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37 San Poil Subbasin Overview

37.1 Regional Context for San Poil Subbasin

The San Poil Subbasin is one of six subbasins that comprise the IMP. The Subbasin is bounded to the west by the Lake Rufus Woods Subbasin and to the east and north by the Upper Columbia Subbasin (Figure 37.1). The major drainage consists primarily of the San Poil River and its tributaries, which are a major tributary to Franklin D. Roosevelt Lake.

37.2 San Poil Subbasin Description[1]

37.2.1 General Location

The San Poil River originates in the Okanogan Highlands east of the Okanogan River and drains in a southerly direction for 27 miles through parts of the Colville and Okanogan National Forests in Ferry and Okanogan counties. The river then enters the Colville Indian Reservation and flows approximately 32 miles south before it enters the impounded Columbia River in the San Poil arm of Lake Roosevelt at river mile 615.5 (Figure 37.1). The resulting reservoir, Lake Roosevelt, inundates 33,490 ha at a full pool elevation of 1,289 ft (msl) (Thatcher et al. 1992). Annual water retention time is less than 40 days (Thatcher et al. 1992).

37.2.2 Drainage

The San Poil drainage forms the Water Resource Inventory Area (WRIA 52) as defined by the WDOE. The Subbasin encompasses approximately 981square miles of Ferry and Okanogan counties (WDOE GIS data), which includes about 500 square miles of Tribal land on the Colville Indian Reservation. Elevations within the Subbasin range from 7,135 feet above sea level at Copper Butte to 1,290 feet for Lake Roosevelt at full pool. Major tributaries to the San Poil River include Bridge, Gold, Granite, Iron, Louie, Lost, Manilla, Ninemile, North Nanamkin, O'Brien, Scatter, Thirteenmile, Seventeenmile, South Nanamkin, Thirtymile, Twentyfive mile, Twentythree mile creeks and the North, South, and West Forks of the San Poil River. Lakes include Crawfish, Ferry, Gold, Swan, and Long lakes. Historically, Curlew Lake had a hydrologic connection to the San Poil River and Subbasin, but anthropogenic alterations eliminated this connection in the early 1900s and since that time all overland flows have been directed to the Kettle River and the Upper Columbia Subbasin (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Therefore, Curlew Lake has been placed in the Upper Columbia Subbasin for the purpose of subbasin planning.

[1] Portions of Section 37.2 were contributed to by the San Poil Subbasin Summary Report (2000) pp. 1-3.

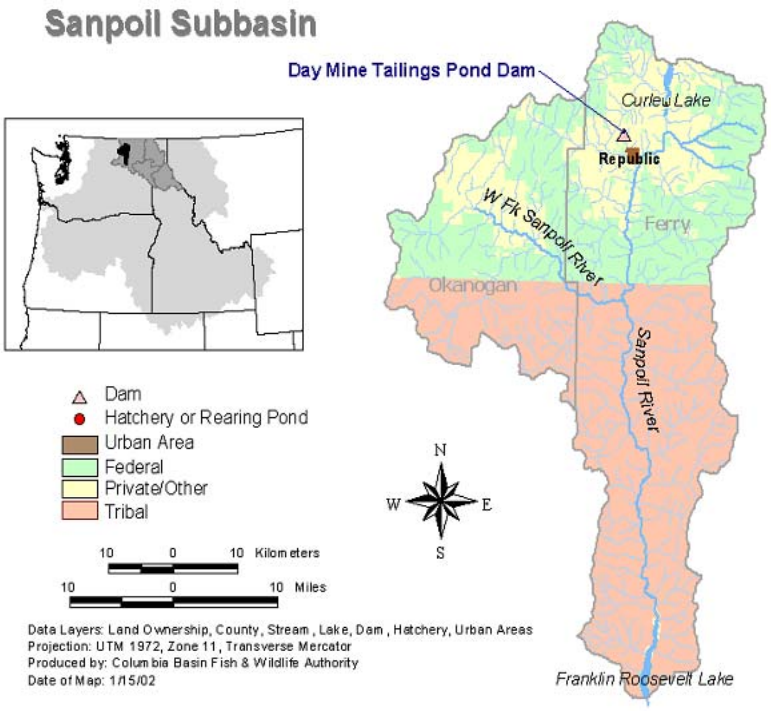

Figure 37.1. San Poil Subbasin (Note: Curlew Lake is part of the Upper Columbia Subbasin)

37.2.3 Climate

The area has a continental climate that is influenced by maritime air masses from the Pacific Coast. This region has an average temperature of 6.6° C (44° F), with the month of July being the warmest and January the coldest. An average of 42.5 cm (16.73 inches) of precipitation falls on the region, with an average of 130 cm (51 inches) of snow (Weather Underground 2003).

37.2.4 Geology

The San Poil Subbasin lies on two geologic provinces. The first is the old coastal plain that at one time was part of the western margin of North America. The coastal plain was shifted into tight folds of sedimentary rock, with granitic intrusions known now as the Kootenay Arc. West of the Kootenay Arc is the Okanogan subcontinent, an island about the size of California, that was pushed up against the Kootenay Arc due to continental drift. The southern portions of both provinces disappear beneath the Miocene basalt flows of the Columbia Plateau to the south (Alt and Hyndman, 1984).

37.2.5 Soils

Soils of the Subbasin are tied to elevation. In high elevation mountain areas, the soils are derived from granite parent material. The texture is a gravelly sandy loam that normally has a depth of a meter or less. These soils also have some volcanic ash, which has a silt loam texture. In lower elevations at the margins of river valleys, soils are derived from

glacial till. The texture is normally sandy-loam to loam and moderately dark in color. At the lowest elevation along rivers, the soils are coarse in texture. They are derived from glacial outwash sands and gravels (Franklin and Dyrness 1988).

37.2.6 Vegetation

Historically the landscape was dominated by sub-alpine fir and lodgepole pine in the higher elevations and mosaics of even-aged, relatively open stands of fire resistant ponderosa pine in the lower elevations (CCT 2000). The higher elevations were frequently burned before fire suppression began in 1930 (CCT 2000). Fire suppression changed the forest composition by removing the natural force for thinning the forest, increasing the forest density, and favoring conditions for multiple canopy stands (CCT 2000).

Figure 37.2 shows the current distribution of wildlife-habitat types in the San Poil Subbasin based on IBIS (2003). Currently, the native vegetation is predominated by pine savannas with grasses, shrubs, and ponderosa pine trees in low elevations of the Subbasin. As these areas transition into higher elevations with increased precipitation, communities of Douglas fir/ponderosa pine/larch and red cedar/hemlock become dominant (CCT 2000). Agricultural lands comprise less than one percent of the total area within the Subbasin. Urbanization is limited within the Subbasin; the town of Republic is the largest urban center in the Subbasin.

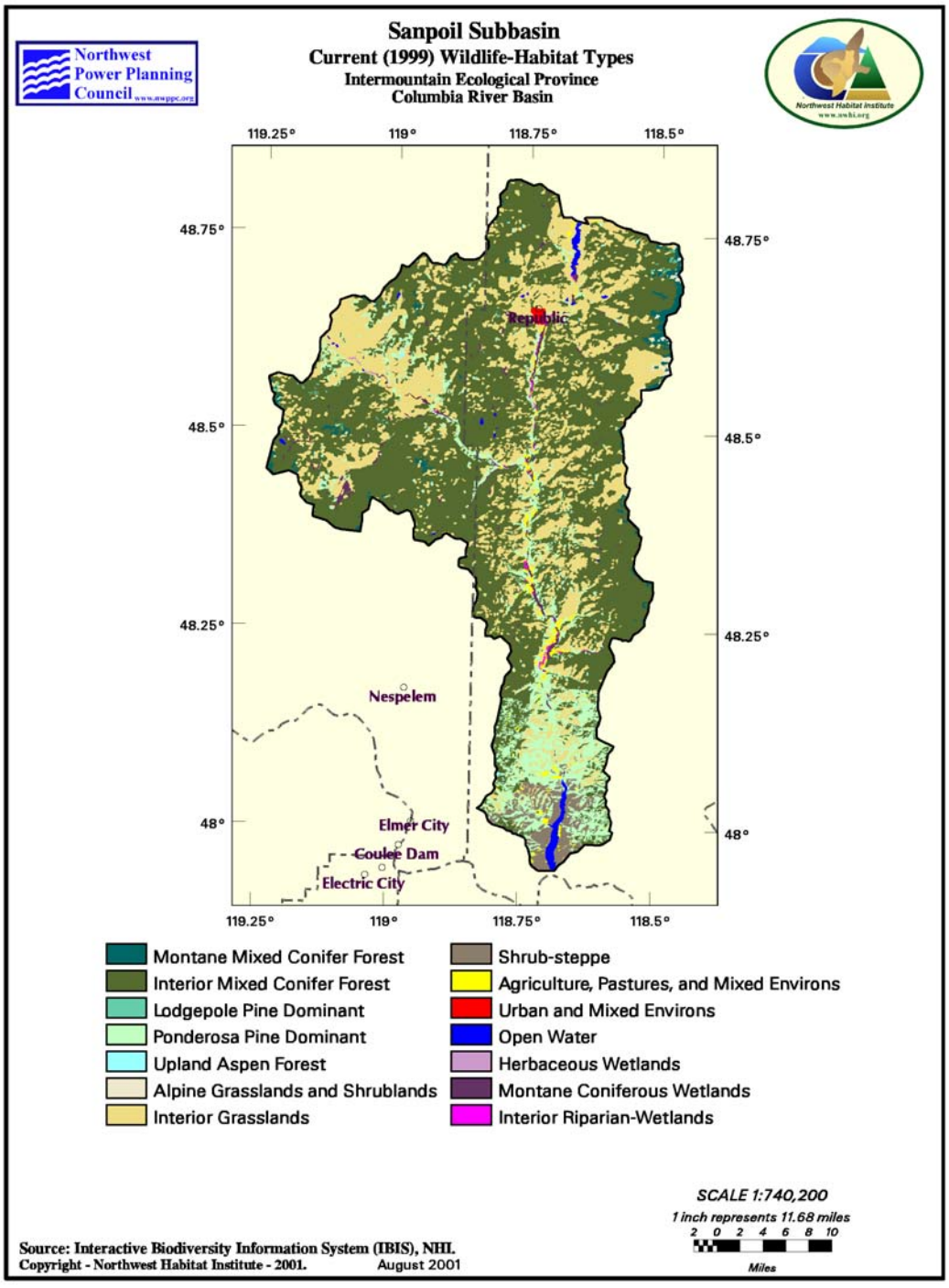

Figure 37.2. Habitat types found in the San Poil Subbasin, taken from IBIS (2003)

37.2.7 Major Land Uses

Figure 37.1 shows the major land ownership categories in the San Poil Subbasin. The primary land uses in this Subbasin are agriculture, grazing, logging, and mining. Cattle grazing is present throughout contributing to soil compaction, increased stream width-to-depth ratios, and displacement of native wildlife species (Council 2000). The Subbasin is heavily forested with many areas of timber harvest and associated roads present on Colville Indian Reservation lands, Colville National Forest Lands, and private lands. On a much smaller scale, urban development (towns of Republic and Keller) has also occurred.

The building of State Highway 21 effectively blocked fish access to a majority of the streams entering the west side of San Poil River due to poorly designed or improperly installed culverts (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Access was maintained into the West Fork of the San Poil River because a bridge was installed. In addition, Scatter Creek, which enters the San Poil River from the west, has no access problems for fish entering it from the San Poil River. A review of aerial photographs from 1946, 1966, 1973, 1983, and 1991 indicates a progressive deterioration of in-stream and floodplain conditions. By 1946, most highways had been established providing access to this area; these main roads were likely established to bring materials and supplies to the Grand Coulee area during construction of Grand Coulee Dam.

The San Poil River was a single defined channel with a broad floodplain and heavy canopy cover made up of mature trees. In the period from 1946 to 1966 profound changes had occurred within the floodplain areas from clearing land for timber and for cultivation. The San Poil River begins to show signs of lateral scouring. Major impacts were evident to both the San Poil River and Bridge Creek system in the 1966 to 1973 photos, including an almost complete deforestation of the Bridge Creek riparian corridor and a change from the stable meandering course to a well-incised straight form (Wilber et al. 2002). By 1973, the floodplain of the San Poil River was almost completely deforested, bank erosion was evident along many reaches, large sand bars were prevalent, and the channel was considerably straighter (Wilber et al. 2002). By 1983 channel width had increased by four to five times historic with expansive sand flats indicating a system that is overloaded with sediments and a channel that is in disequilibrium. Within the last two decades conditions along the San Poil River have stabilized with some minor improvements but channel width is still approximately four times historic, riparian areas are largely denuded, and sediment loads are still higher than the river can effectively convey (John Arterburn, Fish Biologist, CCT, personal communication, 2003).

Figure 37.3 shows road density, by density class, for each sixth order watershed in the San Poil Subbasin. Nearly the entire Subbasin is ranked as high road density (1.7 to 4.7 miles of road per square mile). One watershed at the southern end of the Subbasin ranked as moderate road density (0.7 to 1.7 miles of road per square mile). No watersheds in the Subbasin are ranked as low or very low for road density. The highest road densities on the Colville Reservation are located in the Strawberry Creek, Lime Creek, King Creek, Upper Gold Creek, and south fork of Lost Creek drainages in the west fork of the San Poil River watershed. The highest road densities along the mainstem San Poil River

include Cache, Meadow, and Capoose creeks along with the upper portion of the inundated section. The number of road crossing was highest in the upper Gold Creek, Manila Creek, Bridge Creek, 30-mile Creek, and along mainstem San Poil River. All these areas had more than 25 crossings within the respective watershed management unit; these known road densities and crossing numbers are likely to be underestimated (CCT 2000).

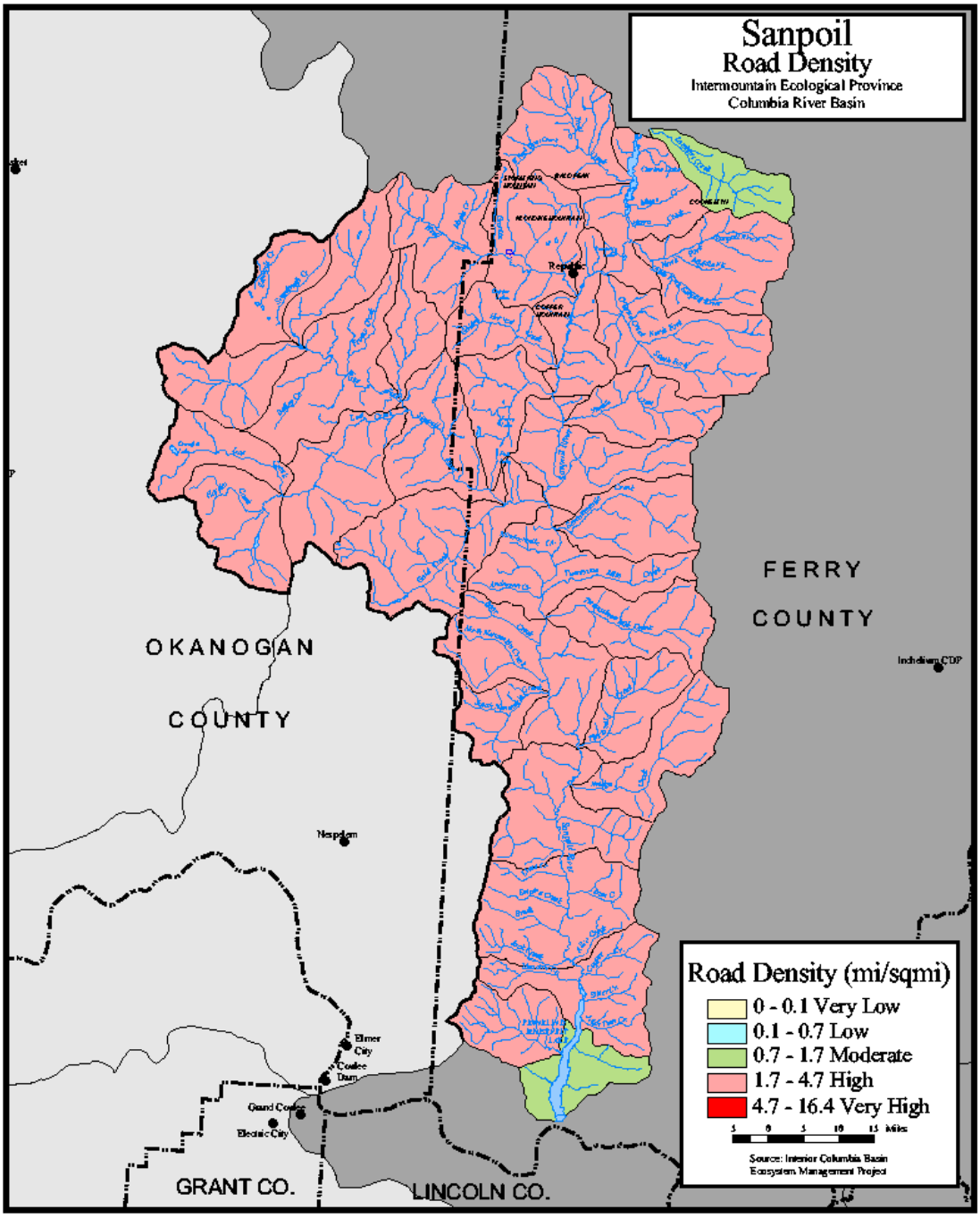

Figure 37.3. Road density for sixth order watersheds in the San Poil Subbasin

37.2.8 Lake Roosevelt Shoreline Erosion

Construction of Grand Coulee Dam resulted in inundation of the lowermost 12 miles of the San Poil River. Overall, about 70 percent of the Lake Roosevelt shoreline consists of easily eroded unconsolidated sediments (USBR 2000). The sediments are alternately exposed during winter reservoir drawdowns, and inundated during full pool operation. The combination of wave action and water fluctuations has contributed to slope failures of these inherently unstable soils at many locations around the reservoir. Figure 37.4 shows the portion of Lake Roosevelt located within the San Poil Subbasin and highlights the areas of high erosion potential along the shoreline. Analysis of a 300-foot band upslope of the 1,290-foot elevation level shows that 38 percent of the area within the band has high erosion potential, while about 8 percent is composed of bedrock. Soils in the San Poil River watershed are predominately erodible types and once exposed are easily dislodged and do not contain enough nutrients for vegetation to colonize rapidly. Therefore, fine sediment issues are a major problem throughout the San Poil Subbasin.

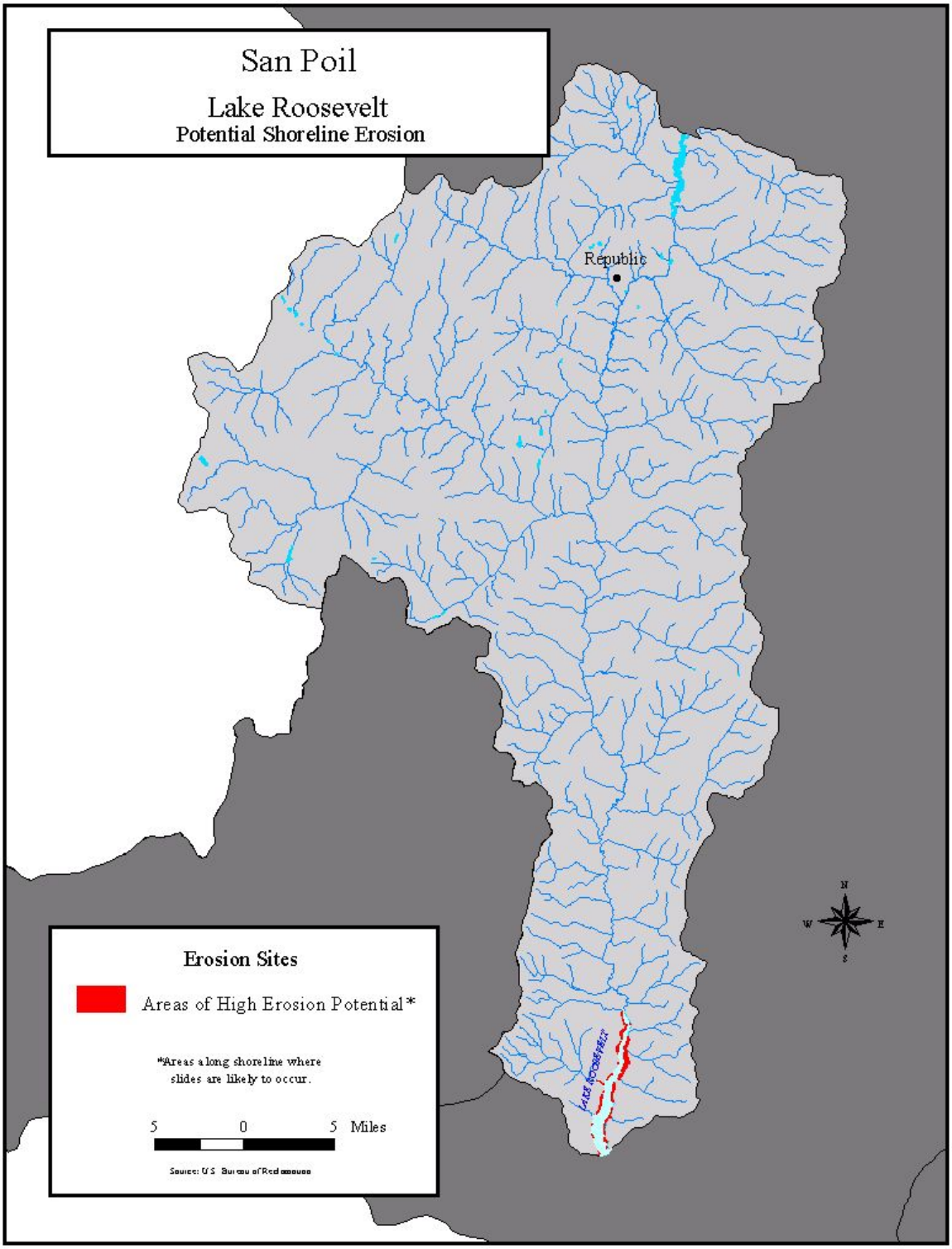

Figure 37.4. Areas of high erosion potential for areas of Lake Roosevelt located in the San Poil Subbasin. Note: areas of high erosion potential emphasized for display purposes, and are not to scale.

37.3 Logic Path

The logic path starts with an overall physical description of the Subbasin, followed by an assessment of aquatic and terrestrial resources from which a management plan was created with specific strategies and objectives to address limiting factors and management goals. In the next section, Section 38: Aquatic Assessment San Poil Subbasin, aquatic resources regarding the historic and current status of selected focal species are described in detail. An analysis based on the QHA technique (described in Section 3) identifies specific habitat attributes that have been altered the most over time relative to the entire Subbasin and which areas in the Subbasin are categorized as having poor or good habitat for the respective focal species. Based on the current status of the focal species, limiting habitat attributes, and management goals recognized in the Subbasin, strategies and objectives were identified and are presented in Section 42: San Poil Subbasin Management Plan. The terrestrial assessment, provided in Section 40, provides a description of the historic and current status of wildlife species and condition of terrestrial habitat types within the Subbasin. Based on the terrestrial assessment and key findings, strategies and objectives were developed and are defined in Section 40: San Poil Subbasin Management Plan.

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38 San Poil Subbasin Assessment – Aquatic[1]

38.1 Species Characterization and Status

The southern most 12 miles of the San Poil River has been inundated by reservoir operations from Grand Coulee Dam. As such, Table 38.1 encompasses both fish species that are found in the San Poil Subbasin and fish species that may be encountered in Lake Roosevelt. The fish community is comprised of native and introduced species. All anadromous salmon and steelhead as well as Pacific lamprey have been extirpated from the region as a consequence of dam operations. Species listed as native to the area, but have not been documented as present in the San Poil Subbasin, are listed as "within range" in Table 38.1.

38.1.1 Reservoir

Although the southern most portion of the San Poil River is now part of Lake Roosevelt, Lake Roosevelt is not discussed in detail within the San Poil Subbasin assessment. Detailed information pertaining to Lake Roosevelt is found in the Upper Columbia Subbasin, Sections 29-31.

Table 38.1. List of fish species that have been listed as occurring within the San Poil Subbasin

Species	Common Name	Origin	Status
Lampetra tridentata	Pacific lamprey	native	within range[5]- extirpated
Acipenser transmontanus	white sturgeon	native	known[1]
Coregonus clupeaformis	lake whitefish	introduced	known[2]
Prosopium williamsoni	mountain whitefish	native	known[2]
Oncorhynchus clarki	Westslope cutthroat trout	native	known[3]
Oncorhynchus mykiss	redband/rainbow trout	native	known[2]
Oncorhynchus tshawytscha	Chinook salmon	native	known[4] - extirpated
Oncorhynchus gorbuscha	pink salmon	native	within range[5] -extirpated
Oncorhynchus nerka	sockeye salmon	native	within range[5] -extirpated
Onchorhynchus keta	chum salmon	native	within range[5] -extirpated
Onchorhynchus kisutch	coho salmon	native	within range[5] -extirpated
Oncorhynchus nerka	kokanee salmon	native	known[2]
Salmo trutta	brown trout	introduced	known[2]
Salvelinus fontinalis	brook trout	introduced	known[2]
Salvelinus confluentus	bull trout	native	known[3]
Acrocheilus alutaceus	chiselmouth	native	known[2]
Cyprinus carpio	common carp	introduced	known[2]
Mylocheilus caurinus	peamouth	native	known[2]
Ptychocheilus oregonensis	northern squawfish	native	known[2]
Rhinichthys cataractae	longnose dace	native	known[6]
Rhinichthys osculus	speckled dace	native	known[6]

[1] Portions of Section 38 were contributed to by the San Poil Subbasin Summary Report (2000), pp. 3,4, 7-9.

Species	Common Name	Origin	Status
Richardsonius balteatus	redside shiner	native	known[2]
Tinca tinca	tench	introduced	known[2]
Catostomus catostomus	longnose sucker	native	known[2]
Catostomus columbianus	bridgelip sucker	native	known[2]
Catostomus macrocheilus	largescale sucker	native	known[2]
Catostomus platyrhynchus	mountain sucker	native	within range[5]
Lota lota	burbot	native	known[2]
Gasterosteus aculeatus	three-spine stickleback	native	within range[5]
Micropterus dolomieui	smallmouth bass	introduced	known[2]
Micropterus salmoides	largemouth bass	introduced	known[2]
Pomoxis annularis	white crappie	introduced	known[2]
Pomoxis nigromaculatus	black crappie	introduced	known[2]
Perca flavescens	yellow perch	introduced	known[2]
Stizostedion vitreum	walleye	introduced	known[2]
Cottus bairdi	mottled sculpin	native	known[6]
Cottus beldingi	piute sculpin	native	known[2]
Cottus cognatus	slimy sculpin	native	within range[5]
Cottus confusus	shorthead sculpin	native	within range[5]
Cottus rhotheus	torrent sculpin	native	within range[5]
Cottus asper	prickly sculpin	native	known[6]

[1]Anders and Powell 1999
[2]Griffith and McDowell 1996
[3]Tom Shuhda, Fish Biologist, USFS, personal communication
[4]Fish and Hanavan 1948
[5]Wydoski and Whitney 1979
[6]Green et al.1979

38.1.2 Tributaries

Westslope cutthroat trout are limited to a few tributaries including the South Fork San Poil River on Colville National Forest Lands (Tom Shuhda, Fish Biologist, Colville National Forest, personal communication, 2003) and tributaries to Gold Lake on the Colville Reservation. However, it is believed that these are naturalized populations from historic stocking activities; therefore they are not thought of as native populations.

Genetically pure naturally reproducing populations of redband trout are known to exist in several streams in the San Poil Subbasin including Bridge, Jack, Brush, Meadow, and Twenty-three mile creeks and the West Fork of the San Poil River. As more genetic data are collected, it is likely that more streams will be added to this list (John Arterburn, Fish Biologist, CCT, personal communication, 2003).

Kokanee, eastern brook trout, and several non-game species are also found in tributary streams within the San Poil Subbasin. Anadromous salmon are not present, as they were extirpated with the construction of Grand Coulee Dam and subsequent lack of fish passage (CCT 2000). Very little is known about the status and distribution of bull trout in

the San Poil Subbasin (USFWS 2002), and there have been no documented observations in recent years.

38.1.3 Lakes

Small lakes in the San Poil Subbasin provide recreation and subsistence fisheries for both Tribal members of the Confederated Colville Tribes (CCT) and the general public. There is a long history of stocking lakes within the San Poil Subbasin with rainbow trout and eastern brook trout to increase opportunities for recreational and subsistence fishing. Some lakes still support naturalized westslope cutthroat trout populations and are managed to promote the persistence of this species. Many small lakes in the San Poil Subbasin and within the boundaries of the Colville Reservation cannot support self-sustaining populations of salmonids due to poor natural water quality (for example, low summer dissolved oxygen). Fisheries managers have installed aerators in some instances in an attempt to create put and take fisheries.

38.1.4 Artificial Production

Redband trout were historically the dominant resident salmonid and were common throughout the San Poil Subbasin (Behnke 1992). Hatchery stocking of coastal rainbow trout has resulted in considerable introgression especially in areas with good access, but redband populations in tributaries above natural falls have mostly remained genetically pure (John Arterburn, Fish Biologist, CCT, personal communication, 2003).

Hatchery production has mainly focused on domesticated nonnative stocks (coastal rainbow trout) and nonnative species (brook trout). Historical stocking data for the San Poil Subbasin indicate Eastern brook trout, coastal rainbow trout, westslope cutthroat trout, kokanee salmon, Chinook salmon, and possibly others have been utilized to supplement depressed fisheries since the early 1930s, although stockings may have occurred as early as 1890 (Thiessen 1965; Halfmoon 1978; Jones 2000). Warmwater species introduction have mainly occurred in Lake Roosevelt, as well as upstream reservoirs. Considerable efforts to enhance predator populations and provide a variety of opportunities for anglers has lead to stocking walleye, smallmouth bass, and tiger muskellunge. Walleye are known to consume salmonids in Lake Roosevelt (Baldwin et al. 2003), which may pose an added threat to native fish conservation. Balancing angler demands for nonnative predatory species along with conservation of native fishes is often a difficult task for resource managers. The difficulty in balancing these concerns may be compounded in reservoir habitats, where native salmonid populations are often at low levels of abundance, which alone cannot meet angler demands.

38.2 Focal Species Selection

Redband/rainbow trout and Chinook salmon were selected as focal species in the San Poil Subbasin. The specific reasons for the selection of these species are discussed in section 38.3 and 38.4, respectively. Note that redband trout are a subspecies of rainbow trout native to the IMP, and coastal rainbow trout are an introduced subspecies of rainbow trout (in this document they are referred to as rainbow trout). Although these are two distinct subspecies, much of the data on redband/rainbow trout is not separated, mainly because there is a lack of genetic data deciphering the two in many areas.

38.3 Focal Species – Redband/Rainbow Trout

Redband/rainbow trout were selected as a focal species for the San Poil Subbasin because of their recreational value as a sport fish and their cultural significance to the CCT. Redband trout are a native species to the Subbasin and represent several possible life history types. Adfluvial rainbow trout migrate from Lake Roosevelt into the San Poil River and its tributaries. Genetic analysis of these populations indicated that they are introgressed between redband trout and coastal rainbow trout (Leary 1997). Thus, these fish may carry important genetic material of the native, summer steelhead populations that once were abundant in the system (Leary 1997).

Rainbow trout were historically distributed from northern Mexico to southeastern Alaska and inland in rivers that are free of natural obstructions from the Pacific Ocean (Behnke 1992). Rainbow trout exhibit both anadromous and non-anadromous life history strategies, with the anadromous form being referred to as steelhead. Three life history strategies are displayed by non-anadromous rainbow trout. Fluvial fish rear as adults in larger rivers and migrate to tributary streams to spawn, adfluvial fish rear as adults in lakes or reservoirs and migrate to tributaries to spawn, and resident fish spend their entire life cycle in tributary streams. The present distribution of rainbow trout and steelhead has been affected by both indiscriminate stocking practices and habitat alterations (Wydoski and Whitney 2003).

Rainbow trout are a cold-water salmonid that prefer water with temperatures below 70^{o} F and high amounts of dissolved oxygen (Wydoski and Whitney 2003). Rainbow trout typically mature between age 1 and age 5, depending on their growth rates (Wydoski and Whitney 2003). Rainbow trout spawn in the spring usually between February and June, depending on the temperature and location. Substrate composition, cover, water quality, and water quantity are important habitat elements for spawning rainbow trout (Bjornn and Reiser 1991). Juvenile rainbow trout typically prey on drifting organisms while residing in lotic systems and prey on a variety of planktonic, terrestrial, and bethic organisms when in lentic habitats. Adult rainbow trout are ominivorous and often feed on the most abundant prey resource at any given time. As rainbow trout grow in size, a proportion of their diet may be comprised of fish.

Rainbow trout have been transplanted to many temperate-zone waters in both the northern and southern hemispheres and have self-sustaining populations in many areas (Bjornn and Reiser 1991). Two subspecies of rainbow trout exist in the State of Washington, the coastal rainbow trout (*O. mykiss mykiss*) and the redband trout (*O. mykiss gairdneri*). Redband rainbow trout are native to the IMP and currently at risk in many areas due to introgression from transplanted coastal rainbow trout stocks. The extirpated steelhead runs within the IMP were of the redband subspecies (Behnke 1992), therefore conservation of current redband populations may have benefits for recovering steelhead runs within the IMP in the future with the possibility of fish passage at Chief Joseph and Grand Coulee dams.

38.3.1 Historic Status

The species *Oncorhynchus mykiss* was divided into two subspecies, *Oncorhynchus mykiss irideus* (rainbow trout) and *Oncorhynchus mykiss gairdneri* (redband trout) within the early twentieth century (Behnke 2002). Though these common names are often used interchangeably, only *O. m. gairdneri* were present in the Upper Columbia River basin historically (Behnke 1992; 2002). This subspecies exhibited three differing life history strategies including an anadromous form referred to as steelhead, a small-sized, stream resident form most often referred to as redband or redside trout, and a large, lake adapted form. All steelhead within the IMP were summer-run fish that entered the system mainly from May through September. Historical accounts indicate as many as one million steelhead entered the Columbia River under optimal conditions before impacted by European settlement. With commencement of widespread stocking of hatchery-raised rainbow trout into the Upper Columbia River basin, *O. m. irideus* was introduced.

Rainbow trout of coastal origin were historically the trout species preferred in management aquaculture, and have been widely stocked throughout the IMP. Rainbow trout of coastal origin may have been introduced as early as 1890 (Thiessen 1965). Documented stocking of rainbow trout in the IMP began in the 1930s by the Washington Department of Fish and Wildlife (WDFW) and the United States Fish and Wildlife Service (USFWS). Although historical stocking occurred in the San Poil Subbasin it was mainly limited to lakes within the Lake Rufus Woods and Upper Columbia subbasins.

Specific water bodies where rainbow trout were historically stocked include Swan Lake, Fish Lake, Long Lake, Ferry Lake, O'Brien Creek, North Fork San Poil River, West Branch San Poil River, San Poil River, and other water bodies (Curt Vail, District Biologist, WDFW, personal communication, 2003). Today limited rainbow trout stocking occurs within the San Poil Subbasin. Several stocking programs for rainbow trout operate within the Upper Columbia Subbasin in the Columbia River above Grand Coulee Dam, which could influence portions of the San Poil Subbasin. The Colville State Hatchery produces triploid coastal rainbow trout and native redband trout, thus limiting problems associated with hybridization. The Colville Tribal Hatchery stocks a minimal number of small triploid rainbow trout into Lost Creek. The Washington Department of Fish and Wildlife (WDFW) also stock rainbow trout into Ferry, Swan, and Fish lakes. The Colville Tribal Hatchery is currently attempting to establish a captive redband trout brood stock and if successful, redband trout may be stocked more widely into the San Poil Subbasin.

