INTRODUCTION

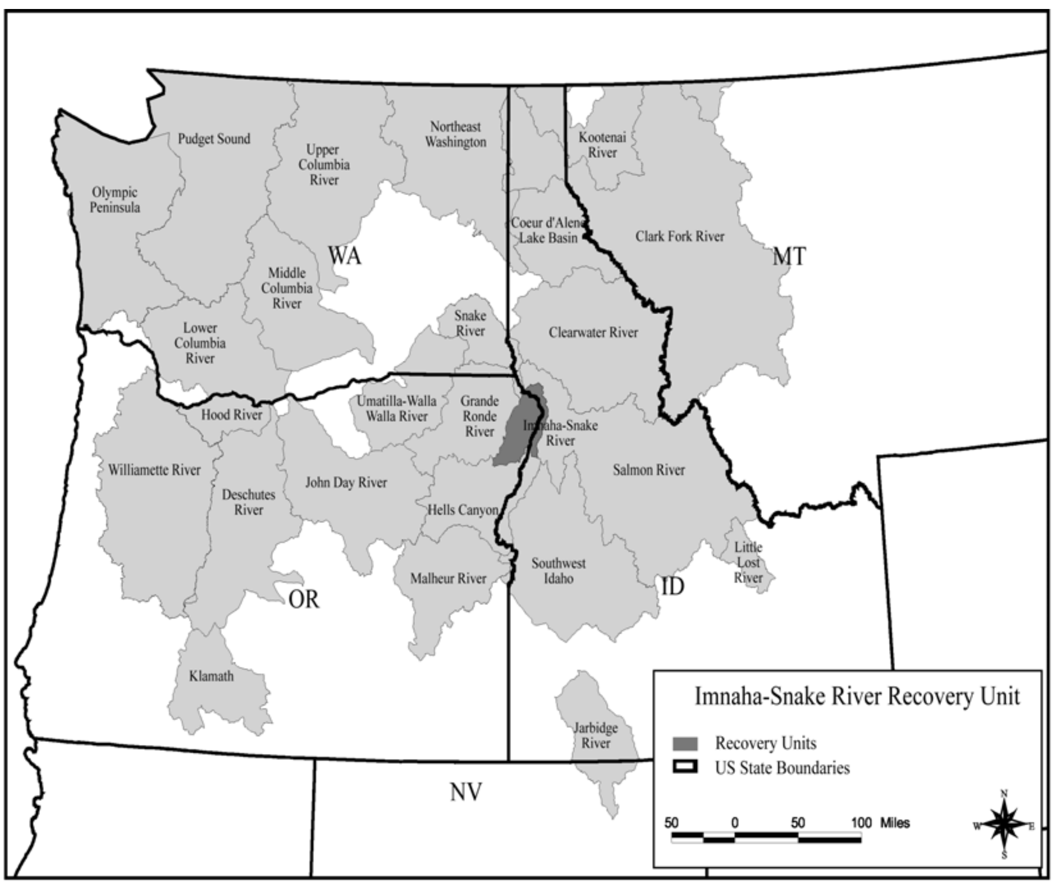
Recovery Unit Designation

The U.S. Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). An emergency rule listing the Jarbidge River population as endangered due to road construction activities was published on August 11, 1998 (63 FR 42757), and the population was subsequently listed as threatened on April 8, 1999 (64 FR 17110), when the emergency rule expired. The Coastal-Puget Sound and St. Mary-Belly River populations were listed as threatened on November 1, 1999 (64 FR 58910), which resulted in all bull trout in the coterminous United States being listed as threatened (Figure 1). The five populations discussed above are listed as distinct population segments, that is, the U.S. Fish and Wildlife has concluded that they meet the requirements of the joint policy with the National Marine Fisheries Service regarding the recognition of distinct vertebrate populations (61 FR 4722).

As required by the Endangered Species Act, the U.S. Fish and Wildlife Service has developed a plan which, when implemented, will lead to the recovery and ultimate delisting of the Columbia River Distinct Population Segment of bull trout. An overall recovery unit team with membership from the states of Washington, Oregon, Idaho, and Montana, as well as Native American Tribes was established to develop a framework for the recovery plan, provide guidance on technical issues, and insure consistency through the recovery planning process. Within the Columbia River Distinct Population Segment, the recovery unit team has identified 22 recovery units. Recovery unit teams were established to identify specific reasons for decline and develop actions necessary to recover bull trout.

Recovery units were identified based on three factors: (1) recognition of jurisdictional boundaries, (2) biological and genetic factors common to bull trout within a specific geographic area, and (3) logistical concerns for coordination, development, and implementation of the recovery plan. The Imnaha-Snake Rivers Recovery Unit was identified as one of the 22 recovery units for bull trout. To facilitate the recovery planning process and avoid duplication of effort, the Imnaha-Snake Rivers Recovery Unit Team considered the frameworks put forth in Kostow (1995) and Buchanan *et al*. (1997) to develop recovery units in Oregon. Use of these existing frameworks will allow for better coordination during both salmon and bull trout recovery planning and implementation.

Figure 1. Bull trout recovery units in the United States. The Imnaha-Snake Rivers Recovery Unit is highlighted.



The Imnaha-Snake Rivers Recovery Unit includes bull trout from the Imnaha River, Sheep Creek, and Granite Creek watersheds (Figure 2). The entire Imnaha River subbasin, which constitutes the majority of the recovery unit, is in the State of Oregon. The Sheep Creek and Granite Creek subbasins are located in the State of Idaho.

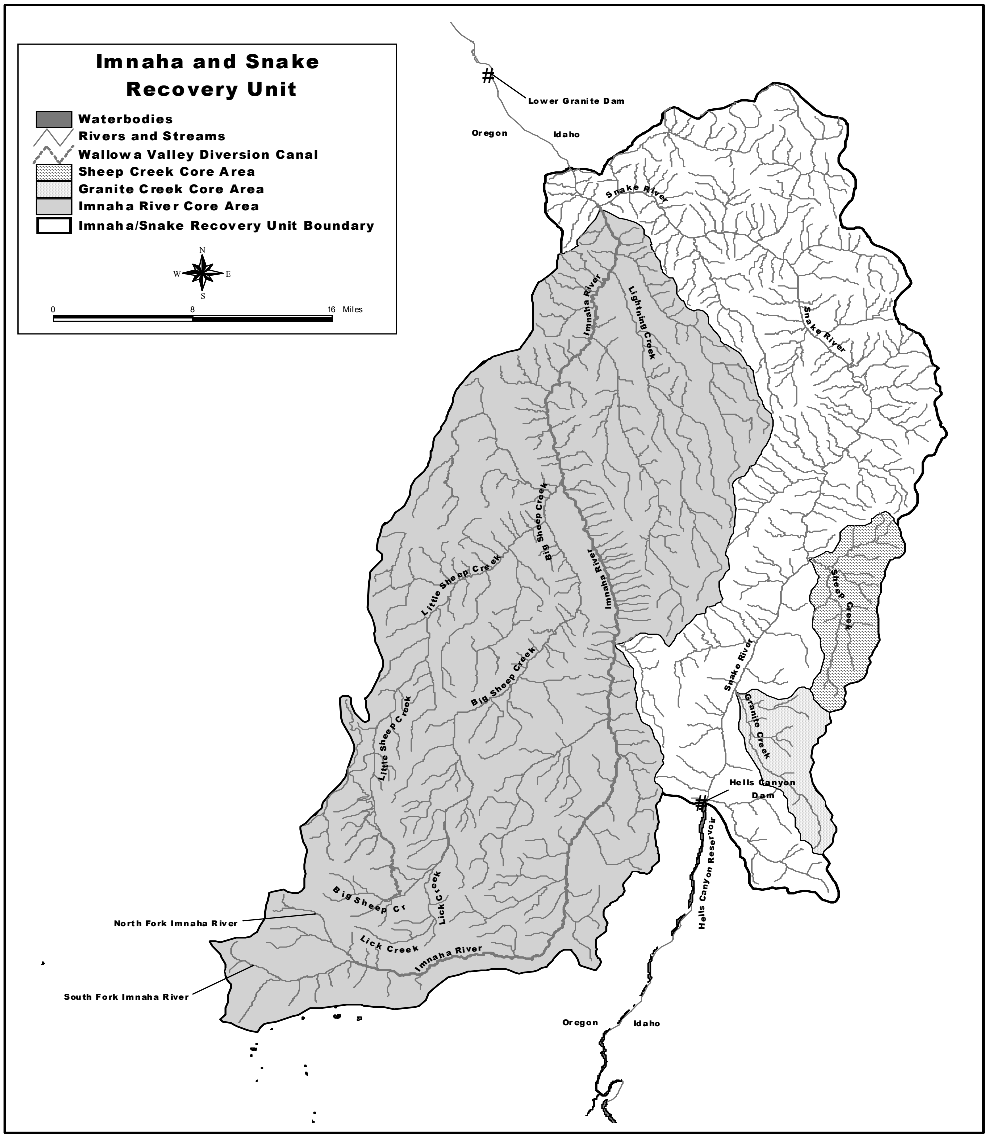
After considering information that is currently available, including that in Ratliff and Howell (1992), Kostow (1995), and Buchanan *et al*. (1997), the recovery unit team identified seven extant, local populations of bull trout within the Imnaha-Snake Rivers Recovery Unit. A local population is considered to be fish from a given species which spawn in a particular lake or stream(s) at a particular season, and which to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season.

