PN	G4	S3
Gray Catbird	*Dumetella carolinensus*	N	PN	G5	S5
Gray Jay	*Perisoreus canadensis*	N	PN	G5	S5
Great Blue Heron	*Ardea herodias*	N	PN	G5	S5
Great Gray Owl	*Strix nebulosa*	N	PN	G5	S3
Great Horned Owl	*Bubo virginianus*	N	PN	G5	S5
Hairy Woodpecker	*Picoides villosus*	N	PN	G5	S5
Hammond's Flycatcher	*Empidonax hammondii*	N	PN	G5	S5
Hermit Thrush	*Catharus guttatus*	N	PN	G5	S4
Horned Lark	*Eremophila alpestris*	N	PN	G5	S5
House Finch	*Carpodacus mexicanus*	N	PN	G5	S5
House Wren	*Troglodytes aedon*	N	PN	G5	S4
Killdeer	*Charadrius vociferus*	N	PN	G5	S5
Lark Sparrow	*Chondestes grammacus*	N	PN	G5	S5
Lazuli Bunting	*Passerina amoena*	N	PN	G5	S5
Lewis' Woodpecker	*Melanerpes lewis*	N	PN	G4	S4
Lincoln Sparrow	*Melospiza lincolnii*	N	PN	G5	S5
Long-eared Owl	*Asio otus*	N	PN	G5	S5
MacGillivray's Warbler	*Oporornis tolmiei*	N	PN	G5	S5
Mountain Bluebird	*Sialia currucoides*	N	PN	G5	S4
Mountain Chickadee	*Parus gambeli*	N	PN	G5	S5

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Nashville Warbler	*Vermivora ruficapilla*	N	PN	G5	S5
Northern Flicker	*Colaptes auratus*	N	PN	G5	S5
Northern Goshawk	*Accipiter gentilis*	N	PN	G4	S4/SC
Northern Harrier	*Circus cyaneus*	N	PN	G5	S5
Northern Pygmy-owl	*Glaucidium gnoma*	N	PN	G5	S4/SC
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	N	PN	G5	S5
Northern Saw-whet Owl	*Aegolius acadicus*	N	PN	G5	S4
Northern Waterthrush	*Seiurus noveboracensis*	N	PN	G5	S3
Olive-sided Flycatcher	*Contopus borealis*	N	PN	G4	S5
Orange-crowned Warbler	*Vermivora celata*	N	PN	G5	S5
Osprey	*Pandion haliaetus*	N	PN	G5	S5
Pied-Bill Grebe	*Podilymbus podiceps*	N	PN	G5	S4
Pileated woodpecker	*Dryocopus pileatus*	N	PN	G5	S4
Pine Siskin	*Carduelis pinus*	N	PN	G5	S5
Plumbeus Vireo	*Vireo plumbeus*	N	PN	G5	S5
Pygmy Nuthatch	*Sitta pygmaea*	N	PN	G5	S3
Red Crossbill	*Loxia curvirostra*	N	PN	G5	S5
Red-breasted Nuthatch	*Sitta canadensis*	N	PN	G5	S5
Red-eyed Vireo	*Vireo olivaceus*	N	PN	G5	S5
Red-naped Sapsucker	*Sphyrapicus nuchalis*	N	PN	G5	S5
Red-tailed Hawk	*Buteo jamaicensis*	N	PN	G5	S5
Red-winged Blackbird	*Agelaius phoeniceus*	N	PN	G5	S5
Rock Wren	*Salpinctes obsoletus*	N	PN	G5	S5
Ruby-crowned Kinglet	*Regulus calendula*	N	PN	G5	S5
Rufous Hummingbird	*Selasphorus rufus*	N	PN	G5	S5
Savannah Sparrow	*Passerculus sandwichensis*	N	PN	G5	S5
Say's Phoebe	*Sayornis saya*	N	PN	G5	S5
Sharped-shinned Hawk	*Accipiter striatus*	N	PN	G5	S5.
Short-eared Owl	*Asio flammeus*	N	PN	G5	S5
Song Sparrow	*Melospiza melodia*	N	PN	G5	S5
Spotted Sandpiper	*Actitis macularia*	N	PN	G5	S5