38.3.2 Current Status

Redband/rainbow trout are distributed within the San Poil River and its tributaries as well as Lake Roosevelt. Abundance estimates conducted as part of the Mount Tolman Study indicated a density of 671 rainbow trout per mile and occurred in the lower free flowing San Poil River. Three distinct groups were observed passing the weir. The first group was collected from March to the end of May and consisted of primarily large adult adfluvial fish on their spawning migration. The second group was mostly juvenile fish migrating downstream between mid-June and mid-July these fish had all spent one full year and part of a second in the river. A third group of intermediate-sized fish moved upstream from mid-July to the beginning of November. It is believed that this third group

represents a group of nonnative stock likely of hatchery origin that were attempting to spawn (Green et al. 1979).

Current redband/rainbow trout life history types present in the San Poil Subbasin include a resident form, fluvial form, as well as adfluvial form. Two adfluvial forms of redband/rainbow trout have been documented in the San Poil Subbasin. A population of adfluvial redband/rainbow trout spawn in the San Poil River or its tributaries and migrate to Lake Roosevelt. Another population of adfluvial redband/rainbow trout appear to spawn in Trout Creek and migrate to Curlew Lake (Curt Vail and Sandy Lembcke, WDFW, personal communication, 2003).

Early fisheries investigations (Scholz et al. 1986) indicated that the lack of high quality spawning and rearing habitat was a limiting factor to adfluvial rainbow trout production in Lake Roosevelt. Stream surveys also identified fish passage barriers (improper culvert installation and intermittent flows) as limiting production within the San Poil River.

Results of assessments on six tributaries to the San Poil River conducted between 1991 and 1999 indicated that juvenile rainbow trout densities were higher in pool habitats than riffle habitats (Boyce et al. 1998; Jones 2000). Juvenile rainbow trout occupied pool habitat at a density of 1.9 fish per square meter, while they occupied riffle habitat at a rate of 0.7 fish per square meter. However, this data was collected during periods of low flow when not much habitat existed except for pool habitat. Subsequent sampling suggests that redband trout were more likely to be captured from flowing habitats with brook trout more common in back waters and still pools. This indicates that resource partitioning may occur between these two species. However, this partitioning may be merely a reflection of available habitat. It is unknown at this time whether inter-species competition for resources has impacted redband populations in the isolated habitats above barriers where pure genetic stocks remain (Sears 2002).

Areas above natural barriers are being surveyed for redband trout. Genetic testing is currently being conducted on populations found above barriers in Jack, Meadow, Brush, and Manila creeks in addition to those already tested in Bridge, Barnaby, and Hall creeks. All samples collected are sent to the Center for Salmonid Species at Risk at the University of Idaho for mitochondrial DNA analysis. The Center is using 2 loci to specifically assess hybridization of native redband trout with coastal rainbow trout stocks and to determine the genetic purity of suspected redband trout.

The last report received from the Center stated that there appeared to be more than one spawning population of pure redbands. Additional loci will need to be tested to determine if there is more than one spawning population. Additional testing of located populations will continue yearly as funding allows. GIS layers have been created for all reaches where genetic analysis indicates a pure stock exists. This will enable the delineation of a core recovery zone for redband trout within the San Poil Subbasin

Upstream migration of adult fish has been monitored annually since 1994 (Table 38.2). Jones (2000) describes the spawning migration to be mostly comprised of age-3 and age-

4 individuals (Green et al. 1979). Results of the upstream monitoring show that 1994 and 1995 year-classes exhibited substantially larger returns than did the 1996-1999 year-classes, possibly a result of Lake Roosevelt water elevations (Jones 2000). Downstream monitoring of juvenile out migrations was conducted in 1979 on the mainstem San Poil River from 1996 to 1999 using fyke nets in tributaries and a five-foot diameter screw trap in the mainstem. Juvenile trapping success was limited due to flashy hydrographs and it was estimated that the sampling included less than 10 percent of the actual fish (Table 38.3). Although only a small percentage of migrating trout were actually collected, trends indicate that the adfluvial trout population is likely stable. In addition, although entrainment of individuals through Grand Coulee Dam is hypothesized, the extent is unknown. Record snow packs and extremely high flows during the spring freshet's of 1996 and 1997 may have led to high entrainment accounting for the low returns during those years. Adult returns since 1997 have steadily increased to the levels seen in 1994 and 1995.

Table 38.2. Adfluvial rainbow trout adult returns to five San Poil River tributaries from 1994-2003

Year	Adult Return
1979	52
1994	246
1995	214
1996	39
1997	13
1998	37
1999	59
2000	No Data
2001	7*
2002	121
2003	237

*Trapping only conducted on Bridge Creek

Table 38.3. Trap results for juvenile rainbow trout collected in the San Poil Subbasin mainstem and tributaries from 1996-1999

Year	Tributary Traps	Mainstem Screw Trap
1979		316
1996	163	212
1997	12	511
1998	339	228
1999	497	264

Preliminary genetic analyses indicate that the adfluvial rainbow trout population that migrates from Lake Roosevelt to the San Poil River to spawn is introgressed between coastal rainbow and redband trout (Leary 1997; Kirk Truscott, Fish Biologist, WDFW, personal communication, 2003). Given the historic abundance of steelhead in the basin and the redband trout component of the current population, the population may contain

genetic material of the native steelhead stock. The significance of maintaining the population, aside from native species conservation, is that it may provide a native donor stock for anadromous reintroduction. Ongoing efforts to monitor this population include upstream and downstream trapping.

38.3.3 Limiting Factors Redband/Rainbow Trout

Adfluvial and resident redband trout were analyzed separately in the QHA due to their different life history strategies. Adfluvial redband trout are more influenced by barriers to migration than resident redband trout as a result of their life history strategy. In addition, differences in rearing location and behavior can be profound between these two life history forms. Therefore, it was important to assess habitat conditions for both resident and adfluvial redband trout history types even if some overlap exists. The primary difference within the QHA was not the physical habitat attributes assessed, but the habitat utilization during the three different life stages (spawning and incubation, growing and rearing, migration) by the two distinct life history strategies of resident and adfluvial redband trout.

Adfluvial Redband Trout

Historically, adfluvial redband trout were distributed in 41 reaches (out of 69 reaches delineated in the Subbasin) from which the degree of physical change to the habitat from reference conditions was assessed (Table 38.4). Adfluvial redband trout are currently present in 35 of the delineated reaches and watersheds within the Subbasin. According to the QHA model, adfluvial redband trout are no longer considered present in the South Fork of North Namnankin, Upper Bear, Jack, Meadow, and Brush creeks. Adfluvial redband trout in Trout Creek are from Curlew Lake (discussed in Upper Columbia section) and not the San Poil River.

The watersheds having experienced the greatest amount of habitat alteration are spread throughout the Subbasin. The habitat attributes that received the highest rankings for change from reference conditions include flow regimes and obstructions (see Table 38.13). The entire Namnankin watershed has experienced varying degrees of change to the stream habitat with most alterations associated to flow regime (Table 38.4). Upper San Poil River (in the northern portion of the Subbasin), ranked third, was the only watershed of the top thirteen that identified habitat diversity and fine sediments as having the greatest deviation from reference conditions.

The mid-region of the San Poil Subbasin received the highest rankings for protection. These regions include parts of the San Poil River and tributaries such as Twenty-one Mile, Twenty-three Mile, Thirteen Mile, and Seventeen Mile creeks (Table 38.5).

The tornado diagram (Table 38.6) and maps (Map SP-1, Map Sp-2 located at the end of Section 38) present the reach scores for both current habitat condition (ranging from zero to positive one, Map SP-1) and protection (ranging from zero to negative one, Map SP-2). Scores closest to negative one depict reaches that are most representative of reference habitat conditions. Scores closest to positive one depict reaches with habitat conditions least similar to reference conditions. Confidence scores range from zero to one and are

associated with the ratings assigned by local biologists based on documentation or their expert opinion regarding reference and current habitat attributes for each reach.

Table 38.4. Ranking of reaches with the largest deviation from the reference habitat conditions for adfluvial redband trout in the San Poil Subbasin. A reach rank equal to 1 has the greatest deviation from reference condition in comparison to other reaches. Reach scores range from 0 to 1, with 1 having the greatest deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute having the greatest deviation from reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes equally deviate the most from the reference.

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
14	Lambert	1	0.6	3	3	7	3	1	1	10	10	7	3	7
24	Iron Creek	2	0.4	9	4	6	7	2	2	10	5	7	10	1
2	Upper San Poil River	3	0.4	3	5	1	1	8	8	5	10	5	4	10
32	Lower South Namnankin (Inter.)	4	0.3	8	8	5	6	3	2	10	4	6	10	1
64	Upper Moses Creek (Meadow)	5	0.3	7	8	5	3	1	2	9	6	9	9	3
38	Lower Bear Creek (High Gradient)	6	0.3	8	9	7	4	1	1	10	5	5	10	3
49	Middle 17-mile Creek (Canyon)	7	0.3	3	9	7	8	4	2	9	6	5	9	1
33	Upper South Namnankin (Peren.)	8	0.3	8	5	3	9	2	1	10	7	5	10	3
37	South Fork North Namnankin Creek	9	0.3	4	4	4	9	1	1	10	7	7	10	3
55	Strawberry Creek	10	0.3	5	5	5	8	2	2	9	4	9	9	1
26	Louie Creek	11	0.3	3	6	7	9	1	1	10	4	8	10	5
36	Upper North Namnankin (from S. Fork)	12	0.3	6	5	4	9	1	1	10	6	6	10	3
34	Lower North Namnankin (Inter.)	13	0.3	8	9	5	7	1	1	10	4	6	10	3
18	Lower Manila Creek (To Falls)	14	0.3	5	3	1	5	5	2	9	10	4	11	8
27	Lower Bridge Creek (To Falls)	15	0.3	3	5	2	5	9	7	10	8	3	10	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
20	San Poil Arm (Transitional)	16	0.3	2	3	1	3	8	8	6	8	5	7	8
60	Middle Lost Creek (Meadow)	17	0.3	6	6	4	8	5	1	10	3	8	10	2
17	Mouth to Manila creek	18	0.3	1	6	1	1	8	8	5	8	4	7	8
3	Golden Harvest Ck	19	0.3	2	4	2	1	4	4	8	8	8	8	4
31	30-mile Creek	20	0.3	6	4	3	6	9	2	10	5	6	10	1
15	West Fork Trout Ck	21	0.3	7	7	3	1	3	1	7	11	3	7	3
63	Lower Haden Creek	22	0.2	8	7	6	2	3	1	9	5	9	9	4
53	Gold Creek Mouth to Strawberry Creek	23	0.2	3	9	3	7	2	1	11	5	7	10	5
39	Upper Bear Creek (Lower Gradient)	24	0.2	5	8	3	9	1	1	10	5	5	10	4
59	Lower Lost Creek (Canyon)	25	0.2	1	6	5	6	9	4	11	3	6	10	1
35	Middle North Namnankin (To S. Fork)	26	0.2	5	4	3	8	1	1	10	5	5	10	9
68	San Poil River 5 (West Fork to 9-mile)	27	0.2	3	3	6	3	1	1	9	6	6	9	9
58	Middle West Fork San Poil River	28	0.2	2	5	5	5	9	3	9	3	8	9	1
22	Jack Creek	29	0.2	7	6	5	2	3	3	9	9	7	9	1
21	Meadow Creek	30	0.2	8	7	5	2	3	3	9	9	5	9	1
25	Lower San Poil River (Meadow to Cache)	31	0.2	1	5	3	2	8	7	8	6	3	8	8
30	San Poil River 2 (Cache to 30-mile)	32	0.2	2	6	1	2	8	7	8	5	2	8	8
40	San Poil River 3 (30-mile to 23-mile)	33	0.2	5	4	1	2	8	7	8	5	2	8	8
47	Lower 17-mile Creek	34	0.2	6	7	5	3	8	2	9	4	1	9	9
23	Brush Creek	35	0.1	7	6	4	4	2	2	9	9	7	9	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
16	N Fk /Main Trout Ck	36	0.1	6	6	6	1	2	2	9	9	9	5	2
41	Lower 23-mile Creek (To Falls)	36	0.1	1	4	5	3	7	2	8	8	5	8	8
52	West Fork San Poil Mouth to Gold Creek	36	0.1	1	6	6	6	9	2	9	2	5	9	2
44	Lower 21-mile Creek (To Falls)	39	0.1	4	3	4	2	7	1	8	8	4	8	8
51	San Poil River 4 (23-mile to West Fork)	40	0.1	4	3	2	1	8	7	8	4	4	8	8
66	Lower 13-mile Creek (High Gradient)	41	0.0	2	4	1	2	4	4	4	4	4	4	4

Table 38.5. Ranking of streams whose habitat is most similar to the reference condition for adfluvial redband trout in the San Poil Subbasin in comparison to other reaches. A reach rank equal to 1 reveals the reach with current conditions most similar to reference conditions in comparison to other reaches. Reach score ranges from 0 to -1, with -1 having the least deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute being most similar to the reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes are equally the most similar to the reference.

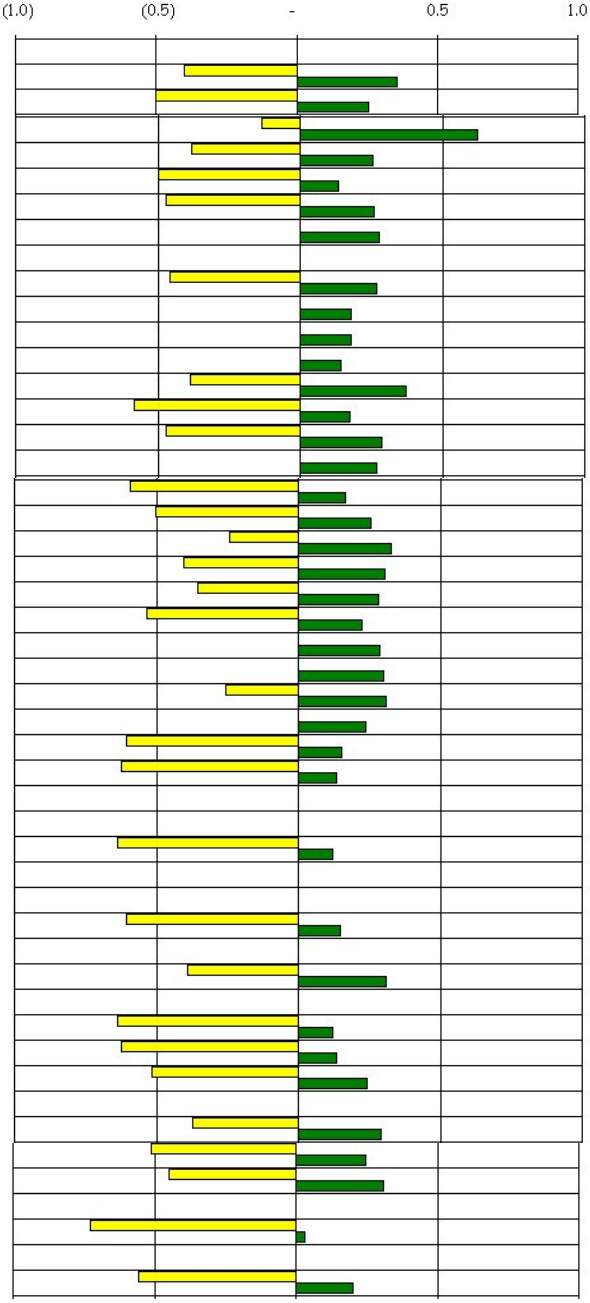
Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
66	Lower 13-mile Creek (High Gradient)	**1**	**-0.73**	9	4	11	9	1	1	4	4	4	4	1
51	San Poil River 4 (23-mile to West Fork)	**2**	**-0.64**	6	9	10	11	1	3	4	6	6	4	1
44	Lower 21-mile Creek (To Falls)	**3**	**-0.64**	7	10	7	11	2	3	4	4	7	4	1
41	Lower 23-mile Creek (To Falls)	**4**	**-0.62**	11	9	7	10	2	3	4	4	7	4	1
52	West Fork San Poil Mouth to Gold Creek	**4**	**-0.62**	11	6	6	6	1	2	4	10	9	4	2
47	Lower 17-mile Creek	**6**	**-0.61**	7	6	8	10	2	3	4	9	11	4	1
40	San Poil River 3 (30-mile to 23-mile)	**7**	**-0.61**	6	8	11	9	1	3	4	6	9	4	1
30	San Poil River 2 (Cache to 30-mile)	**8**	**-0.59**	8	6	11	8	1	3	4	7	8	4	1
25	Lower San Poil River (Meadow to Cache)	**9**	**-0.58**	11	7	8	10	1	3	4	6	8	4	1
58	Middle West Fork San Poil River	**10**	**-0.56**	10	6	6	6	1	2	3	9	5	3	11
68	San Poil River 5 (West Fork to 9-mile)	**11**	**-0.56**	9	9	6	9	4	4	2	6	6	2	1
35	Middle North Namnankin (To S. Fork)	**12**	**-0.53**	5	8	11	4	9	9	2	5	5	2	1
59	Lower Lost Creek (Canyon)	**13**	**-0.53**	11	5	9	5	1	2	3	10	5	4	5
53	Gold Creek Mouth to Strawberry Creek	**14**	**-0.52**	10	5	10	6	4	9	2	8	6	3	1
63	Lower Haden Creek	**15**	**-0.51**	6	7	8	11	5	9	1	10	1	1	4
31	30-mile Creek	**16**	**-0.50**	5	9	10	5	1	4	2	8	5	2	11

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
3	Golden Harvest Ck	**17**	**-0.50**	9	8	9	11	1	1	4	4	4	4	1
16	N Fk /Main Trout Ck	**17**	**-0.50**	9	9	9	8	1	1	4	5	5	5	1
60	Middle Lost Creek (Meadow)	**19**	**-0.49**	8	8	10	4	1	7	2	11	4	2	4
17	Mouth to Manila creek	**20**	**-0.47**	9	5	9	9	1	1	6	4	7	8	1
26	Louie Creek	**21**	**-0.47**	11	7	6	4	8	8	2	10	5	2	1
20	San Poil Arm (Transitional)	**22**	**-0.46**	10	8	11	9	1	1	5	4	6	7	1
64	Upper Moses Creek (Meadow)	**23**	**-0.45**	5	4	9	11	9	7	1	8	1	1	6
33	Upper South Namnankin (Peren.)	**24**	**-0.40**	4	6	10	3	11	9	1	5	6	1	6
2	Upper San Poil River	**25**	**-0.40**	9	5	10	10	2	2	5	4	5	8	1
49	Middle 17-mile Creek (Canyon)	**26**	**-0.39**	10	1	4	9	3	6	1	5	7	7	11
24	Iron Creek	**27**	**-0.39**	3	10	6	4	7	7	1	9	4	1	11
15	West Fork Trout Ck	**28**	**-0.38**	8	8	11	8	1	3	3	6	7	3	1
55	Strawberry Creek	**29**	**-0.37**	7	7	7	3	5	5	1	7	4	1	11
34	Lower North Namnankin (Inter.)	**30**	**-0.35**	9	7	11	4	5	5	1	10	8	1	3
38	Lower Bear Creek (High Gradient)	**31**	**-0.26**	6	4	7	4	8	8	1	11	10	1	3
32	Lower South Namnankin (Inter.)	**32**	**-0.24**	4	4	10	3	8	9	1	10	4	1	4
14	Lambert	**33**	**-0.14**	6	6	4	6	6	6	2	2	4	6	1
6	Lower Ninemile Ck	**34**	**0.00**	1	1	1	1	1	1	1	1	1	1	1
7	Upper Ninemile Ck	**34**	**0.00**	1	1	1	1	1	1	1	1	1	1	1

Table 38.6. Tornado diagram for adfluvial redband trout in the San Poil Subbasin. Degree of confidence for protection and current habitat conditions range from 0.0 to 1.0 with the greatest confidence equal to 1.0. Protection reach scores are presented on the left side and current habitat reach scores are presented on the right. Negative scores are in parentheses.

NP = Not present

Sequence	Reach Name	Protection Confidence	Current Habitat Condition Confidence
1	Curlew Lake	NP	
2	Upper San Poil River	0.33	0.33
3	Golden Harvest Ck	-	0.17
14	Lambert	0.50	0.42
15	West Fork Trout Ck	0.33	0.33
16	N Fk /Main Trout Ck	0.33	0.33
17	Mouth to Manila creek	0.47	0.40
18	Lower Manila Creek (To Falls)	0.47	0.40
19	Upper Manila Creek (above Falls)	NP	
20	San Poil Arm (Transitional)	0.47	0.40
21	Meadow Creek	0.50	0.42
22	Jack Creek	0.47	0.40
23	Brush Creek	0.50	0.42
24	Iron Creek	0.47	0.40
25	Lower San Poil River (Meadow to Cache)	0.50	0.42
26	Louie Creek	0.50	0.42
27	Lower Bridge Creek (To Falls)	0.50	0.42
30	San Poil River 2 (Cache to 30-mile)	0.33	0.33
31	30-mile Creek	0.43	0.38
32	Lower South Namnankin (Inter.)	0.50	0.42
33	Upper South Namnankin (Peren.)	0.43	0.38
34	Lower North Namnankin (Inter.)	0.50	0.42
35	Middle North Namnankin (To S. Fork)	0.43	0.38
36	Upper North Namnankin (from S. Fork)	0.43	0.38
37	South Fork North Namnankin Creek	0.37	0.35
38	Lower Bear Creek (High Gradient)	0.37	0.35
39	Upper Bear Creek (Lower Gradient)	0.37	0.35
40	San Poil River 3 (30-mile to 23-mile)	0.33	0.33
41	Lower 23-mile Creek (To Falls)	0.33	0.25
42	Middle 23-mile Creek (High gradient)	NP	
43	Upper 23-mile Creek (Meadow)	NP	
44	Lower 21-mile Creek (To Falls)	0.20	0.18
45	Middle 21-mile Creek (High Gradient)	NP	
46	Upper 21-mile Creek (Meadow)	NP	
47	Lower 17-mile Creek	0.37	0.27
48	South Fork 17-mile Creek	NP	
49	Middle 17-mile Creek (Canyon)	0.37	0.27
50	Upper 17-mile Creek	NP	
51	San Poil River 4 (23-mile to West Fork)	0.30	0.23
52	West Fork San Poil Mouth to Gold Creek	0.33	0.25
53	Gold Creek Mouth to Strawberry Creek	0.37	0.27
54	Gold Creek (Strawberry to Gold Lake)	NP	
55	Strawberry Creek	0.43	0.22
63	Lower Haden Creek	0.37	0.18
64	Upper Moses Creek (Meadow)	0.37	0.18
65	Haden Creek	NP	
66	Lower 13-mile Creek (High Gradient)	0.50	0.42
67	Upper 13-mile Creek (Lower Gradient)	NP	
68	San Poil River 5 (West Fork to 9-mile)	0.25	0.13



Biological significance, such as existing population abundance or productivity, of an area is not included in the QHA model. The QHA results simply describe the physical habitat

of a specified watershed. The following will discuss key biological reaches important to protect and/or restore within the Subbasin that may or may not have been highlighted in the QHA model. In addition, reaches that received high rankings for protection may not be the most biologically productive are also addressed.

Deviation from historic flow regimes was a common result from the QHA. However, flow conditions in Iron Creek, lower South Namnankin (ranked 4th) Creek, and Louie Creek (ranked 11th) are intermittent drying up in the summer months before flowing again in October/November. Although little water withdrawal occurs in these areas, it is unclear whether the creeks were naturally intermittent or if this trait is human induced (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Further investigation of these reaches may be needed to identify the true characteristics of the habitat, flow regime, and biological importance for adfluvial redband trout. In the meantime, they do not appear to be the best candidates for restoration efforts.

Lower Thirteen Mile Creek received the top rating for protection. This is most likely attributed to the watershed being located within a roadless area that has experienced minimal impacts to the habitat. Although the physical habitat is regarded as high quality, productivity is considered relatively low and the redband trout population may already be at maximum carrying capacity (Tom Shuhda, Fish Biologist, Colville National Forest, personal communication, 2003). For these reasons, additional protection activities may not be necessary or justified.

The San Poil River, of which many reaches were ranked high for protection, provides an important migratory corridor for adfluvial redband trout and may also serve as important rearing habitat for young of the year. Thus, biologically, it is important to maintain or improve the quality of habitat in the mainstem. However, the majority of the productive spawning habitat is located in the West Fork of the San Poil River (ranked 4th for protection) (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Therefore, protection efforts for the mainstem San Poil should be focused on the maintenance and improvements of the migratory corridor and rearing areas. The West Fork of the San Poil should be a high priority for general aquatic habitat protection and spawning area protection. Throughout the San Poil Subbasin man-made barriers limit access to important habitats, therefore it is important to improve the habitat quantity by removing these barriers. Efforts to improve habitat quality throughout the San Poil Subbasin should attempt to address fine sediment inputs, floodplain connectivity, and degraded riparian habitats, which inherently improve secondary items such as habitat diversity, temperature, flow, and channel stability.

Resident Redband Trout

Currently, resident redband trout are present in 62 of 69 delineated watersheds and reaches within the Subbasin. Historically, resident redband trout were present everywhere in the Subbasin.

The main changes from historic to current habitat conditions include the addition of obstructions, the decrease in quality of riparian condition, and the decrease in habitat

diversity (see Table 38.13). The first five reaches listed in Table 38.7 identify riparian condition, channel stability, channel complexity, low flow, oxygen, temperature regimes, and obstructions as experiencing the greatest degree of habitat alteration. Three of the five reaches, including West Fork of the San Poil River, Granite, Frosty, and Cape Labelle creeks, encompass the northwest corner of the San Poil Subbasin. The other two (Lambert and Upper San Poil River) reaches are located in the northeast corner of the Subbasin. The remaining top ten reaches in Table 38.7 are either in the northern tip or southern tip of the Subbasin with obstructions listed as the top habitat modification. Only West Fork Trout Creek (northern tip) identified habitat diversity as the physical attribute deviating the most from reference conditions, which follows trends of other reaches in the same region.

Results show that current habitat conditions in the 13-Mile watershed (both upper and lower) are most representative or similar to reference conditions and should be protected (Table 38.8). Other areas receiving a high rank for protection include middle and upper watersheds along the mainstem San Poil River and its tributaries.

The tornado diagram (Table 38.9) and maps (Map SP-6, Map SP-7, located at the end of Section 38) present the reach scores for both current habitat condition (ranging from zero to positive one, Map SP-6) and protection (ranging from zero to negative one, Map SP-7). Scores closest to negative one depict reaches that are most representative of reference habitat conditions. Scores closest to positive one depict reaches with habitat conditions least similar to reference conditions.

Confidence scores range from zero to one and are associated with the ratings assigned by local biologists based on documentation or their expert opinion regarding reference and current habitat attributes for each reach. Based upon the data used during the QHA analysis, it is important to understand that most model outputs are only as good as the data that is entered into them. Data that is lacking or inaccurate is likely to produce erroneous results. Within the San Poil Subbasin some data were lacking. Although data were lacking for certain reaches, the best judgment of the technical team was used to fill in data gaps. Therefore, the results of QHA may be subjective. Confidence scores for protection ratings in the inundated reaches of the San Poil River, Lambert Creek, Manila Creek, Meadow Creek, Jack Creek, Brush Creek, Iron Creek, Louie Creek, Lower Bridge Creek, Lower North Namnankin Creek, Lower South Namnankin Creek, Lower 13-mile Creek, and the lower San Poil River mainstem were the reaches where sufficient confidence in the data existed to produce reliable results**.** Confidence results identified a complete lack of data about the habitat in the Golden Harvest Creek, Lower 23-mile Creek, San Poil River 4, Lower West Fork of the San Poil, Strawberry Creek, Lower Haden Creek, Upper Moses Creek, San Poil River 5, Lower Lost Creek canyon and Middle West fork San Poil River reaches. Some data gaps existed for all other reaches. Consequently, anyone attempting to utilize the QHA assessment for making substantive decisions should do so with caution. In most cases the data used for current habitat conditions was regarded as having higher confidence than data used in historic habitat ratings. A large proportion of the data used in the historic habitat ratings were from expert opinion due to a lack of quantifiable historical information. Although the lack of

historical data limits the QHA models use in some reaches within the San Poil Subbasin, this problem is not exclusive to the San Poil Subbasin, since many habitat-altering practices occurred before formal monitoring of water bodies was routinely practiced.

Table 38.7. Ranking of reaches with the largest deviation from the reference habitat conditions for resident redband trout in the San Poil Subbasin. A reach rank equal to 1 has the greatest deviation from reference condition in comparison to other reaches. Reach scores range from 0 to 1, with 1 having the greatest deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute having the greatest deviation from reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes equally deviate the most from the reference.

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
14	Lambert	1	0.7	1	1	4	6	8	1	8	8	4	6	8
2	Upper San Poil River	2	0.4	2	4	1	3	9	8	4	10	4	4	10
69	West Fork Granite Creek	2	0.4	1	1	1	9	11	1	1	1	1	9	1
70	S.E. San Poil (Frosty Creek)	2	0.4	1	1	1	9	11	1	1	1	1	9	1
71	N.W. San Poil (Cape Labelle Creek)	2	0.4	1	1	1	9	11	1	1	1	1	9	1
24	Iron Creek	6	0.4	9	3	5	8	7	2	10	4	6	10	1
19	Upper Manila Creek (above Falls)	7	0.4	8	5	2	7	9	3	10	6	4	10	1
15	West Fork Trout Ck	8	0.4	2	2	1	2	11	2	7	7	2	10	7
21	Meadow Creek	9	0.4	9	8	3	6	7	2	10	5	3	10	1
22	Jack Creek	10	0.4	8	4	3	5	7	2	10	6	8	10	1
43	Upper 23-mile Creek (Meadow)	11	0.4	1	4	4	6	9	3	10	7	8	10	1
20	San Poil Arm (Transitional)	12	0.4	2	3	1	5	8	8	6	8	4	7	8
54	Gold Creek (Strawberry to Gold Lake)	12	0.4	1	7	3	9	6	2	11	3	7	10	3
49	Middle 17-mile Creek (Canyon)	14	0.4	2	9	6	8	7	3	9	5	4	9	1
18	Lower Manila Creek (To Falls)	15	0.4	5	2	1	6	8	3	7	8	3	11	8

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
33	Upper South Namnankin (Peren.)	16	0.3	8	3	1	9	7	2	10	6	3	10	3
27	Lower Bridge Creek (To Falls)	17	0.3	3	5	2	7	9	8	10	6	3	10	1
17	Mouth to Manila creek	18	0.3	1	6	1	3	8	8	5	8	3	7	8
23	Brush Creek	19	0.3	7	4	3	9	6	2	10	4	7	10	1
56	Gold Lakes	20	0.3	1	7	1	6	7	7	4	7	1	7	4
26	Louie Creek	21	0.3	1	4	6	9	5	2	10	3	7	10	7
64	Upper Moses Creek (Meadow)	22	0.3	7	8	2	4	6	1	9	3	9	9	4
60	Middle Lost Creek (Meadow)	23	0.3	5	5	3	8	9	2	10	1	7	10	3
36	Upper North Namnankin (from S. Fork)	24	0.3	6	3	1	9	5	1	10	6	6	10	3
3	Golden Harvest Ck	25	0.3	1	4	1	1	11	5	5	5	5	10	5
55	Strawberry Creek	26	0.3	5	5	5	8	4	2	9	3	9	9	1
31	30-mile Creek	27	0.3	6	4	2	8	9	3	10	5	6	10	1
46	Upper 21-mile Creek (Meadow)	28	0.3	3	3	1	5	8	2	9	9	6	9	6
59	Lower Lost Creek (Canyon)	29	0.3	1	6	4	8	9	5	11	2	6	10	3
29	Upper Bridge Creek (Above hwy culvert)	30	0.3	6	2	6	5	8	3	9	4	9	9	1
28	Middle Bridge Creek (Falls to HWY culvert)	31	0.3	6	2	6	4	9	5	10	2	6	10	1
53	Gold Creek Mouth to Strawberry Creek	32	0.3	2	9	2	8	7	1	11	4	5	10	5
63	Lower Haden Creek	33	0.3	8	6	4	3	7	1	9	2	9	9	4
11	No Fork/main O'Brien	34	0.3	1	2	2	2	5	8	8	8	5	7	8
39	Upper Bear Creek (Lower Gradient)	35	0.3	4	8	2	9	3	1	10	4	4	10	4

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
35	Middle North Namnankin (To S. Fork)	36	0.2	5	3	2	8	4	1	10	5	5	10	9
25	Lower San Poil River (Meadow to Cache)	37	0.2	1	5	2	4	8	7	8	6	2	8	8
58	Middle West Fork San Poil River	38	0.2	2	4	4	7	9	4	9	3	8	9	1
68	San Poil River 5 (West Fork to 9-mile)	39	0.2	1	1	5	4	8	3	9	5	5	9	9
30	San Poil River 2 (Cache to 30-mile)	40	0.2	2	6	1	4	8	7	8	5	2	8	8
4	Granite Ck	41	0.2	2	2	2	8	10	2	2	10	2	8	1
40	San Poil River 3 (30-mile to 23-mile)	42	0.2	5	4	1	3	8	7	8	5	2	8	8
45	Middle 21-mile Creek (High Gradient)	42	0.2	3	3	3	7	8	2	9	9	3	9	1
42	Middle 23-mile Creek (High gradient)	44	0.2	3	3	3	8	7	2	8	8	3	8	1
32	Lower South Namnankin (Inter.)	45	0.2	6	6	2	3	5	4	10	9	6	10	1
57	Upper Gold Creek	45	0.2	2	7	6	3	4	4	10	8	10	9	1
47	Lower 17-mile Creek	47	0.2	5	7	3	5	8	3	9	2	1	9	9
10	S Fk O'Brien Ck	48	0.2	1	1	1	1	5	6	6	6	6	6	6
48	South Fork 17-mile Creek	49	0.2	7	7	5	2	3	3	10	9	5	10	1
38	Lower Bear Creek (High Gradient)	50	0.2	7	9	6	1	4	4	10	8	3	10	2
52	West Fork San Poil Mouth to Gold Creek	51	0.2	1	6	6	8	9	3	9	2	3	9	3
41	Lower 23-mile Creek (To Falls)	52	0.2	1	2	4	4	7	3	8	8	4	8	8
16	N Fk /Main Trout Ck	53	0.2	2	2	2	1	8	2	9	9	9	7	2
5	Scatter Ck	54	0.2	1	4	1	3	6	6	6	6	4	6	6
65	Haden Creek	55	0.2	8	7	5	2	3	4	9	6	9	9	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
51	San Poil River 4 (23-mile to West Fork)	56	0.2	4	3	1	2	8	7	8	4	4	8	8
7	Upper Ninemile Ck	57	0.2	1	3	3	2	7	7	7	7	3	6	7
34	Lower North Namnankin (Inter.)	58	0.2	6	9	2	5	3	3	10	8	6	10	1
44	Lower 21-mile Creek (To Falls)	59	0.2	3	1	3	3	7	2	8	8	3	8	8
61	Looney Creek	60	0.1	4	8	4	4	2	2	9	7	9	9	1
37	South Fork North Namnankin Creek	61	0.1	4	4	4	7	2	2	10	9	8	10	1
50	Upper 17-mile Creek	62	0.1	6	9	5	4	2	2	10	8	6	10	1
13	N Fk San Poil	63	0.1	1	2	2	2	2	6	6	6	6	6	6
62	Upper Lost Creek (From Haden Creek)	64	0.1	8	7	2	2	5	4	8	6	8	8	1
6	Lower Ninemile Ck	65	0.1	5	6	1	3	6	6	6	6	1	3	6
12	S Fk San Poil	66	0.1	1	1	1	4	5	5	5	5	5	5	5
66	Lower 13-mile Creek (High Gradient)	67	0.0	2	4	1	3	4	4	4	4	4	4	4
67	Upper 13-mile Creek (Lower Gradient)	68	0.0	2	3	3	1	3	3	3	3	3	3	3

Table 38.8. Ranking of streams whose habitat is most similar to the reference condition for resident redband trout in the San Poil Subbasin in comparison to other reaches. A reach rank equal to 1 reveals the reach with current conditions most similar to reference conditions in comparison to other reaches. Reach score ranges from 0 to -1, with -1 having the least deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute being most similar to the reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes are equally the most similar to the reference.