The risk of any given population going extinct varies within the recovery unit. The risk of the Imnaha River local population going extinct is low (Ratliff and Howell 1992). The risk of either the local populations above or below the diversion in Big Sheep Creek going extinct is of special concern (see Ratliff and Howell 1992). The risk of the McCully Creek local population going extinct is considered moderate (Buchanan *et al*. 1997). The risk of the Little Sheep Creek local population going extinct is considered high (Buchanan *et al*. 1997). From the Idaho portion of the recovery unit, reports exist of bull trout in Sheep and Granite Creeks. However, information on the status of these stocks is not available, their risk of extinction cannot be determined, and both are considered research needs.

All stocks identified in the recovery unit are believed to be native fish. There have been no known releases of hatchery-origin bull trout anywhere in the recovery unit. There are also no plans to release hatchery-origin bull trout in the recovery unit.

This recovery unit geographically overlaps ceded lands of the Nez Perce Tribe. The tribe has guaranteed treaty fishing rights for both anadromous and resident fish species. When the Imnaha-Snake Rivers Recovery Unit has

Figure 2. Imnaha-Snake Rivers Bull Trout Recovery Unit (Imnaha River, Sheep Creek, and Granite Creek Core Areas of Oregon and Idaho).



achieved its goal, the Oregon Department of Fish and Wildlife and the Idaho Department of Fish and Game as well as the tribal nation will determine the location and level of bull trout harvest which can be sustained while maintaining healthy populations.

Geographic Description

Location. The Imnaha-Snake Rivers Recovery Unit is located in the northeast corner of Oregon and spans the State line into western Idaho. It is defined by a combination of the Imnaha River subbasin and a portion of the Snake River watershed, from the confluence of the Salmon River south to Hells Canyon Dam. A large portion of the recovery unit lies within the boundaries of the Wallowa-Whitman National Forest, the Nez Perce National Forest, and the Hells Canyon Wilderness. The recovery unit drains an area of approximately 2,847 square kilometer (1,112 square miles). The headwaters of the Imnaha River originate in the Eagle Cap Wilderness area. The mainstem Imnaha is formed at an elevation of 1,615 meters (5,300 feet) and flows in a northerly direction for approximately 101 kilometers (63.5 miles) to its confluence with the Snake River at river kilometer 306 (river mile 191) (U.S. Forest Service 1994; Northwest Power Planning Council 2001).

Topography. The Imnaha-Snake Rivers Recovery Unit is diverse in elevation and topographic relief (see Northwest Power Planning Council 2001). The Imnaha River subbasin is characterized by high mountain peaks, high tablelands, and deeply incised valleys. Elevations range from nearly 3,050 meters (10,000 feet) in the Wallowa Mountains to 300 meters (975 feet) at the river's mouth, while the plateaus, such as Lord Flat Plateau, rise to nearly 2,100 meters (7,000 feet). Slopes in the Imnaha River subbasin range from vertical in the Wallowa Mountains to 5 to 15 percent in the shallow slopes of the river valley corridor.

The Snake River subbasin, downstream of Hells Canyon Dam, flows through a canyon that varies in depth from about 1,675 meters (5,500 feet) in the Hells Canyon area to approximately 215 meters (705 feet) in the Lewiston area.

The subbasin is characterized by an elevated mountainous mass cut by the deep canyons of the Snake River. Steep side slopes and narrow valleys typify the Snake River watershed between Hells Canyon Dam and the Salmon River. The corridor alternates from rolling benches to steep, rocky canyon walls. Included in this area, is Hells Canyon, the deepest gorge in North America (see Northwest Power Planning Council 1990).

Climate. The climate in the recovery unit may be classified as temperate, continental, and dry with the Cascade Mountains acting as a barrier to the moisture-bearing winds from the Pacific Ocean (see Northwest Power Planning Council 1990, 2001). However, microclimates do occur as both temperature and precipitation are greatly influenced by elevation. Mean summer temperatures below 914 meters (3,000 feet) are 27 to 32 degrees Celsius (80 to 90 degrees Fahrenheit) and mean winter temperatures are approximately 0 degrees Celsius (32 degrees Fahrenheit). Between 900 and 1,800 meters (3,000 and 6,000 feet), the mean summer temperature is 16 degrees Celsius (61 degrees Fahrenheit) and the mean winter temperature is -7 degrees Celsius (20 degrees Fahrenheit). At greater than 1,800 meters (6,000 feet), the mean summer temperature is 12 degrees Celsius (54 degrees Fahrenheit) and the mean winter temperature is -10 degrees Celsius (14 degrees Fahrenheit) (see Northwest Power Planning Council 2001). Estimates for precipitation range from 23 centimeters (nine inches) per year at the confluence of the Imnaha and Snake Rivers, to 191 centimeters (75 inches) annually at the headwaters. Above 1,525 meters (5,000 feet), more than 70 percent of the annual precipitation is in the form of snow (see Northwest Power Planning Council 1990).

Soils. Landforms in the Imnaha-Snake Rivers Recovery Unit provide a unique and diverse area for soil development (see Northwest Power Planning Council 2001). Varying rock type, topography, and climatic conditions have a large impact on soil-forming processes. In the Imnaha River subbasin, soils are generally derived from the weathering of local bedrock or colluvial rock materials (called residual soils). However, forces other than weathering of bedrock have also been active in the region. Wind derived soils (loess) and ash deposits from the eruptions of Glacier Peak (12,000 years ago) and Mount Mazama (6,600 years ago) have contributed to the productivity of the local soils. Sedimentation in the upper portion of the subbasin occurs due to the instability of the barren granitic peaks. In these areas, the primary mechanism for sediment delivery into the aquatic system is debris flows caused by significant rain and snow events. At lower elevations, in the central part of the valley, the soils have volcanic ash and loess content and are well-developed fertile soils that support modern agriculture.

Soils in the Snake River subbasin are of two types (see Northwest Power Planning Council 1990). At higher elevations, the cold soils are formed from diorite, quartz, monzonite, granite, gneiss, schist, and in volcanic ash overlying basalt. Lower elevation soils were formed mainly from basalt with a thin loess cover and, in smaller areas, from granite. Plateaus and south-facing slopes in this unit have mesic soil temperature and most north slopes are frigid.

Geology. The Imnaha River subbasin is formed by Wallowa granite from the Cretaceous/Jurassic (160 to 120 million years ago) period (see Northwest Power Planning Council 2001). This weather-resistant granite forms the high peaks of the Wallowa mountains where the headwaters of many intermittent creeks form tributaries that merge at terminal moraines of crushed rock and fine sediment. These formations form the beginnings of the Imnaha River and Big and Little Sheep Creeks. As the Imnaha River flows east, cobbles of limerock line the river and creek bed which slowly transition into metamorphosed sedimentary and volcanic rock. As the Imnaha River and its tributaries flow north, they cut through the overlying and more durable Grande Ronde basalt to form deep V-shaped valleys. Quarternary alluvial deposits form narrow river terraces along the banks of the Imnaha River and its major tributaries. The Imnaha River enters the Snake River through an alluvial fan of river-rock and sand, as well as tailings from early mining operations (Vallier 1998).

