Draft

Salmon
Subbasin Summary

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Salmon Subbasin Summary

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Salmon Subbasin Summary

1. Background

The following report was drafted to meet the Independent Scientific Review Panel's need for a summary of environmental conditions and conservation efforts for fish and wildlife in the Salmon Subbasin, Idaho. Part of a "rolling provincial review", the report is a first step toward a more ecologically based process for establishing budgets and identifying fish and wildlife conservation projects that ought to be funded by the Bonneville Power Administration (BPA). The report also establishes a basis for a more thorough assessment of conditions across the Salmon Subbasin and the development of a final subbasin plan. When completed, the final plan will be a comprehensive document meeting objectives and standards set forth in the Northwest Power Planning Council's amended Fish and Wildlife Program, and against which future projects proposed for the Salmon Subbasin will be assessed. That plan will be central to meeting BPA's Endangered Species Act responsibilities in its future funding decisions.

The report briefly addresses existing information on the Salmon Subbasin's environmental setting, the status of its fish, wildlife, and their habitats, recent efforts related to habitat restoration and species conservation, and ongoing research or data collection activities that may help improve or evaluate future conservation effectiveness. Many agencies, entities, and individuals contributed to the development of this document.

2. Introduction

The Salmon Subbasin is unique in the Columbia River Basin. It supports a diverse group of some of the region's more important wild, indigenous salmonid populations, many of them residing in habitat strongholds within the subbasin's large areas of designated wilderness and other roadless terrain. A recent broad-scale assessment of the entire Interior Columbia River Basin ecosystem found that the Salmon Subbasin provides a core of remaining connected habitat for five species of salmonids: bull trout, westslope cutthroat trout, redband trout (sympatric with steelhead), stream-type chinook salmon, and summer steelhead (Lee et al. 1997, Thurow et al. 2000). The subbasin also supports critical habitat for listed sockeye salmon, and large connected habitats for Pacific lamprey, white sturgeon, and a variety of other native nongame fishes.

However, although resident salmonid populations within many of the Salmon Subbasin's undeveloped areas are recognized as some of the strongest in the region, the ESA-listed salmon and steelhead in these areas are struggling to persist upstream of eight hydroelectric dams on the mainstem Columbia and Snake rivers. This leaves a difficult decisions about how best to conserve and restore salmon and steelhead populations that are declining within the subbasin's watersheds. At present, regional decision-makers have developed plans that focus on restoring habitats within degraded watersheds as an alternative to breaching lower Snake River dams as a restoration measure for anadromous salmonids. This option is intended to increase in-subbasin survival rates of these fish, and will also improve habitat conditions for important populations of resident salmonids and other sensitive species within the subbasin.

3. Subbasin Description

3.1. General Description

3.1.1. Subbasin Location

The Salmon Subbasin lies within the northern Rocky Mountains of central Idaho and encompasses 10 major watersheds (Figure 1). The Salmon River flows 410 miles north and west through central Idaho to join the Snake River in lower Hells Canyon. The Salmon is one of the largest subbasins in the Columbia River Basin and encompasses some of its most pristine terrestrial and aquatic temperate montane ecosystems.

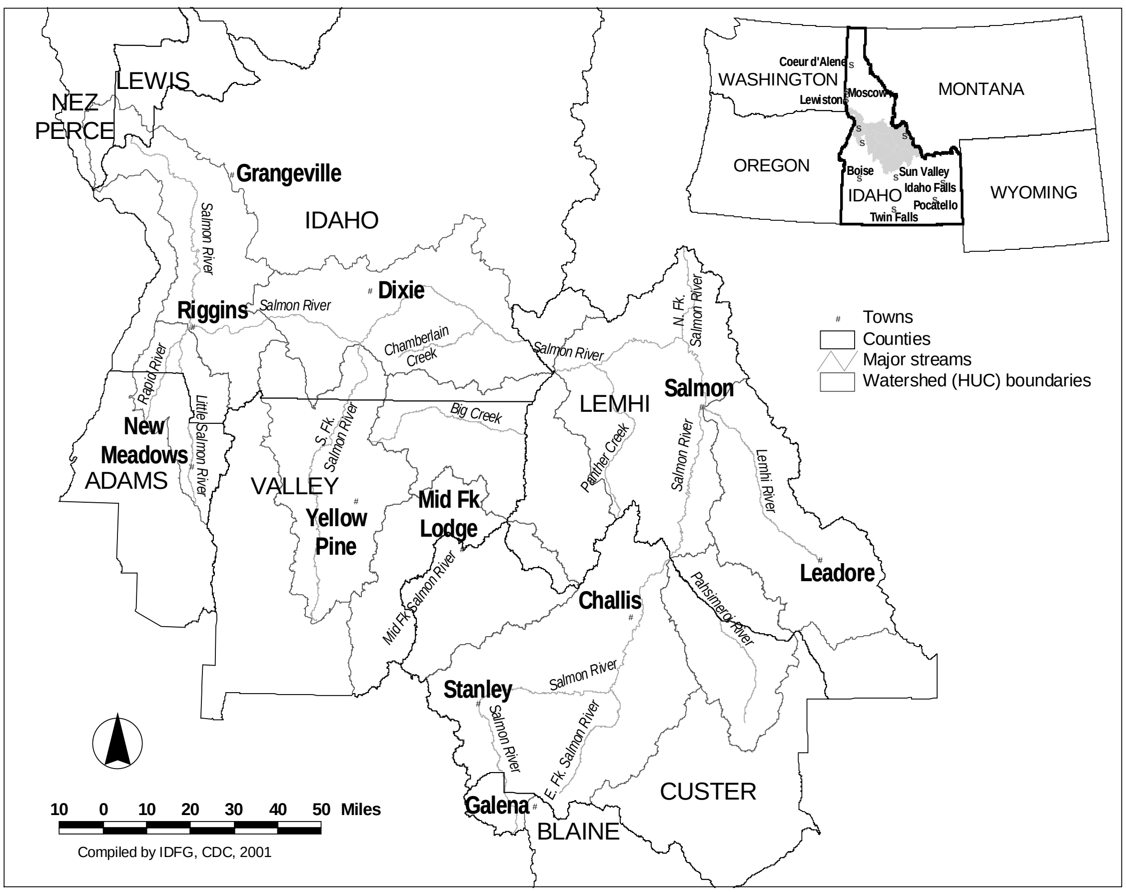


Figure 1. Location map of the Salmon Subbasin, Idaho.

The subbasin is located within the Middle Rocky Mountain Steppe - Coniferous Forest - Alpine Meadow Province ecoregional province (McNab and Avers 1994). Most of the subbasin is characterized by an intricate mosaic of moderate to high elevation mountain ranges combined with deeply cut valleys of the Salmon River Mountains. The western portion of the subbasin encompasses the northern Seven Devils Mountains and the southern fringe of the Palouse Prairie region. Here Columbia River flow basalt provides the context for contrasting sharp canyonlands and gentle, undulating plateaus. The southeastern portion of the subbasin is punctuated by the high alpine ridges of the Lost River and Lemhi ranges, parallel block fault ranges characteristic of basin-and-range terrain of the Great Basin. Elevation within the subbasin ranges from 12, 662 feet on the Summit of Mount Borah down to 900 feet at the mouth of the Salmon.

3.1.2. Drainage Area

The Salmon Subbasin covers approximately 14 thousand square miles, 16.7 percent of the land area of Idaho. Ten major hydrologic units (watersheds) occur within the subbasin: the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, South Fork Salmon, Lower Salmon, and Little Salmon watersheds (Figure 2).