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
67	Upper 13-mile Creek (Lower Gradient)	1	-0.87	8	1	1	10	10	1	1	1	1	9	1
66	Lower 13-mile Creek (High Gradient)	2	-0.82	7	1	8	11	9	1	1	1	1	9	1
51	San Poil River 4 (23-mile to West Fork)	3	-0.73	4	7	9	11	10	3	1	4	4	8	1
5	Scatter Ck	4	-0.73	8	5	8	11	8	1	1	1	5	7	1
16	N Fk /Main Trout Ck	5	-0.72	4	4	4	11	10	4	1	1	1	9	4
44	Lower 21-mile Creek (To Falls)	6	-0.72	4	8	4	11	10	7	1	1	4	9	1
52	West Fork San Poil Mouth to Gold Creek	7	-0.72	10	2	2	9	10	4	1	8	4	7	4
41	Lower 23-mile Creek (To Falls)	8	-0.69	8	7	4	11	10	6	1	1	4	8	1
42	Middle 23-mile Creek (High gradient)	9	-0.69	3	3	3	7	10	9	1	1	3	7	11
45	Middle 21-mile Creek (High Gradient)	10	-0.68	3	3	3	9	10	8	1	1	3	7	11
4	Granite Ck	11	-0.68	2	2	2	8	8	2	2	1	2	8	8
47	Lower 17-mile Creek	12	-0.67	4	3	5	11	10	5	1	7	8	8	1
40	San Poil River 3 (30-mile to 23-mile)	13	-0.66	4	6	10	11	7	3	1	4	7	7	1
30	San Poil River 2 (Cache to 30-mile)	14	-0.64	6	4	10	11	6	3	1	5	6	6	1
68	San Poil River 5 (West Fork to 9-mile)	15	-0.63	7	7	3	11	10	6	1	3	3	7	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
25	Lower San Poil River (Meadow to Cache)	**16**	-0.63	10	5	6	11	6	3	1	4	6	6	1
63	Lower Haden Creek	**17**	-0.63	3	4	6	11	10	9	1	8	1	5	6
58	Middle West Fork San Poil River	**18**	-0.63	7	3	3	10	7	3	1	6	2	7	11
35	Middle North Namnankin (To S. Fork)	**19**	-0.62	3	6	7	10	11	9	1	3	3	7	2
53	Gold Creek Mouth to Strawberry Creek	**20**	-0.62	7	2	7	7	11	10	1	6	3	5	3
39	Upper Bear Creek (Lower Gradient)	**21**	-0.61	3	2	8	8	11	10	1	3	3	7	3
28	Middle Bridge Creek (Falls to HWY culvert)	**22**	-0.61	2	7	2	10	9	5	1	7	2	6	11
46	Upper 21-mile Creek (Meadow)	**23**	-0.60	6	6	11	10	9	8	1	1	3	5	3
31	30-mile Creek	**24**	-0.59	2	6	8	8	10	7	1	4	2	5	11
55	Strawberry Creek	**25**	-0.59	3	3	3	7	10	9	1	8	1	6	11
3	Golden Harvest Ck	**26**	-0.58	7	6	7	11	10	1	1	1	1	7	1
36	Upper North Namnankin (from S. Fork)	**27**	-0.58	2	7	9	6	11	9	1	2	2	5	7
60	Middle Lost Creek (Meadow)	**28**	-0.58	4	4	6	6	11	9	1	10	2	3	6
64	Upper Moses Creek (Meadow)	**29**	-0.57	4	3	8	10	11	9	1	7	1	5	6
59	Lower Lost Creek (Canyon)	**30**	-0.57	11	2	5	9	8	4	1	9	2	7	6
23	Brush Creek	**31**	-0.55	2	5	7	7	11	9	1	5	2	4	10
49	Middle 17-mile Creek (Canyon)	**32**	-0.54	10	1	3	6	9	8	1	5	6	4	11
11	No Fork/main O'Brien	**33**	-0.54	8	5	5	10	8	1	1	1	4	5	11
54	Gold Creek (Strawberry to Gold Lake)	**34**	-0.53	10	2	5	5	11	9	1	5	2	4	5
65	Haden Creek	**35**	-0.53	3	4	5	10	11	7	1	8	1	5	9

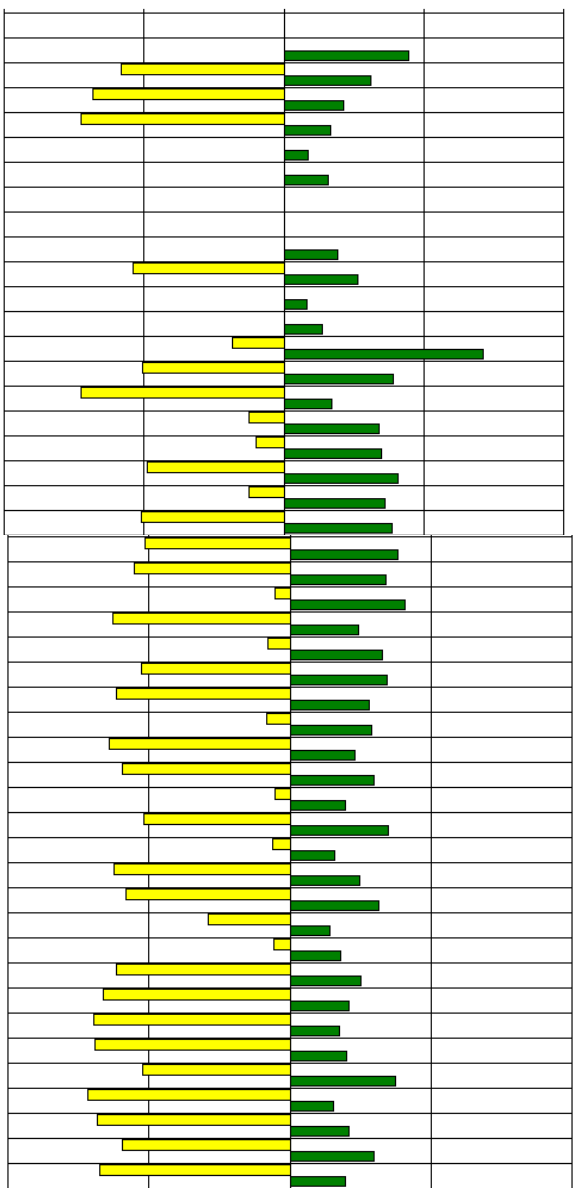
Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
27	Lower Bridge Creek (To Falls)	36	-0.53	5	4	9	10	8	2	1	3	5	5	11
43	Upper 23-mile Creek (Meadow)	37	-0.52	10	5	5	9	8	7	1	3	2	4	10
33	Upper South Namnankin (Peren.)	38	-0.52	2	4	10	8	11	9	1	3	4	4	4
22	Jack Creek	39	-0.51	2	6	7	9	10	8	1	5	2	4	11
21	Meadow Creek	40	-0.51	2	3	6	9	10	8	1	5	6	4	11
15	West Fork Trout Ck	41	-0.50	4	4	10	11	9	4	1	1	4	4	1
19	Upper Manila Creek (above Falls)	42	-0.49	2	5	10	8	9	7	1	4	6	3	11
69	West Fork Granite Creek	43	-0.45	1	1	1	9	11	1	1	1	1	9	1
70	S.E. San Poil (Frosty Creek)	43	-0.45	1	1	1	9	11	1	1	1	1	9	1
71	N.W. San Poil (Cape Labelle Creek)	43	-0.45	1	1	1	9	11	1	1	1	1	9	1
62	Upper Lost Creek (From Haden Creek)	46	-0.31	4	6	10	3	8	9	1	11	4	1	6
50	Upper 17-mile Creek	47	-0.30	5	4	7	3	9	9	1	11	5	1	8
61	Looney Creek	48	-0.29	6	5	6	3	9	9	1	11	4	1	6
37	South Fork North Namnankin Creek	49	-0.29	6	6	6	3	9	9	1	11	5	1	4
48	South Fork 17-mile Creek	50	-0.26	4	4	6	3	8	8	1	10	6	1	11
14	Lambert	51	-0.18	6	6	4	6	6	6	1	1	4	6	1
17	Mouth to Manila creek	52	-0.12	7	7	7	7	1	1	5	4	6	7	1
20	San Poil Arm (Transitional)	52	-0.12	7	7	7	7	1	1	5	4	6	7	1
56	Gold Lakes	54	-0.10	7	7	7	7	1	1	5	3	6	7	3
18	Lower Manila Creek (To Falls)	55	-0.10	7	7	7	7	2	3	5	4	6	7	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
29	Upper Bridge Creek (Above hwy culvert)	**56**	-0.08	6	6	6	6	1	2	3	5	3	6	6
26	Louie Creek	**57**	-0.08	7	7	7	7	4	4	2	6	3	7	1
34	Lower North Namnankin (Inter.)	**58**	-0.06	7	7	7	7	3	3	1	6	5	7	1
38	Lower Bear Creek (High Gradient)	**59**	-0.06	7	7	7	7	3	3	1	5	5	7	1
57	Upper Gold Creek	**60**	-0.06	6	6	6	6	3	3	1	5	1	6	6
32	Lower South Namnankin (Inter.)	**61**	-0.05	7	7	7	7	2	3	1	6	4	7	4
24	Iron Creek	**62**	-0.05	6	6	6	6	2	2	1	5	4	6	6

Table 38.9. Tornado diagram for resident redband trout in the San Poil Subbasin. Degree of confidence for protection and current habitat conditions range from 0.0 to 1.0 with the greatest confidence equal to 1.0. Protection reach scores are presented on the left side and current habitat reach scores are presented on the right. Negative scores are in parentheses.

NP = Not present

Sequence	Reach Name	Protection Confidence	Current Habitat Condition Confidence
1	Curlew Lake	NP	
2	Upper San Poil River	0.33	0.50
3	Golden Harvest Ck	-	0.33
4	Granite Ck	0.50	0.58
5	Scatter Ck	0.50	0.58
6	Lower Ninemile Ck	0.50	0.58
7	Upper Ninemile Ck	0.50	0.58
8	0	NP	
9	0	NP	
10	S Fk O'Brien Ck	0.50	0.58
11	No Fork/main O'Brien	0.33	0.50
12	S Fk San Poil	0.50	0.58
13	N Fk San Poil	0.50	0.58
14	Lambert	0.50	0.58
15	West Fork Trout Ck	0.33	0.50
16	N Fk /Main Trout Ck	0.33	0.50
17	Mouth to Manila creek	0.47	0.57
18	Lower Manila Creek (To Falls)	0.47	0.57
19	Upper Manila Creek (above Falls)	0.47	0.57
20	San Poil Arm (Transitional)	0.47	0.57
21	Meadow Creek	0.50	0.58
22	Jack Creek	0.47	0.57
23	Brush Creek	0.50	0.58
24	Iron Creek	0.47	0.57
25	Lower San Poil River (Meadow to Cache)	0.50	0.58
26	Louie Creek	0.50	0.58
27	Lower Bridge Creek (To Falls)	0.50	0.58
28	Middle Bridge Creek (Falls to HWY culvert)	0.50	0.58
29	Upper Bridge Creek (Above hwy culvert)	0.47	0.57
30	San Poil River 2 (Cache to 30-mile)	0.33	0.50
31	30-mile Creek	0.43	0.55
32	Lower South Namnankin (Inter.)	0.50	0.58
33	Upper South Namnankin (Peren.)	0.43	0.55
34	Lower North Namnankin (Inter.)	0.50	0.58
35	Middle North Namnankin (To S. Fork)	0.43	0.55
36	Upper North Namnankin (from S. Fork)	0.43	0.55
37	South Fork North Namnankin Creek	0.37	0.52
38	Lower Bear Creek (High Gradient)	0.37	0.52
39	Upper Bear Creek (Lower Gradient)	0.37	0.52
40	San Poil River 3 (30-mile to 23-mile)	0.33	0.50
41	Lower 23-mile Creek (To Falls)	0.33	0.42
42	Middle 23-mile Creek (High gradient)	0.25	0.38
43	Upper 23-mile Creek (Meadow)	0.33	0.42
44	Lower 21-mile Creek (To Falls)	0.20	0.35
45	Middle 21-mile Creek (High Gradient)	0.20	0.35
46	Upper 21-mile Creek (Meadow)	0.20	0.35
47	Lower 17-mile Creek	0.37	0.43



48	South Fork 17-mile Creek	0.20		0.35
49	Middle 17-mile Creek (Canyon)	0.37		0.43
50	Upper 17-mile Creek	0.33		0.42
51	San Poil River 4 (23-mile to West Fork)	0.30		0.40
52	West Fork San Poil Mouth to Gold Creek	0.33		0.42
53	Gold Creek Mouth to Strawberry Creek	0.37		0.43
54	Gold Creek (Strawberry to Gold Lake)	0.37		0.35
55	Strawberry Creek	0.43		0.38
56	Gold Lakes	0.42		0.38
57	Upper Gold Creek	0.37		0.35
58	Middle West Fork San Poil River	0.33		0.33
59	Lower Lost Creek (Canyon)	0.27		0.30
60	Middle Lost Creek (Meadow)	0.33		0.33
61	Looney Creek	0.25		0.29
62	Upper Lost Creek (From Haden Creek)	0.37		0.35
63	Lower Haden Creek	0.37		0.35
64	Upper Moses Creek (Meadow)	0.37		0.35
65	Haden Creek	0.37		0.35
66	Lower 13-mile Creek (High Gradient)	0.50		0.58
67	Upper 13-mile Creek (Lower Gradient)	0.50		0.58
68	San Poil River 5 (West Fork to 9-mile)	0.25		0.29
69	West Fork Granite Creek	0.33		0.50
70	S.E. San Poil (Frosty Creek)	-		0.25
71	N.W. San Poil (Cape Labelle Creek)	-		0.25

In general, artificial obstructions (for example, culverts) are prevalent throughout the Subbasin and identified as the main alteration to habitat for resident redband trout. Culverts are present at nearly every highway crossing between Keller and Republic creating numerous upstream fish passage barriers (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Barriers may have benefited redband trout populations by protecting them from indiscriminant historic stocking practices. Pure redband populations are mostly located above barriers, either natural or man-made. Therefore, caution should be used when removing barriers. Consideration of all the potential positive and negative effects of removing barriers needs to be adequately addressed before any action is taken. Removing a barrier that currently disconnects native redband and nonnative coastal rainbow trout populations may increase the likelihood of hybridization. In addition, habitat quality efforts throughout the San Poil Subbasin should attempt to address fine sediment inputs, floodplain connectivity, and degraded riparian habitats, which in turn would likely improve secondary items such as habitat diversity, temperature, flow, and channel stability.

Although Thirteen Mile Creek is favored for protection, this is most likely attributed to the watershed being located within a National Forest System roadless area that has experienced minimal impacts to the habitat. Although the physical habitat is regarded as high quality, productivity is considered relatively low and the redband trout population may already be at maximum carrying capacity (Tom Shuhda, Fish Biologist, Colville National Forest, personal communication, 2003). For these reasons, additional protection activities may not be necessary or justified. However, this may be a good location for testing the potential impacts of artificial nutrient enrichment within the San Poil Subbasin to determine if lost nutrients from extirpated salmon and steelhead stocks could enhance fish production.

Streams such as Bridge, Jack, Brush, Meadow, Twenty-three mile creeks and the West Fork of the San Poil River have known naturally producing and genetically pure populations of redband trout (John Arterburn, Fish Biologist, CCT, personal communication, 2003). These streams should be giving priority for both restoration and protection activities to keep with the Council's direction to build from areas of population strength. This makes good biological sense because although these reaches may be somewhat degraded, a small amount of restoration will likely produce greater benefits in areas were fish have been able to persist as opposed to areas were they have been extirpated. The genetic work to determine the distribution of pure redband trout has just started, but it is likely the known distribution of pure redband trout will expand. The CCT have discovered nine pure populations over the last two years on the Colville Reservation alone and five of these were located within the San Poil Subbasin.

38.3.4 Current Management

Rainbow trout can currently be harvested from non-Tribal areas in the San Poil Subbasin under WDFW regulations, with the San Poil River itself co-managed by the CCT. As of the 2003 statewide sportfish regulations, two trout with a minimum size of 8 inches can be harvested per day from rivers and five trout with no minimum size can be harvested from lakes outside of the Colville Indian Reservation (WDFW 2003). WDFW annually stocks the following lakes within the Subbasin to provide for a sport fishery: Ferry Lake 3,000 catchable size rainbow trout; Fish Lake 500 catchable size rainbow trout; Swan Lake 15,000 fry size rainbow trout.

Areas of the San Poil River including the lower five miles of the West Fork San Poil River, which flow through the Colville Indian reservation, are exclusively managed by the CCT. Management activities are designed to provide an annual subsistence and recreational adfluvial rainbow trout fishery that supports a relative abundance (catch per unit effort, CPUE) of one fish per hour or greater from February 1 to May 31 in the San Poil River. Tribal members enjoy a year-round fishing season on all lakes and streams except South Nanamkin, North Nanamkin, Iron, Bridge, Louie, Copper, and Thirty-mile creeks, which are closed from January 1 to May 31. This restriction is imposed to protect the spawning portion of the adfluvial rainbow trout populations. Tribal members daily catch, size, and possession limits are unrestricted, except for kokanee, where all wild kokanee must be released from August 15 to November 15 to protect spawning fish.

The San Poil River including the West Fork are open to non-Tribal member anglers from May 1 through October 31 and may retain 5 fish with no more than 1 exceeding 20 inches in length with a minimum length of 6 inches. All wild kokanee must be released and a walleye bag limit of 25 fish is allowed, although all angling must be done with artificial flies and lures only down stream to the full pool elevation (1,290 feet above mean sea level) of Lake Roosevelt.

The San Poil River including the West Fork upstream of 30-mile bridge to the reservations northern boundary fishing is catch and release only with artificial flies and lures with barbless hooks. The San Poil Arm of Lake Roosevelt is closed to non-Tribal member fishing from February 1 to May 31 upstream of French John's Lake at Manila

Creek, but follows state regulations for daily catch, size, and possession limits and is open to all anglers for the remainder of the year.

Lost Creek provides non-Tribal members the opportunity to fish from April 13 to October 31 and retain 5 fish, where no more than 1 may exceed 20 inches and no fish smaller than 6 inches may be kept. All other tributary streams are closed to non-member fishing year round. Gold Lake is stocked annually with 13,500 subcatchable eastern brook trout from the Colville Tribal Hatchery and is open to Tribal members only. Lost Creek is stocked annually with 825 catchable size triploid rainbow trout.

The Colville Tribal Hatchery Program has evaluated wild-breeding programs for native and adfluvial redband stocks. Unpredictable adult returns, and collection conditions (for example, high water flows) may limit the applicability of the program. Captive breeding programs are currently being developed at the Colville Tribal Hatchery with another program already in operation at Phalon Lake with fish reared at the WDFW Colville Hatchery. Once a captive breeding program for redband trout is established at the Colville Tribal Hatchery, up to 5,000 catchable redband trout may be stocked into the San Poil River along with an additional 1,000 into Lost Creek. In addition, other streams on the Colville Reservation may be considered for stocking to supplement resident populations. This program is addressed in the San Poil Subbasin Management Plan, in Section 40.

38.4 Focal Species – Chinook salmon

Though currently considered to be extirpated, Chinook salmon were selected as a focal species in the San Poil Subbasin because of their cultural importance to the CCT, their potential recreational value as a sport fish, and to be in alignment with the Councils program to reintroduce salmon where feasible. The mainstem San Poil River has no significant blockages and is accessible for virtually its entire length to migratory fish.

Chinook salmon are sometimes referred to as king, tyee, spring, and quinnat salmon. Chinook salmon are indigenous to the northern half of the Pacific Coast of North America (Meehan and Bjornn 1991), and are of great commercial and recreational importance within this area. Chinook salmon are most abundant in the large river systems, although they may be present in various sized rivers and streams. Although they have been stocked into many lakes and reservoirs throughout North America, they are usually not self-sustaining in these systems.

Chinook salmon display a great deal of variation in the timing of adult migration, juvenile migration, and spawning. One hundred eight stocks of Chinook salmon were identified in the State of Washington alone (Wydoski and Whitney 2003). Historically, Chinook salmon migrated to the headwaters of the Columbia River in Canada, but since the construction of Grand Coulee Dam and the subsequent construction of Chief Joseph Dam, their upstream terminus is river mile 545 (Wydoski and Whitney 2003).

38.4.1 Historic Status

Prior to hydroelectric development, Chinook salmon migrated as far inland up the Columbia River as British Columbia with estimates of as many as several million adults making annual migrations (Behnke 2002). Historically, the San Poil River sustained a large run of summer/fall Chinook salmon and provided a major spawning area within the Upper Columbia River basin (Meyers et al. 1998). Additional data suggest a race of spring Chinook may also have been present within the San Poil River due to historically available habitat (Thurow et al. 2000).

Chinook salmon have been previously stocked in the San Poil River. A total of 169,280 Chinook were stocked from two, out-of-basin sources. Approximately 94,391 Chinook salmon were stocked from the Chehalis River in 1975 and 74,889 were stocked from the Spring Creek National Fish Hatchery in 1977 (Meyers et al. 1998). Fish from both locations were considered to be from fall Chinook salmon stocks that are now considered part of the Upper Columbia summer/fall Chinook ESU. Minimal returns from these stocking activities caused this program to be discontinued. The results of this experiment were not surprising based on what is known about entrainment at Grand Coulee Dam and that these fish were from anadromous stocks. It is believed these fish migrated out of Lake Roosevelt and did not residualize in Lake Roosevelt. If fish migrated downstream, they were unable to return because no fish passage was available at Chief Joseph or Grand Coulee Dams.

38.4.2 Current Status

As previously mentioned, native Chinook salmon have been extirpated from the Upper Columbia River basin. Despite past stocking efforts, resident or adfluvial stocks of Chinook salmon have not been considered successful (Meyers et al. 1998). Stocks for past attempts were taken from anadromous stocks that likely entrained through Grand Coulee Dam and never returned (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Current trends in abundance and distribution of resident Chinook salmon above Chief Joseph and Grand Coulee dams are unknown but presumed to be minimal. Electrofishing and gillnet surveys on Lake Roosevelt observed only three Chinook salmon out of 3,590 fish collected over a three-month period in 1992 (Griffith and McDowell 1996). Genetic variation and diversity historically present within Chinook salmon stocks above Chief Joseph and Grand Coulee dams are presumed to have been lost.

Habitat assessment and reintroduction feasibility studies conducted by the CCT indicate that there is suitable spawning habitat for Chinook salmon in the San Poil Subbasin. These assessments provide information for where habitat improvement may be beneficial, but do not make any conclusions about the carrying capacity for Chinook salmon (John Arterburn, Fish Biologist, CCT, personal communication, 2003). Field observations indicate the entire San Poil River mainstem, West Fork of the San Poil River, and Gold Creek drainages have adequate water depth, velocity, and substrate that would make ideal spawning habitat for Chinook salmon according to specifications in Meehan (1991). The lower sections of Bridge, Twenty-one Mile, Twenty-three Mile, and Thirty Mile would likely support smaller spawning areas. All these areas are located

below any natural barriers or impediments (John Arterburn, Fish Biologist, CCT, personal communication, 2003).

38.4.3 Limiting Factors Chinook Salmon

The primary limiting factor for Chinook salmon in the San Poil Subbasin is the lack of fish passage facilities at both Chief Joseph and Grand Coulee dams. Any reintroduction program for anadromous stocks of Chinook salmon in the Subbasin would likely fail without some type of fish passage program at these dams. Efforts to introduce a naturalized resident population of Chinook salmon failed in 1977 and would likely fail again based on current knowledge of fish entrainment through Grand Coulee Dam. Suitable spawning and rearing habitat exists in the West Fork of the San Poil River and Gold Creek (Jerry Marco, Senior Fish Biologist, CCT, personal communication, 2004). Chinook salmon are currently listed as extirpated in the San Poil Subbasin. Efforts to restore habitat for other salmonid species would likely benefit freshwater Chinook habitat, however until the lack of fish passage on the mainstem Columbia River is addressed these benefits are academic. Because Chinook salmon have no current distribution in the San Poil Subbasin they were not analyzed using the QHA model. The historic distribution of Chinook habitats are considered to be all mainstem reaches in the San Poil and West Fork of the San Poil River, along with the lower reaches of major tributaries such as Gold, Bridge, and 23-mile creeks. Historical evidence indicates that Native American fishing sites existed along the San Poil River at the same times as the Kettle Falls fishery, therefore Chinook populations were likely sufficient to supply local subsistence needs.

38.4.4 Current Management

Chinook reintroduction studies, fish passage at Chief Joseph Dam, and building a hatchery for the Okanogan River are supported by the Upper Columbia United Tribes, NOAA Fisheries, USFWS, other agencies and local stakeholders, but until passage is obtained and anadromous fish are reintroduced little management is possible. Habitat improvement projects for resident salmonids should provide indirect benefits for Chinook.

Stocking of Chinook salmon only occurred in 1975 and 1977 with little success. Currently, no stocking occurs and no captive breeding programs operate within the San Poil Subbasin. Past attempts to develop a residualized population of Chinook within the Subbasin suggest that little progress can be made to recover Chinook prior to resolution of passage issues at Chief Joseph and Grand Coulee Dams. Although no programs are currently planned for reintroducing Chinook salmon to the San Poil Subbasin in the next 10 years, it is a long-term goal of all the Upper Columbia United Tribes to return native salmon to as much of their historic range as possible.

38.5 Focal Species – Kokanee salmon

Kokanee salmon were chosen as a focal species for the San Poil Subbasin based on their potential importance as a native species and an important component of the subsistence and recreational fishery in the Subbasin. The kokanee salmon occurring in the San Poil River are genetically unique and are important to the CCT.

The salmon *Oncorhynchus nerka* occurs in two forms: the anadromous sockeye salmon, and the nonanadromous or resident kokanee salmon. Kokanee are distributed from the Columbia River system in the South to northern Alaska (Meehan and Bjornn 1991). Kokanee are usually smaller than sockeye salmon, since adult rearing takes place in less productive lake environments rather than the productive Pacific Ocean.

Kokanee are fall spawners and may spawn in either tributaries to nursery lakes or within suitable habitat along the shores of lakes. Substrate composition, cover, water quality, and water quantity are important habitat elements for spawning kokanee salmon (Meehan and Bjornn 1991). Planktonic crustaceans are the primary food source for juvenile and adult kokanee salmon (Meehan and Bjornn 1991).

Kokanee are a very popular game fish because of their excellent taste. Native stocks of kokanee salmon within the Columbia River system may be important for the conservation and the possible future reintroduction of sockeye salmon, since stocks of kokanee salmon may contain genetic material from stocks of extirpated sockeye salmon.

38.5.1 Historic Status

Although it is not known if kokanee salmon were historically present in the San Poil Subbasin, there is evidence that sockeye salmon may have been historically present. There are anecdotal accounts of "silvers" (kokanee salmon locally referred to as silvers) being caught in Curlew Lake around 1909, although documented stocking of kokanee in the region didn't occur until the 1930s. Curlew Lake was still connected to the San Poil River during the early 1900s, thus sockeye salmon migrating up the San Poil River to Curlew Lake is one possibility of the "silvers" that were caught in Curlew Lake. Sockeye and kokanee salmon are the same species with different life history strategies, thus could easily be mistaken for one another.

38.5.2 Current Status

Recent genetics testing of kokanee salmon in Lake Roosevelt identified the San Poil River kokanee salmon as a unique stock (Loxterman and Young 2003). Since these fish are genetically distinct from other hatchery origin stocks that occur in Lake Roosevelt, it is hypothesized that the San Poil River kokanee salmon are possibly of native origin. In addition to being genetically distinct, the San Poil River kokanee salmon are phenotypically different than other stocks of kokanee salmon occurring in Lake Roosevelt (Loxterman and Young 2003). San Poil River kokanee salmon reach larger sizes than other stocks in Lake Roosevelt, which also makes them the preferred stock for subsistence and recreational harvest (John Arterburn, Fish Biologist, CCT, personal communication, 2003). The San Poil River kokanee salmon are self-reproducing and may be locally adapted to the conditions in the Subbasin, unlike the hatchery origin kokanee that are stocked into Lake Roosevelt. Although it is known that San Poil River kokanee salmon are naturally reproducing and contribute to the fishery of Lake Roosevelt, it is not well understood to the extent that they contribute to the fishery. In addition, the spawning location and timing of these fish in the San Poil River is still not well understood.

38.5.3 Limiting Factors Kokanee Salmon

Kokanee are a lake species that utilize riverine habitat for spawning and rearing, thus were included in the QHA approach to identify potential limiting factors to the life stage, spawning and incubation. Details of the QHA process are provided in Section 3.

Kokanee are currently present in 17 of the 69 delineated watersheds and reaches within the Subbasin. Historically, only 15 areas were identified to host kokanee and included in comparison of current to past habitat conditions. Kokanee were not historically present in Lambert and Trout Creek, thus these areas were excluded from this portion of the analysis. In addition, kokanee were considered historically present in Lower Manila Creek (to the falls), but are not currently present.

The areas that received the highest ranks for habitat modification are randomly distributed in the southern arm of the San Poil Subbasin. The habitat attributes that deviated the most from reference conditions included new obstructions, a change in the low flow regime, and an increase in fine sediment (Table 38.10).

The highest ranked areas for protection are concentrated in the mid-region of the San Poil Subbasin (Table 38.11). However, habitat improvements in the upper part of the watershed would have little benefit for kokanee salmon if issues related to passage or low flow are not addressed downstream of these areas first.

Table 38.10. Ranking of reaches with the largest deviation from the reference habitat conditions for kokanee in the San Poil Subbasin. A reach rank equal to 1 has the greatest deviation from reference condition in comparison to other reaches. Reach scores range from 0 to 1, with 1 having the greatest deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute having the greatest deviation from reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes equally deviate the most from the reference.

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
31	30-mile Creek	1	0.2	9	8	3	3	5	2	10	5	7	10	1
27	Lower Bridge Creek (To Falls)	2	0.2	7	8	5	2	9	3	10	6	4	10	1
18	Lower Manila Creek (To Falls)	3	0.2	7	6	2	3	3	1	9	10	3	11	7
53	Gold Creek Mouth to Strawberry Creek	4	0.2	5	9	5	5	2	1	11	4	8	10	3
17	Mouth to Manila creek	5	0.2	2	6	2	1	8	8	5	8	4	7	8
20	San Poil Arm (Transitional)	6	0.2	3	4	2	1	8	8	6	8	4	7	8
59	Lower Lost Creek (Canyon)	7	0.2	4	8	6	5	9	3	11	2	6	10	1
58	Middle West Fork San Poil River	8	0.2	4	6	6	4	9	2	9	3	8	9	1
25	Lower San Poil River (Meadow to Cache)	9	0.1	2	6	4	1	8	7	8	5	2	8	8
30	San Poil River 2 (Cache to 30-mile)	10	0.1	4	6	3	1	8	7	8	5	2	8	8
52	West Fork San Poil Mouth to Gold Creek	11	0.1	4	7	7	6	9	1	9	3	5	9	1
40	San Poil River 3 (30-mile to 23-mile)	12	0.1	6	5	3	1	8	7	8	4	2	8	8
41	Lower 23-mile Creek (To Falls)	13	0.1	3	5	6	2	7	1	8	8	4	8	8
44	Lower 21-mile Creek (To Falls)	14	0.1	5	4	5	2	7	1	8	8	3	8	8
51	San Poil River 4 (23-mile to West Fork)	15	0.1	6	5	2	1	8	7	8	2	2	8	8

Table 38.11. Ranking of streams whose habitat is most similar to the reference condition for kokanee in the San Poil Subbasin in comparison to other reaches. A reach rank equal to 1 reveals the reach with current conditions most similar to reference conditions in comparison to other reaches. Reach score ranges from 0 to -1, with -1 having the least deviation from reference. Values associated with each habitat attribute range from 1 to 11, a value of 1 indicates a habitat attribute being most similar to the reference compared to the other attributes within that reach. In some cases multiple habitat attributes have a value of 1 indicating all attributes are equally the most similar to the reference.

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
51	San Poil River 4 (23-mile to West Fork)	1	-0.55	9	10	11	8	1	3	4	6	6	4	1
44	Lower 21-mile Creek (To Falls)	2	-0.54	9	11	9	7	2	3	4	6	8	4	1
41	Lower 23-mile Creek (To Falls)	3	-0.54	11	10	9	7	2	3	4	6	8	4	1
40	San Poil River 3 (30-mile to 23-mile)	4	-0.53	8	10	11	7	1	3	4	6	8	4	1
52	West Fork San Poil Mouth to Gold Creek	5	-0.53	11	9	9	6	1	2	4	8	7	4	2
16	N Fk /Main Trout Ck	6	-0.50	9	9	9	8	1	1	4	5	5	5	1
58	Middle West Fork San Poil River	7	-0.48	11	8	8	5	1	2	3	7	6	3	8
17	Mouth to Manila creek	8	-0.47	9	5	9	9	1	1	6	4	7	8	1
59	Lower Lost Creek (Canyon)	9	-0.46	11	8	9	5	1	2	3	10	7	4	5
20	San Poil Arm (Transitional)	10	-0.46	10	8	11	9	1	1	5	4	6	7	1
53	Gold Creek Mouth to Strawberry Creek	11	-0.44	10	9	10	5	4	7	2	8	6	3	1
31	30-mile Creek	12	-0.42	8	9	10	5	1	4	2	7	6	2	11
15	West Fork Trout Ck	13	-0.38	8	8	11	8	1	3	3	6	7	3	1
25	Lower San Poil River (Meadow to Cache)	14	-0.37	7	7	7	7	1	3	4	5	6	7	1
30	San Poil River 2 (Cache to 30-mile)	14	-0.37	7	7	7	7	1	3	4	5	6	7	1

Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
27	Lower Bridge Creek (To Falls)	**16**	-0.27	7	7	7	7	1	2	3	4	5	7	5
14	Lambert	**17**	-0.12	6	6	5	6	6	6	2	3	4	6	1

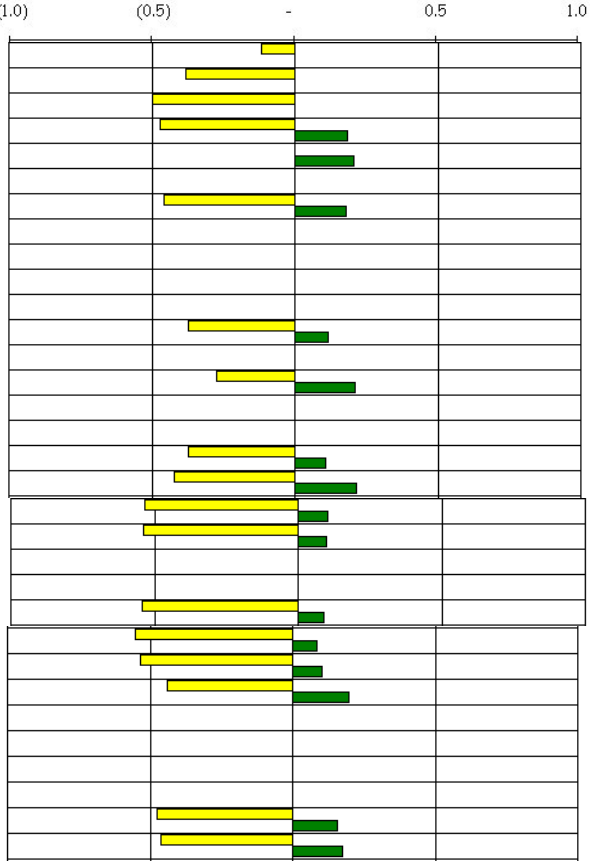
The tornado diagram (Table 38.12) and maps (Map SP-5, Map SP-6, located at the end of Section 38) present the reach scores for both current habitat condition (ranging from zero to positive one, Map SP-5) and protection (ranging from zero to negative one, Map SP-6). Scores closest to negative one depict reaches that are most representative of reference habitat conditions. Scores closest to positive one depict reaches with habitat conditions least similar to reference conditions.