Geology in the Snake River portion of the recovery unit consists of metamorphosed marine sedimentary and volcanic rocks, granitic and dioritic intrusives, and basalt lavas (see Northwest Power Planning Council 2001). The highly folded and metamorphosed (oldest) rocks are found principally along the lower, steep canyon walls of the Snake River corridor. These rocks consist of metamorphosed volcanic flows, sandstones, mudstones, shales, slates, schists, and greenstones. Basalt rocks are the youngest and most dominant surface rocks that overlie the older metamorphic rock. They formed from a series of basalt lava flows (known as the Columbia River Basalt) measuring from 610 to 1,427 meters (2,000 to 4,100 feet) deep, and are the most extensive rock type in the drainage.

Vegetation. In the Imnaha River subbasin, there are vast expanses of relatively undisturbed land (see Northwest Power Planning Council 2001). The uppermost part of the subbasin is above the tree line. Below the tree line, the watershed contains a mixture of subalpine communities that grade into forested and grassland stands at lower elevations. Lower elevations in the Imnaha River subbasin consist of grassland belonging to a variety of bunchgrass associations with dominants such as bluebunch wheatgrass (*Agropyron spicatum)*, Sandberg's bluegrass (*Poa sandbergii*), and Idaho fescue (*Festuca idahoensis*). Low elevation forest communities are dominated by Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and grand fir (*Abies grandis*) (see U.S. Forest Service 1998). Mid-elevation areas are dominated by Douglas fir and ponderosa pine as well as grassland meadow communities consisting of the green fescue/Hood's sedge (*Festuca viridula/Carex hoodii*) association. High elevation areas are more heavily forested, primarily with grand fir, Douglas fir, and ponderosa pine. Subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) associations dominate the highest elevations until they finally give way to true alpine plant associations in the Eagle Cap Wilderness Area's highest reaches.

Vegetation for the portion of the Snake River subbasin contained within the recovery unit is very similar to that of the Imnaha River subbasin (see Northwest Power Planning Council 1990). It varies according to elevation with bunchgrass associations dominating the flora at the lower elevations. At higher elevations, a mixed coniferous forest of ponderosa pine, Douglas fir, and grand fir predominates.

Hydrology. The Imnaha River subbasin drains an area of 2,266 square kilometers (885 square miles) with its headwaters beginning in the Eagle Cap

Wilderness (see Northwest Power Planning Council 2001). Major tributaries to the Imnaha River include Cow Creek, Lightning Creek, Horse Creek, Big Sheep Creek, Little Sheep Creek, and the South, Middle, and North Forks of the Imnaha River. The U.S. Geological Survey maintains a gauging station near the town of Imnaha. The discharge measured at this gauging station represents approximately 72 percent of the discharge within the subbasin (U.S. Forest Service 1994). The river's mean annual discharge at the Imnaha gauging station is 14.6 cubic meters per second (517 cubic feet per second) based on 73 years of flow data.

The largest irrigation diversion in the Imnaha River subbasin is the Wallowa Valley Improvement Canal (see Northwest Power Planning Council 2001). The project began in the 1800's and presently, it diverts water from both the Big Sheep and Little Sheep Creek watersheds into the Wallowa Valley. Within the entire Imnaha River subbasin, there are approximately 128 water rights with an additional 36 recent filings that have yet to be approved.

In the Snake River portion of the recovery unit, Hells Canyon Dam has had a major influence on the hydrology of the watershed (see Northwest Power Planning Council 2001). The dam is operated by Idaho Power Company for electricity generation and has resulted in daily river flow fluctuations due to variations in demand. The mean monthly flows for the Snake River at Hells Canyon Dam from 1966 to 1996 vary from 309 cubic meters per second (10,920 cubic feet per second) in November to 844 cubic meters per second (29,810 cubic feet per second) in July. The mean river flow at the dam tends to be higher in the summer and lower in the winter. Hells Canyon Dam also affects the flow of sediment throughout the Snake River watershed. Large dams may be up to 99 percent effective in trapping upstream sediment and result in a decrease in the size and number of sandbars in the downstream river. The ability of the system to transport sediments remains high, but little sediment is available for transport. Besides Hells Canyon Dam, other water diversions from the Snake River watershed in the Imnaha-Snake Rivers Recovery Unit are minimal. The only other water diversion within present bull trout habitat (excluding the Snake River) is located on Sheep Creek.

Land Use. Approximately 75 percent of the Imnaha River subbasin is under public ownership (see Northwest Power Planning Council 2001). The majority of the subbasin lies within the Wallowa-Whitman National Forest and is managed by three Ranger Districts (Eagle Cap, Hells Canyon National Recreation Area, and Wallowa Valley). Ranching and grazing, timber harvest, transportation, mining, recreation, and agriculture are primary forms of land use in the subbasin.

Over the past three centuries, domestic livestock grazing has occurred within the subbasin for horses, cattle, and sheep (see Northwest Power Planning Council 2001). Sheep grazing, once prevalent in the subbasin, no longer occurs. Cattle grazing, despite its decline in the late 19th century, remains the major land use activity on private lands in the Imnaha River subbasin (Beamesderfer *et al*. 1996). Evidence of grazing exists throughout the watershed and includes streambank disturbances, soil compaction, and changes to plant communities (U.S. Forest Service 1998). Agriculture within the subbasin is mainly for livestock and grazing. Major crops that are grown within the subbasin are barley, wheat, and hay (see Northwest Power Planning Council 2001).

Prior to 1950, the majority of timber harvested in the Imnaha River subbasin was large diameter Douglas fir, ponderosa pine, and western larch (*Larix occidentalis*) trees accessible from roads (U.S. Forest Service 2000). Due to the growing demand for timber in the late 1950's, even-aged timber management began to increase. However, forest management practices and priorities have changed over the past few decades and timber harvest on Federal lands in the Imnaha River basin has declined significantly. This area includes the Eagle Cap Wilderness Area, established in 1964, and the Hells Canyon Recreation Area, established in 1975. The Imnaha River was designated as a Wild and Scenic River in 1988. Current methods of harvest on federal lands are restricted to salvage logging and selective thinning (U.S. Forest Service 2000). Today, harvest only occurs in 21 percent of the watershed. Currently, 2,067 kilometers (1,292 miles) of open and closed roads exist in the Imnaha River watershed (U.S. Forest Service 2000). Of these, 1,334 kilometers (834 miles) occur on land administered by the Wallowa-Whitman National Forest, and 701 kilometers (438 miles) occur on private, State, and Bureau of Land Management land (U.S. Forest Service 2000).

Historically, gold, silver, copper and cinnabar mining have all occurred in the Imnaha River watershed (U.S. Forest Service 1998). There are currently no active mining claims in the Imnaha River watershed (U.S. Forest Service 1998). Regulations associated with the establishment of Hells Canyon National Recreation Area, Eagle Cap Wilderness, and Imnaha Wild and Scenic River designation withdrew lands associated with these areas from mineral entry. The remainder of the watershed, although open for mineral entry, is unlikely to be mined as it is composed entirely of basalt, which does not contain a marketable source of minerals.

Due to the Wilderness designation, the Wild and Scenic designation, and the Hells Canyon National Recreation Area designation, the Imnaha River watershed continues to draw a wide variety of users for recreational activity (U.S. Forest Service 1998). In the winter, snowmobilers, cross-country skiers and alpinists comprise the majority of recreationalists. In the summer, hiking, horseback riding, fishing, hunting, and camping are popular activities within the subbasin (see Northwest Power Planning Council 2001).

The Snake River subbasin is still in a relatively undeveloped state (see Northwest Power Planning Council 1990). This area contains most of the Hells Canyon National Recreation Area, which encompasses 264,258 hectares (652,488 acres), of which 78,623 hectares (194,132 acres) are designated as wilderness. The history of livestock and grazing in the Snake River watershed is similar to that of the Imnaha River subbasin. At present, grazing allotments are managed such that animals are rotated through areas according to the season, available forage, and resource objectives to minimize environmental impact.

Timber harvest has never been an extensive activity on National Forest lands in the Snake River watershed (U.S. Forest Service 2000). Prior to the late 1960's, timber harvest was restricted to sanitation and salvage logging on the upper plateau areas. No timber harvest is currently ongoing or proposed on

National Forest land in the watershed at this time. At present, there are over 320 kilometers (200 miles) of open and closed roads in the watershed, of which 222 kilometers (138.5 miles) occur on land administered by the Wallowa-Whitman National Forest. The road density for open and closed roads on this portion of the watershed is 0.18 kilometer per square kilometer (0.29 mile per square mile).