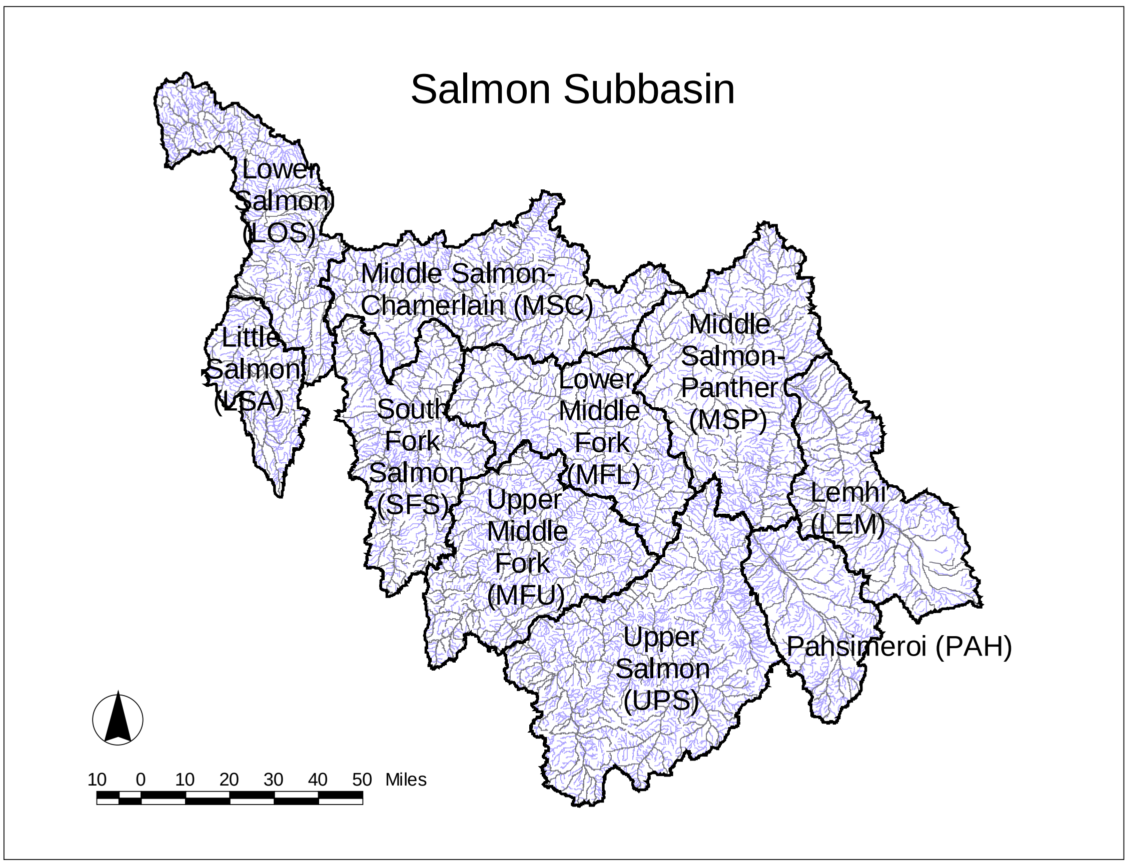


Figure 2. Major hydrologic units (watersheds) within the Salmon Subbasin, Idaho.

The subbasin has nearly 1700 named streams with a combined length of nearly 17 thousand stream miles. These streams flow from headwaters in the Beaverhead, Salmon River, Lemhi, Lost River, Sawtooth and smaller mountain ranges to the mouth of the Salmon River at its confluence with Snake River in lower Hells Canyon. The largest of the major watersheds is the Upper Salmon, and the smallest the Little Salmon (Table 1).

Table 1. Drainage areas, numbers of named streams, and total stream miles for the ten major hydrologic units (watersheds) within the Salmon Subbasin, Idaho (source: U.S. Geologic Survey).

Watershed	Code	Hydrologic Unit Code (HUC)	Drainage area (square miles)	Number of named streams	Total stream miles
Upper Salmon	UPS	17060201	2,410	219	3,251
Pahsimeroi	PAH	17060202	825	60	889
Middle Salmon-Panther	MSP	17060203	1,810	192	1,958
Lemhi	LEM	17060204	1,270	124	1,330
Upper Middle Fork Salmon	MFU	17060205	1,490	234	1,979
Lower Middle Fork Salmon	MFL	17060206	1,370	185	1,571
Middle Salmon-Chamberlain	MSC	17060207	1,700	251	2,019
South Fork Salmon	SFS	17060208	1,310	193	1,626
Lower Salmon	LOS	17060209	1,240	168	1,636
Little Salmon	LSA	17060210	582	68	718
Totals			**14,007**	**1,694**	**16,977**

3.1.3. Geomorphology

The subbasin lies within the Northern Rocky Mountain and Columbia Intermontane geomorphic provinces (Ross and Salvage 1967). Major geologic formations include Cretaceous calc-alkaline intrusive rocks of the Idaho Batholith, Eocene silicic and basaltic rock of the Challis Volcanics, Precambrian feldspathic quartzite, Quaternary alluvial deposits of the Lemhi and Pahsimeroi valleys, and Columbia River flow basalt (Figure 3).

Topographical relief is reflective of a terrain that once attained a mature erosional level (by the Middle Tertiary) and subsequently uplifted, thus re-initiating stream erosional processes (Ross and Savage 1967). Quaternary glaciation occurred primarily on isolated high elevation peaks. Major alpine glacier systems formed in the Sawtooth Range, White Cloud Peaks, and Boulder Mountains, and to a lesser extent, the Lost River and Lemhi ranges. Large scale glacially derived physiographic features (e.g., broad U-shaped valleys) are prominent in the upstream portions of the Upper Middle Fork, Upper Salmon, and Lemhi watersheds (e.g., view the distribution of Pleistocene fluvial glacial debris, Figure 3). Localized evidence of alpine glaciation (e.g., pothole lake systems and glacial cirques) is common and dispersed throughout the subbasin on upper slope and ridge top positions of higher elevation ridge systems. Stream erosion, however, has played the predominant role in shaping the physiography of the subbasin. Stream erosion since the Middle Tertiary has given rise to a topography characterized by relatively narrow, V-shaped valleys, steep valley side slopes, and relatively narrow ridge systems.

The geomorphology of the eastern Upper Salmon, Pahsimeroi and Lemhi watersheds is a dramatic exception to the proceeding discussion. The sub-parallel block fault ridges of the Lost River and Lemhi ranges represent the northernmost extent of Basin and Range terrain (so predominant to the south in the Great Basin). In this portion of the subbasin, high mountain peaks rise rapidly from broad, gentle valleys.

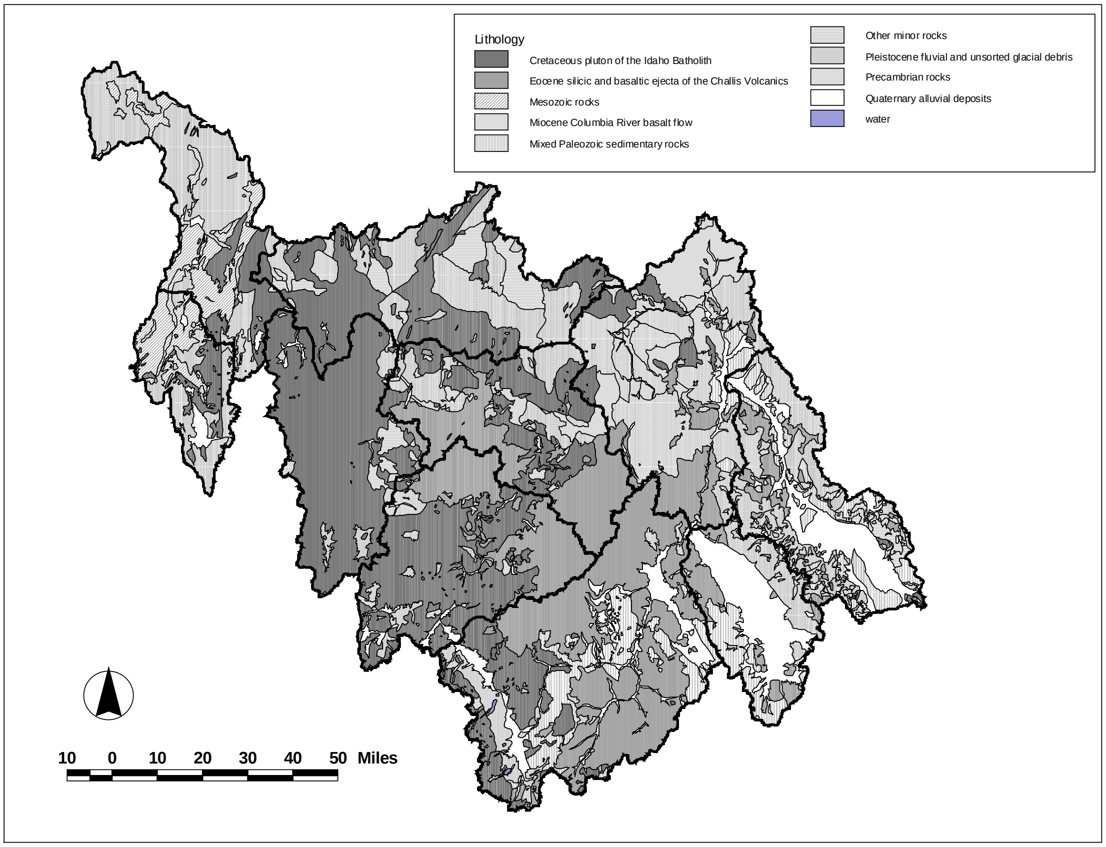


Figure 3. Major geological formations within Salmon Subbasin, Idaho (adapted from Jensen et al. 1997). Major streams are shown to provide geographical reference.