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Spotted Towhee	*Pipilo maculatus*	N	PN	G5	S5
Steller's Jay	*Cyanocitta stelleri*	N	PN	G5	S5
Swainson's Hawk	*Buteo swainsoni*	N	PN	G4	S4
Swainson's Thrush	*Catharus ustulatus*	N	PN	G5	S5
Townsend's Solitaire	*Myadestes townsendi*	N	PN	G5	S5
Townsend's Warbler	*Dendroica townsendi*	N	PN	G5	S4
Tree Swallow	*Tachycineta bicolor*	N	PN	G5	S5
Turkey Vulture	*Cathartes aura*	N	PN	G5	S4
Varied Thrush	*Ixoreus naevius*	N	PN	G5	S5
Vaux's Swift	*Chaetura vauxi*	N	PN	G5	S4
Veery	*Catharus fuscescens*	N	PN	G5	S5
Violet-green Swallow	*Tachycineta thalassina*	N	PN	G5	S5
Warbling Vireo	*Vireo gilvus*	N	PN	G5	S5
Western Bluebird	*Sialia mexicana*	N	PN	G5	S4
Western kingbird	*Tyrannus verticalis*	N	PN	G5	S5
Western Meadowlark	*Sturnella neglecta*	N	PN	G5	S5
Western Screech Owl	*Otus kennicottii*	N	PN	G5	S4
Western Tanager	*Piranga ludoviciana*	N	PN	G5	S5
Western Wood-pewee	*Contopus sordidulus*	N	PN	G5	S5
White-breasted Nuthatch	*Sitta carolinensis*	N	PN	G5	S4
White-headed Woodpecker	*Picoides albolarvatus*	N	PN	G5	S2
White-throated Swift	*Aeronautes saxatalis*	N	PN	G5	S4
Willow Flycatcher	*Empidonax traillii*	N	PN	G5	S4
Wilson's Warbler	*Wilsonia pusilla*	N	PN	G5	S5
Winter Wren	*Troglodytes troglodytes*	N	PN	G5	S5
Yellow Warbler	*Dendroica petechia*	N	PN	G5	S5
Yellow-breasted Chat	*Icteria virens*	N	PN	G5	S5
Yellow-rumped Warbler	*Dendroica coronata*	N	PN	G5	S5
Waterfowl					
Wood Duck	*Aix sponsa*	N	G	G5	S4

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Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
Canada Goose	*Branta canadensis*	N	G	G5	S5
Cinnamon Teal	*Anas cyanoptera*	N	G	G5	S5
Common Merganser	*Mergus merganser*	N	G	G5	S5
Mallard	*Anas platyrhynchos*	N	G	G5	S5
Northern Shoveler	*Anas clypeata*	N	G	G5	S5
Upland Birds/Forest Grouse					
Mountain Quail	*Oreortyx pictus*	N	PN	G5	S2
Spruce Grouse	*Dendragapus canadensis*	N	G	G5	S4
American Crow	*Corvus brachyrhynchos*	N	G	G5	S5
Blue Grouse	*Dendragapus obscurus*	N	G	G5	S5
Common Snipe	*Gallinago gallinago*	N	G	G5	S5
Ruffed Grouse	*Bonasa umbellus*	N	G	G5	S5
Mourning Dove	*Zenaida macroura*	N	G	G5	S5
Introduced Game Birds					
California Quail	*Callipepla californica*	E	G	G5	SE
Chukar	*Alectoris chukar*	E	G	G5	SE
Gray Partridge	*Perdix perdix*	E	G	G5	SE
Northern Bobwhite	*Colinus virginianus*	E	G	G5	SE
Ring-necked Pheasant	*Phasianus colchicus*	E	G	G5	SE
Wild Turkey	*Meleagris gallopavo*	E	G	G5	SE
Native Mammals					
American Badger	*Taxidea taxus*	N	UN	G5	S5
American Beaver	*Castor canadensis*	N	G	G5	S5
American Marten	*Martes americana*	N	G	G4	S4
American Pika	*Ochotona princeps*	N	PN	G5	S5
Big Brown Bat	*Eptesicus fuscus*	N	UN	G5	S4
Bighorn Sheep	*Ovis canadensis*	N	G	G4	S4
Black Bear	*Ursus americanus*	N	G	G5	S5
Bobcat	*Felis rufus*	N	G	G5	S4