Small mining operations occurred in the Snake River watershed during the late 1800's and early 1900's (see Northwest Power Planning Council 2001). However, most activities ceased by the 1930's. It became clear that the inaccessibility of the corridor would prevent mining from ever being a lucrative business. The establishment of Hells Canyon National Recreation Area in 1975 prevented any new mineral entry. Since 1992, no active mining claims have been registered with the U.S. Forest Service or Bureau of Land Management in the Snake River watershed. Therefore, we are unaware of any existing valid mineral rights for this area.

Recreational uses of the Snake River watershed include backpacking, berry picking, camping, cross-country skiing, all terrain vehicle use, fishing, hiking, horseback riding, hunting, mountain biking, mushroom harvesting, boating, snowmobiling, and wildlife viewing and photography. Current management of the recreational facilities include public contacts by U.S. Forest Service personnel in the spring and summer. Trails are also maintained for some of the recreational uses mentioned above. The trail system includes 314 kilometers (196 miles) of trail in Idaho and 310 kilometers (193.6 miles) of trail in Oregon.

DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

The Imnaha-Snake Rivers Recovery Unit currently has six populations of bull trout that have been identified. In the final listing rule (63 FR 31647) the U.S. Fish and Wildlife Service identified four bull trout subpopulations in the Imnaha River subbasin. These subpopulations were the Imnaha River, Big Sheep Creek, Little Sheep Creek, and McCully Creek and included both resident and migratory fish. Since the final listing rule (63 FR 31647) the U.S. Fish and Wildlife Service has identified two additional bull trout subpopulations in this unit: Sheep Creek and Granite Creek. Both of these subpopulations are in tributaries, from the State of Idaho, that flow directly into the Snake River.

At the time of listing (June 1998), the status of and trend in these subpopulations was unknown. These subpopulations were not considered to be at risk of extirpations due to natural events. The U.S. Fish and Wildlife Service determined that there were four major threats to the Imnaha-Snake River subpopulations of bull trout. These threats were dams, forestry, grazing, and agriculture.

Although subpopulations were an appropriate unit upon which to base the 1998 listing decision, the recovery plan has revised the biological terminology to better reflect both the current understanding of bull trout life history and conservation biology theory. Therefore, the term subpopulation will not be used in this chapter. Population terminology is provided in Chapter 1.

Current Distribution and Abundance

In the past, wild bull trout occurred throughout the Imnaha-Snake Rivers Recovery Unit. Although bull trout were probably never as abundant as other salmonids in the subbasin, they were probably more abundant and more widely distributed than they are today. Reports from anglers who fished the Imnaha River in the 1940’s suggest that large bull trout were relatively abundant.

Currently, the U.S. Fish and Wildlife Service considers there to be three core areas in the Imnaha-Snake Rivers Recovery Unit: the Imnaha River, Sheep Creek, and Granite Creek. Four bull trout local populations have been recognized in the Oregon portion of the recovery unit (Ratliff and Howell 1992): the Imnaha River (above the mouth of Big Sheep Creek), Big Sheep Creek, Little Sheep Creek, and McCully Creek. In the Idaho portion of the recovery unit, Oregon Department of Fish and Wildlife (Buchanan *et al*. 1997), Idaho Fish and Game, and the U.S. Forest Service generally recognize one local population of bull trout in Sheep Creek, and one local population of bull trout in Granite Creek. Although there have also been bull trout observed in the mouths of Deep and Wolf Creeks, there does not appear to be a distinct local population of bull trout in these creeks (B. Knox, Oregon Department of Fish and Wildlife, pers. comm. 2002; Buchanan *et al*. 1997). All bull trout in the Imnaha-Snake Rivers Recovery Unit are native fish sustained by wild production. There is very little information to indicate whether these stocks are genetically distinct. The Oregon Department of Fish and Wildlife separated stocks based on geographical, physical, and thermal isolation of the spawning populations.

For the purposes of the recovery plan bull trout local populations within the Imnaha-Snake Rivers Recovery Unit have been designated based on re-establishment of connectivity and reduction of threats (See Strategy for Recovery). The Oregon Department of Fish and Wildlife in cooperation with the U.S. Fish and Wildlife Service, U.S. Forest Service, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe, conduct annual bull trout spawning ground surveys in selected locations within the basin. This data represents the best census information available for abundance within the Imnaha River subbasin. The U.S. Fish and Wildlife Service is unaware of any census information for the Sheep Creek and Granite Creek stocks of bull trout.

Imnaha River. Depending on the season, bull trout can be found throughout the Imnaha River (see Buchanan *et al*. 1997). For examples, summer distribution in the mainstem Imnaha River extends from at least river kilometer 64 (river mile 39.8) to the Forks at river kilometer 118 (river mile 73.3), whereas fall and spring distributions include the lower Imnaha and Snake Rivers. Bull trout have been observed throughout the mainstem of the Imnaha River as well as in the South Fork, Middle Fork, and North Fork of the Imnaha. In the Middle Fork, upstream distribution appears to be limited by a waterfall that is approximately 2 river kilometers (1.2 river miles) from the mouth. Bull trout have also been observed in Bear, Blue, and Soldier Creeks, all tributaries to the South Fork of the Imnaha River. Although there have been isolated reports of bull trout in Lightning Creek (Buchanan *et al*. 1997), standard surveys have not been able to document meaningful numbers of spawning and rearing fish.

Spawning in the Imnaha River presumably occurs in the headwater areas as well as in some headwater tributaries. Most known summer rearing and holding areas in the Imnaha River are on National Forest or wilderness lands above Summit Creek. On an intermittent basis, bull trout can also be found distributed throughout the mainstem Imnaha River, perhaps migrating to and from various tributaries or following sources of food. It is certain that some fluvial bull trout from the Imnaha River migrate out of the Imnaha River and overwinter in the Snake River and, given recent radiotelemetry data (Chandler and Richter 2001), fish found in the Imnaha River below Summit Creek are probably moving between summer or spawning habitat and overwinter habitat in the lower Imnaha or Snake Rivers. Fluvial adults appear to migrate upstream in the Imnaha River during the months of May, June, July, and perhaps August. Fluvial adults appear to move downstream in the Imnaha River during the months of August, September, October, and perhaps November.

Limited information is available on the abundance of bull trout in the Imnaha River. Standard redd counts (G. Sausen, U.S. Forest Service, pers. comm. 2001) have been conducted only recently. Migratory adults captured at a chinook salmon weir (near river kilometer 74; river mile 46) have been enumerated since the mid-1980's (P. Sankovich, Oregon Department of Fish and Wildlife, pers. comm. 2002). However, in many years the weir did not begin operating until after the middle of July (S. Parker, Oregon Department of Fish and Wildlife, pers. comm. 2002). In some years, standard creel surveys are conducted between September and April for a summer steelhead fishery (Flesher, *in litt.* 2002). Although these surveys collect some information on bull trout, they are not done in a manner conducive to estimating abundance. Ratliff and Howell (1992) considered bull trout from the Imnaha River at low risk of extinction. Little information is available on the size of these fish at spawning, age at maturation, sex ratio, fecundity, time of emergence, or survival rates. It seems likely that bull trout in this population complex exhibit both resident and fluvial life history forms.

Big Sheep Creek. Bull trout in Big Sheep Creek have been observed throughout the mainstem as well as in the Middle and South Forks of the Imnaha River, Salt Creek, and Lick Creek (Buchanan *et al*. 1997). Summer distribution extends from approximately river kilometer 43 to 61 (river mile 26.7 to 37.9) in Big Sheep Creek, from river kilometer 0 to 11 (river mile 0 to 6.8) in Lick Creek, and includes the lower 2.5 river kilometers (1.6 river miles) of Salt Creek. Historically, summer distribution likely extended downstream in Big Sheep Creek to around the mouth of Coyote Creek. Although Smith and Knox (1992) concluded that at least 300 spawning bull trout were probably present, no specific population estimates have been conducted in Big Sheep Creek. Ratliff and Howell (1992) considered bull trout in Big Sheep Creek between a low and moderate risk of extinction. Although there is poor information on the dynamics of bull trout in Big Sheep Creek, the majority of summer rearing appears to occur above river kilometer 50 (river mile 31) near Owl Creek (Buchanan *et al*. 1997). Presumably spawning occurs in the headwater tributaries. Resident fish in Big Sheep Creek were found to mature at a fork length of approximately 160 mm (6.3 inches) (Smith and Knox 1992). Otherwise, very little information is available on the size of fluvial fish at spawning, age at maturation, sex ratio, fecundity, time of emergence, and survival rates. Few, if any, attempts have been made to capture fluvial bull trout migrating in Big Sheep Creek. However, it seems likely that bull trout in this population exhibit fluvial and resident life history forms. A diversion for the Wallowa Valley Improvement Canal exists at approximately river kilometer 61 (river mile 37.9) of Big Sheep Creek. Fish can be found on both sides of this diversion, which has segregated the population of bull trout in Big Sheep Creek. While fish may occasionally ‘spill’ downstream, fish cannot pass upstream of the diversion.