Key geologic features within the subbasin are the Idaho Batholith, Challis Volcanics, and the Quaternary alluvial deposits of the Pahsimeroi and Lemhi valleys. Soils derived from these parent materials are typically highly erodible. The combination of these soils, steep topography, and climatic stresses give rise to significant base surface erosion, slumping, and debris avalanche hazards (Megahan 1975; Jensen et al. 1997).

3.1.4. Climate

The Salmon Subbasin has a broad climatic gradient, from the prevalence of a Pacific maritime regime in the west to a continental regime in the east. Coarse patterns in the distribution of climatic regimes within the subbasin are summarized using a modified Koppen system climatic classification (Godfrey and Molnau 1999) in Table 2. Detailed analyses and mapping of these conditions is given in Appendix A.

The Pacific maritime-influenced climate of the western portion of the subbasin is primarily affected by the seasonal movement of two opposing weather systems (Ross and

Savage 1967). From the late fall to early spring months, the climate is influenced by cool and moist Pacific maritime air. Periodically this westerly flow of air is interrupted by outbreaks of cold, dry, continental air from Canada normally blocked by mountain ranges to the east. During the summer months, the westerly winds weaken, and a Pacific high pressure system becomes dominant, resulting in decreased precipitation, and more continental climatic conditions. The region is generally characterized by warm summers and mild or cool winters. Across much of the Salmon Subbasin, most precipitation occurs as snow during winter and summers are comparatively dry.

Table 2. Climatic regimes of the 10 major hydrologic units (watersheds) within the Salmon Subbasin, Idaho (adapted from Godfrey and Molnau 1999).

Koppen climate class	Description	Percent of area within hydrologic unit (watershed)									
		UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
BSk	Very dry continental climate; most precipitation occurs in summer	4.9	21.5	4.7	7.1					1.5	
Cfa	Warm to hot summers, mild winters; precipitation is rather evenly distributed between winter and summer									2.9	0.7
Cfb	Warm summers, mild winters; precipitation is rather evenly distributed between winter and summer									0.0	
Dfa	Warm to hot summers, cold winters; precipitation is rather evenly distributed between winter and summer									1.1	
Dfb	Warm summers, cold winters; precipitation is rather evenly distributed between winter and summer	27.3	31.4	62.0	39.4	20.1	46.8	20.7	4.5	74.8	8.9
Dfc	Warm summers, cold winters; precipitation is rather evenly distributed between winter and summer; summers are relatively short	48.7	47.1	22.8	52.5	36.5	44.0	27.7	10.9	2.7	1.3
Dsb	Warm summers, cold winters; extreme differences occur between summer versus winter precipitation (summers are much drier)	0.0		6.2		10.5	1.0	10.3	35.2	14.9	72.8
Dsc	Warm summers, cold winters; extreme differences occur between summer versus winter precipitation (summers are much drier); summers are relatively short	19.0		4.2		32.9	8.2	41.3	49.5	2.0	16.2
H	Due to high elevation, the mean temperature of the warmest month is < 50 F			0.3	1.0						

The eastern-most portion of the subbasin is characterized by warm summers and cold winters. Mean annual precipitation is typically one-half the amount received in the west. The Salmon River Mountains and Sawtooth Range create a rain-shadow effect, allowing only an occasional influx of moisture laden winter air from the Pacific. Precipitation patterns in the rain-shadow, which predominate in the Pahsimeroi and Lemhi watersheds, differ from those found across the rest of the subbasin. In these areas, precipitation frequently occurs in the early summer when convective showers are common; winters are relatively dry.

Geographic differences in the seasonal distribution of precipitation influence the characteristics of terrestrial and aquatic habitats. When snowpack is low, anadromous fish in irrigated portions of the subbasin are affected by stream dewatering and elevated summer temperatures. Occasionally, lengthy frontal rain storms can produce as much as 10 inches of precipitation. These events are a critical factor in flooding and landslides during winter and spring (Platts 1974). Some areas are snow covered for more than eight months of the year while other areas receive only minor amounts. Above 4,000 feet, most of the annual precipitation occurs as snow with maximum accumulation occurring by about the first week in April.

3.1.5. Hydrology

The mean annual flow of the Salmon River at White Bird, the US Geological Survey gaging station closest to the mouth, is 11,300 cubic feet per second (cfs). The drainage area of the basin upstream from this station is 13,550 mi^2, or 97% of the entire area of the Salmon Subbasin. This means that mean annual discharge from the subbasin is approximately 0.83 cfs/mi^2.

Recent or historic streamflow data are available for 89 gaging stations that the USGS has operated for varying periods of time within the Salmon Subbasin. The distribution of these stations among the 10 major watersheds of the subbasin is given in Table 3. Detailed information on each station is summarized in Appendix B. At present, the USGS collects streamflow data at 17 stations within the subbasin (Figure 4), at least one of which is situated in each major watershed except the Middle Salmon-Chamberlain. These active stations cover a wide variety of physical settings, and are positioned at elevations ranging from 1412-6370 ft MSL and below catchments whose sizes range from 6.3 to 13,500 mi^2.

Table 3. Distribution of active and old/inactive USGS streamflow gaging stations among the ten major hydrologic units (watersheds) within the Salmon Subbasin, Idaho (source: USGS).

Hydrologic Unit (watershed)	Code	USGS streamflow gaging stations		
		Old/inactive	Active	Total
Upper Salmon	UPS	22	5	27
Pahsimeroi	PAH	10	1	11
Middle Salmon-Panther	MSP	6	2	8
Lemhi	LEM	6	2	8
Upper Middle Fork	UMF	4	1	5
Lower Middle Fork	LMF	2	1	3
Middle Salmon-Chamberlain	MSC	3	0	3
South Fork Salmon	SFS	12	3	15
Lower Salmon	LOS	4	1	5
Little Salmon	LSA	3	1	4
Total	---	72	17	89