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Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
Bushy-tailed Woodrat	*Neotoma cinerea*	N	UN	G5	S5
Columbian Ground Squirrel	*Spermophilus columbianus*	N	UN	G5	S5
Common Porcupine	*Erethizon dorsatum*	N	UN	G5	S5
Common Raccoon	*Procyon lotor*	N	G	G5	S4
Coyote	*Canis latrans*	N	PW	G5	S5
Deer Mouse	*Peromyscus maniculatus*	N	UN	G5	S5
Dusky Shrew	*Sorex monticolus*	N	UN	G5	S4
Elk	*Cervus elaphus*	N	G	G5	S5
Ermine	*Mustela erminea*	N	PW	G5	S5
Fisher	*Martes pennanti*	N	PN	G5	S1
Fringed Myotis	*Myotis thysanodes*	N	PN	G5	S1/SC
Golden-mantled Ground Squirrel	*Spermophilus lateralis*	N	PN	G5	S5
Gray Wolf	*Canis lupus*	N	PN/LE	G4	S1
Heather Vole	*Phenacomys intermedius*	N	UN	G5	S4
Hoary Bat	*Lasiurus cinereus*	N	UN	G5	S4
Little Brown Myotis	*Myotis lucifugus*	N	UN	G5	S5
Long-eared Myotis	*Myotis evotis*	N	UN	G5	S3
Long-legged Myotis	*Myotis volans*	N	UN	G5	S3
Long-tailed Vole	*Microtus longicaudus*	N	UN	G5	S5
Long-tailed Weasel	*Mustela frenata*	N	PW	G5	S5
Lynx	*Lnyx canadensis*	N	PN/LT	G5	S1
Masked Shrew	*Sorex cinereus*	N	UN	G5	S4
Meadow Vole	*Microtus pennsylvanicus*	N	UN	G5	S5
Mink	*Mustela vison*	N	G	G5	S5
Montane Vole	*Microtus montanus*	N	UN	G5	S5
Moose	*Alces alces*	N	G	G5	S4
Mountain Cottontail	*Sylvilagus nuttallii*	N	G	G5	S5
Mountain Lion	*Felis concolor*	N	G	G5	S4
Mule Deer	*Odocoileus hemionus*	N	G	G5	S5
Muskrat	*Ondatra zibethicus*	N	G	G5	S5
Northern River Otter	*Lutra canadensis*	N	PN	G5	S4

			Management	Population Status	
Common Name	**Scientific Name**	**Origin**	**Status**	**Global**	**State**
Northern Flying Squirrel	*Glaucomys sabrinus*	N	PN	G5	S4
Northern Pocket Gopher	*Thomomys talpoides*	N	UN	G5	S5
Pallid Bat	*Antrozous pallidus*	N	UN	G5	S1
Pygmy Shrew	*Sorex hoyi*	N	UN	G5	S2
Red Fox	*Vulpes vulpes*	N	G	G5	S5
Red Squirrel	*Tamiasciurus hudsonicus*	N	PN	G5	S5
Red-tailed Chipmunk	*Tamias ruficaudus*	N	PN	G5	S4
Silver-haired Bat	*Lasionyctersis noctivagans*	N	UN	G5	S4
Snowshoe Hare	*Lepus americanus*	N	G	G5	S5
Southern Red-backed Vole	*Clethrionomys gapperi*	N	UN	G5	S5
Striped Skunk	*Mephitis mephitis*	N	PW	G5	S5
Townsend's Big-eared Bat	*Corynorhinus townsendii*	N	UN	G4	S2/SC
Vagrant Shrew	*Sorex vagrans*	N	UN	G5	S4
Water Shrew	*Sorex palustris*	N	UN	G5	S4
Water Vole	*Microtus richardsoni*	N	UN	G5	S4
Western Jumping Mouse	*Zapas princeps*	N	UN	G5	S5
Western Small-footed Myotis	*Myotis ciliolabrum*	N	UN	G5	S4
Western Spotted Skunk	*Spilogale gracilis*	N	PW	G5	S5
White-tailed Deer	*Odocoileus virginianus*	N	G	G5	S5
White-tailed Jackrabbit	*Lepus townsendii*	N	PW	G5	S5
North American Wolverine	*Gulo gulo luscus*	N	PN	G4	S2/SC
Yellow Pine Chipmunk	*Tamias amoenus*	N	PN	G5	S5
Yellow-bellied Marmot	*Marmota flaviventris*	N	UN	G5	S5
Yuma Myotis	*Myotis yumanensis*	N	UN	G5	S3

UN = Unprotected nongame species; PN = protected nongame species; PW = predatory wildlife; G = game species; N = native species; E = exotic or introduced species
1 = critically imperiled because very rare or vulnerable to extinction (0-5 occurrences)
2 = imperiled because rare or other factors making vulnerable to extinction (6-20 occurrences)
3 = vulnerable species
4 = not rare cause for long-term concern
5 = widespread abundant secure