Confidence scores range from zero to one and are associated with the ratings assigned by local biologists based on documentation or their expert opinion regarding reference and current habitat attributes for each reach. Based upon the data collected during the QHA analysis, it is important to understand that most model outputs are only as good as the data that is entered into them. Data that is lacking or inaccurate is likely to produce erroneous results. Within the San Poil Subbasin some data were lacking. Although data were lacking for certain reaches, the best judgment of the technical team was used to fill in data gaps. Therefore, the results of QHA may be subjective. Confidence scores for protection ratings in the inundated reaches of the San Poil River, Manila Creek, and Lower Bridge Creek were the only reaches where sufficient confidence in the data existed to produce reliable results. Confidence results identified a complete lack of data about the habitat in the Lower Lost Creek Canyon, Middle West fork San Poil River, and Lower 21-mile Creek reaches. Some data gaps existed for all other reaches. Consequently, anyone attempting to utilize the QHA assessment for making substantive decisions should do so with caution. In most cases the data used for current habitat conditions was regarded as having higher confidence than data used in historic habitat ratings. A large proportion of the data used in the historic habitat ratings were from expert opinion due to a lack of quantifiable historical information. Although the lack of historical data limits the QHA models use in some reaches within the San Poil Subbasin, this problem is not exclusive to the San Poil Subbasin, since many habitat-altering practices occurred before formal monitoring of water bodies was routinely practiced.

Table 38.12. Tornado diagram for kokanee salmon in the San Poil Subbasin. Degree of confidence for protection and current habitat conditions range from 0.0 to 1.0 with the greatest confidence equal to 1.0. Protection reach scores are presented on the left side and current habitat reach scores are presented on the right. Negative scores are in parentheses.

NP = Not present

Sequence	Reach Name	Protection Confidence	Current Habitat Confidence
14	Lambert	NP	
15	West Fork Trout Ck	NP	
16	N Fk /Main Trout Ck	NP	
17	Mouth to Manila creek	0.47	0.40
18	Lower Manila Creek (To Falls)	0.47	0.40
19	Upper Manila Creek (above Falls)	NP	
20	San Poil Arm (Transitional)	0.47	0.40
21	Meadow Creek	NP	
22	Jack Creek	NP	
23	Brush Creek	NP	
24	Iron Creek	NP	
25	Lower San Poil River (Meadow to Cache)	0.50	0.42
26	Louie Creek	NP	
27	Lower Bridge Creek (To Falls)	0.50	0.42
28	Middle Bridge Creek (Falls to HWY culvert)	NP	
29	Upper Bridge Creek (Above hwy culvert)	NP	
30	San Poil River 2 (Cache to 30-mile)	0.33	0.33
31	30-mile Creek	0.43	0.38
40	San Poil River 3 (30-mile to 23-mile)	0.33	0.33
41	Lower 23-mile Creek (To Falls)	0.33	0.25
42	Middle 23-mile Creek (High gradient)	NP	
43	Upper 23-mile Creek (Meadow)	NP	
44	Lower 21-mile Creek (To Falls)	0.20	0.18
51	San Poil River 4 (23-mile to West Fork)	0.30	0.23
52	West Fork San Poil Mouth to Gold Creek	0.33	0.25
53	Gold Creek Mouth to Strawberry Creek	0.37	0.27
54	Gold Creek (Strawberry to Gold Lake)	NP	
55	Strawberry Creek	NP	
56	Gold Lakes	NP	
57	Upper Gold Creek	NP	
58	Middle West Fork San Poil River	0.33	0.17
59	Lower Lost Creek (Canyon)	0.27	0.13



A genetic study conducted by WDFW (Loxterman and Young 2003) concluded that the San Poil kokanee stock is most closely related to the Lake Roosevelt and Nespelem River stocks. Therefore, protecting habitats where wild kokanee salmon spawn is critical to retaining long-term benefits of this fishery within Lake Roosevelt. However, little information presently exists about the location and timing of kokanee spawning areas. Information about juvenile rearing within the San Poil Subbasin and the timing of outmigration is not clearly understood. Impacts on wild fish from nonnative predators are known to occur, but the impacts have never been quantified nor have specific management activities been utilized to reduce the impacts. Another alternative to wild kokanee production is to implement artificial production of this locally adapted stock. Artificial production could be used to restore depressed wild stocks that are currently in jeopardy from angler harvest and hybridization with nonnative stocks from current

hatchery programs for Lake Roosevelt. Other ways to increase wild kokanee production might include creating spawning channels or acclimation sites to enhance wild fish returns.

38.5.4 Current Management

Efforts to understand the origin, general biology, life history, and distribution of San Poil River kokanee salmon are continuing. It is thought that if San Poil River kokanee salmon are a locally adapted form of sockeye salmon that are non-anadromous due to the lack of fish passage facilities at Grand Coulee Dam, then these fish could benefit the current artificial propagation programs in the province. Using San Poil River kokanee salmon for a brood stock may increase the return to the recreational creel and increase natural reproduction in the tributaries to Lake Roosevelt (John Arterburn, Fish Biologist, CCT, personal communication). Much more information is needed to better understand the San Poil River kokanee salmon and their relationship to other stocks of kokanee in the Province.

38.6 Environmental Conditions

38.6.1 San Poil River and Tributaries

The absence of marine-derived nutrients from anadromous fish has impacted the entire ecosystem from primary producers, to tertiary aquatic consumers, and many terrestrial predators. Exacerbating the biological habitat degradations, physical habitats have been severely impacted as a consequence of various land use activities including agriculture, grazing, logging, mining, and urban development. Many riverine habitats exhibit unstable banks, poor riparian communities, high summer temperatures, high substrate embeddedness, icing, low productivity, and intermittent flows. Those tributary reaches in good condition characteristically lack access for livestock or vehicles within the riparian area, tend to have high gradients, and are often low in productivity, thus produce few fish (Tom Shuhda, Fish Biologist, Colville National Forest, personal communication, 2003).

An estimated 5 to 10 percent of streams on the Colville Indian Reservation have experienced an increase in nutrient and sediment loading from runoff and erosion, contamination from agrochemicals, and loss of riparian vegetation as a result of agricultural activities (CCT 2000). Nearly all the streams within areas managed for timber harvest on the Colville Indian Reservation have been impacted by road construction, improper drainage structures, erosion, and culverts serving as fish barriers (CCT 2000).

About half of the stream and riparian areas on the Colville Indian Reservation are classified as severely impacted. This classification means less than 50 percent of the potential riparian vegetation is present and fines constitute more than 50 percent of the stream substrate (CCT 2000). Another 25 percent of the aquatic habitat is moderately impacted with 40 percent of the potential riparian vegetation present and 40 percent fines in the stream (CCT 2000).

Tributary habitats in the Colville National Forest range from poor to good depending upon the past and present level of activities within the region. In general, where habitat is

poor to fair, road densities are high and many roads are located within the riparian areas. Stream habitat is degraded where the riparian habitat is easily accessible to livestock, and in many cases, the vegetation is overgrazed. Specifically, reaches of these tributaries in poor to fair condition have low numbers of pools, large in-stream wood, and high embeddedness of the streambed substrate decreasing the amount of spawning and rearing habitat (Tom Shuhda, Fish Biologist, Colville National Forest, personal communication, 2003).

The San Poil Subbasin has a high watershed sensitivity rating meaning that this area has little resiliency or physical stability to absorb anthropogenic impacts (CCT 2000). The CCT have established a goal for road densities of less than 3 miles of road per square mile but some areas currently contain road densities 5 to10 times this value. Road erosion is often the leading contributor to high sediment loads in streams (Waters 1995). Road erosion issues are compounded by highly erosive soils that make up most of the San Poil Subbasin (Furniss et al. 1991).

Six tributaries of the San Poil River were inventoried for habitat conditions between 1991 and 1999 (Jones 2000; Boyce et al. 1998). Although results are derived from only six tributaries, they are assumed to represent conditions throughout the watershed. Substrate composition of the streams consisted of 15 percent sand, 42 percent gravel, 31 percent cobble, 10.1 percent boulder, and less than 1 percent bedrock. The six streams inventoried collectively had a pool to riffle ratio of 0.23:1. Hunter (1991) suggested that pool to riffle ratios representing ideal salmonid habitat should range from 0.4 to 1.5:1. Thus, pool to riffle ratios in this area are below ideal salmonid habitat according to Hunter et al. (1991).

Successful natural reproduction by native or nonnative species is closely linked to habitat conditions especially the amount of fine sediment present (Meehan 1991, Waters 1995). Field data only provide a snap shot in time but conditions across the San Poil Subbasin reflect high embeddedness and abundant fine sediments (CCT unpublished field data). Ariel photographs since 1946 show a steady increase of sand accumulating along the course of the San Poil River providing considerable evidence that the river is overloaded with sediment. Fine sediments are likely limiting production in the San Poil Subbasin with salmonid species being more susceptible to impacts from fine sediments than many other fish species (Bjornn and Reiser 1991)

38.6.2 Lakes

Gold Lake is a small cold-water lake located in Okanogan County at T33N, R31E, Section 9N and 9P in the Gold Creek drainage within the San Poil Subbasin. The perennial inlet is unnamed and flows into the west lake basin. The outlet drains the eastern lake basin and is the origination point for Gold Creek, which flows to the San Poil River. The dominant substrate is sand and gravels. Zooplankton communities are dominated by rotifers with only a few large cladocerans (*Daphnia spp.*) present. *Chara globularis*, *Nuphar polysepalum* and *Potamogeton gramineus* are the conspicuous macrophytes. Some *Typha spp*. are present at the marshy west end of the lake. This lake was one of the original three lakes set aside strictly for Tribal member use. The CCT

maintains a picnic area, campground, toilets, boat launch, and dock at this lake. The surrounding terrain is comprised of steep canyons and most of the vegetation is western larch and Douglas fir.

Bridgelip suckers, brook trout, and westslope cutthroat trout are known to exist in Gold Lake. In addition, black spot disease is known to be present in the system. Recent Tribal member accounts of fishing at Gold Lake indicate that westslope cutthroat appear to be in better condition than brook trout. For the last several years, only brook trout were stocked indicating that some natural reproduction of westslope cutthroat is occurring in this system. Gold Lake is biannually stocked with brook trout for the purpose of providing a subsistence fishery for the CCT. The westslope cutthroat trout population is occasionally supplemented by Lake Chelan hatchery stock, which are considered to be genetically pure westslope cutthroat trout. The stocking of westslope cutthroat trout into Gold Lake occurs at most once out of every five years. (John Arterburn, Fish Biologist, CCT, personal communication, 2003) Few westslope cutthroat trout have been collected downstream of Gold Lake, but the population has persisted for a long time. Downstream impacts from brook trout stocking is thought to be minimal as brook trout are already common and naturally reproducing throughout the San Poil River watershed.

Cody Lake is a small cold-water lake located in Ferry County at T33N, R33E, Section 23-Q/R in the Twenty-three Mile Creek drainage within the San Poil Subbasin. This lake is spring fed from the north and has one small pocket of deep water. A beaver dam has raised the lake level about 2 feet, inundating many of the trees that historically surrounded this lake. Cody Lake currently does not contain a sport fishery due to natural poor water quality conditions insufficient to maintain a salmonid fishery throughout the year.

38.6.3 Out-of-Subbasin Effects and Assumptions

The function and structure of the aquatic ecosystem within the San Poil Subbasin has been permanently altered as a consequence of the construction of Grand Coulee and Chief Joseph dams, which are outside the Subbasin. The dams, which lack fish passage facilities, have extirpated anadromous salmonids from the San Poil Subbasin and eliminated habitat for different life stages (spawning, rearing, migration) of native salmonids. Inundating the lower 12 miles of the San Poil River has permanently transformed the historic hydrograph from a free flowing riverine system inhabited by native, cold-water fishes to a lacustrine system (Lake Roosevelt) inhabited by nonnative trout and warmwater fishes. The warm-water species in Lake Roosevelt compete with and prey upon native species (Thatcher et al. 1992) and raise concerns about introgression and genetic integrity. Young adfluvial trout migrating from the San Poil River into Lake Roosevelt during the spring must pass a gauntlet of introduced piscivores (for example, smallmouth bass, walleye) that exploit this annual resource although the exact extent is unknown (John Arterburn, Chris Fisher and Chuck Jones, CCT, personal communication, 2003).

38.7 Limiting Factors and Conditions

38.7.1 Physical Habitat Alterations/Limiting Habitat Attributes

QHA was utilized to compare historic versus current physical stream conditions with respect to 11 habitat attributes. Details of the analysis method are provided in Section 3. QHA model does not determine which habitat attributes are most biologically limiting, but does identify which physical attributes have undergone the greatest deviation from the reference stream/reach condition. These results, coupled with knowledge of local biologists and biological status and interactions of the focal species, can assist in identifying key limiting factors. This section provides QHA results on a Subbasin level for the San Poil Subbasin. Results specific to each focal species are discussed in each focal species section.

Currently the San Poil Subbasin is a mosaic of pristine and degraded habitats. Historically the entire Subbasin offered high-quality habitat for a number of salmonid species. Reference conditions in the entire Subbasin were considered optimal with the exception of one reach, upper Ninemile Creek having an obstruction present historically, thus received a less than optimal rating in the reference condition. Today habitat degradation results from localized activity rather than system-wide impacts, where a given stream may have only certain segments that are degraded. Anthropogenic impacts from timber harvest, the clearing of riparian areas for pasture, or the production of hay, have impacted certain areas more than others. Stream obstructions, cleared or degraded riparian areas, and fine sediment issues are consistent throughout the Subbasin. Flow issues have been exacerbated by forest management, water diversions, and climatic conditions, and have resulted in oxygen, temperature, and obstruction issues. Decreased channel stability from cleared riparian areas, and high road densities combine to create most of the fine sediment issues. Although the source of many habitat problems within the San Poil Subbasin are localized, their impacts are often distributed downstream so headwater habitat restoration work can have synergistic benefits, even though the accumulated impacts are most noticeable along the mainstem San Poil River.

Using the QHA model, habitat conditions were qualitatively analyzed where redband (adfluvial and resident) trout and kokanee salmon were historically and are currently present. Most regions were delineated into smaller watersheds with the exception of a few river reaches (Ninemile, Trout, and O'Brien creeks and the South and North Forks of the San Poil River) delineated in the northeastern corner of the Subbasin (Map SP-7, located at the end of Section 38).

The habitat parameters with the greatest deviation from reference conditions vary by species and are presented in Table 38.13. This table should be interpreted as an indication of the types of habitat parameters that are problematic for the focal species in the Subbasin as a whole. Some reaches had more than one habitat parameter ranked as being equally deviant from the reference, hence the number of reaches listed adds up to more than the total number of reaches ranked. Most reaches had more than one habitat parameter that is currently ranked less than the reference. Table 38.13 only lists those habitat parameters that had the greatest deviation from reference, not all the parameters that could be less than optimal.

Table 38.13. Habitat conditions with the greatest deviation from reference conditions as presented in the QHA model output for each focal species in San Poil Subbasin. In parentheses are the number of reaches or watersheds with the particular habitat attribute exhibiting the largest deviation within that area.

Adfluvial Redband Trout (41)	Resdient Redband Trout (68)	Kokanee (15)
Low Flow (15)	Obstructions (28)	Fine Sediment (6)
Obstructions (11)	Riparian Conditions (22)	Low Flow (5)
High Flow (10)	Habitat Diversity (21)	Obstructions (5)
Habitat Diversity (7)	Low Flow (10)	
Fine Sediment (6)	Channel Stability (8)	
Riparian Condition (5)	Fine Sediment (5)	
High Temperature (1)	High Temperature (6)	
	Low Temperature (4)	
	Oxygen (3)	

38.7.2 San Poil River and Tributaries

The major limiting factors within the San Poil Subbasin include barriers to fish migration, habitat degradation, and impacts from nonnative species.

The presence of Chief Joseph and Grand Coulee dams, of which both lack fish passage, has prevented upriver migration, negatively impacts downriver migration, and reduces the biological productivity in the system. Many resident fish emigrating downstream during smoltification are entrained and are thus unable to return to the San Poil Subbasin for spawning (LeClair 1999). Additionally, the absence of marine-derived nutrients from lost anadromous fish and the associated decreased productivity is likely limiting resident salmonid production (Hicks et al. 1991).

Other barriers within the Subbasin such as culverts also impede resident fish migration. (Jones 2000; LeCaire and Peone 1991) The Lake Roosevelt Habitat Improvement Project (LRHI) and Washington Department of Transportation (WDOT) survey of state roads in 1997 examined migration barriers and determined that blockages from improperly installed culverts were limiting fish production, particularly migratory redband/rainbow trout. Major barriers exist along State highway 21 effectively blocking most westside streams to most fish migration except for the West Fork of the San Poil River where a bridge exists, and both North and South Nanamkin creeks where CCT replaced many impassible culverts using BPA funds.

In addition, habitat degradation from anthropogenic activities have directly and indirectly impacted aquatic habitat in the San Poil River and its tributaries. This degradation has resulted in elevated water temperatures, embedded substrate, increased width to depth ratios, and reduced habitat complexity (Jones 2000). The degraded fluvial habitat conditions limit native salmonid populations.

For a more detailed analysis of specific limiting habitat factors in the San Poil Subbasin see sections on focal species where limiting factors based on QHA results and key findings for each focal species are discussed.

38.7.3 Lakes

Gold Lake has limited spawning habitat suitable for salmonid fishes, although some reproduction is currently occurring the extent is unknown. High summer water temperatures are most likely limiting this fishery. Historically high stocking rates of brook trout may be limiting individual fish growth for both westslope cutthroat trout and brook trout. The Colville Confederated Tribes (CCT) are currently evaluating stocking strategies in Gold Lake for the future.

Cody Lake contains no suitable spawning habitat for salmonids so any cold-water fisheries management actions will most likely require annual stocking. The lack of flushing flows, high biological oxygen demand, and high summer water temperatures all make future fisheries management unlikely in its present state. CCT is recommending adding a lake aerator to Cody Lake, which may alleviate its limiting factors during the summer months, and may allow a put and take fishery for the future.

38.7.4 Description of Historic Factors Leading to Decline of Focal Species

Construction of Chief Joseph and Grand Coulee dams blocked passage for the historically large runs of spring and summer/fall Chinook, steelhead, other anadromous fishes, and resident fish that historically migrated to and from the San Poil River. The loss of anadromous fish has irrevocably altered the ecosystem and changed the social/economic systems of those inhabiting the San Poil Subbasin. For more detail regarding the impacts to Chinook salmon refer to Section 38.4.

Resident fish species were also impacted through habitat alteration (inundation), lost productivity (absence of nutrient component attributable to anadromous fish), habitat degradation relating to land-use practices (agriculture, grazing, logging and municipal development) and altered aquatic communities (exotic introductions).

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39 San Poil Subbasin Inventory of Existing Programs – Aquatic

39.1 Current Management Directions

Within the San Poil Subbasin, fish and wildlife resources are co-managed by the Washington Department of Fish and Wildlife (WDFW) and the Colville Confederated Tribes (CCT) outside of the boundaries of the Colville Indian Reservation and exclusively by the CCT within the boundaries of the reservation. The current management direction is to maintain viable populations (numbers and distribution of reproductive individuals) of native and desired nonnative species of fish and wildlife, and their supporting habitats, while providing sufficient numbers to meet the cultural, subsistence and recreational needs. A complete list of state, federal, and Tribal entities that are involved in management of fish and wildlife or their habitats is included in section 2.4.1, along with a description of the agency's management direction.

39.1.1 Local Government

39.1.1.1 Ferry Conservation District (FCD)

FCD is involved in several partnership efforts from individuals and agencies, to school districts and tribes. As a political subdivision of Washington State government (under the umbrella of the Washington State Conservation Commission), the FCD serves the public in a manner that best provides for the interest and management of natural resources and environmental protection. As the last non-regulatory entity left in the State of Washington, it provides service to individuals, associations, local government, etc. in a neutral manner that promotes being proactive in the planning and management for natural resources.

Though only receiving approximately $9,700 a year from the Conservation Commission for basic funding, FCD has sought out and applied moneys to the planning and implementation that improves and enhances water quality, as well as fish and wildlife-habitat. FCD was the first in the northwest to use DNA microbial source sampling as a tool to identify problems and problem areas, to start focusing project dollars where the money can do the most good and return the most benefit-to-dollar ratio. The shade and water temperature studies have produced valuable data that are now being used by the United States Forest Service (USFS) and Washington State Department of Ecology (WDOE) to implement TMDL programs throughout northeastern Washington. The District is involved in the partnership efforts with WDOE TMDL projects in three different counties so far, and is contributing equipment and manpower towards these efforts at no charge.

FCD currently is receiving grants from Washington Conservation Commission, WDOE, National Fish and Wildlife Foundation, EPA, and the USFS. Recent grants from the WDOE will fund the Headwaters of the San Poil (HOSP) project to implement projects for landowners, the USFS, Ferry County, Washington State Department of Transportation, and the CCT in the headwaters and mainstem of the San Poil River.

FCD's primary priorities are to reduce the problems associated with EPA 303(d) listed streams to improve water quality. The District implements Best Management Practices (BMPs) that also improve fish and wildlife-habitat.

FCD is currently applying for two more Centennial Clean Water Funded Grants from WDOE. One is to focus on fecal coliform problems and solutions (and other water quality standards) with implementation projects throughout Ferry County. The other is to team with the Forest Service, who has received funding to do an environmental analysis on the proposed action of removing Growden Dam on Sherman Creek in the Upper Columbia Subbasin.

FCD participates in many local and regional planning efforts. The District has also been quite involved in local Water Resource Inventory Area (WRIA) processes and plans on pursuing the Lead Entity on the San Poil WRIA (52). The District's involvement in these planning processes, attendance at local association meetings, starting watershed planning groups, and other stakeholder functions, will keep the District aware of the current resource management concerns.

FCD staff are involved on State Natural Resource committees and associations to assist others with natural resource concerns, and to secure additional funding for the implementation of those solutions. In addition, FCD serves on a three-county Local Working Group to assist the Natural Resource Conservation Service (NRCS) in the selection and implementation of the Environmental Quality and Incentives Program (EQIP) to allocate funding from the U.S. Farm Bill.

As FCD teams with many agencies, often as the liaison between all the partners, it plans to have the same kinds of past success to help landowners and agencies become and/or stay proactive in their efforts to improve and protect their resources. The primary function is providing cost-share incentives for projects, and educating the general public about the need for natural resource protection and environmental enhancement. This is a part of the management strategies for the future.

Ferry County Codes. Nine codes or parts of codes may affect fish and wildlife. Most are urban planning/land use.

Okanogan County http://www.okanogancounty.org. Ten codes or parts of codes may affect fish and wildlife. Most are urban planning/land use.

39.2 Existing and Imminent Protections

Currently, bull trout are the only federally listed fish species within the San Poil Subbasin. However, it is presumed the distribution of bull trout is not widespread within the Subbasin. Habitat within the Subbasin has not been determined to be within the critical bull trout habitat area as outlined by the United States Fish and Wildlife Service (USFWS) (USFWS 2002). The USFWS reviewed the status of westslope cutthroat trout in 2003 and found that listing under the Endangered Species Act was not currently warranted (Federal Register 2003). Other fish candidates for potential listing may include

redband trout due to hybridization with introduced stocks of rainbow trout and white sturgeon because of a lack of juvenile recruitment and suitable spawning habitat within Lake Roosevelt.

39.3 Inventory of Recent Restoration and Conservation Projects

The two management agencies (WDFW and the CCT) with fisheries management responsibility within the Subbasin have initiated projects through the Northwest Power and Conservation Council's Fish and Wildlife Program. These projects were created to partially mitigate for the loss of anadromous fish due to the creation of the federal hydropower system utilizing native fish restoration and resident fish substitution.

The following BPA funded projects have enhanced the resident fishery (both native and nonnative) in the San Poil Subbasin:

- Habitat/passage improvements – Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project, #9001800.
    - Implements habitat restoration and passage improvements to streams entering Lake Roosevelt.
    - Monitors and evaluates the effect of these improvements
    - Native fish restoration and RM&E activities on streams
- Artificial production enhancement activities – Colville Tribal Fish Hatchery, #8503800
    - Provides hatchery production for lakes and streams on the Colville Reservation (Mostly outside of the San Poil subbasin).
    - Monitors and evaluates hatchery activities.
    - Resident Fish substitution and RM&E activities on lakes.

The following information provides a more detailed description of the primary BPA funded project (#9001800) and non-BPA funded projects within the San Poil Subbasin.

39.3.1 BPA Funded Project

Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project (LRHIP) (#9001800)

The goal of the project is to contribute to subsistence and recreational fisheries by protecting and enhancing the production of adfluvial rainbow trout populations through improvement to fish passage and in-stream habitat in tributaries to Lake Roosevelt. Twenty-seven streams were examined during 1990-1991 to assess fish habitat, fish population estimates, and potential limiting factors to adfluvial rainbow trout production. Five (5) streams were selected, four (4) on the San Poil River and the fifth, Blue Creek, was on the Spokane Reservation in the Upper Columbia Subbasin for planning implementation of passage/habitat improvements based upon presence of adfluvial rainbow trout, limiting factors, and potential for improved production. Design and implementation of habitat and passage improvement actions on the four selected streams in the San Poil Subbasin began in 1992 and continued through 1995. Implementation actions affected 20.9 miles of stream course. Specific actions included reinstallation of six culverts, 500 meters of channel reconstruction (meanders) installed in previously

channeled stream courses and installation of 125 in-stream structures to improve passage and improve rearing habitat. Riparian improvements included placing 14,500 riparian plants/shrubs/trees and livestock exclusion fence along 4.5 miles of stream course. Habitat quantity was increased by 11 percent through passage improvement alone.

Activities since 2001 have focused on the restoration of fish habitat conditions in Lower Bridge Creek, an important tributary to the San Poil River in Ferry County, Washington. Previous and current land use activities (deforestation, road building, agriculture activities, quarrying, etc.) within the Bridge Creek watershed have significantly altered hydrologic, hydraulic and sediment transfer processes. These actions have greatly impaired in-channel habitat conditions in the lower portions of the creek, affecting its ability to support spawning and rearing of adfluvial rainbow trout of the San Poil River system. Agriculture and grazing have had the greatest impact on Bridge Creek. Grazing has significantly contributed to the loss of vegetation along the riparian areas. Channelization has impaired the lowermost portion of the restoration segment, and bank erosion upstream has increased the width-to-depth ratio upstream. Both of these factors have limited pool habitat significantly and prevented a stable riparian zone from becoming established along much of the restoration reach. Rainbow trout of the San Poil River system are a culturally important resource to the CCT, and tributary spawning habitat for this stock is limited in the San Poil watershed. Thus the lower reaches of Bridge Creek have been identified for potential restoration of spawning habitat for rainbow trout. The CCT has two restoration objectives for Bridge Creek: (1) create a dependable and unobstructed access from the San Poil River to Bridge Creek, and (2) restore stable and suitable spawning habitat for adfluvial rainbow trout. The design for stabilization has been completed with implementation beginning in December 2003.

Associated Monitoring and Accomplishments:
An important component of the LRHIP is the pre- and post-implementation juvenile and adult trapping, electro-shocking population estimates, horizontal surveys and habitat surveys are conducted for two years before and after implementation. Long term monitoring of all locations where improvements have been done has been initiated using a rotational monitoring system similar to EMAP. Monitoring is to be done each year for current status with general trend monitoring of all watersheds. Pre-implementation surveys, trapping, and electro-shocking has been completed on Bridge Creek. A landowner agreement for protection of improvements was signed and a categorical exclusion was received from BPA and the CCT following public review, inter-disciplinary review, approval of all required Tribal permits, and approval of the report on the archaeological survey with shovel tests by the Tribal Historic Preservation Officer (THPO).

Table 39.1. Colville Confederated Tribes inventory of accomplishments for the last five years in the San Poil Subbasin from BPA project (9001800) and associated non-BPA funded projects completed by the Colville ConfederatedTribes and other partners

Date Completed	Description Of Implemented Projects	Funding Agency
1998	Horizontal stream post-implementation surveys on 5 project streams, Louie, Iron, Blue, N. Nanamakin, and S. Nanamkin Crks	BPA
1998	Population estimate of juvenile adfluvial adfluvial rainbow trout	BPA
1998	Adult spawning escapement and outmigration surveys (trapping)	BPA
1998	Complete Phase I Report	BPA
1999	Horizontal stream post-implementation surveys on 5 project streams, Louie, Iron, Blue, N. Nanamakin, and S. Nanamkin Crks	BPA
1999	Population estimate of juvenile adfluvial adfluvial rainbow trout	BPA
1999	Adult spawning escapement and outmigration surveys (trapping)	BPA
1999	Complete Phase II Report	BPA
2000	Horizontal stream post-implementation surveys on 5 project streams, Louie, Iron, Blue, N. Nanamakin, and S. Nanamkin Crks	BPA
2000	Population estimate of juvenile adfluvial adfluvial rainbow trout	BPA
2000	Adult spawning escapement and outmigration surveys (trapping)	BPA
2000	FY 1999 Report with data and statistical analysis and pictorial booklet of project	BPA
2001	Horizontal stream surveys on Bridge Creek	BPA
2001	Baseline adult adfluvial rainbow trout trapping in spring and fall kokanee trapping	BPA
2001	Electroshock/population estimates on Bridge Creek	BPA
2001	Baseline habitat survey of Bridge Creek	BPA
2001	Adult spawning escapement and outmigration surveys (trapping)	BPA
2001	New culvert installed at Old State Road and Bridge Creek	Ferry County
2002	FY 2001 Annual Report	BPA
2002	Developed contracts and bids for design/engineering new channel and upper channel stabilization for Bridge Creek improvements	BPA
2002	Adult adfluvial rainbow trout trapping in spring on Bridge, Thirty Mile, N. Nanamkin, Bear Creeks	BPA
2002	Adult spawning escapement and outmigration surveys (trapping)	BPA
2002	Horizontal stream surveys on Thirty Mile Creek	BPA
2002	Baseline habitat survey of Thirty Mile Creek	BPA
2002	Legal survey for section lines and elevational changes for design of Bridge Creek passage/habitat improvements.	BPA
2002	Began NEPA process with NRCS, Ferry County Conservation District, Ferry County, Landowner, Archeological Survey.	BPA
2002	Passage barrier on San Poil River at Bear Creek removed	BPA
2002	Redd surveys on Louie, Iron, N. Nanamkin, S. Nanamkin, Bear, and Bridge Creeks	BPA
2002	Collection of fin clips for DNA Analysis of red band rainbow in Bridge, Barnaby, and Hall Creeks.	BPA
2002	Inventory and GPS of culverts in EDT test section of San Poil Subbasin	BPA
2002	Digitalized and GPS all information into Tribal GIS system	BPA
2002	Defined, and mapped all reaches and barriers (natural and man-made) in EDT test section of San Poil River.	BPA
2002	Documented status and photographed all barriers in EDT test section of San Poil Subbasin.	BPA

Date Completed	Description Of Implemented Projects	Funding Agency
2002	Determined slope of each designated reach, consolidated all water quality and habitat data collected by Colville Tribes over past ten years and input into EDT model for the test section of the San Poil Subbasin.	BPA
2002	Inventory and GPS of culverts in EDT test section of San Poil Subbasin	BPA
2002	Collected GPS data from WA State F&W, STOI, EWU /Al Scholz, CCT for creel sites, study sites, net pens, BOR temperature data collection sites, and USGS monitoring sites on Lake Roosevelt then re-projected and converted to shapefiles for GIS system use and distributed files to interested agencies associated with Lake Roosevelt Management.	BPA
2002	Inventory and GPS of culverts in remaining lower elevation sections of San Poil River for EDT Model on entire San Poil River	BPA
2002	Conducted Electroshock population estimates on 30-MileCk, Jack Ck, and Brush Ck and collected Samples for DNA analysis of possible red band trout.	BPA
2002	Inventory and GPS of culverts in lower reaches of Upper Columbia Subbasin	BPA
2002	Completed water diversion on S. Nanamkin Creek	BPA/Landowner
2003	Adult adfluvial rainbow trout trapping in spring on Bridge, Thirty Mile, Twentythree Mile, Seventeen Mile, Anderson, and Bear Creeks	BPA
2003	Adult spawning escapement and outmigration surveys (trapping)on Bridge, Thirty Mile, Twentythree Mile, Seventeen Mile, Anderson, and Bear Creeks	BPA
2003	Presented project at Lake Roosevelt Forum Conference	Lake Roosevelt Forum
2003	2002 Annual Report	BPA
2003	Redd surveys on Thirty Mile, Twentythree Mile, Seventeen Mile, Anderson, N. Nanamkin, S. Nanamkin, Bear, and Bridge Creeks	BPA
2003	Redd caps enumeration of emerging adfluvial rainbow trout and red band rainbow trout on four selected redds in Bridge, Thirty Mile, S. Nanamkin Creeks	BPA
2003	Bridge Creek riparian fencing for area of improvements	Ferry County Conservation District
2003	Request for Bids for implementing Bridge Creek habitat/passage improvements	BPA
2003	Implementation of designed habitat/passage improvements on Bridge Creek	BPA
2003	Road decommissioning on Lime Ck, stabilization of road washouts on Louie, Twenty-Five Mile, Deadhorse Creeks for sediment reduction, reconnect wetlands on Elbow Lake Road and repair of road.	EPA 319 Clean Water Grants
2003	Inventory and GPS of culverts in remaining high elevation sections of San Poil Sub-basin for EDT Model on entire San Poil Sub-basin	BPA
2003	Determined slope of each designated reach, consolidated all water quality and habitat data collected by Colville Tribes over past ten years and input into EDT model for the remaining sections of the San Poil Subbasin.	BPA
2003	Replace old culverts (fish passage barriers) on Thirty Mile Creek	BPA
2003	Stabilize active erosion on upper Thirty Mile Creek	EPA 319 Clean Water Grants
2003	Out-migrant screw trap operating in West Fork San Poil River	BPA
2003	Electroshock/population estimates on 23-Mile Creek	BPA
2003	Horizontal and habitat stream survey 23-Mile Creek	BPA
2003	Stabilize active erosion on 3 sites of San Poil River between North and South Nanamkin Creeks	EPA 319 Clean Water Grants

Date Completed	Description Of Implemented Projects	Funding Agency
2003	Trapping fall spawning kokanee in West Fork San Poil River	BPA

39.3.2 Non-BPA Funded Projects

Fencing, Range Improvements for Protection of Bridge Creek

Project Description:
Put in off-site water troughs, gates, hard rock crossings, and fencing in area of Bridge Creek restoration project. This project is funded by FCD and is part of the Lake Roosevelt Habitat Improvement Project.

Associated Monitoring:
Improvements will be monitored in connection with the Bridge Creek improvements.

Accomplishments:
Obtained solar pump for water troughs, installation will follow implementation of improvements

Notes:
All work on in-stream habitat improvements and bank stabilization on the 2550 feet of Bridge Creek starting at the new culvert at the Old State Road have been completed. Post implementation finish work included erosion matting, native grass seeding, and tree planting with willow, red osier dogwood, cottonwood, and pine. Design work for passage improvements reconnecting Bridge Creek to the San Poil River will be done in 2004 with implementation in 2005

Rochelle Habitat Enhancement

Project Description:
Install 6 cross-channel log weirs to help rebuild fish habitat; place rock toe and soil bioengineered bank stabilization; plant hardwood shrubs for wildlife habitat.

Associated Monitoring:
Semiannual inspection by FCD staff.

Accomplishments:
950 feet of improved streambank, 475 feet of improved instream fish habitat, reduction of potential high-water damage.

Thirty Mile Creek Culvert Replacement

Project Description:
Replace perched culvert at lower Thirty Mile Creek with bottomless arch to improve fish passage. This project is funded by the EPA and is sponsored by the CCT as part of the Lake Roosevelt Habitat Improvement Project. The end date is 2004.

Associated Monitoring:
Improvements will be monitored for two years post implementation and then in

connection with the long-term monitoring done in the spring with fish trapping.

Accomplishments:
Contracting process is underway for work to be done in late summer of 2004..