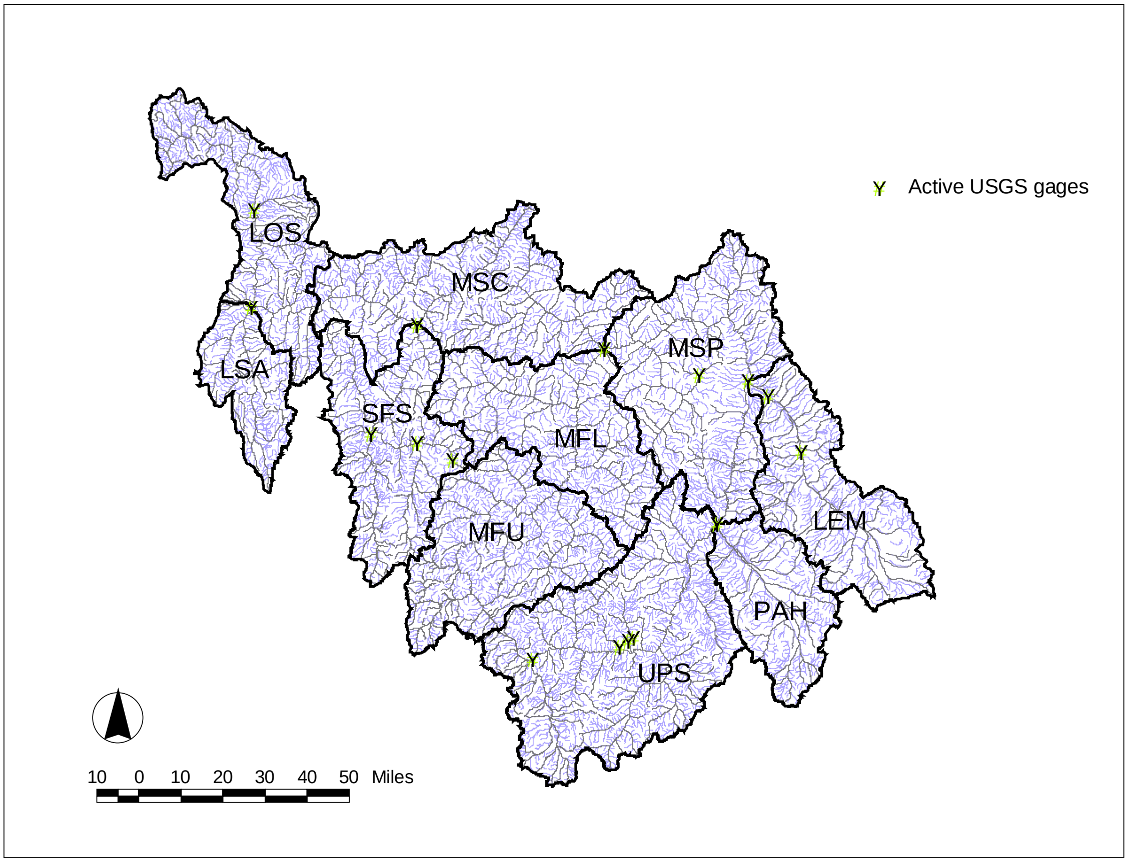


Figure 4. Locations of active USGS streamflow gages in the Salmon Subbasin, Idaho.

Seasonal patterns of streamflow for the periods of record at selected gaging stations within the subbasin are summarized in Figure 5. In general, streamflows peak in spring and recede to considerably lower levels in summer, fall and winter. High flows are strongly dependent on snowmelt in most areas, and peaks are generally reached earliest in lower elevation catchments. Spring-time flows in the lower river reaches of the Lemhi and Pahsimeroi hydrologic units (watersheds) stand out as somewhat different than those found in the other units, and reflect a high rate of water diversion for irrigation purposes as well as differences in geology and levels of precipitation at the eastern edge of the subbasin. Flows in the lower Lemhi River reach particularly low levels in the summer and fall.

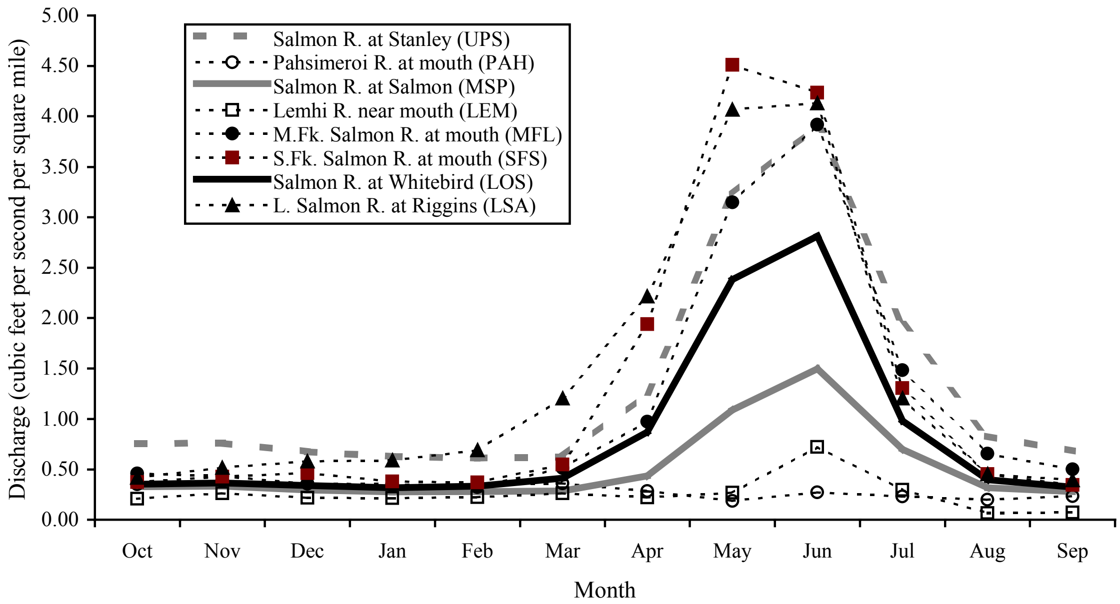


Figure 5. Seasonal patterns in streamflows for the periods of record at eight gaging stations on rivers within the Salmon Subbasin, Idaho (data source: USGS) Flows at gage sites have been normalized to drainage area for comparative purposes.

3.1.6. Water Quality

Information on water quality issues within the subbasin is characterized by prevalent regulatory guidelines: the location of toxic substance releases, the location of hazardous materials, known point source discharges, and the presence of impaired water bodies. Water quality in many areas of the subbasin is affected to varying degrees by landuses that include livestock grazing, road construction, logging and mining. Detailed information on water quality issues within the subbasin is summarized in Appendix C.

Eighty-nine water bodies in the Salmon Subbasin are classified as impaired under the guidelines of Section 303(d) of the Clean Water Act (US EPA and Idaho DEQ 1998). The primary parameters of concern are sediments (88 cases), nutrients (17 cases), flow alteration, irregular temperatures, and habitat alteration. Ten to 25 percent of the waters within the South Fork Salmon and the Lower Salmon watersheds are listed as impaired by the EPA (Figure 6). Five to 10 percent of the waters in the Little Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds are impaired. In the Upper Salmon, Upper Middle Fork Salmon, and the Lower Middle Fork Salmon, less than five percent (<5%) are listed as impaired. Total maximum daily load (TMDL) standards were approved for the Lemhi watershed in March, 2000. Watershed assessments and proposed TMDL standards have been developed for Middle Salmon-Panther, Middle Salmon-Chamberlain, and South Fork Salmon (Idaho DEQ 2000, 2001). Watershed assessments and TMDL standards are to be developed for Upper Salmon and Pahsimeroi in 2001; Lower Salmon and Little Salmon, 2004; and for Middle Fork Salmon watersheds in 2005.Potential for surface water pollution by heavy metals contaminants is localized and associated with mining activity. Six mines within the subbasin have records of toxic substance releases(US EPA 2001a). The incidents have involved the following contaminants and conditions: arsenic, chromium, nitrate compounds, nickel, iron, silver, zinc, cadmium, lead, copper, manganese, mercury, cobalt, 2-mercaptomenzothiazole, chlorine, coliform, solids, and altered basic water chemistry. An additional six mines located within the subbasin show no records of toxic substance releases (US EPA 2001a, 2001b).

