SECTION 38 – Table of Contents

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.

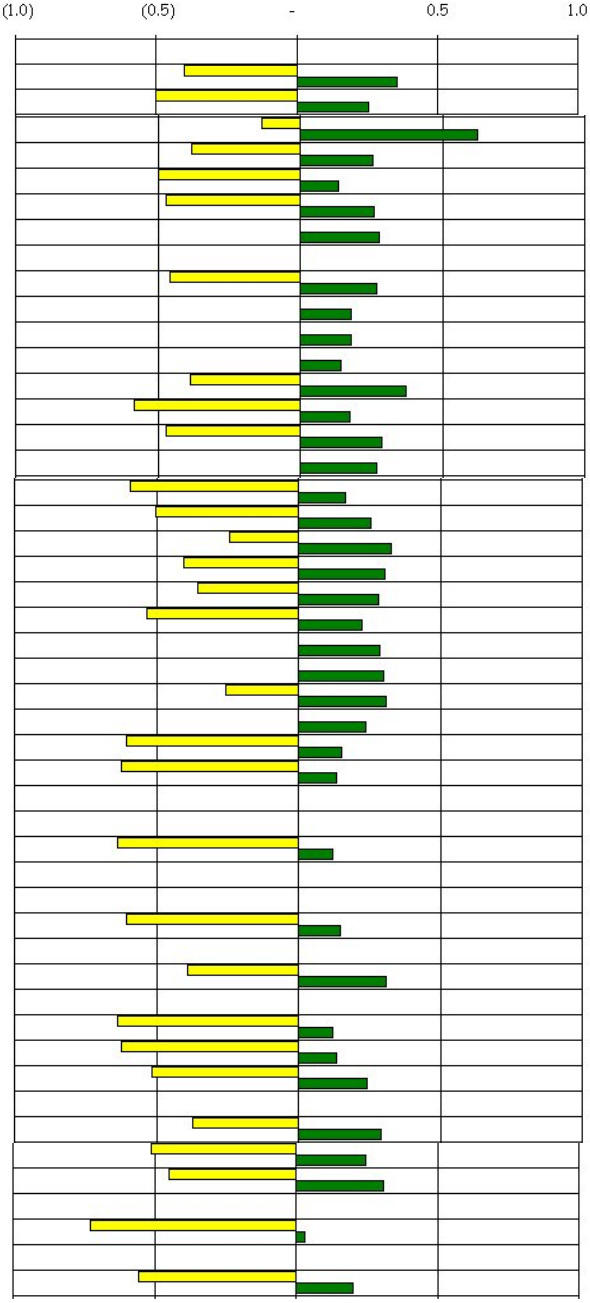
Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
66	Lower 13-mile Creek (High Gradient)	**1**	**-0.73**	9	4	11	9	1	1	4	4	4	4	1
51	San Poil River 4 (23-mile 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

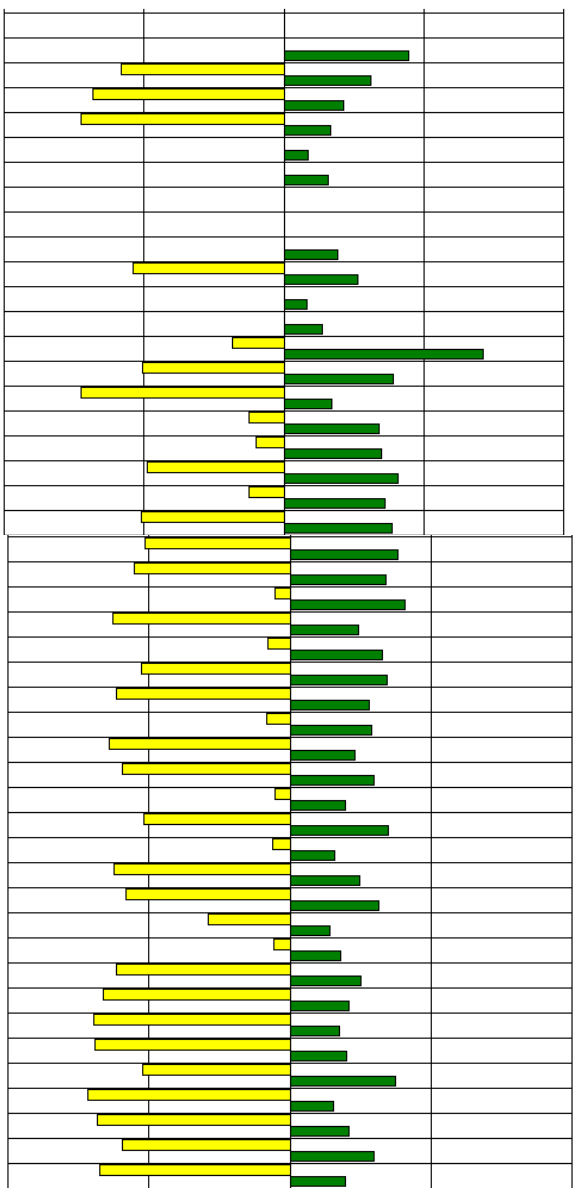
Sequence	Reach Name	Reach Rank	Reach Score	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
27	Lower Bridge Creek (To Falls)	36	-0.53	5	4	9	10	8	2	1	3	5	5	11
43	Upper 23-mile Creek (Meadow)	37	-0.52	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

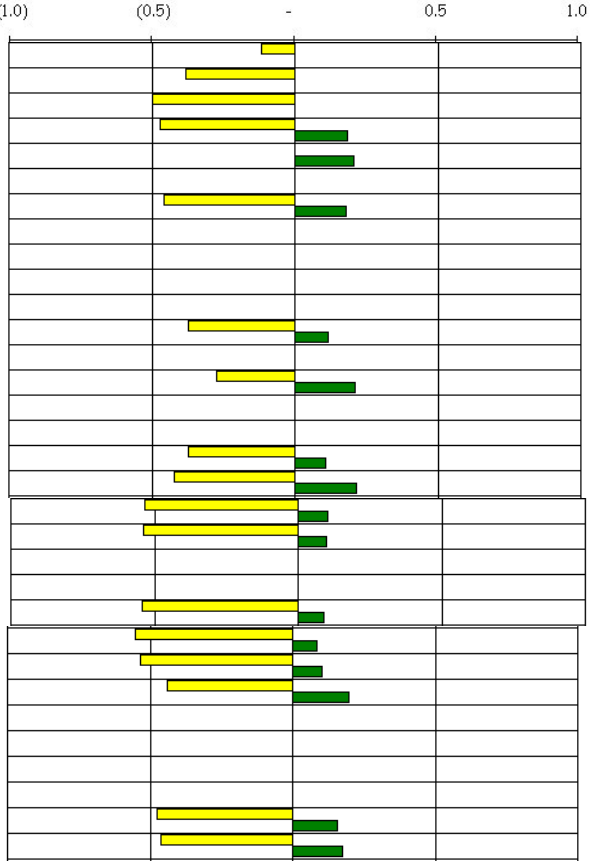
The tornado diagram (Table 38.12) and maps (Map SP-5, Map SP-6, located at the end of Section 38) present the reach scores for both current habitat condition (ranging from zero to positive one, Map SP-5) and protection (ranging from zero to negative one, Map SP-6). Scores closest to negative one depict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