Thirty Mile Creek, Lime Creek, Louie Creek, and San Poil River Improvements for Sediment Reduction
Project Description:
Repair of road washouts that were adding sediment to the San Poil River and its tributaries. Types of work included removal of old culverts, re-sloping road cuts, installing water bars, adding rock and boulders to dissipate stream energy that has been actively eroding. This project was funded by the EPA and sponsored by the CCT as part of the Lake Roosevelt Habitat Improvement Project. It ended in November 2003.

Associated Monitoring:
Improvements will be monitored for two years post implementation and then in connection with the long-term monitoring done in the spring with fish trapping.

Accomplishments:
Work on Lime Creek, Deadhorse Creek, Twenty-five Mile Creek, Thirty Mile Creek has been completed. Additional culvert replacement on Thirty Mile Creek and stabilization of actively eroding areas along the San Poil River between South Nanamkin and North Nanamkin Creeks are under contract and are about to be implemented. Louie Creek stabilization and road relocation have been contracted and are awaiting final approval by BIA Roads.

Notes:
A wetland project to reconnect two wetlands that had been disconnected by a road in the wetland located above the North Fork of Hall Creek in the Upper Columbia Subbasin was also done with the 319 Clean Water Grant monies.

Annabelle Creek Culvert Replacement
Project Description:
Replace perched culvert at a tributary to Scatter Creek with a partially buried concrete culvert to provide fish passage. This project was funded by the Colville National Forest.

39.4 Strategies Currently Being Implemented Through Existing Projects

39.4.1 Limiting Factors and Strategies Currently Being Implemented

As described in Section 2.4, a database was developed that lists the recent projects that have been implemented in the Subbasin. Each project was coded for the limiting factors that were addressed, and the strategies that were employed.

In the San Poil Subbasin, 16 recent restoration and conservation projects were identified. Of the projects identified, 10 were focused on resident fish, 3 primarily benefited wildlife, and 3 benefited both fish and wildlife.

The focus of many of the recent projects in the San Poil Subbasin (60 percent) has been on addressing habitat related limiting factors. Habitat quality (14 percent), water quality or quantity (15 percent), habitat quantity (12 percent) and barriers (19 percent) have all received attention in recent years (Figure 39.1). The lack information has been addressed by 10 percent of the recent projects. Disease, competition, predation, and hybridization are limiting factors that have been addressed by 20 percent of the recent projects. Indirect mitigation was addressed by 10 percent of projects.

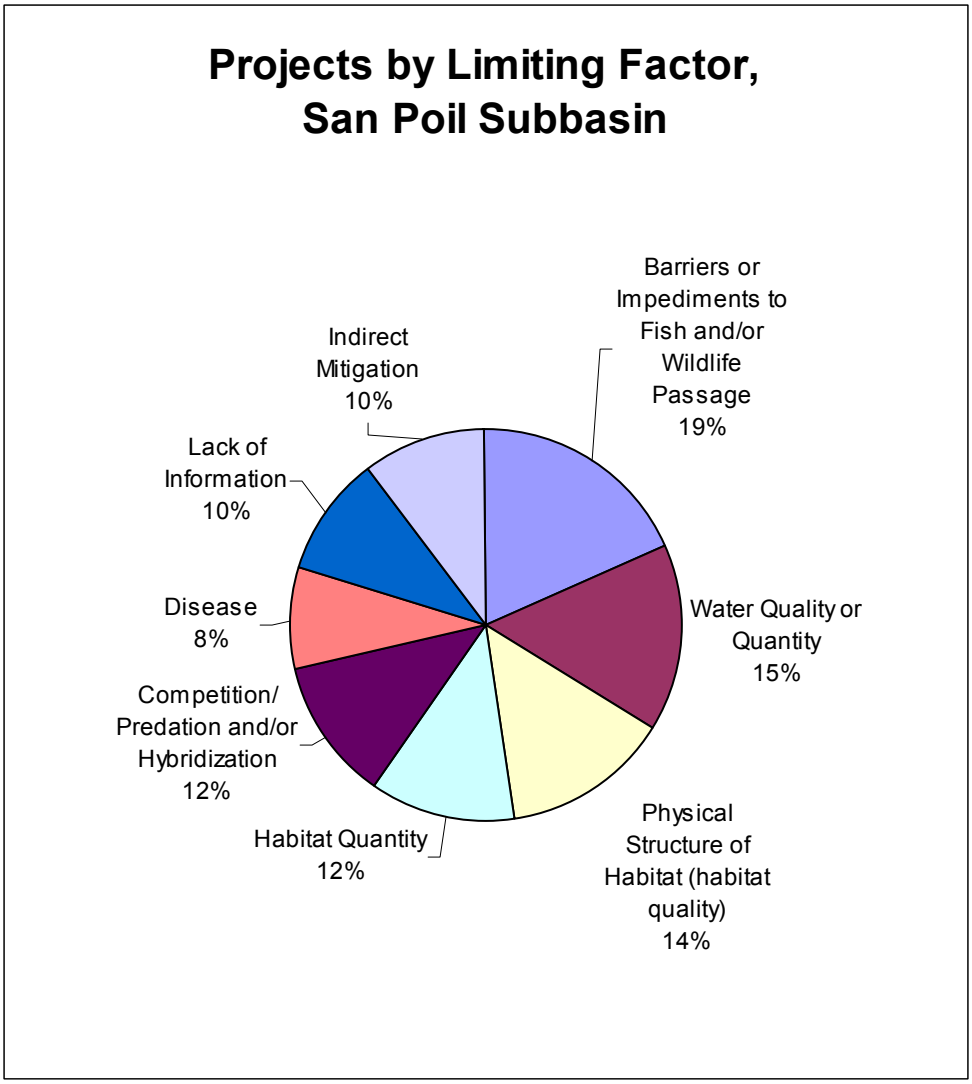

Figure 39.1. Proportion of projects in the San Poil Subbasin that relate to specific limiting factors

A wide array of strategies have been employed in the San Poil Subbasin (Figure 39.2). The only strategy that has not been extensively employed by the projects in the database is enforcement/protection. Although the CCT do have Resource Protection Enforcement

Officers that patrol the San Poil along with all areas of the Colville Reservation. Changes in State and Tribal Fishing Regulations have been made to increase protection of the adfluvial rainbow trout during spawning migration.

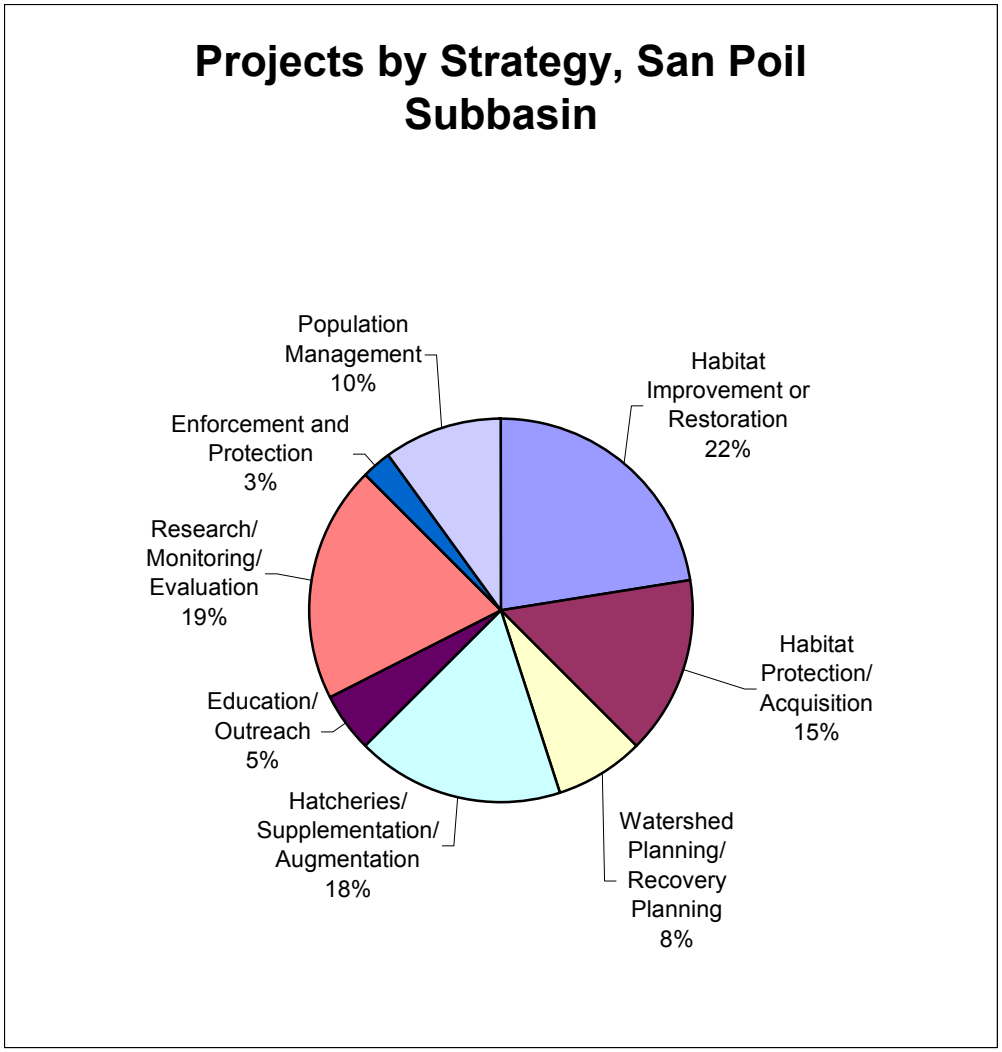

Figure 39.2. Proportion of projects in the San Poil Subbasin that relate to specific strategies

39.4.2 Gaps Between Actions Taken and Actions Needed

The Technical Guide for Subbasin Planners requires that gaps between actions taken and actions needed be identified. This perspective will help determine whether ongoing activities are appropriate or should be modified and lead to new management activity considerations.

In the IMP, the Technical Coordination Group provided information on the gaps between the actions taken and the actions needed based on their knowledge and experience in their subbasins. The input is described below.

There were only 16 total projects identified in this Subbasin for both fish and wildlife combined. The most obvious gap between the actions taken and the actions needed in the San Poil is the lack of any action.

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40 San Poil Subbasin Assessment – Terrestrial

40.1 Focal Habitats: Current Distribution, Limiting Factors, and Condition

The San Poil Subbasin is dominated by eastside interior mixed conifer forest, which is distributed broadly across the Subbasin. Eastside interior grassland is the second most abundant habitat type and is also widely distributed across the Subbasin. Ponderosa pine savannah and forest comprise another 10 percent of the habitats, located mainly in the lower elevations of the Subbasin. Shrub-steppe makes up about two percent of the total cover and is located in the southernmost portion of the Subbasin. Wetland habitats are limited to small areas of montane coniferous wetlands, herbaceous wetlands, and interior riparian wetlands associated with the San Poil River and other large streams. Agriculture and related land uses make up less than one percent of the total and affect lands along the San Poil River corridor and the southern portion of the Subbasin. Urbanization is limited within the Subbasin; the town of Republic is the largest urban center.

Figure 37.2 (Section 37) shows the current distribution of wildlife-habitat types in the San Poil Subbasin based on IBIS (2003). Table 40.1 presents the acreages by habitat type and by subbasin focal habitats. Five focal habitats were selected for the IMP: wetlands, riparian, steppe and shrub-steppe, upland forest, and cliff/rock outcrops. The same habitats were selected as focal habitats for the San Poil Subbasin (Ad Hoc Terrestrial Resources Tech Team, May 5, 2003). Focal habitats comprise about 99 percent of the basin, including upland forests (68 percent), steppe and shrub-steppe (29 percent), and wetlands and riparian habitats (just under two percent). Developed habitats, including agricultural and urban lands, currently comprise approximately one percent of the Subbasin and are located primarily along the San Poil River corridor. Cliff/rock outcrop habitats are not mapped in the IBIS system.

The IBIS data is based on satellite imagery at a scale that tends to under-represent habitats that are small in size or narrow in shape. Additional information on habitats and wildlife within the San Poil Subbasin is available for selected ownerships and/or jurisdictions; these sources include the WDFW, WDOE, Colville Confederated Tribes, USFS, and USFWS. Data from these sources has been used where available to provide more specific information on habitat and wildlife species distribution within the Subbasin.

Historical vegetation data for the Subbasin is not available at a scale similar to the current condition IBIS data. Native vegetated habitats in the Subbasin have been converted to developed habitats and have also been modified through changes to vegetation type and structure. Refer to the Section 4 for a discussion of historical vs. current habitat types in the IMP and factors influencing the distribution and quality of those habitats.

Table 40.1. Current Wildlife-Habitat Types in the San Poil Subbasin

Wildlife-Habitat Type	San Poil Current Acres	Percent of Total
Wetlands (Focal Habitat)		
Lakes, Rivers, Ponds, and Reservoirs	4,757	0.7%
Herbaceous Wetlands	219	0.0%
Montane Coniferous Wetlands	6,914	1.0%
Riparian and Riparian Wetlands (Focal Habitat)		
Eastside (Interior) Riparian Wetlands	931	0.1%
Steppe and Shrub-Steppe (Focal Habitat)		
Eastside (Interior) Grasslands	183,039	26.8%
Shrub-Steppe	15,259	2.2%
Upland Forest (Focal Habitat)		
Montane Mixed Conifer Forest	10,287	1.5%
Eastside (Interior) Mixed Conifer Forest	384,653	56.2%
Lodgepole Pine Forest and Woodlands	1,125	0.2%
Ponderosa Pine Forest and Woodland	66,052	9.7%
Upland Aspen Forest	2,306	0.3%
Alpine and Subalpine		
Alpine Grasslands and Shrublands	1,724	0.3%
Developed		
Agriculture, Pasture, and Mixed Environs	5,744	0.8%
Urban and Mixed Environs	981	0.1%
Total	**683,991**	100.0%

(*Source*: IBIS 2003)

40.1.1 Open Water, Wetlands, and Riparian Areas

The IBIS wildlife-habitat map (Figure 37.2) is based in part on National Wetlands Inventory (NWI) mapping, but does not utilize all of the wetland categories or show the full extent of very small mapped areas. The following discussion of open water habitats is based on Figure 37.2 and the corresponding Table 40.1. Figure 40.1 provides a more detailed mapping of wetlands, excluding open water habitats, based on WDOE mapping (WDOE 1999) using aggregated NWI wetland types. Table 40.2 summarizes the acreages of wetlands in the Subbasin by wetland category.

40.1.1.1 Open Water

Open water habitats of natural and human origin comprise 0.7 percent of total area of the San Poil Subbasin (IBIS 2003). The San Poil River, extending 59 miles through the Subbasin, is the largest river, and the San Poil arm of Lake Roosevelt is the largest waterbody. Curlew Lake is the largest lake in the San Poil Subbasin[1]. Other lakes include Gold, Swan, Ferry, Long, Crawfish, and San Poil.

[1] Note that Curlew Lake watershed has been included in the San Poil Subbasin for administrative purposes; hydrologically the Curlew Lake watershed is part of the Upper Columbia Subbasin.

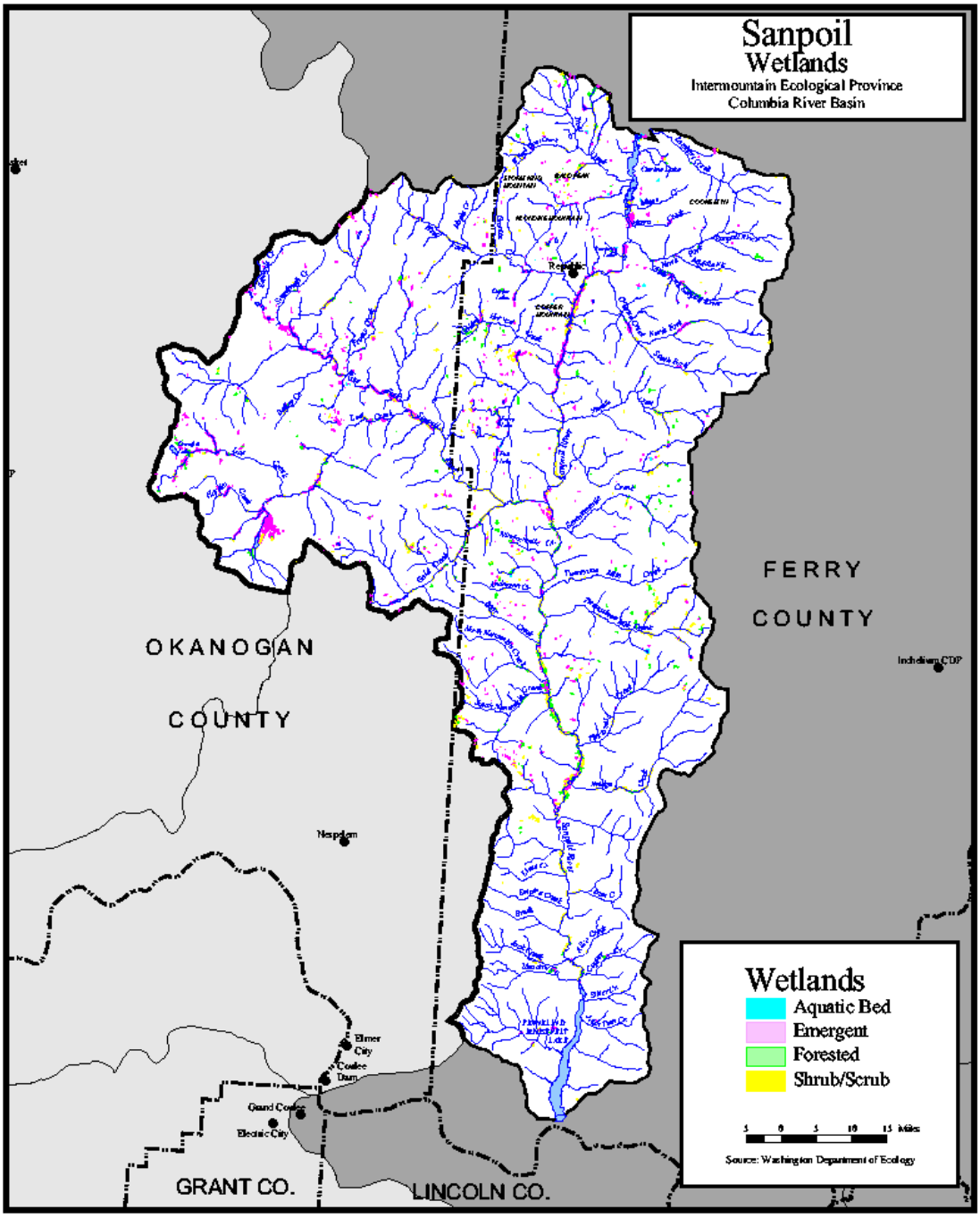

Figure 40.1 Wetland areas within the San Poil Subbasin

The Grand Coulee Project caused the impoundment of approximately 12 miles of the San Poil River and additional reaches of tributary streams (Truscott 2000). The impounded areas fluctuate significantly during the year, with an extended winter drawdown period. Other factors that have influenced the Subbasin's waterbodies include timber management, agriculture, grazing, mining, and residential development.

40.1.1.2 Wetlands and Riparian Areas

Wetlands (excluding open water habitats) comprise approximately one percent of land cover in the San Poil Subbasin (Table 40.2). Wetlands in the Subbasin are dominated by emergent herbaceous habitats (47 percent of total wetland habitat); these wetlands are scattered throughout the Subbasin, with the largest complexes associated with Hayden and Lost creeks, the West Fork and mainstem San Poil rivers, and Curlew Lake. Scrub-shrub wetlands comprise about 36 percent of total wetland habitat and are located in greatest concentration along the West Fork and mainstem San Poil rivers, Gold, Harvest, and Twentythree Mile creeks. Forested wetlands total about 16 percent of all wetlands, and are scattered along the San Poil River, major tributaries, and scattered non-riparian sites in the higher elevations.

Table 40.2. Acres of Wetlands in the San Poil Subbasin by Wetland Type

Wetland Type	Acres
Emergent	3,570
Scrub/shrub	2,691
Forested	1,224
Aquatic bed	69
Total all wetland types	**7,554**

(*Source*: WDOE 1999)

Riparian vegetation along the San Poil arm of Lake Roosevelt is extremely limited, due to the extensive fluctuation zone. During the approximately three-month winter drawdown period, the water surface elevation of portions of Lake Roosevelt is as much as 80 feet below the full pool level. The fluctuation zone along the San Poil arm is largely unvegetated and provides little wildlife value.

Riparian habitats are present along the corridor of the San Poil River and its major tributary streams. Riparian habitats in the Subbasin are limited by a variety of land use activities including hydropower development, timber harvest, mining, grazing, and agriculture. Hydropower development directly affected the lower 12 miles of the San Poil River and the lower reaches of associated tributary streams. Timber harvest has affected riparian habitats through removal of overstory dominant trees, alteration of plant community structure, and increased road density (USFS 2003a). Other effects are increased occurrence of nonnative plant species. Cattle grazing occurs throughout much of the basin and is associated with soil compaction, increased width-to-depth ratio of streams, reduced cover of native species, and increased cover of nonnative plant species in some locations (2003a, Truscott 2000). Mining activities, with associated ground disturbance and road construction, have occurred primarily in the northern portion of the Subbasin.

40.1.2 Steppe and Shrub-Steppe

Interior grasslands are an important land cover in the San Poil Subbasin, occupying 27 percent of the total area; an additional two percent of the Subbasin is classified as shrub-steppe. The extent of grasslands and shrub-steppe has declined from historic conditions due to conversion to agricultural and developed lands. Just under one percent of the Subbasin is currently in agricultural uses, and much of this land was converted from grasslands and shrub-steppe. A secondary effect of agriculture and grazing is the introduction of nonnative noxious weeds through seed sources and via roads and equipment. Remaining grassland and shrub-steppe habitats in the Subbasin are greatly modified from historic conditions by reduction of native plant species and in increases the cover of noxious weeds.

Construction of the Grand Coulee Project resulted in loss of approximately 14,000 acres of shrub-steppe habitat for placement of project facilities and creation of the reservoir (Creveling and Renfrow 1986). A portion of this habitat loss occurred within the San Poil Subbasin.

40.1.3 Upland Forests

Upland forests in the San Poil Subbasin are dominated by interior mixed conifer stands (56 percent of land cover) at higher elevations and ponderosa pine (10 percent) at lower elevations. Timber harvest is a primary land use on the Colville Indian Reservation, Colville and Okanogan National forests, and private lands.

Overall, the amount of forest in late and old-successional stages has been reduced from the historic condition, and is limited from reaching these stages by timber rotation schedules. Managed stands are characterized by their younger seral stage and modified species diversity, typically including species that are less fire tolerant, such as Douglas fir. Timber management has caused increased road densities throughout the Subbasin. Fire control, grazing, and residential development have also influenced the distribution and structure of upland forests in the Subbasin.

Construction of the Grand Coulee Project caused the inundation of ponderosa pine savannah along the southernmost 12-mile reach of the San Poil River.

40.1.4 Other Terrestrial Resource Limiting Factors

As noted in the Section 4, numerous specific habitat elements (called key environmental correlates, or KECs, in IBIS terminology) influence the value of wildlife-habitat types to individual wildlife species. Habitat elements may include natural attributes, such as snags, downed wood, soil types, and also include anthropogenic features such as buildings, chemical contaminants, and roads. Information on site-specific habitat elements is critical to determination of habitat suitability for wildlife; however, data is not available at a subbasin-wide level for most habitat elements. Information on selected habitat elements that have important influences on habitat quality and wildlife use has been compiled for this assessment, including road density and salmonid nutrients lost to the IMP.

40.1.4.1 Road Density

Figure 37.4 (Section 37) shows road density, by density class, for each sixth order watershed in the San Poil Subbasin. Nearly the entire Subbasin is ranked as high road density (1.7 to 4.7 miles of road per square mile). One watershed at the southern end of the Subbasin and the Lambert Creek watershed in the northeastern corner of the Subbasin are ranked as moderate road density (0.7 to 1.7 miles of road per square mile). No watersheds in the Subbasin are ranked as low or very low road density.

High road densities are indicative of human land uses and activities. In the San Poil Subbasin, high road densities are associated primarily with managed timberlands. Road density values in excess of 1.5 miles per square mile are considered suboptimal for mule deer and white-tailed deer summer range; values greater than 0.5 miles per square mile are suboptimal for the same species on their winter ranges (WDFW 1991). Most of the San Poil Subbasin currently supports road density levels considered suboptimal for these game species.

40.1.4.2 Loss of Salmonid Nutrient Base

Construction and operation of the Chief Joseph and Grand Coulee dams on the Columbia River prevented salmon and other anadromous fish from returning to the San Poil Subbasin. The loss of anadromous fish affected not only subsistence and recreational use of the resource, but also affected salmon-dependent wildlife and modified nutrient input to the overall ecosystem.

Appendix E of the 1987 Columbia Basin Fish and Wildlife Program (Council 1987) presents the results of several alternative calculations to determine the loss of salmon within the Columbia River system due to hydropower development. Based on the pre-1850 run size, with no dams in place, the number of adults at spawning grounds in reaches above Chief Joseph Dam would total 3,175,000 fish, with sockeye comprising greater than 55 percent, summer Chinook 19 percent, and fall Chinook, spring Chinook, coho, and steelhead the remaining 26 percent.

Scholz, et al. (1985) compiled information on salmon and steelhead run size and harvest above Grand Coulee Dam. The results of four different techniques to estimate adult run size of the total Columbia River were summarized, showing a range of 1.2 million to 35 million fish. The authors selected the catch-based estimation technique as the most reasonable estimate of total Columbia River run size, equaling 13.1 million fish. The percentage of the total run migrating to the Upper Columbia River was estimated at 5 percent Chinook, 8 percent sockeye, 3 percent coho, and 41 percent steelhead. Using the catch-based total run size, an estimate of run size into the Upper Columbia Basin, prior to major development, was calculated at 1.1 million fish. Minimum annual catch was estimated at 644,000 fish.

The loss of salmon to focal wildlife is discussed in Section 4.5.2 Key Wildlife Species of the Intermountain Province.

40.1.4.3 Lake Roosevelt Shoreline Erosion

Wave action, combined with fluctuating water surface levels and erosive soils, has contributed to erosion of steep banks along portions of the San Poil Arm of Lake Roosevelt.

Erosion of the Lake Roosevelt shoreline has the potential to affect terrestrial resources through loss of habitats, including shrub-steppe, grasslands, wetlands, and riparian shrubs and trees. Direct loss of wildlife could occur through effects to active nesting, denning, and burrow sites. Figure 37.3 (Section 37) shows the portion of Lake Roosevelt located within the San Poil Subbasin and highlights the areas of high erosion potential along the shoreline (USBR 1984). Analysis of a 300-foot wide band, extending upslope from the average reservoir elevation of 1,290 feet, shows that 38 percent of the area within the band is classified as high erosion potential, while about 8 percent of the area is bedrock. To date, site-specific assessment of the effects of shoreline erosion on terrestrial resources has not been conducted.

40.1.5 Land Ownership and Gap Status

Land ownership in the San Poil Subbasin is summarized in Table 40.3. A map of ownership categories in the Province is presented in Section 4, Figure 4.3. The San Poil Subbasin is dominated by Tribal lands of the Colville Indian Reservation, which occupy the southern half of the Subbasin (49 percent of total). Federal lands comprise about 31 percent of the total, consisting primarily of National Forest System lands of the Colville and Okanogan National forests. Private ownership makes up about 18 percent, and state ownership two percent of the Subbasin total.

Relative protection levels of native habitats in the San Poil Subbasin are shown in Table 40.4. No lands within the Subbasin are categorized as Status 1, High Protection. Habitats protected under Status 2, Medium Protection, comprise less than one percent of the total and are confined to a single parcel of state-owned lands at Curlew Lake State Park. Approximately 33 percent of lands in the Subbasin are ranked as low protection, primarily National Forest System lands which provide habitat protection combined with resource extraction. The Low Protection category includes U.S. Forest Service inventoried roadless areas. Lands with no specified protection total 67 percent of the Subbasin and represent both private and Tribal ownership.

Due to the scale of the IBIS and GAP mapping, small parcels may be incorrectly categorized in this analysis. The 3,417-acre Moses Mountain Natural Area is located on the Colville Indian Reservation (Truscott 2000). This highly protected area is not shown in the GAP analysis, but occurs in part within the San Poil Subbasin. No commercial timber harvest is allowed within this area.

Table 40.3. Land Ownership in the San Poil Subbasin by Wildlife-Habitat Types

Wildlife-Habitat Type (acres)	Federal Lands	Native American Lands	State Lands	Local Gov't. Lands	Non-Gov't. Org.Lands	Private Lands	Water	Total
Wetlands (Focal Habitat)								
Lakes, Rivers, Ponds, and Reservoirs	456	2,741	71	0	0	1,584	0	4,853
Herbaceous Wetlands	0	4	2	0	0	250	0	256
Montane Coniferous Wetlands	993	3,927	77	0	0	2,382	0	7,379
Riparian and Riparian Wetlands (Focal Habitat)								
Interior Riparian Wetlands	58	1,179	23	0	0	389	0	1,649
Steppe and Shrub-Steppe (Focal Habitat)								
Interior Grasslands	44,015	72,714	7,910	0	0	60,460	0	185,098
Shrub-steppe	313	15,166	0	0	0	0	0	15,479
Upland Forest (Focal Habitat)								
Montane Mixed Conifer Forest	7,745	3,032	63	0	0	54	0	10,894
Interior Mixed Conifer Forest	139,541	166,100	9,172	0	0	41,937	0	356,750
Lodgepole Pine Forest & Woodlands	4,924	2,709	289	0	0	1,541	0	9,464
Ponderosa Pine Forest & Woodlands	6,238	55,505	1,335	0	0	8,220	0	71,297
Upland Aspen Forest	3,089	4,343	200	0	0	2,938	0	10,570
Alpine and Subalpine								
Subalpine Parkland	68	4	0	0	0	0	0	71
Alpine Grasslands and Shrublands	1,645	33	0	0	0	0	0	1,678
Developed								
Agriculture, Pasture, and Mixed Environs	184	6,352	44	0	0	1,050	0	7,630
Urban and Mixed Environs	11	0	1	0	0	918	0	930
Total Acres	**209,278**	**333,809**	**19,187**	**0**	**0**	**121,725**	**0**	**683,999**

(*Source*: IBIS 2003)

Table 40.4. GAP Status of Lands in the San Poil Subbasin by Wildlife-Habitat Type

Wildlife-Habitat Type (acres)	1 - High Protection	2 - Medium Protection	3 - Low Protection	4 - No Protection	Water	Total
Wetlands (Focal Habitat)						
Lakes, Rivers, Ponds, and Reservoirs	0	291	312	4,272	0	4,875
Herbaceous Wetlands	0	0	0	256	0	256
Montane Coniferous Wetlands	0	13	1,076	6,286	0	7,375
Riparian and Riparian Wetlands (Focal Habitat)						
Interior Riparian Wetlands	0	6	81	1,557	0	1,644
Steppe and Shrub-Steppe (Focal Habitat)						
Westside Grasslands	0	0	0	0	0	0
Interior Grasslands	0	257	51,073	133,837	0	185,167
Shrub-steppe	0	0	23	15,445	0	15,468
Upland Forest (Focal Habitat)						
Mesic Lowland Conifer-Hardwood Forest	0	0	0	0	0	0
Montane Mixed Conifer Forest	0	0	7,807	3,084	0	10,891
Interior Mixed Conifer Forest	0	0	146,234	210,488	0	356,722
Lodgepole Pine Forest & Woodlands	0	1	5,197	4,270	0	9,469
Ponderosa Pine and Interior Forest & Woodlands	0	40	7,328	63,900	0	71,268
Upland Aspen Forest	0	1	3,269	7,295	0	10,565
Alpine and Subalpine						
Subalpine Parkland	0	0	68	4	0	71
Alpine Grasslands and Shrublands	0	0	1,645	33	0	1,678

Developed						
Agriculture, Pasture, and Mixed Environs	0	35	138	7,448	0	7,622
Urban and Mixed Environs	0	0	1	927	0	928
Total Acres	**0**	**646**	**224,251**	**459,101**	**0**	**683,999**

(*Source*: IBIS 2003)

GAP Status Definitions (Source: USGS 2000):
Status 1 – High Protection: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management.
Status 2 – Medium Protection: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance.
Status 3 – Low Protection: An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type (e.g., logging) or localized intense type (e.g., mining). It also confers protection to federally-listed endangered and threatened species throughout the area.
Status 4 – No or Unknown Protection: There are no known public or private institutional mandates or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. The area generally allows conversion to unnatural land cover throughout.

40.2 Wildlife of the San Poil Subbasin

40.2.1 Wildlife Occurring in the San Poil Subbasin

Wildlife-habitat types in the San Poil Subbasin range from low elevation grasslands to montane coniferous forests; wildlife using the habitats are correspondingly numerous and diverse. There are approximately 330 species of terrestrial vertebrate wildlife that occur within the San Poil Subbasin, many of which are important for ecological, cultural, and/or economic reasons. Table 40.5 presents the terrestrial vertebrate wildlife species occurring within the Subbasin. Due to the large number of wildlife species in the Subbasin, the following discussion focuses on wildlife species that are important indicators of habitat quality, those that represent other wildlife species, and those with special management status. Refer to the San Poil Subbasin Summary (Truscott 2000) for more detailed information on general wildlife of the Subbasin. The San Poil Subbasin is located largely within the Colville Reservation (about 49 percent of the subbasin) and the Colville National Forest (about 31 percent). Data on the presence of focal wildlife species comes from several sources, but it should be noted that the Washington Priority Habitats and Species database contains only limited information from the extensive area of the Colville Indian Reservation and the Colville National Forest.

Table 40.5. Number of Wildlife Species (and percent of Province Total) in the San Poil Subbasin

	Occurring Species (Percent of Province Total)	HEP/Priority Species	HEP/Priority Species Closely Associated With Herbaceous Wetlands	HEP/Priority Species Closely Associated With Riparian Wetlands	HEP/Priority Species That Feed Upon Salmon	Occurring Species That Feed Upon Salmon
Amphibians	9 (53%)	0	0	0	0	0
Birds	222 (80%)	10	1	4	2	48
Mammals	86 (85%)	6	1	1	2	22
Reptiles	13 (72%)	0	0	0	0	2
Total	330 (80%)	16	2	5	4	72

(*Source*: IBIS 2003)

40.2.2 HEP and Priority Species of the San Poil Subbasin

Subbasin planners selected a group of wildlife species to represent the focal habitats and wildlife of the San Poil Subbasin. Species used in the Grand Coulee Project Habitat Evaluation Procedures (HEP) study (Creveling and Renfrow 1986) were selected because they were used to assess the construction and inundation losses for the federal hydrosystem project, and because they will be used in the future to evaluate mitigation for the project. Additional wildlife species were selected due to their management, cultural, and or economic values in the Subbasin; these species also represent specific focal habitats. The list of HEP and priority species for the Subbasin, as well as federal and state-listed threatened and endangered species, is presented in Table 40.6.