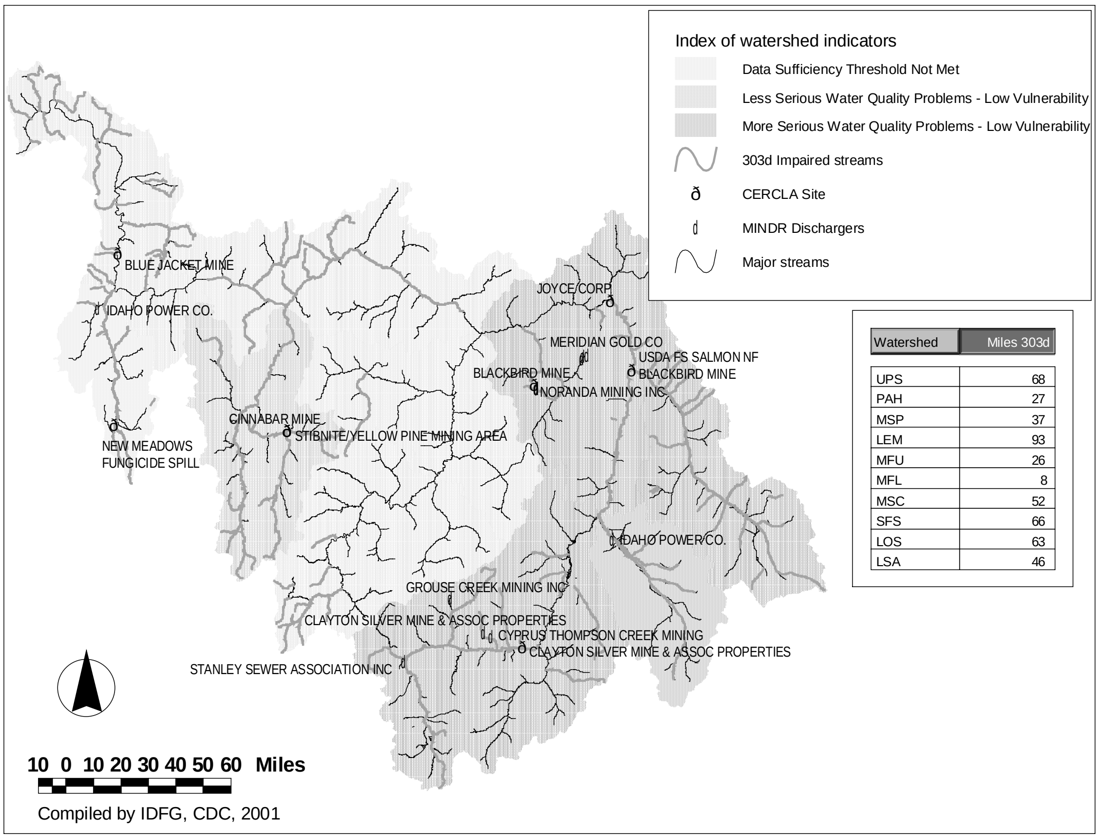


Figure 6. Locations of water quality impaired (Clean Water Act Section 303d) streams identified by the Idaho Department of Environmental Quality and US Environmental Protection Agency as of 1998. Also shown are known point locations for a variety of potential water pollutants (CERCLA Sites and MINDR Dischargers).

Effluents at sewage treatment facilities are also an important water quality concern. Licensed dischargers within the subbasin are primarily municipal sewage treatment facilities (US EPA 2001c). Documented concerns for these sites include the discharge of suspended solids, coliform, and chlorine or the alteration of basic water chemistry (dissolved oxygen and pH).

Four of the major watersheds within the subbasin are given the index of watershed indicators rank, More Serious Water Quality Problems - Low Vulnerability (US EPA

1996). In the Lemhi, Upper Salmon, Pahsimeroi, and Middle Salmon-Panther watersheds, less than 20 percent of the larger streams meet all designated uses (i.e., specific uses identified for each water body through State and Tribal cooperation, such as support of salmonid fishes, drinking water supplies, maintenance of aquatic life, consumption of fish, recreational contact with water, and agriculture). Larger streams in the South Fork Salmon watershed meet their designated uses in 20 - 49 percent of the cases. Streams in the Upper and Lower Middle Fork Salmon watersheds meet their designated uses in well over 80 percent of the cases. There are insufficient data to evaluate the Lower Salmon, Middle Salmon-Chamberlain and Little Salmon watersheds (US EPA 1996).

Community water source facilities are most abundant in the Upper Salmon watershed with 160, and in the Middle Salmon-Panther watershed with 134 water sources. Documented community water sources are generally less common in the more sparsely populated watersheds. The numbers are: Lower Salmon, 17; Little Salmon fourteen, 14; Lemhi, 13; South Fork Salmon, 5; Pahsimeroi, 4; and Middle Salmon-Chamberlain, 3 community water sources. There are no documented community water sources in the Lower Middle Fork Salmon and Upper Middle Fork Salmon watersheds.

3.1.7. Vegetation and Floristic Diversity

Vegetation may be described by a range of different attributes: species composition, stand structure, or seral status (to name a few). Knowledge of vegetative cover provides information on the current dominant plant inhabitants and the associated species that may utilize these plant compositions and structures as habitat. Knowledge of potential plant growth, or potential natural vegetation (PNV), provides information on the basic physical environmental factors and ecological processes that function to structure species habitats. Coupled information on existing vegetative composition and potential natural composition provides insight regarding the current dynamic status of the vegetation in relation to how the vegetation might interact with, for example, disturbance processes or how the vegetation might function to provide specific species habitats.

The forested vegetation of the Salmon Subbasin is described by Steele et al. (1981 and 1983), Cooper et al. (1991), and Johnson and Simon (1987). Johnson and Simon (1987), Tisdale (1985), Daubenmire (1970), Mueggler and Harris (1969) Lauer and Peek (1976), and Hironaka et al. (1983) provide descriptions of the composition and ecology of grassland and shrubland plant associations. Caicco (1983), Moseley (1985), Urbanczyk (1993), and Richardson (1996) conducted work on alpine vegetation within the subbasin (and see Cooper and Lesica 1992). Miller (1976), Tuhy (1982), Mutz and Queiroz (1983) conducted early work on wetland and riparian plant associations and community types within the subbasin. Descriptive work by Crowe and Clausnitzer (1995), Kovalchik (1983), Tuhy and Jensen (1982), and Youngblood et al. (1985) is relevant to the subbasin. Jankovsky-Jones (1999) conducted wetland and riparian inventory work in the Lemhi and Pahsimeroi watersheds. Rust (1998) conducted an inventory of old growth ponderosa pine stands in the Little Salmon and Lower Salmon watersheds. Information on the distribution, composition, and ecology of vegetation with Idaho is available from Idaho Conservation Data Center (2001). Many of these data are also available in NatureServe (Association for Biodiversity Information 2001). Lists of the plant associations and community types known or expected to occur within the subbasin are provided in Appendix D.

Thirteen broad potential natural vegetation plant association groups are identified as occurring within the Salmon Subbasin. The relative abundance of each is summarized by major watershed in Table 4. The subbasin has considerable ecosystem diversity. Evergreen coniferous forest and evergreen shrubland ecosystems are most abundant. Dominant potential natural vegetation varies widely among watersheds within the subbasin in relation to basic environmental factors of climate and elevation. Existing vegetative cover within the subbasin has been grouped into16 cover classes. The relative abundance of each class within each major watershed within the subbasin is summarized in Table 5.

Table 4. Potential natural vegetation, by major watershed, for the Salmon Subbasin, Idaho (adapted from Hann et al. 1997).

Potential Natural Vegetation (plant association group)	Percent of area within hydrologic unit (watershed)									
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Alpine Meadow	2.1		0.0	0.3	0.0	1.1	1.3	1.5	0.2	
Bluebunch Wheatgrass Grassland									14.5	2.6
Douglas-fir Forest	7.5	19.4	35.5	11.6	13.9	22.5	18.5	17.8	25.5	22.7
Grand Fir Forest	0.1		0.1		0.0	0.1	1.0		12.7	32.1
Idaho Fescue Grassland									18.6	3.1
Low Sagebrush Dwarf-Shrubland	11.7	5.7	0.7							
Mountain Big Sagebrush Shrubland	25.9	37.1	9.6	50.9	4.1	3.1	13.2	5.1	5.1	2.7
Mountain Hemlock Forest	0.0		0.1		0.7	0.3	5.1		0.1	
Ponderosa Pine Woodland	0.0		3.5			3.1	12.2	5.2	3.6	0.1
Rock	0.0	1.6		1.1						
Subalpine Fir Forest	10.5		13.0		6.4	22.2	45.2	31.4	16.1	23.1
Subalpine Fir Forest and Woodland	26.0	8.2	20.8	13.4	72.2	44.1	3.5	38.9	3.7	13.4
Whitebark Pine-Limberpine Forest and Woodland	3.4	11.4	2.6	5.9	2.1	3.5	0.0	0.2		
Wyoming Big Sagebrush-Mountain Big Sagebrush Shrubland	12.8	16.7	14.1	16.7	0.5	0.0				

Table 5. Land cover within each of 10 major watersheds in the Salmon Subbasin, Idaho (adapted from Landscape Dynamics Lab 1999).