Little Sheep Creek. Bull trout in Little Sheep Creek have been observed throughout the mainstem as well as in Cabin and Redmont Creeks (Buchanan *et al*. 1997). The summer distribution extends from approximately river kilometer 37 to 45 (river mile 23 to 28) in Little Sheep Creek and includes the lower few kilometers of both Cabin and Redmont Creeks. Bull trout were observed in Little Sheep Creek during presence/absence surveys in 1991 but not in 1992. No specific population estimates have been conducted for bull trout in Little Sheep Creek. Very little information is available on the size of fish at spawning, age at maturation, sex ratio, fecundity, time of emergence, and survival rates. Buchanan *et al*. (1997) considered bull trout in Little Sheep Creek at a high risk of extinction.

Although there is poor information on the dynamics of bull trout in Little Sheep Creek, the majority of summer rearing appears to occur above the canal diversion at approximately river kilometer 41 (river mile 25.5) (Buchanan *et al*. 1997). Presumably spawning occurs above river kilometer 41 (river mile 25.5) in Little Sheep Creek and in the lower portions of Cabin and Redmont Creeks. Fluvial bull trout migrating upstream in Little Sheep Creek have been captured at the Oregon Department of Fish and Wildlife's steelhead facility (weir). The weir is at approximately river kilometer 8 (river mile 5) and generally operates between March and June. Although this evidence suggests that a fluvial component still exists in this population, it seems likely that bull trout in this population also exhibit a resident life history form.

A diversion for the Wallowa Valley Improvement Canal exists at approximately river kilometer 41 (river mile 25.5) of Little Sheep Creek. This diversion has segregated the population of bull trout in Little Sheep Creek. While fish may occasionally 'spill' downstream, fish cannot pass upstream of the diversion. In addition, fish above the diversion may not have originated in Little Sheep Creek but may have originated from any number of streams (*e.g.*, Big Sheep Creek) being diverted into the canal. Finally, some of the tributaries to Little Sheep Creek (*i.e.*, Redmont Creek) have also been segregated by a diversion for the canal.

McCully Creek. Bull trout have been observed throughout McCully Creek (Buchanan *et al*. 1997). Summer distribution extends from the uppermost reaches of McCully Creek down to the canal diversion (at approximately river kilometer 4.5 or river mile 2.8). Bull trout from McCully Creek are probably distributed in the canal. Fish movement up the canal is likely limited by a 9 meter (29.5 foot), cascading waterfall that is approximately 4 kilometers (2.5 miles) from McCully Creek. Fish movement down the canal is probably limited, at least seasonally, by poor water quality conditions and warm water temperatures that would force fish back into McCully Creek. Smith and Knox (1992) estimated approximately 8 bull trout per 100 square meters of McCully Creek, and extrapolated a total population estimate of 2,500 fish. However, Buchanan *et al*. (1997) considered bull trout in McCully Creek at a moderate risk of extinction because of the isolated nature of this population.

Although there is poor information on the dynamics of bull trout in McCully Creek, summer rearing and spawning appears to occur throughout the creek, particularly in National Forest and Wilderness areas (Buchanan *et al*. 1997). Very little information is available on the size of fish at spawning, age at maturation, sex ratio, fecundity, time of emergence, and survival rates. Fluvial bull trout appear to exist in all other populations of the Imnaha River subbasin, including Little Sheep Creek, to which McCully Creek is a tributary. Hence, it seems probable that McCully Creek once supported bull trout that expressed a fluvial life history. However, bull trout in McCully Creek have essentially been isolated above the canal diversion since the 1880's. Thus, bull trout in McCully Creek are no longer able to express a fluvial life history form, and instead exhibit a resident life history form.

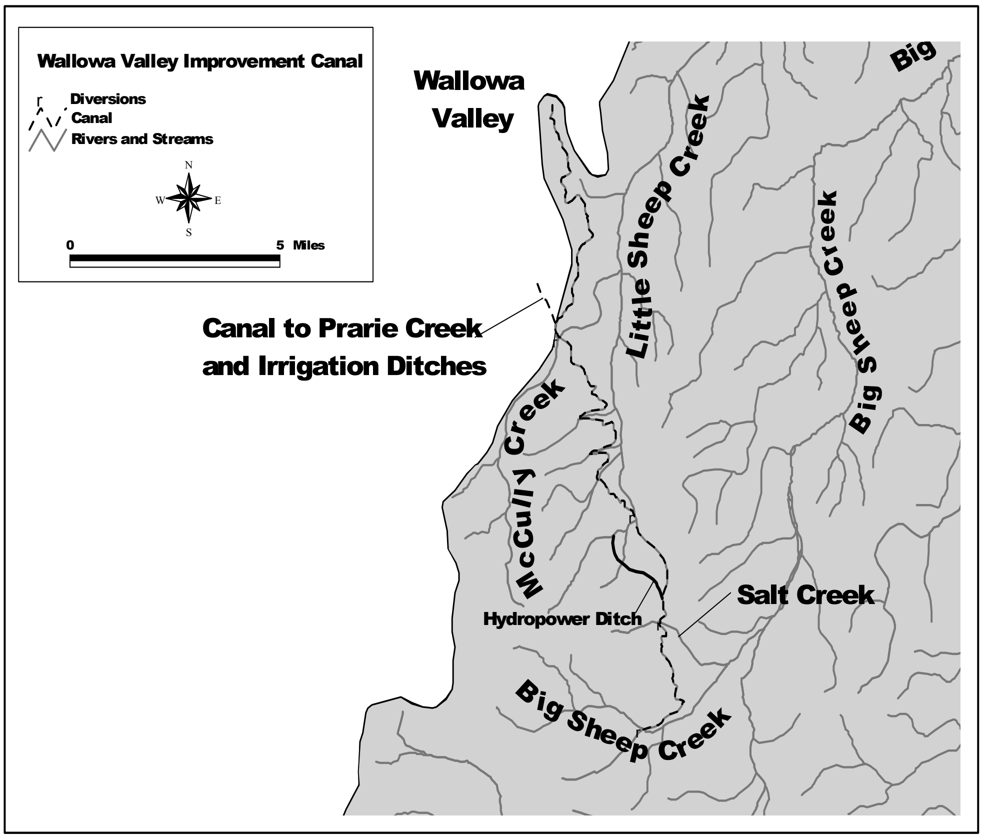
The Wallowa Valley Improvement Canal diversion exists at approximately river kilometer 4.5 (river mile 2.8) of McCully Creek. This diversion has isolated the population of bull trout in McCully Creek to areas above the canal. While fish may occasionally ‘spill’ downstream, fish cannot pass upstream of the diversion. In addition, fish above the diversion may have originated from McCully Creek or from any number of streams (*e.g.*, Big Sheep Creek) being diverted into the canal.

Wallowa Valley Improvement Canal. Bull trout have been observed throughout the Wallowa Valley Improvement Canal (Buchanan *et al*. 1997). Construction of this canal began in the 1800's. The canal begins near Big Sheep Creek and carries water from various tributaries (*e.g.*, Big Sheep Creek, Salt Creek, Little Sheep Creek, McCully Creek) into Prairie Creek or assorted irrigation canals found in the Wallowa Valley (which is part of the Grande Ronde Recovery Unit for bull trout) (Figure 3). Parts of the canal were constructed while other parts utilized existing stream channels. The canal has a waterfall approximately 1 river kilometer (0.6 mile) below Ferguson Creek that is likely impassable to bull trout. Bull trout in the canal have not been recognized as a distinct population. The majority of bull trout in the canal probably originated from Big Sheep Creek, but some fish may be from a variety of streams (*e.g.*, Salt Creek, Little Sheep Creek, McCully Creek). The number of bull trout in the canal is unknown. Although there is poor information on the dynamics of bull trout in the canal, summer rearing and spawning appears to occur throughout, but particularly in the uppermost reaches of the canal (Buchanan *et al*. 1997). All fish in the canal are resident; the fluvial life history form cannot be expressed by bull trout in the canal.