Table 40.6. Federal and State Endangered/Threatened, HEP, and Priority Wildlife Species of the San Poil Subbasin and Degree of Association[1] with Focal Habitats During Breeding

Common & Scientific Names	Federal/ State Listing Status [2]	HEP/ Priority Status [3]	Focal Habitats				
			Cliff/ Rock Outcrop	Wetland	Riparian	Steppe/ Shrub-Steppe	Upland Forest
American beaver *Castor canadensis*	-	P(1,2,3)	-	Close	Close	-	-
Bald eagle *Haliaeetus leucocephalus*	T / t	P(1,2,3)	-	-	General	-	General
Canada goose *Branta canadensis*	-	HEP	General	Close	-	General	-
Canada lynx *Lynx canadensis*	T / t	P(4)	-	-	-	-	Close
Golden eagle *Aquila chrysaetos*	-	P(1,3)	Close	-	General	General	General
Gray wolf *Canis lupus*	T / e	P(4)	-	-	General	General	General
Grizzly bear *Ursus arctos*	T / e	P(4)-	-	-	-	-	General
Long-eared owl *Asio otus*	-	P(1)	-	-	Close	Close	Close
Mourning dove *Zenaida macroura*	-	HEP	-	-	Close	General	General
Mule deer *Odocoileus hemionus hemionus*	-	HEP	-	General	General	General	General
Northern flicker *Colaptes auratus*	-	P(1)	-	General	General	General	General
Ruffed grouse *Bonasa umbellatus*	-	HEP	-	General	Close	-	Close
Sage grouse *Centrocercus urophasianus*	- / t	HEP	-	-	-	Close	-
Sharp-tailed grouse *Tympanuchus phasianellus Columbianus*	- / t	HEP	-	-	-	Close	General
White-tailed deer *Odocoileus virginianus*	-	HEP	-	-	Close	General	General
Yellow warbler *Dendroica petechia*	-	P(1)	-	-	Close	-	-

(*Source*: IBIS 2003 and San Poil Subbasin Work Team)

[1] **Close** = Animal dependent on the habitat for part or all of its life history requirements. **General** = Animal adaptive and supported by numerous habitats.

[2] **E** = Federal Endangered. **T** = Federal Threatened. **e** = State Endangered. **t** = State Threatened.

[3] **HEP** = Species evaluated via Habitat Evaluation Procedures loss assessment for Grand Coulee Dam (Creveling and Renfrow 1986).

P = Priority species designated as important because it is **(1)** ecological indicator for habitat or other animals, **(2)** game animal, **(3)** highly culturally prized, or **(4)** special status for management. Many priority species were selected to represent one or more focal habitat types; the habitat(s) a species represents is(are) indicated by underlined degree of association (e.g., close).

The province-wide status and trends of federal and state-listed threatened and endangered species are discussed in Section 4, Terrestrial Resources in the Intermountain Province. Subbasin-level information on occurrence of federal and state-listed species is provided in this section. The occurrence of HEP and priority species in the Subbasin is also discussed briefly below. Some species were selected primarily as indicators of wildlife guilds or of a focal habitat; for many of these species detailed information on status in the Subbasin is not available.

40.2.2.1 Federal and State Threatened and Endangered Species

Bald eagle. Two nesting territories occur along the San Poil River and a third territory is located near Curlew Lake (WDFW 2003b).

Canada lynx. Between 1980 and 1994, four lynx sightings occurred near the Subbasin's northeastern and northern boundary (WDFW 2003b). The portion of the Kettle Crest area above 4,000 feet elevation is designated as a lynx analysis unit. The Kettle Range and Vulcan-Tunk areas at elevations generally above 4,000 feet are lynx management zones (LMZs) located partially within the subbasin (Stinson 2001).

Gray wolf. Each of three records during 1991 and 1992 report a single animal sighting in tributary drainages west and east of the San Poil River (WDFW 2003b).

Grizzly bear. A single record in 1982 reported two adult bears in the Harvest Creek drainage of the San Poil River (WDFW 2003b).

Sage grouse. No sage grouse sightings are reported by WDFW (2003b) for this Subbasin. Sage grouse habitat was inundated by the construction of Lake Roosevelt, resulting in a loss of 893 Habitat Units on the Colville Reservation; a small portion of this loss may have occurred in the San Poil Subbasin.

Sharp-tailed grouse. The WDFW (2003b) has no current records of sharp-tailed grouse occurrence in this Subbasin. A substantial quantity of sharp-tailed grouse habitat was inundated by Lake Roosevelt, resulting in a loss of 8,833 Habitat Units on the Colville Reservation. An undetermined portion of this loss occurred within the San Poil Subbasin. Sharp-tailed grouse are present on Colville Reservation lands within the San Poil Subbasin; the overall population on the Reservation is estimated at 300 to 600 birds (CCT 2000). The Tribe's Integrated Resource Management Plan contains objectives for restoring grassland and shrub-steppe rangeland habitat and increasing the population size west of the San Poil River.

40.2.2.2 Grand Coulee HEP Species

Canada goose. Data from the WDFW (2004a) shows that the San Poil Subbasin accounts for less than one percent of the state's total goose hunting harvest and recreation (Appendix G). That statistic combines all species of goose (Canada goose, snow goose, Brandt, etc.). A total of 74 goose nesting islands were inundated from the construction of Grand Coulee Project (Creveling and Renfrow 1986). Ten of the nesting sites were lost from Colville Reservation lands; however, the study does not indicate whether any of the sites were located within the San Poil Subbasin.

Mourning dove. The mourning dove is widespread in the Subbasin during the breeding season. Dove hunting harvest and recreation in the Subbasin accounts for less than one percent of the state's totals for those measures (Appendix G). The Grand Coulee Project resulted in the loss of 9,316 mourning dove HUs, of which 1,001 HUs (about 11 percent) have been replaced. The amount attributed to this Subbasin is undetermined.

Mule deer and white-tailed deer. Mule and white-tailed deer are both native to the Subbasin. White-tailed deer populations are relatively stable, while mule deer populations in northeastern Washington are below historic levels. The WDFW's management goal is to preserve, protect, perpetuate, and manage deer and their habitat to ensure healthy, productive populations (WDFW 2003c). The population goal for white-tailed deer is to maintain relatively stable population growth. The population goal for mule deer is an increase in populations within limitations of available mule deer habitat. The Department's recreation management objective for deer is to maintain or increase hunting opportunity and improve hunting quality. The current general, post-hunt minimum goal for buck:doe ratios in Washington is greater than 15 bucks per 100 does for most populations. Deer winter range continues to be lost to human development. Irrigated land important as deer forage in lower elevations has been negatively affected by water restrictions for salmon recovery. Invasion by noxious weeds is a potential problem, and bitterbrush on winter range is aging and under-productive.

An estimate of mule and white-tailed deer hunting harvest and recreation in the Subbasin is presented in Table 40.7. The Subbasin contributes about one percent of Washington State's total deer harvest and hunting recreation.

Table 40.7. Mule Deer and White-Tailed Deer Hunting Harvest and Recreation Within the San Poil Subbasin[1]

	Harvest		Hunter-Days	
Year	Quantity	% of State Total	Quantity	% of State Total
1999	313	1.0	15,856	1.1
2000	474	1.3	10,775	1.1
2001	370	1.0	8,078	1.0
2002	351	1.0	8,713	1.0
Average	377	1.1	10,855	1.1

(*Source*: Appendix G)

[1] Includes portions of Washington Game Management Units 101 and 204.

The Grand Coulee Project resulted in loss of 27,133 mule deer Habitat Units and 21,632 white-tailed deer Habitat Units. Only a small portion of this loss occurred within the San Poil Subbasin.

Ruffed grouse. Data from the WDFW show that forest grouse hunting (ruffed grouse, blue grouse, and spruce grouse) occurs in both counties of this Subbasin (Appendix G). Grouse harvest in the Subbasin accounts for approximately three percent of the state's total and three percent of its grouse hunting recreation (Table 40.8).

Table 40.8. Forest Grouse (Ruffed, Blue, and Spruce Grouse) Hunting Harvest and Recreation Within the San Poil Subbasin[1]

	Harvest		Hunter-Days	
Year	Quantity	% of State Total	Quantity	% of State Total
1999	2,239	3.0	4,952	2.6
2000	5,666	3.8	12,280	3.1
2001	3,692	3.3	8,885	3.0
2002	4,963	3.6	10,064	3.0
Average	4,140	3.4	9,045	2.9

(*Source*: Appendix G)

[1] Includes portions of Ferry and Okanogan counties.

Construction of the Grand Coulee Project resulted in a loss of 16,502 Habitat Units for ruffed grouse; an undetermined number of these Habitat Units were located in San Poil Subbasin.

Sage grouse. Refer to preceding section describing Federal and State Threatened and Endangered Species.

Sharp-tailed grouse. Refer to preceding section describing Federal and State Threatened and Endangered Species.

40.2.2.3 Other Priority Species

American beaver. Beaver are present throughout the San Poil Subbasin. Trapping harvest is several times greater in Okanogan County than in Ferry County. The Subbasin harvest during 1999-2002 averaged approximately eight beaver per year, a number that is under one percent of the state total (Appendix G). Harvest declined during those reporting years, but it is not clear whether this was due to a population decline, the passing of State Initiative 713 in 2000 (which banned the use of leg or body gripping traps), or other reasons such as a weak fur market, or drop in nuisance complaints.

Golden eagle. Since 1983, at least 18 nests representing an estimated 10 territories have been found across the Subbasin (WDFW 2003b). Many are located along the San Poil River, but tributary drainages are occupied as well.

Long-eared owl. General references such as Sibley (2003) show the species as breeding in the Subbasin, with the possibility of it being a year-long resident. However, Smith et al. (1997) report no evidence of breeding in the Subbasin and the WDFW (2003b) has no records of sightings there.

Northern flicker. This woodpecker is a year-round resident of the San Poil Subbasin. No specific occurrence data are recorded by wildlife managers in the Subbasin.

Yellow warbler. Smith et al. (1997) has not confirmed breeding in the San Poil Subbasin, but that finding is probably due to insufficient sampling. However, habitat is limited; there is less than 1,000 acres of interior riparian wetland in the Subbasin.

40.3 Summary of Terrestrial Resource Limiting Factors

40.3.1 Direct Effects of Federal Hydrosystem Projects

Development of the Grand Coulee Project resulted in direct loss of wildlife and wildlife habitats along the southernmost 12 miles of the San Poil River. Habitat losses associated with inundation of project reservoirs were assessed in the Final Report on Wildlife Protection, Mitigation and Enhancement Planning for Grand Coulee Dam (Creveling and Renfrow 1986) through a Habitat Evaluation Procedures (HEP) study. The HEP evaluation species were selected based on their use of specific habitat types and structural elements, and to represent other wildlife species that use those habitats. The HEP study results are provided in terms of Habitat Units (HUs), which are units of value based on both quality and quantity of habitat. The study provides the number of habitat units to be provided in compensation for the construction losses and identifies potential mitigation areas.

Table 40.9 summarizes the loss of habitats as determined by Creveling and Renfrow (1986). The loss of habitat value for individual wildlife species, as determined through the HEP study and expressed in HUs, is summarized in Table 40.10. The majority of habitat losses occurred in the Upper Columbia Subbasin; the San Poil and Spokane subbasins contain relatively small proportions total lands inundated by Lake Roosevelt. Progress made to date toward implementing the recommended mitigation strategies is summarized below in terms of HUs by species; approximately 49 percent of the mitigation remains to be implemented.

Table 40.9. Acres of Habitat Types Affected by Grand Coulee Dam Project Construction and Inundation

Project	Habitat Type	Acres of Habitat Inundated
Grand Coulee		
	Islands	1,000
	Riparian lands	2,000
	Shrub-steppe uplands	14,000
	Forested uplands	25,000
	Agricultural lands	15,000
	Barren lands	13,000
Total		**70,000**[1]

(*Source*: Creveling and Renfrow 1986)

[1] This figure includes the rivers' shorelines between the high and low water levels. USBR revised its figure for lands inundated by Roosevelt Reservoir to include only lands above the mean high water level. This revised figure is approximately 56,000 acres (Creveling and Renfrow 1986).

Table 40.10. Status of Mitigation for Construction and Inundation Wildlife-Habitat Losses, Grand Coulee Project[1]

Grand Coulee Project	Species	Habitat Units lost	Habitat Units acquired	Percent complete
	Mourning dove	9,316	1,001	10.7%
	Mule deer	27,133	19,056	70.2%
	Riparian forest	1,632	234	14.3%
	Riparian shrub	27	131	100.0%
	Ruffed grouse	16,502	2,908	17.6%
	Sage grouse	2,746	7,432	100.0%
	Sharp-tailed grouse	32,723	16,854	51.5%
	White-tailed deer	21,632	9,064	41.9%
	Canada goose (nesting)	74 (islands)	-	0.0%
Total all species		**111,785**	**56,680**	**50.7%**

(*Sources*: BPA 2002; WDFW 2004b, CCT 2004a)

[1] Note: This table shows the total HUs lost at the Grand Coulee Project; mitigation of this loss is to be coordinated between the San Poil, Spokane, and Upper Columbia subbasins. Most of the direct effects occurred to habitats located in the Upper Columbia Subbasin.

The majority of habitat losses associated with the Grand Coulee Project occurred within the Upper Columbia Subbasin; portions of the San Poil and Spokane subbasins (as delineated for this plan) were also affected by creation of Lake Roosevelt. Terrestrial resources mitigation required for the Grand Coulee Project in the San Poil Subbasin is to be coordinated between the three wildlife management jurisdictions in these three subbasins: the Colville Confederated Tribes, Spokane Tribe, and WDFW. The total number of HUs to be acquired as mitigation for the Grand Coulee Project (111,785) is presented in corresponding tables in each of the three subbasin chapters. Note that this is a single, coordinated mitigation target rather than three independent subbasin targets.

The Grand Coulee construction losses for terrestrial resources were apportioned between the three wildlife management jurisdictions in these subbasins: the Colville Tribe, Spokane Tribe, and WDFW (Creveling and Renfrow 1986). To date, WDFW has acquired the greatest number of HUs (50,678 HUs acquired, approximately 89 percent complete per WDFW 2004b); the Colville and Spokane tribes each have a substantial number of HUs remaining to be acquired.

40.3.2 Operational Effects of Federal Hydrosystem Projects

Ongoing operation of the Grand Coulee Project affects terrestrial resources of the San Poil Subbasin through:

1) ongoing erosion of shoreline habitats along the San Poil arm of Lake Roosevelt;
2) ongoing absence of riparian vegetation, particularly woody species, along portions of the reservoir subjected to sustained drawdowns;
3) ongoing disturbance of wildlife and wildlife-habitats (for example, nest sites, amphibian breeding sites) within the fluctuation zone of the reservoir; and

4) ongoing absence of anadromous fish in the Subbasin, resulting in loss of key food item for numerous wildlife species and important nutrient input for the riverine ecosystem.

Erosion sites along Lake Roosevelt have been in inventoried and described by USBR (1984). The effects of erosion on wildlife and other terrestrial resources have not been determined. Other ongoing effects of operation of the Grand Coulee Project have not been assessed. Assessment and mitigation of the operational effects of the project are required under the Northwest Power Act, and these activities are considered a high priority by the San Poil Subbasin Planning Team.

40.3.3 Secondary Effects of Federal Hydrosystem Projects and Other Limiting Factors

The federal hydropower system contributed to development in the San Poil Subbasin primarily by providing an inexpensive source of power. The Subbasin supports high levels of timber management; grazing, agriculture, and residential land uses also occur throughout much of the Subbasin. Factors that currently limit terrestrial resources in the Subbasin are dominated by loss of habitat through conversion and modification, disturbance of wildlife species by humans and human activities, and interactions with nonnative plant and animal species.

40.4 Interpretation and Synthesis

The San Poil Subbasin has been highly modified from historic conditions due primarily to timber harvest, increased road densities, agriculture and grazing. An estimated one percent of native habitats have been converted to agriculture and developed land uses. The majority of the remaining habitats have been modified through land use practices.

Construction of the Grand Coulee Dam directly affected the San Poil River and adjacent habitats for 12 miles upstream of the mouth. Grand Coulee, and the downstream Chief Joseph Project, currently prevent all anadromous fish from accessing the San Poil Subbasin. Reservoir fluctuations, in combination with wind and wave action and unstable soils, cause erosion along portions of the Lake Roosevelt shoreline within the Subbasin. Road densities are high throughout the majority of the Subbasin and highly protected lands are relatively low in acreage. Secondary effects of the FCRPS projects on development of the Subbasin are wide-reaching, including timber management, agriculture, grazing, and residential development.

Terrestrial resources mitigation related to the Grand Coulee Project is approximately 51 percent complete. Completion of the mitigation is the highest terrestrial resources priority for the Subbasin Work Team, followed by assessment and mitigation of operational impacts of the hydrosystem projects.

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41 San Poil Subbasin Inventory of Existing Programs – Terrestrial

41.1 Current Management Directions

Within the San Poil Subbasin, fish and wildlife resources are co-managed by the State of Washington and the Colville Tribes outside of the boundaries of the Colville Indian Reservation and by the Colville Tribes within the boundaries of the reservation. Other state and federal agencies, including, but not limited to, the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), U.S. Army Corps of Engineers (USACE), Environmental Protection Agency (EPA), the Natural Resources Conservation Service (NRCS), and the Washington Department of Ecology (WDOE) are involved in programs that affect the land or water that provide habitat for fish and wildlife. A complete list of state, federal, and Tribal entities that are involved in management of fish and wildlife or their habitats is included in section 2.4.1, along with a description of each agency's management direction.

The Natural Resources Department of the Colville Tribes has management and regulatory authority that includes, but is not limited to, the following areas: fish and wildlife management, enforcement, land use activities, water rights and adjudication, development permitting, hydraulics permitting and shoreline protection (for example, Confederated Tribes of Colville Reservation (CTCR) Shoreline Management Act). CTCR/Bureau of Indian Affairs uses the Colville Reservation Forest Plan, Integrated Resource Management Plan, Code of Federal Regulations, and others to manage land, fish, and wildlife on the Colville Reservation. It is the mission of the Fish and Wildlife Division, "To provide subsistence, cultural opportunities and economic benefits for the Tribal Membership through sustainable ecosystem management. We accept our responsibility to manage, protect, and enhance tribal natural resources and to provide multiple products and services for the tribal membership on the reservation and on accustomed and traditional lands." The current management direction is to maintain viable populations (numbers and distribution of reproductive individuals) of native and desired nonnative species of fish and wildlife, and their supporting habitats, while providing sufficient numbers to meet cultural, subsistence and recreational needs.

41.1.1 Local Government

Ferry Conservation District (FCD)

FCD is involved in several partnership efforts from individuals and agencies, to school districts and Tribes. As a political subdivision of Washington State government, under the umbrella of the Washington State Conservation Commission, FCD provides natural resources planning and management services to individuals, associations, and local government.

Ferry County Codes

Nine codes or parts of codes may affect fish and wildlife. Most of these address urban planning/land use.

Okanogan County Codes
Ten codes or parts of codes may affect fish and wildlife. Most of these address urban planning/land use.

41.2 Existing and Imminent Protections

Refer to Section 2.4 for a description of the natural resources management agencies and organizations and their primary authorities at the federal, state, and regional levels. Many State and Federal laws and regulations protect natural resources within the IMP. Tribal governments and local governments also have regulations that protect specific areas or locations within the IMP. The following section summarizes the existing and imminent protections for federal and state threatened and endangered wildlife species known or potentially occurring in the San Poil Subbasin. Refer to the San Poil Subbasin Terrestrial Resources Assessment, Section 40, for detailed description of the occurrence and status of federal and state threatened and endangered species in the subbasin.

41.2.1 Endangered Species Act

Bald Eagle
Bald eagles are currently listed as threatened under the federal Endangered Species Act. This provides protection from "take" (i.e., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect…). Bald eagles were proposed for removal from the endangered species list in 1999. That action has not been taken, in part because one prerequisite for delisting, a nationwide monitoring plan, has not yet been met. If a development project occurs on federal land or involves federal funding (i.e., nexus), an endangered species consultation may be required by the U.S. Fish and Wildlife Service.

Bald eagles are classified as threatened in Washington State.

In 1984, Chapter 77.12.655 RCW was adopted by the Washington State Legislature, requiring the establishment of rules defining buffer zones around bald eagle nests and roost sites. The law states that the rules shall take into account the need for variation of the extent of the buffer zone on a case by case basis.

In 1986, the Bald Eagle Protection Rules (WAC 232-12-292) were adopted by the Washington Wildlife Commission. The rules require permitting agencies (i.e., Department of Natural Resources, counties, cities) to review the database of bald eagle nest and communal roost locations prior to issuing permits for timber harvest, clearing land, residential development, etc. If the activity is within ½ mile of an eagle nest, the permitting agency notifies WDFW, who works with the applicant to develop a Bald Eagle Management Plan (see WAC 232-12-292 (4.4)).

Deliberate harassment of eagles is prohibited by state and federal law (Chapter 77.15.130 RCW; Bald Eagle Protection Act; Endangered Species Act; and, Migratory Bird Treaty Act).

Canada Lynx
The lynx was listed as a state threatened species in Washington in 1993 and was listed as

a federally threatened species under ESA in April 2000. The San Poil Subbasin includes land within designated lynx analysis units (Kettle Range and Vulcan-Tunk).

Legal take of lynx in Washington ceased in 1991 and consequent designation as a threatened species presently provides complete protection from hunting or trapping at both the state (Chapter 77.16.120 RCW) and federal level.

Gray Wolf
The gray wolf is listed as a federally threatened species under the ESA and is classified in Washington State as endangered.

In Washington, protection of gray wolf from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of state endangered species with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

Grizzly Bear
The grizzly bear listed as a threatened species under ESA and as an endangered species in the state of Washington. Protection of grizzly bear in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of state endangered species with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

Fisher
The fisher is will become a candidate for federal listing under the ESA in the near future (USFWS 2004). Fisher is a state endangered species in Washington.

In Washington, fisher is managed based on the findings of the WDFW status report (Lewis and Stinson 1998). Protection of fisher in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of state endangered species with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

American White Pelican
The American white pelican is listed as an endangered species in Washington.. Protection of American white pelican in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of an American white pelican with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

Northern Leopard Frog
The northern leopard frog is classified as an endangered species in Washington. Protection of northern leopard frog in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of northern leopard frog with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

Sage Grouse
The sage grouse is classified as a threatened species in Washington. Protection of sage grouse in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of sage grouse with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

Sharp-tailed Grouse
The Columbian sharp-tailed grouse is classified as a threatened species in Washington. Protection of sharp-tailed grouse in Washington from hunting, possession, or control is provided under Chapter 77.16.120 RCW. Washington further charges those convicted of illegal take of sharp-tailed grouse with a $2,000 reimbursement for each animal taken or possessed (Chapter 77.21.070 RCW).

41.3 Inventory of Recent Restoration and Conservation Projects

Below is a summary of some of the BPA and non-BPA funded projects identified within the San Poil Subbasin. Projects that are relevant to both terrestrial and aquatic resources may be presented in the aquatic inventory section for this subbasin (see Section 39). Refer to Section 2.4, Inventory of Projects in the IMP, for description of projects involving more than one subbasin. Major Grand Coulee Dam wildlife mitigation projects are located and manged in more than one subbasin. Appendix H includes more comprehensive listings of the BPA and non-BPA funded project conducted in this subbasin and the entire IMP.

41.3.1 BPA Funded Projects

Project #1992-048-00 Colville Tribes Hellsgate Wildlife Mitigation

Project Description:

The focus of the Hellsgate Project is the protection, restoration, and enhancement of critical winter habitat for big game and shrub-steppe/sharp-tailed grouse habitat on lands purchased/managed for mitigation on the Colville Indian Reservation. At present, the Hellsgate Project protects and manages 25,501 acres for the biological requirements of wildlife (CCT 2004). Currently there are 12 management units that make up the Hellsgate Project, most are located on or near the Columbia River (Lake Rufus Woods and Lake Roosevelt) and surrounded by Tribal land. These management units contain a wide diversity of vegetative types and habitats for a variety of wildlife.

Associated Monitoring:

- Monitor threatened and endangered species and habitats of concern.
- Conduct HEP to evaluate habitats and collect HU data for mitigation accounting.
- Conduct annual neo-tropical bird surveys for species diversity using project lands.
- Conduct population and trend data to monitor habitat use and seasonal distribution.
- Coordinate with other agencies and Tribes on Columbia River mitigation issues and methodologies.

Accomplishments:
- Acquired 23,000 acres of habitat for mitigation.
- Protected 11,000 Habitat Units on acquired lands.
- Installed fencing on several units.
- Conducted noxious weed control on acquired lands.

Notes:
No enhancements to project lands to offset hydropower losses have taken place. Some small-scale enhancements have been conducted using USDA funds to plant native vegetation on selected sites.

Project #21034 Colville Tribes Habitat Restoration and Adaptive management of Columbian Sharp-tailed Grouse on the Intermountain Province

Project Description:
Develop and implement an adaptive management plan that will include restoration of native plant communities on lands within the Intermountain Province to support viable meta-populations of Columbia sharp-tailed grouse.

Associated Monitoring:
Monitor sharp-tailed grouse and their habitats using scientific principals and techniques to ensure that project objectives are being met and to provide a basis for use of adaptive management when appropriate. To evaluate species and habitat responses to management activities for the benefit of Sharp-tailed grouse and other wildlife using similar habitats. Develop a Habitat Suitability Index for the area and create a sharp-tailed grouse management plan for the Colville Reservation.

Accomplishments:
- Literature review of all information concerning sharp-tailed grouse on the Intermountain Province.
- Conducted grouse surveys on known and historic leks.
- Surveyed for new leks.
- Trapped and collected data on marked 48 birds fitted with radio collars.
- Followed and mapped habitats used by marked grouse throughout the year.
- Conducted genetic variance tests on trapped birds.
- Determined sharp-tailed grouse seasonal ranges, and associated GIS maps.
- Formed and coordinated with a regional grouse team for support and input.
- Reported our progress through quarterly reports and unpublished papers.
- Conducted a public outreach program to inform individuals of status and future of sharp-tailed grouse on the Colville Indian Reservation and Intermountain Province.

Notes:
This is currently the last year of funding for the sharp-tailed grouse project. The regional grouse team agrees that this is an extremely important project that addresses concerns of various agencies throughout the region dealing with a State Threatened and Endangered species. It is the recommendation of the regional grouse team that future funding for this

project be a priority in within the IMP and that the work continue to conserve and protect this species and associated habitats.

41.3.2 Non-BPA Funded Projects

Water and Soil Protection Project (WASP)

Project Description:

The intent of WASP was to partner with landowners and other natural resource agencies to conduct a cost-share program, offer technical assistance, and provide a public information and educational outreach programs for water quality improvement and protection. Eligible activities included streambank stabilization, riparian vegetation restoration, spraying of noxious weeds, riparian fencing, hard crossings, off stream watering improvements and erosion control BMPs. Also provided was free engineering to landowners and agencies through a separate engineering grant for implementation projects. The project was funded by the Washington State Conservation Commission and ended in 2002.

Associated Monitoring:

Continued Monitoring by FCD Staff.

Accomplishments:

Technical assistance including permit processing, on-the-ground site surveying, and engineering design development with NRCS and the N.E. Area District Engineers were facilitated by FCD. Numerous other landowners were offered technical assistance to help them address water quality problems on their lands. Many more were helped over the phone and in personal office meetings to answer questions and provide information or suggest other agencies to contact.

On-the-ground accomplishments for these projects resulted in several hundred feet of streambank stabilization through engineered designs and bioengineering projects. Many acres of erosion control and habitat development came from planting grass mixture, shrubs, and trees. Additional acres of steep slopes of noxious weed (knapweed) received chemical treatments to prevent further erosion and aid in the re-establishment of beneficial plants. These activities were conducted on the San Poil Watershed (WRIA 52) and Kettle River Watershed (WRIA 60).

WASP has had a very positive impact on the Ferry County landscape and has enabled FCD to educate and assist the families who live here to improve water quality functions and values. Each engineered and bioengineering design, as well as other water and landscape BMPs that are implemented provide a testing ground for the District upon which to refine BMP designs and applications.

Water and Soil Protection Project II (WASP II)

Project Description:

The intent of WASP II (Continuing the concepts from WASP) was to partner with landowners and other natural resource agencies to conduct a cost-share program, offer technical assistance, and provide a public information and educational outreach programs

for water quality improvement and protection. Eligible activities included streambank stabilization, riparian vegetation restoration, spraying of noxious weeds, riparian fencing, hard crossings, off stream watering improvements and erosion control BMPs. We also provide free engineering to landowners and agencies through a separate engineering grant for implementation projects. The project was funded by the Washington State Conservation Committee and ended in 2002.

Associated Monitoring:
Continued Monitoring by FCD Staff.

Accomplishments:
Technical assistance including permit processing, on-the-ground site surveying, and engineering design development with NRCS and the N.E. Area District Engineers were facilitated by FCD. Numerous other landowners were offered technical assistance to help them address water quality problems on their lands. Many more were helped over the phone and in personal office meetings to answer questions and provide information or suggest other agencies to contact.

On-the-ground accomplishments for these projects resulted in several hundred feet of streambank stabilization through engineered designs and bioengineering projects. Many acres of erosion control and habitat development came from planting grass mixture, shrubs, and trees. Additional acres of steep slopes of noxious weed (knapweed) [received chemical treatments] to prevent further erosion and aid in the re-establishment of beneficial plants. These activities were conducted on the San Poil Watershed (WRIA 52) and Kettle River Watershed (WRIA 60).

WASP II has had a very positive impact to the Ferry County landscape and has enabled FCD to educate and assist the families who live here to improve water quality functions and values. Each engineered and bioengineering design, as well as other water and landscape BMPs that are implemented provide a testing ground for the District upon which to refine BMP designs and applications.

Water and Soil Protection Project III (WASP III)
Project Description:
The intent of WASP III (Continuing the concepts from WASP II) was to partner with landowners and other natural resource agencies to conduct a cost-share program, offer technical assistance, and provide a public information and educational outreach programs for water quality improvement and protection. Eligible activities included streambank stabilization, riparian vegetation restoration, spraying of noxious weeds, riparian fencing, hard crossings, off stream watering improvements and erosion control BMPs. We also provide free engineering to landowners and agencies through a separate engineering grant for implementation projects. The project is funded by the Washington State Conservation Committee, and is scheduled to terminate at the end of 2003.

Associated Monitoring:
Continued Monitoring by FCD Staff.

Accomplishments:
Technical assistance including permit processing, on-the-ground site surveying, and engineering design development with NRCS and the N.E. Area District Engineers were facilitated by FCD. Numerous other landowners were offered technical assistance to help them address water quality problems on their lands. Many more were helped over the phone and in personal office meetings to answer questions and provide information or suggest other agencies to contact.

On-the-ground accomplishments for these projects resulted in several hundred feet of streambank stabilization through engineered designs and bioengineering projects. Many acres of erosion control and habitat development came from planting grass mixture, shrubs, and trees. Additional acres of steep slopes of noxious weed (knapweed) received chemical treatments to prevent further erosion and aid in the re-establishment of beneficial plants. These activities were conducted on the San Poil Watershed (WRIA 52) and Kettle River Watershed (WRIA 60).

WASP III has had a very positive impact to the Ferry County landscape and has enabled FCD to educate and assist the families who live here to improve water quality functions and values. Each engineered and bioengineering design, as well as other water and landscape BMPs that are implemented provide a testing ground for the District upon which to refine BMP designs and applications.

Riparian Demonstration and Education Project (RDEP)
Project Description:
The Riparian Demonstration and Education Project (RDEP) implemented riparian protection, enhancement, and restoration for water quality benefits throughout Ferry County Conservation District in Water Resource Inventory Area (WRIA) 52, 58, and 60. This project met the challenge of protection and restoration of riparian areas adjacent streams and lakes in such a manner that maintains water quality integrity while improving, protecting, or enhancing fish and wildlife habitat. The implementation projects in this program are available for use in individual, group, associations, and schools for education efforts into the future. Many varieties of BMPs have been implemented and landowners can view the different strategies used to create the various types of environmental protection and enhancement that we have utilized. This project is funded by the Washington State Department of Ecology and sponsored by the FCD. The project ends in 2003.

Associated Monitoring:
FCD Staff continues the monitoring efforts for this project.

Accomplishments:
Developed a Riparian Education and Demonstration Program to include implementation of projects on the FCD property, and a native plant nursery for use in this and future implantation projects. Conducted a partnering restoration effort with several individual landowners, agencies, the Colville Confederated Tribes, and School Districts (as far as Seattle). Implemented an extensive public education and information program. Perform a comprehensive monitoring program.

41.4 Strategies Currently Being Implemented Through Existing Projects

41.4.1 Limiting Factors and Strategies

Refer to Figure 39.1 of the Aquatic Inventory section for a graph displaying the percent of all fish and wildlife mitigation projects in the Subbasin that respond to specific limiting factors. Wildlife mitigation projects in the basin respond primarily to the limiting factors of habitat quantity and quality; in addition, the sharp-tailed grouse project, mule deer study, and cougar research addressed lack of information on wildlife species.

Figure 39.2 of the Aquatic Inventory section shows the types of management strategies used in the fish and wildlife mitigation projects in the Subbasin. Wildlife mitigation projects in the Subbasin have used primarily the habitat acquisition and habitat improvement/restoration strategies. Other strategies include RM&E and watershed planning/recovery planning.

41.4.2 Gaps Between Actions Taken and Actions Needed

The primary terrestrial resources mitigation need in the subbasin, with respect to the FCRPS, is completion of the construction loss mitigation for the Grand Coulee Project. The construction loss assessment was completed in 1986 (Creveling and Renfrow 1986). Currently, the mitigation for the construction wildlife losses in terms of Habitat Units (HUs) is about 51 percent complete (refer to Section 40). Acquisition of HUs for the Washington State threatened sage grouse has been completed; future enhancement and monitoring funding will be necessary to improve and maintain habitat values. Acquisition of HUs for the Washington State threatened sharp-tailed grouse is approximately 52 percent complete. Populations of this species are considered at very high risk in the state and continued action to enhance habitats and populations in the province is needed.

Additional funding for habitat acquisitions, enhancement and/or restoration measures, and maintenance funding will be necessary to meet the existing construction loss mitigation obligation.

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42 San Poil Subbasin Management Plan

The San Poil Subbasin Management Plan was developed by the San Poil Subbasin Work Team. Detailed information describing the membership and formation of the Subbasin Work Teams and the process used to develop and adopt the management plan can be found in Section 1.2. In general, the components of the management plan, including the subbasin vision, guiding principles, and prioritized biological objectives and strategies were developed in a series of six meetings between June 2003 and March 2004.

The Oversight Committee (OC), Technical Coordination Group, and the San Poil Subbasin Work Team worked collaboratively to establish technically sound objectives and strategies that respond to the limiting factors identified in the subbasin assessment. The management plan was developed in several iterations between the OC and Subbasin Work Teams and the Technical Coordination Group.

Biological objectives were developed using a tiered approach. The Council developed the Columbia River Basin biological goals based on the scientific principles identified in the 2000 Fish and Wildlife Plan. The OC established the province level objectives under the Columbia River Basin level goals by responding to recommendations from the GEI Team, the Technical Coordination Group, and the Subbasin Work Teams. The Subbasin Work Teams developed the subbasin level biological objectives and strategies under the Province objectives, with assistance from the Technical Coordination Group and the GEI Team.

42.1 Summary of San Poil Assessment and Limiting Factors

The vision and biological objectives of the management plan reflect what is learned in the assessment and inventory work. In the San Poil Subbasin, the aquatic and terrestrial assessments and inventories are described in detail in sections 38 to 41 of this document. A brief overview of the key limiting factors that are addressed in this management plan is included below.

42.1.1 San Poil Aquatic Assessment and Limiting Factors

Redband/rainbow trout, Chinook, and kokanee were selected as focal species in the San Poil Subbasin. All three of these species are native to the San Poil Subbasin, although anadromous Chinook are no longer present in the Subbasin because of the lack of fish passage at Chief Joseph and Grand Coulee dams.

Overall, the most important limiting factors for fisheries in the San Poil Subbasin resulted from the construction of Grand Coulee Dam and the subsequent loss of anadromous fishes and the conversion of rivers into reservoirs. The loss of the anadromous life history in the blocked area had a wide range of impacts on the fish, wildlife, and people of the area. These impacts are described in more detail in sections 2.2 and 1.4.1, but include loss of aquatic productivity, loss of fishing opportunity, increased fishing and hunting pressure on other species, and increased stocking of nonnative species. These limiting factors are addressed in the San Poil Subbasin Management Plan through objectives 1A1, 1A2, 2A1, 2A2, 2A3, 2C1, and 2C2.

We used QHA modeling to help us assess the limiting factors in the rivers and streams of the Subbasin. The most significant stream habitat limiting factors for the focal species are listed in tables 42.1-1, 42.1-2, and 42.1-3. In parentheses is the number of reaches or watersheds within the San Poil Subbasin where that particular habitat attribute is the worst habitat-related limiting factor. The numbers in the Objective column correspond to the subbasin objectives that were developed in this management plan to address this limiting factor. Aquatic objectives for the San Poil Subbasin are described in more detail in Section 42.3.