Land cover class	Percent of area within hydrologic unit (watershed)									
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Agriculture/Disturbed Non-Forest	2.4	5.9	2.5	8.9	0.1	0.1	0.1	0.2	3.1	4.6
Alpine Perennial Grassland	0.3	1.0	0.0	0.7	0.1	0.0	0.1	0.1	0.0	0.1
Deciduous Shrubland	0.6	0.0	1.5	0.1	3.0	4.3	4.9	4.7	4.6	2.9
Douglas-fir Forest	8.7	8.2	30.9	15.2	28.9	39.0	28.6	23.5	12.3	11.3
Evergreen Dwarf-Shrubland	7.7	19.1	0.6	11.5	0.3	0.1	0.0	0.1	0.0	0.2
Evergreen Shrubland	25.5	33.7	21.4	39.0	6.7	6.4	2.6	2.2	1.7	3.6
Forb/Graminoid Wetland	0.4	0.9	0.0	1.0	1.0	0.0	0.2	0.4	0.5	0.2
Lodgepole Pine Forest	13.2	1.3	19.0	3.9	23.4	16.1	16.7	18.3	3.5	1.4
Mixed Mesic Forest	0.6	0.2	0.6	0.4	0.7	0.5	6.2	1.3	19.0	5.8
Mixed Subalpine Forest	16.4	3.0	9.3	3.5	14.4	13.3	18.6	20.4	6.0	15.9
Perennial Forb Vegetation	0.1		0.9		1.9	1.9	1.4	5.6	4.3	3.4
Perennial Grassland	3.4	6.3	2.9	2.7	4.3	4.8	5.7	5.3	11.9	7.1
Ponderosa Pine Woodland	0.0		3.8	0.0	0.4	1.1	10.8	10.6	22.1	37.0
Riparian Shrubland and Forest	1.8	1.2	1.0	2.1	2.1	0.6	0.7	0.9	0.9	1.5
Sparsely Vegetated Land	3.1	8.1	0.3	2.4	0.0	0.0	1.3	0.0	4.8	0.9
Subalpine Evergreen Woodland	15.6	11.0	5.0	8.4	12.6	11.7	1.7	6.4	0.9	3.9
Unclassified/water	0.3	0.0	0.2	0.0	0.0	0.0	0.2	0.1	3.4	0.2

3.1.7.a. Forest and Woodland Vegetation

Major groups of forest plant associations include grand fir (*Abies grandis)* forest, subalpine fir (*Abies lasiocarpa*) forest, subalpine fir forest and woodland, whitebark pine-limberpine (*Pinus albicaulis* and *Pinus flexilis*, respectively) forest and woodland, ponderosa pine (*Pinus ponderosa*) woodland, Douglas-fir (*Pseudotsuga menziesii*) forest. mountain hemlock (*Tsuga mertensiana*) Forest is a relatively minor component in the subbasin. The plant association group is restricted to moderately high elevation (4600 - 9600 feet), cold, wet to moist environments most abundant in the northeast portion of the Middle Salmon-Chamberlain watershed. Cooper et al. (1991) and Steele et al. (1981 and 1983) summarize species composition of forested plant associations present within the subbasin. Plant associations within each group are summarized in Appendix D.

The ponderosa pine woodland plant association group typically occurs at lower treeline within the subbasin on ecotonal gradients between grassland or shrubland and more mesic coniferous forest. The plant association group occurs at 1950 to 7800 feet elevation on metamorphic intrusive and granitic rock associated with the Idaho Batholith within the northern and western-most watersheds of the subbasin. It is restricted to Pacific maritime-influenced climatic regions within the subbasin. Ponderosa pine does not occur in the southern and eastern portions of the subbasin (Upper Salmon, Upper Middle, Pahsimeroi, and Lemhi watersheds) as sufficient moisture in this Continental climatic region only occurs in cool, high elevation habitats.

Very frequent, low intensity fire is a key factor in maintaining the open canopies characteristic of these woodlands. Soil drought or infertility may be equally important in some areas. A very frequent, low intensity to infrequent, low intensity fire regime is characteristic of ponderosa pine woodland and Douglas fir forest associations that form forest/grassland ecotonal woodlands. Fire disturbance in these low to moderately productive plant associations functions to reduce tree encroachment into grassland and thin understory tree regeneration, favoring the structural and compositional dominance of ponderosa pine or Douglas-fir (especially in the eastern portion of the subbasin) and reducing the development of pole-sized ladder fuels. On moderately productive sites, fire return intervals range from 10 to 18 years. On low productive sites the fire return interval in this group may be as long as 50 years as sufficient fuels are not present to carry fire or are broken by rock outcrop or bare soil (Agee 1993; Crane and Fischer 1986).

The Douglas-fir forest plant association group occurs in warm, dry to cool, very dry environments of both Pacific maritime-influenced and Continental climatic regions of the subbasin at 1300 to 10600 feet elevation. The group is an important constituent in all but the Upper Salmon watershed. Parent materials are highly varied. The group has the greatest affinity for intrusive granitic rock of the Idaho Batholith. These associations occur on low to moderately productive sites. Relatively frequent, low intensity fire, on these moderately productive sites, maintains open stands of large diameter ponderosa pine or Douglas-fir with patchy Douglas-fir understory regeneration and a patchy mosaic of understory shrub, grass, and herb cover. This fire disturbance regime functions to thin understory tree regeneration, favoring the structural and compositional dominance of ponderosa pine in the overstory and reducing the development of pole-sized ladder fuels (Fischer and Bradley 1987; Crane and Fischer 1986). As ground and ladder fuels accumulate during fire-free periods, these stands become increasingly susceptible to stand-replacing fire.

The grand fir forest plant association group occurs in cool to warm, relatively moist environments at 2800-8900 feet elevation on basalt (mafic volcanic flow), calc-alkaline intrusive rock of the Idaho Batholith, and meta-volcanic parent materials within the Lower Salmon and Little Salmon watersheds. The plant association group occurs within Pacific maritime climatic regions of the subbasin.

Grand fir plant associations within the subbasin represent a broad range of native fire disturbance regimes (Crane and Fischer 1986). The predominant pre-European settlement disturbance regime was frequent, low-intensity fire. Frequent ground fires maintained relatively open stands of large diameter fire-resistant tree species. These highly productive sites support fire-maintained, mid-seral old growth dominated by large diameter ponderosa pine.

In the western and northern portions of the subbasin (Middle Salmon-Panther, Middle Salmon-Chamberlain, South Fork Salmon, Little Salmon, and Lower Salmon watersheds) ponderosa pine is a long-lived seral species in grand fir and Douglas-fir forest. Historically, frequent, low intensity fire disturbance gave rise to the development of mid-seral old growth forest dominated by ponderosa pine. Mid-seral ponderosa pine-dominated old growth provides key cavity-nesting and thermal cover habitats. The following species prefer ponderosa pine-dominated old growth as breeding and feeding habitat: northern goshawk, white-headed woodpecker, pileated woodpecker, Williamson's sapsucker, white-breasted nuthatch, pygmy nuthatch, Townsend's warbler, silver-haired bat, California myotis, fisher and flammulated owl (Hayward and Verner 1994; Warren 1989; Wisdom et al. 2000). Local studies (relevant to the subbasin) regarding the flammulated owl are documented by Hayward (1986), Hayward and Garton (1988), Powers et al. (1996), Groves et al. (1997), Atkinson and Atkinson (1990), Moore and Frederick (1991), Shepherd and Servheen (1992), and Shepherd (1996). Rust (1998) provides an indexed, annotated bibliography of literature related to ponderosa pine-dominated old growth and species habitats relations. Ponderosa pine is the currently dominant forest canopy species on most grand fir and Douglas-fir forest sites. However, several decades of fire exclusion in these old growth ponderosa pine stands have resulted in significant alteration in the characteristics and placement of fuels (Barrett 1988; Sloan 1994). Fire suppression has resulted in the accumulation of surface and ladder fuels. These changes threaten the viability of ponderosa pine-dominated old growth forest habitats as pre-settlement low- and moderate-severity fire regimes transition to present day moderate- and high-severity fire regimes (Hann et al. 1997).