Sheep Creek. Sheep Creek (Idaho) flows directly into the Snake River. A population of bull trout exists in Sheep Creek (Buchanan *et al*. 1997). Bull trout in Sheep Creek likely express both fluvial and resident life history forms (see Chandler and Richter 2001). The number of bull trout in the Sheep Creek is unknown. The distribution, abundance and life history characteristics of bull trout in Sheep Creek have been identified as research needs.

Granite Creek. Granite Creek (Idaho) flows directly into the Snake River. A population of bull trout exists in Granite Creek (Buchanan *et al*. 1997). Bull trout in Granite Creek likely express both fluvial and resident life history forms (see Chandler and Richter 2001). The number of bull trout in Granite Creek is unknown. The distribution, abundance, and life history characteristics of bull trout in Granite Creek have been identified as research needs.

Figure 3. Wallowa Valley Improvement Canal, Wallowa County, Oregon.



REASONS FOR DECLINE

Dams

Dams can affect bull trout by altering habitats; flow, sediment, and temperature regimes; migration corridors; and interspecific interactions, especially between bull trout and introduced species (Rode 1990; Washington Department of Wildlife 1992; Craig and Wissmar 1993; ODFW, *in litt*. 1993; Rieman and McIntyre 1993; Wissmar *et al*. 1994; Bodurtha, *in litt.* 1995). In addition, hydroelectric facilities can directly impact bull trout via entrainment, and by direct injury or mortality by passing through turbines. Impassable dams and other barriers have caused declines of bull trout primarily by preventing access of migratory fish to spawning and rearing areas in headwaters and precluding recolonization of areas where bull trout have been extirpated (Rieman and McIntyre 1993; Montana Bull Trout Scientific Group 1998).

The Imnaha River as well as Sheep and Granite Creeks flow into the Snake River between Lower Granite and Hells Canyon Dams. Bull trout from the Imnaha River, Sheep Creek (Chandler and Richter 2001), and likely Granite Creek express a fluvial life history form, migrating to and overwintering in the mainstem of the Snake River. Dams in the Snake River have impaired the connectivity between bull trout local populations from the Imnaha-Snake Rivers Recovery Unit and those from below Lower Granite Dam or above Hells Canyon Dam. Lower Granite Dam has also changed the habitat where bull trout potentially overwinter from a free-flowing river to a reservoir. The specific impacts of these dams to bull trout from the Imnaha-Snake Rivers Recovery Unit are unclear. Please refer to Chapter 1 of this recovery plan for further discussion on mainstem issues.

Forest Management Practices

Past and present forest management practices on Federal, private and State lands have and continue to adversely affect riparian and stream habitat as well as bull trout. Past practices such as logging (for example, Little Sheep Creek watershed), thinning of riparian vegetation, the destruction of riparian vegetation and increased sedimentation from forest roads (for examples, Imnaha River watershed) have impacted bull trout. Agricultural clearing (for example, Big Sheep Creek between the forest boundary and Coyote Creek), loss of woody debris from campground development (for example, Lick Creek), and harvest-related wildfire have also decreased the function of the existing riparian vegetation in many areas.

The riparian functions that have been compromised include the ability of the vegetation to act as a sediment filter and provide streambank stability, overhead shade, detritus, and a source of instream wood. Riparian species size and composition have decreased from historical conditions and buffer widths between roads and streams are too narrow in many drainages to filter out all soil movement before it reaches the stream. The abundance of large instream wood has been reduced in some watersheds due to the lack of recruitment sources in riparian areas logged in the past or burned in historical wildfires. Some bank erosion has occurred where timber harvest and/or wildfire has removed vegetation with roots integral to the bank stability.

Streambank conditions, in certain areas, are poor with low vegetative coverage and high erosiveness due to past timber harvest and/or the imprint of a road located within the riparian vegetation. Soil movement from harvest sites and road systems adds to the existing high embeddedness level of the streambed substrate where riparian vegetation buffers are insufficiently wide to intercept this material. This high embeddedness decreases the amount of suitable spawning and rearing habitat through the filling of interstitial spaces and filling of pool habitat. The combination of eroding streambanks, high sediment loading and lack of large woody debris have caused sections of stream channel to have higher bankfull width/depth ratios than would be expected of the channel type. These degraded stream segments are wider and shallower than normal. Furthermore, diverse benthic fauna is beneficial to native trout species at all life stages and embedded substrates can have detrimental effects on invertebrate density and species diversity.

Although habitat in the recovery unit has been impacted and may affect bull trout, impacts to bull trout from degraded habitat should be assessed while considering the context in which bull trout use the impacted area. For example, embeddedness is less of an issue in migratory corridors than it is in spawning areas. Some of the habitat impacts found in this recovery unit are outside of the summer rearing or spawning areas used by bull trout.

Livestock Grazing

Livestock grazing has contributed to the decline of bull trout through impacts to both upland and riparian areas of many tributaries in the recovery unit. For example, livestock use affects habitat between Owl Creek and Lick Creek (Big Sheep Creek watershed) and in the lower several kilometers of Lick Creek. Significant livestock grazing (as well as some feedlot development) also exists in the lower portion of Little Sheep Creek. The result of poor livestock management is overgrazing of the riparian vegetation. This overutilization leads to the reduced effectiveness of species that cover and stabilize streambanks. The compacting and cutting action of the hooves of livestock on moist soils causes the sloughing of banks where localized use for feeding, watering, and crossing occurs. The indirect effects are increased bank erosion and embeddedness of the streambed substrate, widening of the stream channel and an increase in water temperature due to lack of overhanging vegetation. Livestock may also cause direct mortality of eggs or alevin if the redd (spawning bed) is trampled during watering or crossing.

Agricultural Practices

The construction and operation of dams and diversions, both within and outside the Imnaha-Snake Rivers Recovery Unit, has contributed to the decline of bull trout populations. Within the Imnaha River subbasin, diversions exist in association with the Wallowa Valley Improvement Canal. Barriers have been constructed in Big Sheep Creek, Little Sheep Creek, and McCully Creek (Figure 3). These barriers divert water into the canal, which carries the water to the Wallowa Valley (part of the Grande Ronde River subbasin and Grande Ronde

Recovery Unit) primarily for irrigation. The diversion at McCully Creek (for example) has effectively isolated bull trout since the 1880's (Buchanan *et al*. 1997).

All of these diversions were constructed without fish passage facilities. Lack of passage prevents bull trout from below the diversions from being connected with bull trout above the diversions. Lack of passage also prevents bull trout from above the diversions from being connected to bull trout below the diversions or to the mainstems of the Imnaha and Snake Rivers. All of these diversions were constructed without screens to prevent fish from entering the canal. As a result, some bull trout have entered and spawn and rear in the canal (Buchanan *et al*. 1997). Bull trout populations above the canal diversions may connect to each other through the canal. However, a waterfall exists in the canal less than 1 river kilometer (0.6 river mile) below Ferguson Creek. Bull trout in the canal above this waterfall likely originated from Big Sheep Creek whereas bull trout in the canal below the waterfall likely originated from McCully Creek. As a result, the canal may not provide much opportunity for populations to be connected.

Bull trout within the Imnaha-Snake Rivers Recovery Unit have been and continue to be adversely affected by irrigation diversions and water withdrawals. Unscreened or inadequately screened irrigation diversions may strand bull trout (and other fish) in irrigation canals, sometimes resulting in high mortality. In addition, water withdrawals from streams for irrigation, particularly in late summer, exacerbate natural low-flow conditions and in some streams. Low flows in late summer can prevent bull trout, which are preparing to spawn, from reaching spawning grounds and can strand them. Low stream flows can also strand rearing juvenile fish in dry channel beds. Low flows can also result in elevated water temperatures which can delay spawning. When irrigation water is returned to streams and rivers, it carries sediment and nonpoint pollution from agricultural chemicals which degrade water quality. Specific concerns include, for example, much of the Little Sheep Creek watershed, which has water withdrawals that reduce summer and fall flows in the upper reaches of the system.