Within the San Poil Subbasin obstructions was the variable that was the greatest problem for resident redband trout, while low flows was the habitat variable that was most often indicated for adfluvial rainbow trout. Low flow, fine sediment, and obstructions were implicated relatively equally as the most deteriorated habitat variable for kokanee.

Table 42.1-1. Stream habitat conditions that currently most deviate from the reference for adfluvial rainbow trout, San Poil Subbasin. The number in parenthesis is the number of reaches or watersheds within the San Poil Subbasin where that particular habitat attribute is the worst habitat-related limiting factor. The numbers in the Objective column correspond to the subbasin objective that was developed to address this limiting factor in Section 42.3.

Adfluvial Rainbow	
Habitat Condition	**Objective**
Low Flow (15)	1B2, 1B7
Obstructions (11)	1B2. 1B1
High Flow (10)	1B2, 1B7
Habitat Diversity (7)	1B2. 1B6
Fine Sediment (6)	1B2, 1B5
Riparian Condition (5)	1B2, 1B3
Low Temperature (4)	1B2
Oxygen (3)	1B2
High Temperature (1)	1B2, 1B4

Table 42.1-2. Stream habitat conditions that currently most deviate from the reference for resident rainbow trout, San Poil Subbasin. The number in parenthesis is the number of reaches or watersheds within the San Poil Subbasin where that particular habitat attribute is the worst habitat-related limiting factor. The numbers in the Objective column correspond to the subbasin objective that was developed to address this limiting factor in Section 42.3.

Resident Redband	
Habitat Condition	**Objective**
Obstructions (28)	1B2, 1B1
Riparian Condition (22)	1B2, 1B3
Habitat Diversity (21)	1B2, 1B6
Low Flow (10)	1B2, 1B7
Channel Stability (8)	1B2, 1B6

Resident Redband	
Habitat Condition	**Objective**
Fine Sediment (5)	1B2, 1B5
High Temperature (1)	1B2, 1B4

Table 42.1-3. Stream habitat conditions that currently most deviate from the reference for kokanee, San Poil Subbasin. The number in parenthesis is the number of reaches or watersheds within the San Poil Subbasin where that particular habitat attribute is the worst habitat-related limiting factor. The numbers in the Objective column correspond to the subbasin objective that was developed to address this limiting factor in Section 42.3.

Kokanee	
Habitat Condition	**Objective**
Fine Sediment (6)	1B2, 1B5
Low Flow (5)	1B2, 1B7
Obstructions (5)	1B2, 1B1

Although habitat degradation is one of the primary limiting factors for native fishes within the San Poil Subbasin, other factors have negatively impacted the native fish communities within the Subbasin. Nonnative fish introductions within the San Poil Subbasin and in the mainstem Columbia River have had negative impacts on the native fish communities of the San Poil River and its tributaries. The recreational and subsistence fishery is heavily dependent on nonnative fishes such as eastern brook trout and walleye. These fishes have a variety of negative impacts on native fish populations within the Subbasin. Direct predation, competition, and genetic hybridization are a few of the documented consequences of nonnative species introductions. Although it is well documented that nonnative species can have detrimental effects on native fishes, large scale changes in habitat often force managers to fill voids in recreational and subsistence fisheries with species that are more suited for the currently available altered habitats. Management plan objectives that are designed to address nonnative species issues are 1C1, 2A2, and 2C2.

42.1.1 San Poil Terrestrial Assessment and Limiting Factors

Wildlife in the San Poil Subbasin are limited by habitat quantity and quality. Construction of the Grand Coulee Project affected habitats along the lower 12 miles of the San Poil River. In addition, the project had a number of secondary effects to terrestrial resources, including accelerated rates of industrial, agricultural, and residential development leading to loss of habitat; increased hunting pressure on wildlife; and loss of salmonid nutrients to the ecosystem.

Factors currently limiting terrestrial resources in the Subbasin are dominated by loss of habitat and modification of habitat quality as a result of human land uses. The San Poil Subbasin has been highly modified from historic conditions due primarily to timber harvest, increased road densities, agriculture and grazing. Approximately two percent of native habitats have been converted to agriculture and developed land uses.

Management plan objectives addressing the losses from the construction of and inundation from the FCRPS are Objective 1A and associated sub-objectives. Management plan objectives that address the operational impacts to terrestrial species and habitats are Objective 1B and associated sub-objectives. Objectives 2A through 2D address secondary impacts of the hydropower system, as well as other impacts to terrestrial resources that have affected the Subbasin.

42.2 Subbasin Vision and Guiding Principles

The vision for the San Poil Subbasin is:

> *We envision the San Poil Subbasin and Curlew Lake being comprised of and supporting viable, diverse wildlife populations, and their habitats, that contribute to the social, cultural, and economic wellbeing of the Pacific Northwest.*

In addition to the vision, the members of the San Poil Subbasin Work Team drafted the following guiding principles:

1. Subbasin planning should be consistent with the Northwest Power Act, Northwest Power and Conservation Council's Fish and Wildlife Program and technical guidance for subbasin planning, while complementing existing plans, policies, and planning efforts.
2. Integrated subbasin plans should consider ecological and political boundaries.
3. Human interests can be balanced with fish and wildlife needs.
4. All people are stewards for future generations.
5. The subbasin plan should be based on best-available science.
6. Subbasin plans will address cultural, recreational, and subsistence issues.
7. Public involvement is essential for successful plan development and implementation.
8. The subbasin plan will give priority to self-sustaining fish and wildlife populations when appropriate.

42.3 Aquatic Objectives and Strategies

The Columbia River Basin and IMP objectives for aquatic resources presented below were not assigned priorities by the OC. The San Poil Subbasin objectives which follow were prioritized by the Work Team. The ranking of the objectives is given in parenthesis after the objective. The strategies are presented in order of priority beneath each objective. Objectives and strategies also included in the research, monitoring, and evaluation plan are marked with an asterisk.

Columbia River Basin Level Category 1: Mitigate for resident fish losses.

Columbia River Basin Level Goal 1A:
Complete **assessments of resident fish losses** throughout the Columbia River Basin resulting from the federal and federally-licensed hydrosystem, expressed in terms of the various critical population characteristics of key resident fish species.

Province Level Objective 1A:
Fully mitigate fish losses related to construction and operation of federally-licensed and federally operated hydropower projects.

Subbasin Objective 1A1: Expand stable littoral zones along the San Poil arm of Lake Roosevelt to contribute to the Upper Columbia Subbasin objective of stabilizing 10 percent of the reservoir surface area. (Priority 10)

Strategy a: Use vegetation enhancements, annual seeding and water retention in backwater areas to increase near-shore fish production, increase shoreline stability, and reduce erosion.

Strategy b: Conserve and protect intact or restored riparian areas.

Strategy c: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 1A2: Assess and implement nutrient enrichment program for Lake Roosevelt and tributaries. (Priority 12)

Strategy a: Return marine derived nutrients to systems consistent with prudent disease and fish health practices.

Strategy b: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Columbia River Basin Level Goal 1B:
Maintain and restore **healthy ecosystems and watersheds**, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms. Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to the extent that they have been affected by the development and operation of the federal and federally-licensed hydrosystem.

Province Level Objective 1B:
Protect and restore in-stream and riparian habitat to maintain functional ecosystems for resident fish, including addressing the chemical, biological, and physical factors influencing aquatic productivity.

Subbasin Objective 1B1: Inventory all barriers in San Poil Subbasin by 2005 and begin implementing necessary passage improvements associated with man made barriers by 2006. (Priority 7)

Strategy a: Remove identified barriers at 20 percent per year over five years, where prudent. Work team note: Many barriers have already been identified and prioritized by agencies and tribes and removal should not be held up until others are inventoried.

Strategy b*: Inventory and prioritize barrier removal.

Strategy c*: Develop minimum in-stream flows for fish-bearing streams within the San Poil River Subbasin that meet the biological requirements of salmonid fishes.

Strategy d: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Strategy e: Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.

Subbasin Objective 1B2: Begin implementation of habitat strategies for addressing identified limiting factors for all focal species and native fishes by 2005. (Priority 1)

Strategy a: Conduct riparian habitat restoration, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species.

Strategy b: Improve water quality on Curlew Lake.

Strategy c: Return marine derived nutrients to systems consistent with prudent disease and fish health practices.

Strategy d: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Strategy e: Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road densities to desired levels in accordance with existing land management plans.

Strategy f: Construct spawning channels or acclimation sites to increase natural salmonid production.

Subbasin Objective 1B3: Enhance, conserve, and protect riparian habitats to the extent that 80 percent of each stream's riparian areas remain intact and functional. (Priority 3)

Strategy a: Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species.

Strategy b: Conserve and protect intact or restored riparian areas.

Strategy c: Limit livestock from riparian areas and replant native riparian plants where needed.

Strategy d: Use vegetation enhancements, annual seeding and water retention in backwater areas to increase near-shore fish production, increase shoreline stability, and reduce erosion.

Strategy e: Protect and restore cottonwood galleries.

Strategy f: Implement weed control.

Strategy g: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 1B4: Maintain and/or achieve stream temperatures below 18^{o} C for all streams that support salmonid fish populations. (Priority 6)

Strategy a: Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species.

Strategy b: Conserve and protect intact or restored riparian areas.

Strategy c: Limit livestock from riparian areas and replant native riparian plants where needed.

Strategy d*: Develop minimum in-stream flows for fish-bearing streams within the San Poil River Subbasin that meet the biological requirements of salmonid fishes.

Strategy e: Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.

Strategy f: Enforce water right allocations (both WDOE and Tribes).

Strategy g: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 1B5: Enhance and maintain streambed embeddedness at between 20 percent and 30 percent on all streams with known salmonid populations. (Priority 9)

Strategy a: Conduct riparian habitat restoration, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species.

Strategy b: Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road densities to desired levels in accordance with existing land management plans.

Strategy c: Install in-stream structures that improve habitat complexity (i.e. Vortex rock weirs, drop log structures, root wads, habitat boulders, etc.).

Strategy d: Limit livestock from riparian areas and replant native riparian plants where needed.

Strategy e: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 1B6: Reduce width to depth ratios to < 10 for all streams within the Subbasin. (Priority 11)

Strategy a: Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species.

Strategy b: Install in-stream structures that improve habitat complexity (Vortex rock weirs, drop log structures, root wads, habitat boulders, etc.).

Strategy c: Conserve and protect intact or restored riparian areas.

Strategy d: Limit livestock from riparian areas and replant native riparian plants where needed.

Strategy e: Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road

densities to desired levels in accordance with existing land management plans.

Strategy f: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 1B7: Protect and maintain flows adequate for all life stages of focal and native fish species in all intermittent, ephemeral, and perennial streams. (Priority 5)

Strategy a: Implement water conservation, storage, recharge and reclamation projects.

Strategy b: Develop minimum in-stream flows, and target flows, for fish-bearing streams within the San Poil River Subbasin that meet the biological requirements of salmonid fishes.

Columbia River Basin Level Goal 1C:
Restore **resident fish** species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where suitable habitat conditions exist and/or where habitats can be restored.

Province Level Objective 1C1:
Protect, enhance, restore, and increase distribution of native resident fish populations and their habitats in the IMP with primary emphasis on sensitive, native salmonid stocks.

Province Level Objective 1C2:
Maintain and enhance self-sustaining, wild populations of native game fish, and subsistence species to provide for harvestable surplus.

Province Level Objective 1C3:
Minimize negative impacts (for example, competition, predation, introgression) to native species from nonnative species and stocks.

Province Level Objective 1C4:
Increase cooperation and coordination among stakeholders throughout the province.

In the San Poil Subbasin, objectives that address the topics listed in Province level objectives 1C1 – 1C4 are covered in Category 2, below.

Province Level Objective 1C5:
Meet and exceed the recovery plan goals for federally listed **threatened and endangered fish** species.

Subbasin Objective 1C1: The San Poil Subbasin is within the NE Washington Bull Trout Recovery Unit and is identified as a "Research Need Area." Determine if the San Poil Subbasin can contribute to bull trout recovery. (Priority 15) (Refer to http://pacific.fws.gov/bulltrout/recovery.htm)

Strategy a: Conduct Bull Trout distribution and habitat suitability/availability survey.

Province Level Objective 1C6:
Restore **resident fish** species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where suitable habitat conditions exist and/or where habitats can be restored.

In the San Poil Subbasin, objectives that address the topics listed in Province level objective 1C6 are covered in Category 2, below.

Columbia River Basin Level Category 2: Substitute for anadromous fish losses.

Columbia River Basin Level Goal 2A:
Restore **resident fish** species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where suitable habitat conditions exist and/or where habitats can be feasibly restored.

Province Level Objective 2A1:
Protect, enhance, restore, and increase distribution of native resident fish populations and their habitats in the IMP with primary emphasis on sensitive, native salmonid stocks.

Province Level Objective 2A2:
Maintain and enhance self-sustaining, wild populations of native game fish, and subsistence species to provide for harvestable surplus.

Province Level Objective 2A3:
Minimize negative impacts (for example, competition, predation, introgression) to native species from nonnative species and stocks.

Province Level Objective 2A4:
Increase cooperation and coordination among stakeholders throughout the province.

The following subbasin objectives address province level objectives 2A1 – 2A4:

Subbasin Objective 2A1: Manage adfluvial rainbow trout populations to support recreational, cultural and subsistence fisheries with a catch per unit effort of > 1 fish per hour. (Priority 4)

Strategy a: Artificially produce sufficient trout to fulfill management needs in a manner that will maintain the genetic integrity of local stocks.

Strategy b: Increase enforcement of fishing and hunting regulations.

Strategy c: Increase education about laws and management of natural resources.

Strategy d*: Develop and implement a scientifically defensible means of quantifying fish productivity and habitat quality (similar to HEP).

Strategy e: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 2A2: Protect and enhance redband trout and kokanee salmon populations and preserve their genetic integrity, while maintaining their subsistence and recreational fishery. (Priority 2)

Strategy a: Wherever possible use locally adapted and genetically appropriate redband trout stocks to supplement natural populations or in harvest applications where emigration can occur.

Strategy b: Develop artificial production capacity for kokanee salmon that utilizes locally adapted and genetically appropriate stocks.

Strategy c: Construct spawning channels or acclimation sites to increase natural salmonid production.

Strategy d: Prevent introgression between hatchery and wild stocks.

Strategy e*: Determine genetic distribution of resident redband trout, identify limiting factors, and develop management strategies for addressing limiting factors by 2008.

Strategy f: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Subbasin Objective 2A3: Maintain existing westslope cutthroat fishery at Long and Gold lakes. (Priority 16)

Strategy a: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Columbia River Basin Level Goal 2B:
Provide sufficient populations of fish and wildlife for abundant opportunities for Tribal trust and treaty right harvest and for non-Tribal harvest.

Province Level Objective 2B
Focus restoration efforts on habitats and ecosystem conditions and functions that will allow for expanding and maintaining diversity within, and among, species in order to sustain a system of robust populations in the face of environmental variation.

The San Poil Subbasin did not develop objectives and strategies for Province Level Objective 2B. Objectives related to habitats and ecosystem conditions and functions are listed under Objective 1B

Columbia River Basin Level Goal 2C:
Administer and increase opportunities for **consumptive and non-consumptive resident fisheries** for native, introduced, wild, and hatchery reared stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historic abundance (includes intensive fisheries within closed or isolated systems).

Province Level Objective 2C1:
Artificially produce sufficient salmonids to supplement consistent harvest to meet management objectives.

Province Level Objective 2C2:
Provide both short- and long-term harvest opportunities that support both subsistence activities and sport-angler harvest.

The following subbasin objective address province level objectives 2C1 – 2C2:

Subbasin Objective 2C1: Provide for a diverse and sustainable recreational fishery at Curlew Lake. (Priority 13)

Strategy a: Continue and improve net pen program.

Strategy b: Improve water quality in Curlew Lake.

Strategy c: Offer bounty on northern pikeminnow.

Strategy d: Determine appropriateness of Tiger Muskie stocking program, including recreational and ecological impacts.

Subbasin Objective 2C2: Artificially produce enough native, genetically appropriate salmonids stocks to supplement consistent harvest to meet state and Tribal management objectives. (Priority 8)

Strategy a: Wherever possible use locally adapted redband trout to supplement natural populations or in harvest applications where emigration can occur.

Strategy b: Annually produce a minimum of 50,000 pounds of trout at the Colville Tribal Hatchery.

Strategy c: As appropriate, utilize net pens.

Strategy d: Develop artificial production capacity for kokanee salmon.

Strategy e: Prevent introgression between hatchery and wild stocks.

Columbia River Basin Level Goal 2D:
Reintroduce anadromous fish into blocked areas where feasible[1].

Province Level Objective 2D1:
Develop an anadromous fish reintroduction feasibility analysis by 2006 for Chief Joseph and by 2015 for Grand Coulee[2].

Subbasin Objective 2D1*: Complete feasibility study of potential restoration of anadromous Chinook and steelhead by 2015. (Priority 14)

Strategy a*: Conduct feasibility study.

Province Level Objective 2D2:
Develop an implementation plan within five years of feasibility determination for each facility.

42.1.2 Prioritization of Aquatic Objectives and Strategies

A detailed discussion of the methods used to prioritize the objectives and strategies is found in Section 1.2. In the San Poil Subbasin, the members of the Subbasin Work Team contributed to the development of ranking criteria which were based largely on the criteria in the Council's 2000 Fish and Wildlife Program. The IMP OC finalized the ranking criteria, but each Work Team was offered the option of adding additional subbasin specific criteria to the ranking. In the San Poil Subbasin, the Work Team decided to add the following subbasin specific criteria:

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[1] OC notes that "where feasible" is actual language from Council's Program.

[2] At this time the WDFW has no formal agency position, pro or con, on possible reintroduction and/or establishment of anadromous Chinook or steelhead above Grand Coulee Dam. Consideration for re-establishment of anadromous salmonid stocks above Grand Coulee Dam should be carefully evaluated in light of local habitat conditions, and potential impacts upon existing resident fish substitution programs currently in place to partially mitigate for the loss of historic anadromous fish resources.

- Terrestrial subbasin specific criteria – Is the objective/strategy mandated by the Northwest Power Act?
- Aquatic subbasin specific criteria – Does the objective/strategy enhance redband/rainbow trout and their habitats?

The Work Team rated the criteria for each objective from one to ten. An average ranking was calculated for each respondent for each objective, and then an overall Work Team average was calculated. Strategies were rated high, medium and low. These categories were converted to numeric values: 3, 2, and 1 respectively. The average ranking for each strategy was calculated for each respondent and for the Work Team as a whole.

The Work Team discussed the preliminary prioritization results for the objectives and strategies at the sixth Work Team meeting, and based on a consensus decision agreed to the final prioritization of the objectives and strategies.

The final prioritization of the aquatic objectives for the San Poil Subbasin is displayed in Table 42.3-1.

Table 42.3-1. Ranking of aquatic objectives in the San Poil Subbasin, with the limiting factor(s) that the objective was designed to address.

Objectives in Priority Order	Strategies in Priority Order	Limiting Factor(s) Addressed
(1) Begin implementation of habitat strategies for addressing identified limiting factors for all focal species and native fishes by 2005. **Objective 1B2**	**Strategy a:** Conduct riparian habitat restoration, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species. **Strategy b:** Improve water quality on Curlew Lake. **Strategy c:** Return marine derived nutrients to systems consistent with prudent disease and fish health practices. **Strategy d:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin. **Strategy e:** Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road densities to desired levels in accordance with existing land management plans. **Strategy f:** Construct spawning channels or acclimation sites to increase natural salmonid production.	Riparian habitat, water quality, nutrients, sediment
(2) Protect and enhance redband trout and kokanee salmon populations and preserve their genetic integrity, while maintaining their subsistence and recreational fishery. **Objective 2A2**	**Strategy a:** Wherever possible use locally adapted and genetically appropriate redband trout stocks to supplement natural populations or in harvest applications where emigration can occur. **Strategy b:** Develop artificial production capacity for kokanee salmon that utilizes locally adapted and genetically appropriate stocks. **Strategy c:** Construct spawning channels or acclimation sites to increase natural salmonid production. **Strategy d:** Prevent introgression between hatchery and wild stocks. **Strategy e*:** Determine genetic distribution of resident redband trout, identify limiting factors, and develop management strategies for addressing limiting factors by 2008. **Strategy f:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	Nonnative species, loss of anadromous life history
(3) Enhance, conserve, and protect riparian habitats to the extent that 80% of each stream's riparian areas remain intact and functional. **Objective 1B3**	**Strategy a:** Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species. **Strategy b:** Conserve and protect intact or restored riparian areas. **Strategy c:** Limit livestock from riparian areas and replant	Riparian habitat

Objectives in Priority Order	Strategies in Priority Order	Limiting Factor(s) Addressed
	native riparian plants where needed. **Strategy d:** Use vegetation enhancements, annual seeding and water retention in backwater areas to increase near-shore fish production, increase shoreline stability, and reduce erosion. **Strategy e:** Protect and restore cottonwood galleries. **Strategy f:** Implement weed control. **Strategy g:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin.	
(4) Manage adfluvial rainbow trout populations to support recreational, cultural and subsistence fisheries with a catch per unit effort of > 1 fish per hour. **Objective 2A1**	**Strategy a:** Artificially produce sufficient trout to fulfill management needs in a manner that will maintain the genetic integrity of local stocks. **Strategy b:** Increase enforcement of fishing and hunting regulations. **Strategy c:** Increase education about laws and management of natural resources. **Strategy d*:** Develop and implement a scientifically defensible means of quantifying fish productivity and habitat quality (similar to HEP). **Strategy e:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin.	Loss of anadromous life history, loss of lotic habitat, habitat degradation
(5) Protect and maintain flows adequate for all life stages of focal and native fish species in all intermittent, ephemeral, and perennial streams. **Objective 1B7**	**Strategy a:** Implement water conservation, storage, recharge and reclamation projects. **Strategy b:** Develop minimum in-stream flows, and target flows, for fish-bearing streams within the San Poil River subbasin that meet the biological requirements of salmonid fishes.	In-stream flows
(6) Maintain and/or achieve stream temperatures below 18^{o} C for all streams that support salmonid fish populations. **Objective 1B4**	**Strategy a:** Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species. **Strategy b:** Conserve and protect intact or restored riparian areas. **Strategy c:** Limit livestock from riparian areas and replant native riparian plants where needed. **Strategy d*:** Develop minimum in-stream flows for fish-bearing streams within the San Poil River subbasin that meet the biological requirements of salmonid fishes. **Strategy e:** Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.	Water temperature

Objectives in Priority Order	Strategies in Priority Order	Limiting Factor(s) Addressed
	Strategy f: Enforce water right allocations (both WDOE and Tribes). **Strategy g:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin.	
(7) Inventory all barriers in San Poil Subbasin by 2005 and begin implementing necessary passage improvements associated with man made barriers by 2006. **Objective 1B1***	**Strategy a:** Remove identified barriers at 20% per year over 5 years, where prudent. Work team note: Many barriers have already been identified and prioritized by agencies and tribes and removal should not be held up until others are inventoried. **Strategy b*:** Inventory and prioritize barrier removal. **Strategy c*:** Develop minimum in-stream flows for fish-bearing streams within the San Poil River Subbasin that meet the biological requirements of salmonid fishes. **Strategy d:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin. **Strategy e:** Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.	Fish passage barriers
(8) Artificially produce enough native, genetically appropriate salmonids stocks to supplement consistent harvest to meet state and Tribal management objectives. **Objective 2C2**	**Strategy a:** Wherever possible use locally adapted redband trout to supplement natural populations or in harvest applications where emigration can occur. **Strategy b:** Annually produce a minimum of 50,000 pounds of trout at the Colville Tribal Hatchery. **Strategy c:** As appropriate, utilize net pens. **Strategy d:** Develop artificial production capacity for kokanee salmon. **Strategy e:** Prevent introgression between hatchery and wild stocks.	Loss of anadromous life history, loss of lotic habitat, habitat degradation
(9) Enhance and maintain streambed embeddedness at between 20% and 30% on all streams with known salmonids populations. **Objective 1B5**	**Strategy a:** Conduct riparian habitat restoration, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species. **Strategy b:** Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road densities to desired levels in accordance with existing land management plans. **Strategy c:** Install in-stream structures that improve habitat complexity (i.e. Vortex rock weirs, drop log structures, root wads, habitat boulders, etc.). **Strategy d:** Limit livestock from riparian areas and replant native riparian plants where needed.	Sediment

Objectives in Priority Order	Strategies in Priority Order	Limiting Factor(s) Addressed
	Strategy e: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	
(10) Expand stable littoral zones along the San Poil arm of Lake Roosevelt to contribute to the Upper Columbia Subbasin objective of stabilizing 10% of the reservoir surface area. **Objective 1A1**	**Strategy a:** Use vegetation enhancements, annual seeding and water retention in backwater areas to increase near-shore fish production, increase shoreline stability, and reduce erosion. **Strategy b:** Conserve and protect intact or restored riparian areas. **Strategy c:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	Productivity, rearing habitat in Lake Roosevelt
(11) Reduce width to depth ratios to < 10 for all streams within the Subbasin. **Objective 1B6**	**Strategy a:** Conduct riparian habitat restoration, increase canopy cover, reduce fine sediment inputs, and increase channel complexity to address known limiting factors for all focal species. **Strategy b:** Install in-stream structures that improve habitat complexity (Vortex rock weirs, drop log structures, root wads, habitat boulders, etc.). **Strategy c:** Conserve and protect intact or restored riparian areas. **Strategy d:** Limit livestock from riparian areas and replant native riparian plants where needed. **Strategy e:** Decommission roads wherever possible and develop road abandonment plans for federal, state and Tribal lands to reduce road densities to desired levels in accordance with existing land management plans. **Strategy f:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	Stream channel instability
(12) Assess and implement nutrient enrichment program for Lake Roosevelt and tributaries. **Objective 1A2***	**Strategy a:** Return marine derived nutrients to systems consistent with prudent disease and fish health practices. **Strategy b:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin.	Loss of anadromous life history, nutrients
(13) Provide for a diverse and sustainable recreational fishery at Curlew Lake. **Objective 2C1**	**Strategy** a**:** Continue and improve net pen program. **Strategy b:** Improve water quality in Curlew Lake. **Strategy c:** Offer bounty on northern pikeminnow. **Strategy d:** Determine appropriateness of Tiger Muskie stocking program, including recreational and ecological impacts.	Water quality, habitat degradation
(14) Complete feasibility study of potential	**Strategy a*:** Conduct feasibility study.	Loss of anadromous life history

Objectives in Priority Order	Strategies in Priority Order	Limiting Factor(s) Addressed
restoration of anadromous Chinook and steelhead by 2015. **Objective 2D1***		
(15) The San Poil Subbasin is within the NE Washington Bull Trout Recovery Unit and is identified as a "Research Need Area." Determine if the San Poil Subbasin can contribute to bull trout recovery. **Objective 1C1**	**Strategy a:** Conduct Bull Trout distribution and habitat suitability/availability survey.	Lack of information
(16) Maintain existing westslope cutthroat fishery at Long and Gold Lakes. **Objective 2A3**	**Strategy a:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	Loss of fishing opportunities as a result of loss of anadromous life history and habitat degradation

* = Objectives and strategies that are included in the RM&E plan.

42.1.3 Discussion of Aquatic Priorities

The objectives that were ranked the highest priority in the San Poil Subbasin are those that address habitat issues and redband/rainbow trout. The top priority objective is a broad, overarching objective to address habitat-limiting factors. As described above, the San Poil Subbasin has experienced a wide array of habitat problems in the mainstem San Poil River and tributary streams. This objective would cover a variety of habitat improvement projects that may be needed in the San Poil Subbasin. This priority is in alignment with the Council's 2000 Fish and Wildlife Program which is "a habitat-based program, rebuilding healthy, naturally producing fish and wildlife populations by protecting, mitigating, and restoring habitats and the biological systems within them, including anadromous fish migration corridors."

The second top priority objective is specific to redband trout and kokanee salmon, which are native, focal species in the San Poil Subbasin. This objective includes strategies that will increase the numbers of these fishes in the Subbasin through both artificial production and natural production. The strategies under this objective also place a priority on locally adapted and genetically appropriate fishes. These strategies are in alignment with the Council's 2000 Fish and Wildlife Program, which calls for "artificial production and other non-natural interventions to be consistent with the central effort to protect and restore habitat and avoid adverse impacts to native fish and wildlife species."

The next eleven objectives on the priority list address specific habitat issues that have been identified in the San Poil Subbasin, except for objectives 2A1, 2B2, and 2B1. Again, the focus is on habitat protection and restoration.

Objective 2A1 (ranked fourth out of 16) addresses adfluvial rainbow trout, an important recreational, cultural, and subsistence fishery in this subbasin. This objective includes strategies that would increase adfluvial rainbow trout through both artificial production and protection of existing fisheries.

Objective 2B2 (ranked eighth out of 16) is for artificial production of native, genetically appropriate salmonids. This objective is necessary given that the impacts of development of the hydropower system in this subbasin cannot be fully mitigated through habitat protection and restoration. The Council's 2000 Fish and Wildlife Program acknowledge that, "there is an obligation to provide fish and wildlife mitigation where habitat has been permanently lost due to hydroelectric development. Artificial production of fish may be used to replace capacity, bolster productivity, and alleviate harvest pressure on weak, naturally spawning resident and anadromous fish populations."

Objective 2B1 calls for providing a diverse and sustainable recreational fishery at Curlew Lake. This objective ranked 13 out of 16 since the fishery of Curlew Lake is not a native fishery and has not been affected by construction or operation of the FCRPS.

The third lowest priority in the San Poil Subbasin is a feasibility study of anadromous fish restoration. Although anadromous fish restoration is a high priority for the Upper Columbia United Tribes, the Work Team recognized that since the San Poil Subbasin is upstream of

both Chief Joseph and Grand Coulee dams, anadromous fish restoration might be some time in the future. This objective is compatible with the Council's assumption that, "restoration of anadromous fish into areas blocked by dams should be actively pursued where feasible."

The lowest ranked objectives are those that address westslope cutthroat trout in Long and Gold lakes, and bull trout recovery. The Long and Gold lakes fishery was ranked as a low priority because westslope cutthroat trout are not native to the San Poil Subbasin. This species was stocked into these lakes where they provide fishing opportunities. Bull trout recovery was a low priority in this subbasin because bull trout have not been found in this subbasin and it is unlikely that they will be found here. A bull trout objective was included in the management plan only because the San Poil Subbasin was identified as a part of the Northeast Washington Recovery Unit as a Research Needs Area in the draft USFWS Bull Trout Recovery Plan.

The Council's 2000 Fish and Wildlife Program prioritize habitat protection and restoration, native species, and long-term objectives. The San Poil Subbasin aquatic management plan places habitat restoration and native species at the top of the priority list. Therefore, the objectives in the San Poil Subbasin Management Plan are a logical subset of Council's overall Columbia River Basin objectives.

42.4 Terrestrial Objectives and Strategies

The Columbia River Basin and Province level objectives for terrestrial resources are presented below. These objectives were prioritized by the OC at the Province level, and are presented in order of priority. The Subbasin Work Team prioritized the subbasin objectives and the ranking is given in parenthesis after each objective. Strategies are presented beneath the objectives in order of priority. Objectives and strategies also included in the research, monitoring, and evaluation plan are marked with an asterisk.

Columbia River Basin Level Category 1:

A primary overarching objective of the Columbia River Basin 2000 Fish and Wildlife Program is the completion of mitigation for the adverse effects to wildlife caused by the development and operation of the hydrosystem.

Provincial Priority 1: **Columbia River Basin Level Goal 1A:**
Complete the current Wildlife Mitigation Program for construction and inundation losses of federal hydrosystem as identified in Appendix C, Table 11-4 of the Columbia River Basin 2000 Fish and Wildlife Program.

> **Province Level Objective 1A**:
> Fully mitigate for construction and inundation losses incurred from the Chief Joseph Dam, Grand Coulee Dam, and Albeni Falls projects per the requirements of the Northwest Power Act and the current Wildlife Mitigation Program (Appendix C, Table 11-4 of the Columbia River Basin 2000 Fish and Wildlife Program) by 2015. This includes developing and implementing projects within the IMP that protect, enhance, or restore Habitat Units for HEP evaluation species and habitats as specified in the construction loss assessments for Chief Joseph, Grand Coulee, and

Albeni Falls dams (Kuehn and Berger 1992; Creveling and Renfrow 1986; Martin et al. 1988); coordinated planning; provision of adequate funding for long-term Operations and Maintenance (O&M); and effectiveness monitoring of projects.

San Poil Subbasin Objective 1A: Fully mitigate for terrestrial resource losses incurred from construction and inundation of the Grand Coulee Project per the requirements of the Northwest Power Act. Complete the compensation mitigation for construction losses at Grand Coulee Dam for wildlife and wildlife habitat consistent with the HEP loss assessment by year 2015. (These requirements will be met in coordination with the Spokane and Upper Columbia subbasins which also are influenced by Lake Roosevelt).

Objective 1A is the overall top priority objective within this Subbasin. The sub-objectives listed below have also been prioritized.

Objective 1A1: Protect, enhance, or restore secure riverine island Canada goose nest sites to address riverine island/bar habitat losses resulting from construction of the Grand Coulee Project. (Priority 9)

Objective 1A2: Protect enhance, or restore mourning dove habitat to address riparian and agricultural habitat losses resulting from construction of the Grand Coulee Project. (Priority 8)

Objective 1A3: Protect, enhance, or restore mule deer habitat to address shrub-steppe and river break habitat losses resulting from construction of the Grand Coulee Project. (Priority 6)

Objective 1A4: Protect, enhance, or restore riparian forest habitat to address habitat losses resulting from construction of the Grand Coulee Project. (Priority 4)

Objective 1A5: Protect, enhance, or restore riparian shrub habitat to address habitat losses resulting from construction of the Grand Coulee Project. (Priority 3)

Objective 1A6: Protect, enhance, or restore ruffed grouse habitat to address riparian/hardwood forest habitat losses resulting from construction of the Grand Coulee Project. (Priority 5)

Objective 1A7: Protect, enhance, or restore sage grouse habitat to address shrub-steppe habitat losses resulting from construction of the Grand Coulee Project. (Priority 1)

Objective 1A8: Protect, enhance, or restore sharp-tailed grouse habitat to address grasslands, shrub-steppe, and riparian draw habitat losses resulting from construction of the Grand Coulee Project. (Priority 2)

Objective 1A9: Protect, enhance, or restore white-tailed deer habitat to address seral forest habitat losses resulting from construction of the Grand Coulee Project. (Priority 7)

The following strategies apply to Objective 1A and sub-objectives 1A1-1A9. They are listed in priority order.

Strategy a: Maintain wildlife habitat values, HUs, for the life of the project on existing and newly acquired mitigation lands through adequate long-term Operations and Maintenance (O&M) funding.

Strategy b*: Develop management plans that address road closure, cattle, soil, vegetation and unwanted species, fire and fuels, nonnative wildlife, etc.

Strategy c: Protect habitat through fee title acquisition, conservation easements, lease, or management plans.

Strategy d*: Evaluate effectiveness of mitigation by monitoring and evaluating species and habitat responses to mitigation actions.

Provincial Priority 2: **Columbia River Basin Level Goal 1B:**
Quantify the operational effects of federal hydrosystem projects on terrestrial resources, develop mitigation plan in coordination with other resource mitigation and resource planning efforts, and implement projects to mitigate the impacts, including maintenance and monitoring.

Province Level Objective 1B:
Quantitatively assess and mitigate operational impacts of the Chief Joseph Dam, Grand Coulee Dam, and Albeni Falls projects per the requirements of the Northwest Power Act and the current Wildlife Mitigation Program. Complete assessment of operational impacts by 2008; develop mitigation plan by 2010; implement initial mitigation by 2015; incorporate formal methods for review and update of effects assessment and mitigation plan on a three-year cycle, to respond to changes in operation and to effectiveness of mitigation actions.