The consequences of fire exclusion in old growth ponderosa pine-dominated stands are generally proportional to site productivity. On sites where ponderosa-pine is seral, significant increases in the density of understory shade-tolerant tree regeneration have occurred giving rise to multi-layered stand structures that were relatively uncommon in pre-settlement times (Arno et al. 1995; Arno et al. 1997; Hamilton 1993; Johnson 1994; Sloan 1994; Steele et al. 1986). Exasperated by removal of ponderosa pine through selective harvesting or increased understory regeneration resulting from livestock grazing, these conditions have occurred more rapidly and to a greater extent on more productive sites compared to less productive sites (Rust 1998). With the lengthening of fire return intervals, large, old ponderosa pine are increasingly susceptible to mortality due to intensified competition for water and nutrients resulting from increased understory stem density of more competitive, shade-tolerant tree species (Everett et al. 1994; Morgan 1994; Agee 1996; O'Hara 1996).

Hann et al. (1997) characterize a general trend within these lower elevation forest ecosystems of the subbasin of change from predominantly frequent, non-lethal fire disturbance to less frequent, lethal fire disturbance (Table 6). This trend influences the viability of important components of terrestrial biological diversity - ponderosa pine-dominated old growth and the plant and animal habitats these forests and woodlands represent. As forest stands have become increasingly susceptible to mortality from fire and competitive interactions, watershed stability has declined and aquatic habitats have become increasingly susceptible to alteration and loss.

Table 6. Matrix of differences between recent and historic (modeled) fire disturbance regimes in the Salmon Subbasin (adopted from Hann et al. 1997). Values appearing as “0.0” are less than 0.1 percent.

Historic (modeled) fire regime	Current fire regime									
	very frequent, nonlethal	frequent, nonlethal	infrequent, nonlethal	frequent, mixed	infrequent, mixed	frequent, lethal	infrequent, lethal	very infrequent, lethal	extremely infrequent, letha	fire is rare
very frequent, nonlethal	2.4	6.9	27.6	12.7	15.0	6.5	26.1	2.7	0.0	0.0
frequent, nonlethal	0.8	1.2	17.0	12.9	23.8	1.4	31.8	10.9		0.1
infrequent, nonlethal	0.1	0.9	38.5	5.6	29.7	1.8	18.5	4.8		0.2
frequent, mixed	0.2	31.5	6.8	17.9	10.8	1.6	15.1	15.7		0.3
infrequent, mixed	0.0	1.6	2.8	2.0	42.6	0.8	10.9	39.1		0.2
very infrequent, mixed		0.2	0.5	0.8	5.0	0.4	12.7	80.3		
frequent, lethal	2.5	6.0	5.9	3.8	15.1	24.0	31.1	11.3	0.0	0.4
infrequent, lethal	8.7	1.4	9.9	9.6	8.9	16.7	42.9	1.6	0.1	0.2
very infrequent, lethal	0.1	3.7	5.6	5.7	11.4	1.5	16.4	55.4		0.3
extremely infrequent, lethal						10.9	31.3		57.8	
fire is rare		0.3	1.2	0.3	12.5	4.7	12.5	6.7		61.7

Whitebark pine-limberpine and subalpine fir forest and woodland plant associations occur in relatively cool to cold, dry, high elevation valley and ridgetop environments within the subbasin. These plant association groups are abundant in the Upper Salmon, Upper Middle Fork Salmon, Lower Middle Fork Salmon, and South Fork Salmon and important in the Pahsimeroi, Middle Salmon-Panther, and Lemhi. Key concerns for wildlife habitat and biological diversity within these ecosystems are the placement and availability of different stand structures and distribution and abundance whitebark pine.

Subalpine fir forest and woodland plant associations provide key habitats for lynx. Critical habitat areas for lynx have been identified within the subbasin. The distribution of lynx habitat components (e.g., denning versus forage habitats) has not been determined. The stand dynamics and fire disturbance processes contributing to the distribution of lynx habitats has not been studied within the subbasin.

Whitebark pine is a slow growing, long-lived conifer that is common at higher elevations in subalpine environments of the subbasin. In lower elevation subalpine forest and woodlands, whitebark pine is a seral species. In these environments established whitebark pine provide habitat for tree species less tolerant of intense insolation and extreme wind desiccation. In the absence of disturbance it is overtopped in 100-120 years by faster growing, shade-tolerant species (e.g., subalpine fir). Although whitebark pine is killed by crown fires and hot ground fires, it tolerates low-intensity ground fires that will kill the shade tolerant understory tree species. Fire intervals in these habitats range from

30-300 years (Reid et al. 1999). The distribution and abundance of whitebark pine has declined in recent decades due to mortality caused by mountain pine beetle (*Dendroctonus ponderosae*) and whitepine blister rust (*Cronartium ribicola*), an exotic fungal pathogen. Inventories have not been conducted to determine the current distribution and condition of whitebark pine-dominated forest and woodlands within the subbasin.

Whitebark pine seeds are important food sources for (particularly) Clark's nutcracker and grizzly bear. Whitebark pine-dominated forest and woodlands provide key habitats for American marten, three-toed woodpecker, northern flying squirrel, pygmy shrew, wolverine, mountain goat, and long-eared myotis.

3.1.7.b. Canyon Grassland and Sagebrush Steppe

Bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*) plant association groups occur primarily in the Lower Salmon and Little Salmon watersheds. Wyoming big sagebrush-mountain big sagebrush (*Artemisia tridentata wyomingensis* and *Artemisia tridentata vaseyana*, respectively) and mountain big sagebrush plant association groups are abundant in the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and (the later) Middle Salmon-Chamberlain watersheds (Table 4). Native perennial bunchgrass species provide high quality and highly preferred forage for wildlife and domestic livestock on canyon grassland and sagebrush steppe vegetation. Bluebunch wheatgrass and Idaho fescue are both seasonally sensitive to foliar loss by grazing or fire. Declines in the abundance of perennial bunchgrass species due to fire and domestic livestock grazing (and the combined cumulative effects) has contributed to increase abundance and distribution of exotic annual grass species, particularly cheat grass (*Bromus tectorum*) and medusa wildrye (*Elymus caput-medusea*).

The early spring growth phenology of these exotic annual grass species confers a competitive advantage over native perennial bunchgrass (particularly bluebunch wheatgrass) species in seedling establishment. These exotic annual grass species are able to germinate and initiate root growth at cooler soil temperatures and continue to grow throughout winter. In spring the annual species are able to competitively capture soil surface moisture before initiation of significant root growth has occurred in bluebunch wheatgrass (Harris 1967). Increased abundance of annual grass species leads to the accumulation of fine fuels, which results in more frequent fire and the subsequent reduction in abundance of bluebunch wheatgrass (Peters and Bunting 1994; Whisenant 1990). This spiraling decline related to the invasion of annual grass species has contributed to widespread loss of the quality and distribution of bluebunch wheatgrass plant associations.

Native perennial bunchgrass species provide important wildlife habitat and commercial resource values. The long lived, deep rooted perennial bunchgrass species native to the subbasin serve a keystone role in the maintenance of vegetative and watershed stability and resilience to disturbance events and environmental change. Lose of the abundance and vigor of bunchgrass triggers the raveling (perhaps eventually irreversible) decay of watershed integrity, and the capability of these sites to produce wildlife habitat and commercial resource values (Rust et al. 2000). In order to maintain and enhance quality terrestrial and aquatic habitats and commercial resource values in canyon grassland

and sagebrush steppe vegetation within the subbasin management should result in significant and prolonged gains in the distribution and abundance of native bunchgrass.

3.1.7.c. Riparian and wetland vegetation

Wetland and riparian plant communities provide key habitats for both terrestrial and aquatic species within the subbasin. The distribution of wetland and riparian communities within the subbasin is best reflected by land cover mapping projects (Table 5). Wetland and riparian vegetation is highly varied within the subbasin; and distributed throughout. Species dominance changes with basic environmental gradients of elevation and climatic regime, and with geomorphology. Principal concerns are wetland loss and functional shifts involving impairment of function and vegetative type changes due to agricultural practices, livestock grazing, and land development (Jankovsky-Jones 1999; OEA Research 1986a, 1986b).