Transportation Network

Although roads exist in the Imnaha-Snake Rivers Recovery Unit, road densities are not particularly high in many of the watersheds. Depending upon their location, roads may have made some contribution to the reduction of riparian vegetation or disconnected the habitat at stream crossings. However, the recovery unit team did not believe that the transportation network in the Imnaha-Snake Rivers Recovery Unit was a substantial reason for the decline of bull trout.

Mining

Although small mines exist in the Imnaha-Snake Rivers Recovery Unit, there are no major mines nor is there a tremendous number of mines. Depending upon their location, mines may have had some minor impact on bull trout habitat. However, the recovery unit team did not believe that mines in the Imnaha-Snake Rivers Recovery Unit were a substantial reason for the decline of bull trout.

Residential Development

Residential development has contributed to the decline of bull trout. For example, residential developments have encroached on much of Little Sheep Creek. As the human population in the recovery unit increases more development and subsequent impacts to riparian areas, water quality, and bull trout are likely. Impacts to bull trout from previous and future development may include loss of riparian habitat, increases in nutrient loading from septic systems, increases in chemical inputs, and additional road construction.

Fisheries Management

Harvest. Bull trout tend to be aggressive and easily caught through angling. However, the species was considered undesirable until recently. Historical harvest of bull trout may have eliminated populations in small tributaries and contributed to the overall decline. For example, before the 1990's bull trout angling was permitted in the State of Oregon. Angling in the Imnaha

River watershed was controlled by standard statewide seasons and limits for trout. Over the course of the 1990's, fishing for bull trout in Oregon became severely restricted (see, for example, Oregon Department of Fish and Wildlife 2001). By 1994, angling to harvest bull trout in the Imnaha River watershed was prohibited as catch and release regulations were implemented. Currently, both the States of Oregon and Idaho prohibit angling for bull trout in the Imnaha-Snake Rivers Recovery Unit (see Oregon Department of Fish and Wildlife 2001; Idaho Department of Fish and Game 2001).

Although illegal, harvest of bull trout still occurs in the Imnaha River subbasin. Angling pressure is moderate to high near the many campground areas in the subbasin. Anglers likely still harvest bull trout from the Imnaha River, Big Sheep Creek, and Little Sheep Creek watersheds. Although brook trout are not prevalent in the subbasin, some of this bull trout harvest results from the difficulty in distinguishing between bull trout and brook trout. As a result, anglers sometimes mistake a bull trout for a brook trout and accidentally harvest the fish. In general, there is limited understanding on the amount and threat of harvest and angling mortality in the recovery unit. Improved understanding will determine the degree of threat and assist in developing management activities (*e.g.*, additional enforcement, public education and outreach) to reduce the threats.

Hatcheries. Barriers associated with hatchery operations may also be contributing to the decline of bull trout populations within the Imnaha-Snake Rivers Recovery Unit. Weirs to capture adult chinook (Imnaha River) and adult steelhead (Little Sheep Creek) are operated by Oregon Department of Fish and Wildlife. These weirs are designed to operate at a time when fluvial bull trout may also be moving upstream, and do capture bull trout. By impeding the migration of fish, these weirs may alter when and where bull trout spawn. Acclimation facilities are also present at the weir sites in the Imnaha River and Little Sheep Creek. Water intakes to these facilities, and screens associated with these intakes, may divert or impinge juvenile bull trout. As such, these intakes and screens may negatively impact the migration of juvenile bull trout.

Brook and Rainbow Trout. Other trout species exist in the recovery unit. For example, rainbow trout (*Oncorhynchus mykiss*)can be found in Little Sheep Creek (Oregon) and Sheep Creek (Idaho). It is unclear whether and to what extent bull trout compete with rainbow trout. In addition, brook trout (*Salvelinus fontinalis*) may exist in the recovery unit. However, brook trout have not been documented in the Imnaha Core Area. Although interactions with other trout species are possible, they are probably not responsible for the decline of bull trout in this recovery unit.

Anadromous Salmonids. Anadromous salmonids have declined throughout the Imnaha-Snake Rivers Recovery Unit and many are currently listed under the Endangered Species Act (*i.e.*, chinook, *Oncorhynchus tshawytscha*; steelhead, *O. mykiss*) (see National Marine Fisheries Service 2000c). Juvenile salmonids produced by anadromous parents are considered to have been a primary food source of bull trout. Thus, a reduction in prey base has likely contributed to the decline of bull trout in the Imnaha-Snake Rivers Recovery Unit.

Disease. No significant fish disease issues for bull trout have been observed in the recovery unit at this time. However, diseases that could impact bull trout (for example, whirling disease) do exist in the Snake River watershed. These diseases may be impacting bull trout in a manner that is not simple to quantify and may have the potential to impact bull trout in the recovery unit.

Isolation and Habitat Fragmentation

Isolation through habitat fragmentation has resulted from a variety of events. Habitat fragmentation has primarily occurred due to road and dam construction. For example, some fluvial bull trout from the Imnaha River exhibit behavior patterns (*i.e.,* leave the Imnaha River and swim upstream in the Snake River until they reach Hells Canyon Dam) which suggest their migration may be blocked by Hells Canyon Dam. Although the recovery unit team did not consider culverts a major threat to bull trout, it is unknown whether culvert placement prevents upstream migration and precludes bull trout from some tributaries in the recovery unit. Loss of riparian habitat, primarily, has resulted in water temperatures during the summer that may be warmer than they were historically. On a seasonal basis, this warm water may act as a thermal barrier to isolate bull trout.

ONGOING RECOVERY UNIT CONSERVATION MEASURES

Efforts to recover salmonid species, including bull trout, are ongoing in the Imnaha-Snake Rivers Recovery Unit. There is a relatively high level of cooperation among fishery entities on various projects. For example, spawning surveys to assess and monitor status and abundance are a cooperative effort involving the Oregon Department of Fish and Wildlife, Oregon State Police, U.S. Forest Service, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and local volunteers. The following represents some of the major, ongoing efforts within the recovery unit.

Oregon Department of Fish and Wildlife has a number of ongoing efforts to conserve bull trout. The department has reduced or eliminated trout stocking programs; adopted changes in angling regulations to prohibit take of bull trout; modified regulations on other fisheries to reduce incidental take; made changes to in-water work periods to better address bull trout needs; developed and distributed bull trout identification posters; and hired a bull trout coordinator in 1995 to complete statewide bull trout status assessment, map bull trout distribution, and develop conservation strategies for bull trout. When bull trout were listed the coordinator’s effort shifted to recovery planning. Oregon Department of Fish and Wildlife also receives funding through a section 6 cooperative agreement with the U.S. Fish and Wildlife Service, which has helped support spawning surveys for bull trout. In 1994, the Oregon Department of Fish and Wildlife modified fishing regulations in the Imnaha River subbasin, closing it to the harvest of bull trout. The Oregon Department of Fish and Wildlife modified operations at their weir on the Imnaha River to provide timely passage for bull trout migrating upstream. They also collect abundance and timing information on fluvial bull trout migrating upstream to spawn.

The Oregon Department of Fish and Wildlife, Oregon State Police, Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, U.S. Forest Service, and Idaho Power Company staff work cooperatively on spawning and habitat surveys, research, telemetry, and abundance projects. The U.S. Forest Service and Oregon Department of Fish and Wildlife implemented a bull trout research project in 2001 in the Imnaha River subbasin. This research focuses on the fluvial migrations, spawning locations and temperature requirements of bull trout. The project will contribute to status assessments as well as recovery planning. The project is ongoing. Idaho Power Company has been conducting and continues to conduct radiotelemetry surveys in the area around Hells Canyon Dam and in tributaries below Hells Canyon Dam.

In 2002, the States of Oregon and Idaho are scheduled to complete a Water Quality Management Plan for the Imnaha River subbasin as well as for that portion of the Snake River which is in the Imnaha-Snake Rivers Recovery Unit. In other recovery units, Water Quality Management Plans have identified high water temperatures as a threat to bull trout recovery. Water temperature is also one of the parameters identified in the Total Maximum Daily Load process and its improvement would benefit bull trout populations in the basin. This process is mandated by the Federal Clean Water Act.

The Nez Perce Tribe is planning to initiate a gene conservation effort which would include the application of cryogenic technology for bull trout in the Imnaha River subbasin. This technology seeks to preserve genetic diversity of listed bull trout subpopulations before further population decline and loss of genetic diversity occurs.