San Poil Subbasin Objective 1B*: Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008. This category is the second priority overall for the San Poil Subbasin. The sub-objectives have been prioritized as well.

Objective 1B1*: Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008. (Priority 10)

Strategy a*: Conduct the assessment and include, but not limit to, fluctuation zone, loss of nutrients in watershed from loss of salmon, recreational effects to terrestrial resources, BPA transmission lines, etc.

Objective 1B2*: Develop mitigation plan and begin implementation of mitigation by year 2010. (Priority 11)

Columbia River Basin Level Category 2:

In consideration of the primary overarching objectives of the Columbia River Basin 2000 Fish and Wildlife Program, provide: 1) sufficient populations of wildlife for abundant opportunities for Tribal trust and treaty right harvest and for non-Tribal harvest; 2) recovery of wildlife species affected by the development and operation of the hydrosystem that are listed under the Endangered Species Act; and 3) a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife.

Provincial Priority 3: **Columbia River Basin Level Goal 2**:
Mitigate for wildlife losses that have occurred through secondary effects of hydrosystem development, including assessment, development of mitigation plan in coordination with other resources and resource managers, implementation, maintenance, and monitoring.

Province Level Objective 2A:
Mitigate for wildlife losses that have occurred through secondary effects of hydrosystem development by protecting, enhancing, restoring, and sustaining populations of wildlife for aesthetic, cultural, ecological, and recreational values. Objective includes assessment of secondary impacts, development of mitigation plan in coordination with other resources and resource managers, implementation, maintenance, and monitoring. Because the secondary effects of hydrosystem development are tightly intermingled with the effects of other activities in the province, this objective also incorporates other actions to maintain or enhance populations of federal, state, and Tribal species of special concern, and other native and desirable nonnative wildlife species, within their present and/or historical ranges in order to prevent future declines and restore populations that have suffered declines or been extirpated.

Objective 2A1: Maintain bald eagles at or above present levels, and secure bald eagle breeding habitat including active and alternate nest trees, preferred breeding sites, and perch and roost trees. (Protect within current applicable laws and regulations.) (Priority 12)

Strategy a: Enforce current laws and regulations.

Strategy b: Implement management recommendations.

Strategy c*: Identify and map current and/or potential winter perching and foraging habitat.

Strategy d*: Continue and increase annual monitoring.

Objective 2A2: Increase sharp-tailed grouse populations within the Intermountain Province and associated subbasins to a minimum of 800 grouse by 2010; over the long-term, improve and maintain the habitats necessary to support self-sustaining, persistent populations of grouse, estimated to consist of a minimum of 2,000 birds. (This objective shared with Lake Rufus Woods, Spokane, and Upper Columbia subbasins.) (Priority 13)

Strategy a: Protect and create habitat.

Strategy b: Translocate birds.

Strategy c*: Continue and increase monitoring.

Strategy d: Protect and maintain genetic diversity.

Objective 2A3: Increase sage grouse populations within the Lake Rufus Woods and San Poil subbasins to a minimum of 500 grouse by 2015. (Priority 12)

Strategy a: Protect and create habitat.

Strategy b: Translocate birds.

Strategy c: Protect and maintain genetic diversity.

Strategy d*: Continue and increase monitoring.

Objective 2A4: Maintain or enhance populations of federal, state, and Tribal species of special concern, and other native and desirable nonnative wildlife species, within their present and/or historical ranges within the San Poil Subbasin in order to prevent future declines and restore populations that have suffered declines. (Priority 16)

Strategy a*: Assess feasibility of translocating extirpated/historic species.

Strategy b: Implement translocations as appropriate.

Strategy c*: Monitor translocations.

Objective 2A5: Maintain or increase golden eagle populations at or above 2004 levels. (Priority 15)

Strategy a*: Determine limiting factors for golden eagle populations in the San Poil Subbasin by 2006.

Strategy b*: Continue and increase monitoring.

Strategy c*: Develop, prioritize, and implement projects and/or research to address identified golden eagle limiting factors by 2007.

Province Level Objective 2B:
Mitigate for wildlife losses that have occurred through secondary effects of hydrosystem development by protecting, enhancing, restoring, and sustaining native wildlife habitat function to maintain or enhance ecological diversity and security for native and desirable nonnative wildlife species. Objective includes assessment of secondary impacts, development of mitigation plan in coordination with other resources and resource managers, implementation, maintenance, and monitoring. Because the secondary effects of hydrosystem development are tightly intermingled with the effects of other activities in the province, this objective also incorporates other actions to identify, maintain, restore, and enhance priority habitats (wetlands, riparian areas, upland forests, steppe and shrub-steppe, cliffs and rock outcrops, caves, grasslands, and other priority habitats) including their structural attributes, ecological functions, and distribution and connectivity across the landscape to optimize conditions required to increase overall wildlife productivity of desired species assemblages. Strategies may include land acquisition, conservation easements, management contracts, and/or partnerships with other landowners.

Province Objective 2B1: Identify and implement strategies and opportunities for restoring the diversity, block size, and spatial arrangement of habitat types needed to sustain target wildlife species at ecologically sound levels.

Province Objective 2B2: Restore the connectivity of habitat types needed to sustain wildlife populations at the landscape level. Encourage and support the implementation of all forest practices, including road building and maintenance, as specified in the WDNR and IDL Forest Practices Rules and Subbasin Forest Plans for all National Forests within the Subbasin.

San Poil Subbasin Objective 2B: Protect, enhance, and restore native wildlife habitat function to maintain or enhance ecological diversity and security for native wildlife species. Emphasize maintenance and improvement of identified priority habitats (rocks/cliffs, upland forest, steppe and shrub-steppe, riparian, and wetland) to provide cover, forage, and food for desired wildlife species.

Objective 2B1 (Rock/cliff/talus/caves): Ensure no net loss of habitat suitability of rocks/cliffs/talus/caves within San Poil Subbasin. Target species

that use this habitat include: golden eagle, bushy-tailed woodrat, bats, lemmings, and other species closely associated with this habitat. (Priority 21)

Strategy a: Implement actions to protect occupied habitat.

Strategy b: Restore and protect large core areas with connectivity and ensure ecological diversity.

Strategy c*: Inventory existing habitat.

Objective 2B2 (**Steppe and Shrub-Steppe):** Protect, enhance, and restore steppe and shrub-steppe habitats within the Subbasin to ensure no net loss of habitat. Target species include: sage grouse, sharp-tailed grouse, mule deer, and other species closely associated with this habitat. (Priority 18)

Strategy a: Protect/maintain existing habitat by controlling invasion or encroachment of weeds.

Strategy b*: Inventory existing and historic habitat.

Strategy c: Create and re-establish habitat for threatened and endangered plants.

Strategy d*: Monitor habitat.

Strategy e: Restore, create, and protect large core areas with connectivity and ensure ecological diversity.

Strategy f: Restore, create, and protect open ponderosa pine/larch stands with old, big, and mature trees.

Objective 2B3 (Wetlands and Riparian): Protect, restore, and enhance wetland and riparian habitats in the San Poil Subbasin in cooperation with the Colville Confederated Tribes, USFS, and other landowners. Target species include beaver, bald eagle, Canada goose, mourning dove, long-eared owl, yellow warbler, ruffed grouse, white-tailed deer, and other species closely associated with these habitats. (Priority 17)

Strategy a: Restore, create, and protect large core areas with connectivity and ensure ecological diversity.

Strategy b: Conserve and protect intact or restored riparian areas.

Strategy c: Protect/maintain existing habitat by controlling invasion or encroachment of weeds.

Strategy d: Create and re-establish habitat for threatened and endangered plants.

Strategy e: Protect, restore, and ensure connectivity of cottonwood galleries and mature riparian vegetation types.

Strategy f: Limit livestock from riparian areas and replant native riparian plants were needed.

Strategy g*: Inventory existing and historic habitat.

Strategy h*: Continue existing surveys and habitat monitoring.

Strategy i*: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.

Strategy j: Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.

Objective 2B4 (Upland Forest): Protect, restore, and enhance upland forest habitats in the San Poil Subbasin through partnerships with the Colville Confederated Tribes, USFS, and other landowners. Target species include mule deer, northern flicker, ruffed grouse, white-tailed deer, and other species closely associated with this habitat. (Priority 19)

Strategy a: Protect/maintain existing habitat by controlling invasion or encroachment of weeds.

Strategy b: Create and re-establish habitat for threatened and endangered plants.

Strategy c: Restore, create, and protect large core areas with connectivity and ensure ecological diversity.

Strategy d: Restore, create, and protect open ponderosa pine/larch stands with old, big, and mature trees.

Strategy e*: Inventory existing and historic habitat.

Strategy f*: Monitor habitat.

Objective 2B5 (Mule deer habitat): Reverse long-term mule deer population decline by providing for a 25-year increasing trend in the quantity

and quality of mule deer habitats, particularly winter and spring habitats. (Priority 20)

Strategy a: Secure and enhance winter and spring ranges; protect from human development.

Strategy b: Manage forests for a variety of successional stages to meet mule deer habitat needs on a site-specific basis; use fire and forest management to increase quality and quantity of shrubs and mature forest cover.

Strategy c*: Identify specific factors limiting/affecting mule deer populations in the San Poil Subbasin.

Strategy d: Control noxious weeds and restore native grasses and forbs where noxious weeds have impacted mule deer habitat.

Strategy e: Manage motorized traffic in critical mule deer spring and winter ranges.

Strategy f: Increase the area of aspen stands.

Strategy g: Modify state and Tribal hunting regulations to help increase mule deer populations.

Strategy h: Improve enforcement of state and Tribal hunting regulations.

42.4.1 Prioritization of Terrestrial Objectives and Strategies

A detailed discussion of the methods used to prioritize the objectives and strategies is found in Section 1.2. In San Poil Subbasin, the members of the Subbasin Work Team contributed to the development of ranking criteria, which were based largely on the criteria in the Council's 2000 Fish and Wildlife Program. The IMP OC finalized the ranking criteria, but each Work Team was offered the option of adding additional subbasin specific criteria to the ranking. In the San Poil Subbasin, the Work Team decided to add the following subbasin specific criteria:

- Terrestrial subbasin specific criteria – Is the objective/strategy mandated by the Northwest Power Act?
- Aquatic subbasin specific criteria – Does the objective/strategy enhance redband/rainbow trout and their habitats?

The Work Team rated the criteria for each objective from one to ten. An average ranking was calculated for each respondent for each objective, and then an overall Work Team average was calculated. Strategies were rated high, medium and low. These categories were converted to numeric values: 3, 2, and 1 respectively. The average ranking for each strategy

was calculated for each respondent and for the Work Team as a whole.

The Work Team discussed the preliminary prioritization results for the objectives and strategies at the sixth Work Team meeting, and based on a consensus decision agreed to the final prioritization of the objectives and strategies.

The final prioritization of the terrestrial objectives for the San Poil Subbasin is displayed in Table 42.4-1.

Table 42.4-1. San Poil Subbasin Terrestrial objectives and strategies in priority order, with limiting factors addressed.

Objectives in Priority Order	Strategies	Limiting Factor(s) Addressed
Provincial Priority 1 – Mitigate for construction and inundation losses		
(1) Protect, enhance, or restore sage grouse Habitat Units to address shrub-steppe habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A7**	**Strategy a**: Maintain wildlife HUs for the life of the project on existing and newly acquired mitigation lands through adequate long-term Operations and Maintenance (O&M) funding. **Strategy b*:** Develop management plans that address road closure, cattle, soil, vegetation and unwanted species, fire and fuels, nonnative wildlife, etc. **Strategy c:** Protect habitat through fee title acquisition, conservation easements, lease, or management plans. **Strategy d***: Evaluate effectiveness of mitigation by monitoring and evaluating species and habitat responses to mitigation actions.	Inundation of shrub-steppe habitat by the Grand Coulee Project.
(2) Protect, enhance, or restore sharp-tailed grouse Habitat Units to address grasslands, shrub-steppe, and riparian draw habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A8**	**Strategies a – d** as noted for 1A7, above.	Inundation of sharp-tailed grouse habitat by the Grand Coulee Project.
(3) Protect, enhance, or restore riparian shrub Habitat Units to address habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A5**	**Strategies a – d** as noted for 1A7, above.	Inundation of riparian shrub habitat by the Grand Coulee Project.
(4) Protect, enhance, or restore riparian forest Habitat Units to address habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A4**	**Strategies a – d** as noted for 1A7, above.	Inundation of riparian forest habitat by the Grand Coulee Project.
(5) Protect, enhance, or restore ruffed grouse Habitat Units to address riparian/hardwood forest habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A6**	**Strategies a – d** as noted for 1A7, above.	Inundation of ruffed grouse habitat by the Grand Coulee Project.
(6) Protect, enhance, or restore mule deer Habitat Units to address shrub-steppe and river break habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A3**	**Strategies a – d** as noted for 1A7, above.	Inundation of mule deer habitat by the Grand Coulee Project.
(7) Protect, enhance, or restore white-tailed deer Habitat Units to address seral forest habitat	**Strategies a – d** as noted for 1A7, above.	Inundation of white-tailed deer habitat by the Grand Coulee Project.

Objectives in Priority Order	Strategies	Limiting Factor(s) Addressed
losses resulting from construction of the Grand Coulee Project. **Objective 1A9**		
(8) Protect enhance, or restore mourning dove Habitat Units to address riparian and agricultural habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A2**	**Strategies a – d** as noted for 1A7, above.	Inundation of mourning dove habitat by the Grand Coulee Project.
(9) Protect, enhance, or restore secure riverine island Canada goose nest sites to address riverine island/bar habitat losses resulting from construction of the Grand Coulee Project. **Objective 1A1**	**Strategies a – d** as noted for 1A7, above.	Inundation of island habitat by the Grand Coulee Project.
Provincial Priority 2 – Quantify and mitigate for operational impacts		
(10) Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008. **Objective 1B1***	**Strategy a*:** Conduct the assessment and include, but not limit to, fluctuation zone, loss of nutrients in watershed from loss of salmon, recreational effects to terrestrial resources, BPA transmission lines, etc.	Lack of data on operational impacts
(11) Develop mitigation plan and begin implementation of mitigation by year 2010. **Objective 1B2***	**Strategy a:** Develop and implement plan.	Need to mitigate operational impacts
Provincial Priority 3 – Mitigate for secondary FCRPS effects and other subbasin effects		
(12) Increase sage grouse populations within the Lake Rufus Woods and San Poil subbasins to a minimum of 500 grouse by 2015. **Objective 2A3**	**Strategy a:** Protect and create habitat. **Strategy b:** Translocate birds. **Strategy c*:** Protect and maintain genetic diversity. **Strategy d:** Continue and increase monitoring.	Secondary effects of FCRPS and other subbasin effects to sage grouse population.
(13 Increase sharp-tailed grouse populations within the Intermountain Province and associated subbasins to a minimum of 800 grouse by 2010; over the long-term, improve and maintain the habitats necessary to support self-sustaining, persistent populations of grouse, estimated to consist of a minimum of 2,000 birds. (This objective shared with Lake Rufus Woods, Spokane, and Upper Columbia subbasins.) **Objective 2A2**	**Strategy a:** Protect and create habitat. **Strategy b:** Translocate birds. **Strategy c*:** Continue and increase monitoring. **Strategy d:** Protect and maintain genetic diversity.	Secondary effects of FCRPS and other subbasin effects to sharp-tailed grouse population.

Objectives in Priority Order	Strategies	Limiting Factor(s) Addressed
(14) Maintain bald eagles at or above present levels, and secure bald eagle breeding habitat including active and alternate nest trees, preferred breeding sites, and perch and roost trees. (Protect within current applicable laws and regulations.) **Objective 2A1**	**Strategy a:** Enforce current laws and regulations. **Strategy b:** Implement management recommendations. **Strategy c*:** Identify and map current and/or potential winter perching and foraging habitat. **Strategy d*:** Continue and increase annual monitoring.	Secondary effects of FCRPS and other subbasin effects to bald eagles.
(15) Maintain or increase golden eagle populations at or above 2004 levels. **Objective 2A5**	**Strategy a*:** Determine limiting factors for golden eagle populations in the San Poil Subbasin by 2006. **Strategy b*:** Continue and increase monitoring. **Strategy c*:** Develop, prioritize, and implement projects and/or research to address identified golden eagle limiting factors by 2007.	Secondary effects of FCRPS and other subbasin effects to golden eagles
(16) Maintain or enhance populations of federal, state, and Tribal species of special concern, and other native and desirable nonnative wildlife species, within their present and/or historical ranges within the San Poil Subbasin in order to prevent future declines and restore populations that have suffered declines. **Objective 2A4**	**Strategy a*:** Assess feasibility of translocating extirpated/historic species. **Strategy b:** Implement translocations as appropriate. **Strategy c*:** Monitor translocations.	Secondary effects of FCRPS and other subbasin effects to species of special concern
(17) (Wetlands and Riparian) Protect, restore, and enhance wetland and riparian habitats in the San Poil Subbasin in cooperation with the Colville Confederated Tribes, USFS, and other landowners. Target species include beaver, bald eagle, Canada goose, mourning dove, long-eared owl, yellow warbler, ruffed grouse, white-tailed deer, and other species closely associated with these habitats. **Objective 2B3**	**Strategy a:** Restore, create, and protect large core areas with connectivity and ensure ecological diversity. **Strategy b:** Conserve and protect intact or restored riparian areas. **Strategy c:** Protect/maintain existing habitat by controlling invasion or encroachment of weeds. **Strategy d:** Create and re-establish habitat for threatened and endangered plants. **Strategy e:** Protect, restore, and ensure connectivity of cottonwood galleries and mature riparian vegetation types. **Strategy f:** Limit livestock from riparian areas and replant	Secondary effects of FCRPS and other subbasin effects to wetland and riparian habitat

Objectives in Priority Order	Strategies	Limiting Factor(s) Addressed
	native riparian plants were needed. **Strategy g*:** Inventory existing and historic habitat. **Strategy h*:** Continue existing surveys and habitat monitoring. **Strategy i*:** Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil subbasin. **Strategy j:** Acquire water rights/water banking or develop increased water storage in headwater areas of sub-watersheds to regulate and maintain in-stream flows.	
(18) (**Steppe and Shrub-Steppe)** Protect, enhance, and restore steppe and shrub-steppe habitats within the Subbasin to ensure no net loss of habitat. Target species include: sage grouse, sharp-tailed grouse, mule deer, and other species closely associated with this habitat. **Objective 2B2**	**Strategy a:** Protect/maintain existing habitat by controlling invasion or encroachment of weeds. **Strategy b*:** Inventory existing and historic habitat. **Strategy c:** Create and re-establish habitat for threatened and endangered plants. **Strategy d*:** Monitor habitat. **Strategy e:** Restore, create, and protect large core areas with connectivity and ensure ecological diversity. **Strategy f:** Restore, create, and protect open ponderosa pine/larch stands with old, big, and mature trees.	Secondary effects of FCRPS and other subbasin effects to steppe and shrub-steppe habitats
(19) (Upland Forest) Protect, restore, and enhance upland forest habitats in the San Poil Subbasin through partnerships with the Colville Confederated Tribes, USFS, and other landowners. Target species include mule deer, northern flicker, ruffed grouse, white-tailed deer, and other species closely associated with this habitat. **Objective 2B4**	**Strategy a:** Protect/maintain existing habitat by controlling invasion or encroachment of weeds. **Strategy b:** Create and re-establish habitat for threatened and endangered plants. **Strategy c:** Restore, create, and protect large core areas with connectivity and ensure ecological diversity. **Strategy d:** Restore, create, and protect open ponderosa	Secondary effects of FCRPS and other subbasin effects to upland forest habitats

Objectives in Priority Order	Strategies	Limiting Factor(s) Addressed
	pine/larch stands with old, big, and mature trees. **Strategy e*:** Inventory existing and historic habitat. **Strategy f*:** Monitor habitat.	
(20) (Mule deer habitat) Reverse long-term mule deer population decline by providing for a 25-year increasing trend in the quantity and quality of mule deer habitats, particularly winter and spring habitats. **Objective 2B5**	**Strategy a:** Secure and enhance winter and spring ranges; protect from human development. **Strategy b:** Manage forests for a variety of successional stages to meet mule deer habitat needs on a site-specific basis; use fire and forest management to increase quality and quantity of shrubs and mature forest cover. **Strategy c*:** Identify specific factors limiting/affecting mule deer populations in the San Poil Subbasin. **Strategy d:** Control noxious weeds and restore native grasses and forbs where noxious weeds have impacted mule deer habitat. **Strategy e:** Manage motorized traffic in critical mule deer spring and winter ranges. **Strategy f:** Increase the area of aspen stands. **Strategy g:** Modify state and Tribal hunting regulations to help increase mule deer populations. **Strategy h:** Improve enforcement of state and Tribal hunting regulations.	Secondary effects of FCRPS and other subbasin effects to mule deer habitats
(21) (Rock/cliff/talus/caves) Ensure no net loss of habitat suitability of rocks/cliffs/talus/caves within San Poil Subbasin. Target species that use this habitat include: golden eagle, bushy-tailed woodrat, bats, lemmings, and other species closely associated with this habitat. **Objective 2B1**	**Strategy a:** Implement actions to protect occupied habitat. **Strategy b:** Restore and protect large core areas with connectivity and ensure ecological diversity. **Strategy c*:** Inventory existing habitat.	Secondary effects of FCRPS and other subbasin effects to rock /cliff/talus/caves

* = Objectives and strategies that are included in the RM&E plan.

42.4.2 Discussion of Terrestrial Priorities

The prioritization of the terrestrial objectives is directly linked to the priorities established in the Council's 2000 Fish and Wildlife Program, and to the Province level priorities established by the OC.

The overall top priority terrestrial objective for the San Poil Subbasin is to fully mitigate for terrestrial resource losses incurred from construction and inundation of the Grand Coulee Project per the requirements of the Northwest Power Act. Within this objective, there are nine sub-objectives that have been prioritized. The objectives addressing sage and sharp-tailed grouse were ranked at the top of the list because they are listed as threatened species within the State of Washington. Riparian habitat losses (riparian shrub, riparian forest, and riparian hardwood) were ranked as third, fourth, and fifth priority because of the importance of these habitat types to a wide array of species. Mule deer and white-tailed deer habitat were ranked sixth and seventh priority. There is considerable concern about mule deer populations in the Subbasin, and these species are particularly important for cultural and subsistence purposes to the Tribes. Mourning dove habitat and goose nesting islands were the lowest ranked objectives in this group of objectives. However, it should be noted that habitat acquisition to mitigate for the construction and inundation losses is the most important overall objective in the Subbasin and in the Province as a whole.

The next level of priority is quantifying and mitigating for the operational impacts of the FCRPS per the requirements of the Northwest Power Act. In the San Poil Subbasin, no assessment of operational impacts has been conducted. Therefore, this is the first priority in this category of objectives. Once the impacts have been identified the next priority will be to develop a mitigation plan and to implement the mitigation plan. The objective is to begin mitigation for operational impacts by 2010.

The third priority in the IMP is to mitigate for secondary effects of the hydrosystem development. In this category of objectives, the San Poil Subbasin Work Team ranked increasing sage and sharp-tailed grouse as the highest priority. Bald eagles, as a federally listed threatened species, are the next priority. Golden eagles and other species of special concern were the next on the priority list.

In the category of mitigating for secondary effects on habitat, wetlands and riparian habitats were considered top priority in the San Poil Subbasin because of their importance to so many types of wildlife. In addition, riparian and wetland habitat are considered to be high priority habitat types in the Council's 1995 Fish and Wildlife Program. Steppe and shrub-steppe habitats were the next highest priority because sage grouse, sharp-tailed grouse, and mule deer are associated with that habitat type and these are species of concern in the San Poil Subbasin. These habitat types are also considered to be high priority habitat types in the Council's 1995 Fish and Wildlife Program.

Prioritization of strategies includes emphasis for those strategies that maintain and protect existing habitats, as well as enforcement of regulations and funding to guarantee that habitat values are maintained.

SECTION 43 – Table of Contents

43 San Poil Subbasin Research, Monitoring and Evaluation Plan 2

43 San Poil Subbasin Research, Monitoring and Evaluation Plan

In light of the various ongoing efforts to develop a regional monitoring plan, subbasin planners the Intermountain Province (IMP) have chosen to develop a monitoring plan based on existing monitoring methods described in the scientific literature. The IMP approach to the Research, Monitoring and Evaluation (RM&E) is as follows:

- Research is handled separately from the M&E design. A wish list of research needs is identified based on the biological objectives, strategies and critical uncertainties identified in the subbasin management plans and subbasin assessments. Many of the subbasin work teams developed preliminary research needs lists. Although there is an extensive "wish list" of research questions in the IMP, the limitations of available funding made it important to prioritize the research questions into two categories: "need to know" and "would like to know."

- For the M&E component, the IMP planners developed a framework to link specific objectives and strategies identified in the IMP subbasin management plans to a suite of M&E protocols and existing programs (an M&E "tool box"). To do this a subcommittee of the OC identified a broad list of existing M&E protocols and existing M&E programs, which represent: peer reviewed, scientifically validated approaches to M&E; are appropriate to range of geographic scales; and, include the range of the Independent Science Review Panel's (ISRP) three tiers of RM&E. Specific M&E objectives and strategies from each of the subbasin management plans, and from the province level, were then linked in Table 43.1 to:

    - The type of generic approach to addressing limiting factors that is addressed by the strategy or objective (same list used to categorize the inventory of projects)
    - The type of M&E protocol that would be most appropriate
    - Which ISRP M&E tier level of RM&E would be appropriate
    - Which of the "tool box" tools would be used.

The complete tool box bibliography is found in Appendix I. More detailed information on the process for developing the RM&E plan is found in Section 2.

Table 43.1. San Poil Subbasin research, monitoring, and evaluation plan

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Subbasin Objective 1A2: Study and monitor the effects of nutrient enrichment on fish growth, invertebrate communities, water quality, and riparian areas within the San Poil Subbasin.	1,2,6,8,9		1,2 and 3	1,2,3,4	4,5,6,9,10,16,17,22
Subbasin Objective 1B1: Strategy b: :Inventory and prioritize all passage barriers within the San Poil Subbasin.	1,2,3,4,5,6,9,10	2	?	1,2,3,4	1,4,5,6,9,10….
Subbasin Objective 1B7: Strategy b: Develop Minimum-flows for all fish-bearing streams within the San Poil Subbasin that meet the needs of native salmonids still present in the Subbasin.	1,2,3,4,5,9,10			1,2,3	1,4,5,6,9,10,14,15,16,18,19,20,21,23,25,26,28
Subbasin Objective 2A2: Strategy f: Determine and map the genetic and geographic distribution of redband trout.	1,2,3,4,5,6,8,9,10			1,2,3,4	4,5,6,7,8,12,14,15,16,17,18,19,20,21,23,24,25,26,27,28
Subbasin Objective 2A2: Strategy f: Identify limiting factors and management strategies specifically designed to restore redband trout populations	All	All		1,2,3,4	1,4,5,6,9,10….
Subbasin Objective 2B1: Strategy b: Determine the appropriateness, economic, and ecological impacts of stocking Tiger Muskies as a biological control for enhancing salmonid populations.	2,8,9			1,2,3,4	1,4,5,6,9,10….
Subbasin Objective 2C1: Strategy a: Conduct feasibility study of potential reintroduction of anadromous Chinook and steelhead into the San Poil Subbasin	All	All habitat		2,3,4	1,4,5,6,9,10….
Subbasin Objective 1B2: Develop EMAP sites for water quality, focal species production, habitat quality, and habitat quantity data needed to determine progress toward objectives in the San Poil Watershed. (6 sites)	All			1,2,3,4	6,10,14,16,26,28
Subbasin Objective 1B4: Continuously monitor water quality (flow, temperature, etc.) at all selected EMAP sites (5 sites annually, 15 sites every 4th year).	All			1,2,3,4	6,10,14,16,26,28
Subbasin Objective 1B6: Develop baseline Width to depth ratios for at all selected EMAP sites (5 sites annually, 15 sites every 4th year).	1.5			1,2,3,4	6,10,14,16,26,28
Subbasin Objective 1B3: Develop GIS layer of historic riparian habitats	1,6			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28

AQUATIC					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Subbasin Objective 1B3: Survey and monitor existing riparian habitats to determine the percent of remaining functional riparian areas compared to historic at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	1,6			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
Subbasin Objective 1B5: Determine stream embeddedness at all selected EMAP sites (5 sites annually, 15 sites every fourth year).	1,5			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
Subbasin Objective 2A1: Conduct annual creel surveys along the San Poil River to estimate harvest rates of adfluvial redband trout	2,9			1,2,3,4	3,4,5,6,8,12,17,24
Subbasin Objective 2A2: Strategy a: Estimate annual adult returns of kokanee salmon to the San Poil River.	2,4,8,9,10			1,2,3,4	3,4,5,6,8,12,17,24
Subbasin Objective 2B2: Report species, stocks, size, return-to-creel and locations of all artificial production planted into waters contained within the San Poil Subbasin.	9			1,2,3,4	3,4,5,6,8,12,17,24
Subbasin Objective 2B2: Develop a database to store all monitoring, evaluation, and research data throughout the IMP and make data available by the internet for all managers.	All			1,2,3,4	12
Subbasin Objective 1A1: Assess all efforts to increase littoral habitat along Lake Roosevelt by area and type.	1,7,10			1,2,3,4	4,8,12,22,24
Subbasin Objective 1C1: Identify adult and juvenile annual habitat utilization for all focal species.	All			1,2,3,4	1,2,4,5,6,7,9,10,11,12,14,15,16,17,18,21,25,26,28
Subbasin Objective 2A3: Monitor all upland lakes that receive hatchery production for return to creel, age and growth, species composition, natural reproduction, and habitat suitability once every 10 years and adjust management or stocking rates accordingly.	1,2,8,9			1,2,3,4	4,8,12,22,24

AQUATIC					
Strategy & Objective	**Strategy Type**	**Monitoring Type**	**Tier**	**Scale**	**Tool Box-tool**
ADDITIONAL RESEARCH, MONITORING, AND EVALUATION NEEDS					
Research: Determine the economic costs and benefits to the San Poil Subbasin from implementing the measures called for in the subbasin plan.	8			1,2,3,4	Standard environmental economic accounting protocols
Research: Determine the keystone species that can be used to indicate the quality of environments for focal salmonid fish species.	All			1,2,3,4	Basic Research
Research: Determine contaminant levels in fish and provide information to the public	2,9			1,2,3,4	Basic Research
Research: Establish population estimates for all focal species in all established stream reaches and determine viability thresholds to meet recovery/restoration/management goals.	2,9			1,2,3,4	Basic Research

[1]***Strategy types:***

1) Habitat Assessments
2) Population Assessments
3) In-stream Diversion
4) In-stream Passage
5) In-stream Habitat
6) Riparian Habitat
7) Upland Habitat
8) Education/Coordination
9) Population Management
10) Reservoir Operations

[2]***Monitoring Protocol e.g., type of monitoring protocol [note: the specific reference to detailed monitoring protocol is identified in the "tool box"]):***

- TMDL
- Survey
- Survey and mapping
- HEP
- P/A and trend surveys
- All habitat

[3]***ISRP Tier Level:***

1) Tier 1: trend or routine monitoring
2) Tier 2: statistical (status) monitoring
3) Tier 3: experimental research (effectiveness) monitoring

[4]Scale of Monitoring and Evaluation:

1) Project
2) Subbasin
3) Province
4) Columbia Basin

[5]Tool Box Tool

The Tool Box is found in Appendix I.

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Columbia Basin Level Goal 1B: Quantify the **operational effects** of federal hydrosystem projects on terrestrial resources, develop mitigation plan in coordination with other resource mitigation and resource planning efforts, and implement projects to mitigate the impacts, including maintenance and monitoring.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Province Level Objective 1B: Quantitatively assess and mitigate **operational impacts** of the Chief Joseph Dam, Grand Coulee Dam, and Albeni Falls projects per the requirements of the Northwest Power Act and the current Wildlife Mitigation Program. Complete assessment of operational impacts by **2008**; develop mitigation plan by **2010**; implement initial mitigation by **2015**; incorporate formal methods for review and update of effects assessment and mitigation plan on a three-year cycle to respond to changes in operation and to effectiveness of mitigation actions.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 1B: Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 1B1: Quantitatively assess operational impacts of the Grand Coulee Project on terrestrial resources by year 2008.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Strategy a (2.50, 0.50): Conduct the assessment and include, but not limit to, fluctuation zone effects on vegetation and wildlife, loss of nutrients in watershed from loss of salmon, recreational effects to terrestrial resources, BPA transmission lines, etc.	1,2,6,7			1,2,3,4	29,30,31,32,33,34,35
Strategy b: Identify and map current or potential winter perching and foraging habitat.	1,2			1,2,3,4	30
Strategy c: Continue or increase monitoring of nesting and wintering bald eagles.	1,2,9			1,2,3,4	30
Subbasin Objective 2A2: Strategy a: Determine limiting factors on sharp-tailed grouse populations within the IMP and associated subbasins by 2006.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Strategy c: Continue and increase monitoring.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B3: Strategy a: Inventory existing and historic habitat.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A2: Strategy d: Assess and, if deemed needed, limit/restrict nonnative invasive species interaction/competition and habitat degradation.	1,6,7			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A3: Strategy a: Identify specific factors limiting/affecting sage grouse populations in the San Poil Subbasin.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Strategy c: Continue and increase monitoring.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A6: Strategy a: Determine limiting factors for golden eagles by 2006.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A6: Strategy c: Continue and increase monitoring of golden eagles.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A6: Strategy b: Develop, prioritize, and implement projects and/or research to address identified golden eagle limiting factors by 2007.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Strategy b for Objective 1A and Sub-objectives 1A1-1A9): Develop management plans that address road closure, cattle, soil, vegetation and unwanted species, fire and fuels, nonnative wildlife, etc.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 1B2: Develop mitigation plan and begin implementation of mitigation by year 2010.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B3: Strategy j: Develop technical and policy working groups that meet regularly to identify problems and implement solutions for the San Poil Subbasin.	8			1,2,3,4	Coordinated activities
Subbasin Objective 2B2: Strategy a: Inventory existing and historic shrub-steppe habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35

TERRESTRIAL					
Strategy & Objective	**Strategy Type[1]**	**Monitoring Type[2]**	**Tier[3]**	**Scale[4]**	**Tool Box Tool[5]**
Subbasin Objective 2B2: Strategy d: Monitor shrub-steppe habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B4: Strategy a: Inventory existing and historic upland forest habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B4: Strategy d: Monitor upland forest habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B5: Strategy f: Identify specific factors limiting/affecting mule deer populations in the San Poil Subbasin.	1,2,6,7,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2B1: Strategy a: Inventory existing rock/cliff/talus habitat.	1,2,6,7,8,9			1,2,3,4	29,30,31,32,33,34,35
Subbasin Objective 2A5: Strategy a: Assess feasibility of translocating extirpated/historic species.	9			1,2,3,4	Basic Research
Subbasin Objective 2B5: Strategy c (1.67, 0.67): Monitor translocations.	2,9			1,2,3,4	29,30,31,32,33,34,35

[1]***Strategy types:***

1) Habitat Assessments
2) Population Assessments
3) In-stream Diversion
4) In-stream Passage
5) In-stream Habitat
6) Riparian Habitat
7) Upland Habitat
8) Education/Coordination
9) Population Management
10) Reservoir Operations

[2]***Monitoring Protocol e.g., type of monitoring protocol [note: the specific reference to detailed monitoring protocol is identified in the "tool box"]):***

- TMDL
- Survey
- Survey and mapping
- HEP
- P/A and trend surveys
- All habitat

[3]ISRP Tier Level:

1) Tier 1: trend or routine monitoring
2) Tier 2: statistical (status) monitoring
3) Tier 3: experimental research (effectiveness) monitoring

[4]Scale of Monitoring and Evaluation:

1) Project
2) Subbasin
3) Province
4) Columbia Basin

[5]Tool Box Tool

The Tool Box is found in Appendix I.

SECTION 44 – San Poil Subbasin Tables and Figures

Tables and figures are embedded within the text in sections 37 through 43.