RELATIONSHIP TO OTHER CONSERVATION EFFORTS

State of Oregon

On January 14, 1999, Governor Kitzhaber expanded the Oregon Plan for Salmon and Watersheds to include all at-risk wild salmonids throughout the State through Executive Order 99-01. The goal of the Oregon Plan is to “restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits”. Components of this plan include (1) coordination of efforts by all parties, (2) development of action plans with relevance and ownership at the local level, (3) monitoring progress, and (4) making appropriate corrective changes in the future. It is a cooperative effort of State, local, Federal, tribal and private organizations, and individuals.

The Oregon Department of Fish and Wildlife and Oregon Water Resources Department have established priorities for restoration of streamflow as part of the Oregon Plan for Salmon and Watersheds (Measure IV.A.8). The Oregon Department of Fish and Wildlife has prioritized streamflow restoration needs by ranking biophysical factors, water use patterns, and the extent that water limits fish production in a particular area. Oregon Water Resources Department watermasters will incorporate the priorities into their field work activities as a means to implement flow restoration measures. The needs priorities will be used by the Oregon Watershed Enhancement Board as one criterion in determining funding priorities for enhancement and restoration projects. Watershed councils and other entities may also use the needs priorities as one piece of information to determine high priority restoration projects. Bull trout occupied streams in the recovery unit are included in the highest priority designation for streamflow restoration (Northwest Power Planning Council 2001).

Opportunities to convert existing out-of-stream flows to instream flows in Oregon are available through a variety of legislatively mandated programs administered by Oregon Water Resources Department, for example, transfers of type and place of use (Oregon Revised Statute 536.050(4)), voluntary written agreements among water users to rotate their use of the supply to which they are collectively entitled (Oregon Revised Statute 540.150 and Oregon Administrative Rule 690-250-0080), allocating "conserved water" to instream use (Oregon Revised Statute 537.455 to 537.500), leasing all or a portion of consumptive water rights to instream purposes (Oregon Revised Statute 537.348, Oregon Administrative Rule 690-77-070 to 690-77-077, exchanging a water right for an instream purpose to use water from a different source, being stored water, surface or ground water (Oregon Revised Statute 540.533 to 540.543), and substituting a ground water right for a primary surface water right (Oregon Revised Statute 540.524). Oregon Water Trust provides purchase of water rights from willing landowners for conversion to instream water rights.

Under an agreement with the Environmental Protection Agency, the State of Oregon's Department of Environmental Quality is conducting Total Maximum Daily Load surveys and developing Water Quality Management Plans. For example, in the Imnaha River subbasin, Total Maximum Daily Load surveys are scheduled to be completed throughout the subbasin by 2002 (http://www.deq.state.or.us/wq/TMDLs). These plans should addresses forest, agricultural, urban and transportation sources of water quality impairment.

The Agricultural Water Quality Management Program, established through the State Senate Bill 1010 process (Oregon Revised Statute 568.900 through 568.933), addresses water pollution associated with agricultural lands and activities.

The Oregon Department of Fish and Wildlife developed a management plan for native trout (Oregon Department of Fish and Wildlife 1988), which includes bull trout. Oregon's trout plan focuses on protecting native fish and the habitats in which they exist. The plan provides specific guidance to managers and is consistent with much of the recovery plan.

<u>Columbia River Intertribal Fish Commission</u>

The Columbia River Intertribal Fish Commission developed the Tribal Columbia River Fish Restoration Plan, or Wy-Kan-Ush-Mi Wa-Kish-Wit (http://ccrh.org/comm/river/docs/critfcp.htm). Recommendations set forth in this plan for salmon recovery address three types of actions: institutional, technical, and watershed, with the goal of putting fish back in the river. Objectives and strategies specific to the Imnaha River subbasin are included in this restoration plan and will ultimately benefit bull trout.

Nez Perce Tribe

Much of this recovery unit is ceded lands of the Nez Perce Tribe. The Nez Perce Tribe is responsible for managing, protecting, and enhancing treaty fish and wildlife resources and habitats in the Imnaha River subbasin. The Nez Perce Tribe co-manages fishery resources with the Oregon Department of Fish and Wildlife and implements restoration and mitigation activities throughout areas of northeast Oregon. The Nez Perce Tribe individually and/or jointly implements restoration and mitigation activities in the subbasin. The Nez Perce Tribe's Department of Fisheries Resources Management is responsible for managing fisheries resources to provide for healthy self-sustaining populations of historically present species, and to promote healthy ecosystem processes and rich species diversity (see Northwest Power Planning Council 2001).

Confederated Tribes of the Umatilla Indian Reservation

Much of this recovery unit is usual and accustomed territory for the Confederated Tribes of the Umatilla Indian Reservation. The Confederated Tribes of the Umatilla Indian Reservation is responsible for protecting and enhancing treaty fish and wildlife resources and habitats. Members of the Confederated Tribes of the Umatilla Indian Reservation have fishing and hunting rights in much of the recovery unit. Confederated Tribes of the Umatilla Indian Reservation fish and wildlife activities relate to all aspects of management (see Northwest Power Planning Council 2001).

Northwest Power Planning Council's Subbasin Planning

As part of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, the Bonneville Power Administration has the responsibility to protect, mitigate, and enhance fish and wildlife resources affected by operation of Federal hydroelectric projects in the Columbia River and tributaries. The Northwest Power Planning Council develops and oversees the Columbia River Basin Fish and Wildlife Program that is implemented by the Bonneville Power Administration, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Federal Energy Regulatory Commission. Coordination of Bonneville Power Administration's responsibilities for protection, enhancement, and mitigation, and incorporation of recommendations by Northwest Power Planning Council is in part accomplished through the development of subbasin summaries, which identify the status of fish and wildlife resources, limiting factors, and recommended actions at the subbasin level.

Draft Imnaha and Snake-Hells Canyon subbasin summaries were completed in June 2001 (see http://www.cbfwa.org/files/province/blue/subsum/010601Imnaha.pdf and http://www.cbfwa.org/files/province/blue/subsum/010601SnakeHell.pdf). These summaries encompass the Imnaha-Snake Rivers Recovery Unit, and are consistent with bull trout recovery planning efforts to identify limiting factors. The draft subbasin summaries identify elevated temperature, degraded channel conditions, reduced instream habitat diversity, insufficient flow, degraded riparian habitat, and lack of passage as contributing to the decline of bull trout. The recovery unit team will continue to utilize this planning process to identify and seek funding for projects to aid bull trout recovery.

National Marine Fisheries Service

Salmon and steelhead from Snake River tributaries are also listed under the Endangered Species Act. In 1992 the National Marine Fisheries Service listed the Snake River spring/summer chinook Evolutionarily Significant Unit as well as the Snake River fall chinook Evolutionarily Significant Unit (57 FR 23458). In

1997 the National Marine Fisheries Service listed the Snake River steelhead Evolutionarily Significant Unit (62 FR 43937). These Evolutionarily Significant Units encompass the Imnaha-Snake Rivers Recovery Unit. As part of the recovery planning process for chinook and steelhead the National Marine Fisheries Service has issued technical guidance for the development of recovery plans (National Marine Fisheries Service 2000a). Currently, there are 26 Evolutionarily Significant Units which have been listed as either threatened or endangered. The framework for steelhead and salmon recovery plan development is divided into distinct geographic areas, or domains, which may contain multiple Evolutionarily Significant Units. Recovery plans for listed salmon and steelhead will contain the same basic elements as the bull trout recovery plan, both which are mandated by the Endangered Species Act, and include (1) objective measurable criteria, (2) description of site-specific management actions necessary to achieve recovery, and (3) estimates of cost and time to carry out recovery actions. Time frames for recovery plan development for chinook and steelhead have not been finalized, but the Imnaha-Snake Rivers Recovery Unit Team will coordinate the implementation of bull trout recovery actions with salmon and steelhead measures to maximize the use of available resources and avoid duplication.

Numerous biological opinions have been issued by the National Marine Fisheries Service regarding salmon and steelhead in the Imnaha-Snake Rivers Recovery Unit. These include, for example, opinions on operations of the Federal Columbia River Power System (National Marine Fisheries Service 2000b). More specifically, in December 2000, the National Marine Fisheries Service issued a biological opinion on the “Effects to Listed Species from Operation of the Federal Columbia River Power System”. Although designed for salmon and steelhead, reasonable and prudent alternatives in the biological opinion are consistent with many of the needs identified by the recovery unit team for bull trout.