Thirteen high-priority wildlife species use riparian habitats in Idaho. One hundred and thirty Idaho migratory bird species use riparian habitat as nesting habitat. Of the 119 neotropical migratory landbirds in Idaho, 57% use riparian habitat.

3.1.7.d. Rare and Endemic Plant Species.

Ninety-six plant species within the subbasin are considered rare either globally or statewide, and Seventy-seven of these species have been specially designated as either globally rare (ranks G1 - G3) or rare within Idaho (state rarity rank S1 or S2). These specially designated species are identified in Table 7, and detailed occurrence information for them is summarized by major watershed in Appendix D. Four regions of high plant endemism and biodiversity significance occur within the subbasin: Hells Canyon, Stanley Basin/Sawtooth Valley, Challis Endemics area, and East Central Idaho mountains and valleys (Marcot et al. 1998).

Table 7. Rare species of plants found within the Salmon Subbasin, Idaho (source: Idaho Conservation Data Center 2001b).

Alkali primrose (*Primula alcalina*)	Marsh's bluegrass (*Poa abbreviata ssp marshii*)
Bent-flowered milkvetch (*Astragalus vexilliflexus* var *vexilliflexus*)	Meadow milkvetch (*Astragalus diversifolius*)
Blandow's helodium (*helodium blandowii*)	Meesia (*Meesia longiseta*)
Blue gramma (*Bouteloua gracilis*)	Mt. shasta sedge (*Carex straminiformis*)
Borsch's stonecrop (*Sedum borschii*)	Nail lichen (*Pilophorus acicularis*)
Brewer's sedge (C*arex breweri var paddoensis*)	Northern golden-carpet (*Chrysosplenium tetrandrum*)
Broad-fruit mariposa (*Calochortus nitidus*)	Northern sagewort (*Artemisia campestris ssp borealis var purshii*)
Bugleg goldenweed (*Haplopappus insecticruris*)	Pale sedge (*Carex livida*)
Bulb-bearing waterhemlock (*Cicuta bulbifera*)	Palouse goldenweed (*Haplopappus liatriformis*)
Cascade reedgrass (*Calamagrostis tweedyi*)	Payson's milkvetch (*Astragalus paysonii*)
Challis milkvetch (*Astragalus amblytropis*)	Pink agoseris (*Agoseris lackschewitzii*)
Cushion cactus (*Coryphantha vivipara*)	Plains milkvetch (*Astragalus gilviflorus*)
Davis' stickseed (*Hackelia davisii*)	Plumed clover (*Trifolium plumosum var amplifolium*)
Douglass' wavewing (*Cymopterus douglassii*)	Pod grass (*Scheuchzeria palustris*)
False mountain willow (*Salix pseudomonticola*)	Pointed draba (*Draba globosa*)
Farr's willow (*Salix farriae*)	Pored lungwort (*Lobaria scrobiculata*)
Flexible alpine collomia (*Collomia debilis var camporum*)	Prairie moonwort (*Botrychium campestre*)
Four-parted gentian (*Gentianella propinqua*)	Purple thick-leaved thelypody (*Thelypodium laciniatum var streptanthoides*)
Green-band mariposa lily (*Calochortus macrocarpus var maculosus*)	Reindeer lichen (*Cladonia luteoalba*)
Guardian buckwheat (*Eriogonum meledonum*)	Salmon river fleabane (*Erigeron salmonensis*)
Hapeman's sullivantia (*Sullivantia hapemanii var hapemanii*)	Salmon twin bladderpod (*Physaria didymocarpa var lyrata*)
Hazel's prickly phlox (*Leptodactylon pungens ssp hazeliae*)	Short-style tofieldia (*Triantha occidentalis ssp brevistyla*)
Hoary willow (*Salix candida*)	Simple kobresia (*Kobresia simpliciuscula*)
Idaho bitterroot (*Lewisia kelloggii*)	Slender gentian (*Gentianella tenella*)
Idaho douglasia (*Douglasia idahoensis*)	Spacious monkeyflower (*Mimulus ampliatus*)
Idaho hawksbeard (*Crepis bakeri ssp idahoensis*)	Spoon-leaved sundew (*Drosera intermedia*)
Idaho range lichen (*Xanthoparmelia idahoensis*)	Stanley whitlow-grass (*Draba trichocarpa*)
Idaho subalpine maidenhair fern (*Adiantum aleuticum* Subalpine Ecotype)	Sticky goldenweed (*Haplopappus hirtus var sonchifolius*)
Jones' primrose (*Primula incana*)	Swamp onion (*Allium madidum*)
Kotzebue's grass-of-parnassus (*Parnassia kotzebuei var kotzebuei*)	Tobias' saxifrage (*Saxifraga bryophora var tobiasiae*)
Kruckeberg's sword-fern (*Polystichum kruckebergii*)	Two-groove milkvetch (*Astragalus bisulcatus var bisulcatus*)
Leafless bug-on-a-stick (*Buxbaumia aphylla*)	Wavy-leaf thelypody (*Thelypodium repandum*)
Least moonwort (*Botrychium simplex*)	Wedge-leaf saxifrage (*Saxifraga adscendens var oregonensis*)
Lemhi milkvetch (*Astragalus aquilonius*)	Welsh's buckwheat (*Eriogonum capistratum var welshii*)
Lemhi penstemon (*Penstemon lemhiensis*)	White beakrush (*Rhynchospora alba*)
Low fleabane (*Erigeron humilis*)	White clouds milkvetch (*Astragalus vexilliflexus var nubilus*)
Lyall's phacelia (*Phacelia lyallii*)	Wolf's currant (*Ribes wolfii*)
Macfarlane's four-o'clock (*Mirabilis macfarlanei*)	Yellowstone draba (*Draba incerta*)
Marsh felwort (*Lomatogonium rotatum*)	

3.1.7.e. Noxious Weeds

Noxious weed and exotic plant species are spreading rapidly locally, regionally, and nationally. Roads, trails, and rivers act as primary conduits for their spread and establishment. The rapid rate of noxious weed spread and establishment in the West is partly due to a lack of natural population control agents in new environments, prolific seed production, physiological advantages over native species, and a strong ability to become established. Site vulnerability to invasion by noxious weeds varies with productivity and similarity to the native habitat of the invader (Boise National Forest et al. 2000).

Nineteen noxious weed species are currently known or expected within the subbasin (Table 8). The highest priority for treatment is given to invading species. These include diffuse and spotted knapweed, rush skeletonweed, yellow starthistle, dalmatian toadflax, and leafy spurge. Exotic species that are not currently listed as noxious but pose significant adventive threat to the subbasin are hound's-tongue (*Cynoglossum officinale*), sulfur cinquefoil (*Potentilla recta*).

Table 8. Noxious weeds and their known distribution among the ten major hydrologic units of the Salmon Subbasin, Idaho.

Species	Major hydrologic unit (watershed)									
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Black henbane (*Hyoscyamus niger*)	X									
Canada thistle (*Cirsium arvense*)								X	X	X
Common crupina (*Crupina vulgaris*)									X	X
Common St. Johns wort (*Hypericum perforatum*)						X	X	X	X	X
Dalmation toadflax (*Linaria dalmatica*)								X	X	X
Diffuse knapweed (*Centaurea diffusa*)		X	X	X		X	X	X	X	X
Dyers woad (*Isatis tinctoria*)								X		
Field bindweed (*Convolvulus arvensis*)	X							X		
Hoary cress (aka whitetop) (*Cardaria* ssp.)		X	X	X						
Leafy spurge (*Euphorbia esula*)	X	X	X			X			X	X
Musk thistle (*Carduus nutans*)		X	X	X						
Orange hawkweed (*Hieracium aurantiacum*)						X	X	X		
perennial sowthistle (*Sonchus arvensis*)		X	X	X						
Purple loosestrife (*Lythrum salicaria*)									X	
Rush skeletonweed (*Chondrilla juncea*)						X		X	X	X
Scotch thistle (*Onopordum acanthium*)								X	X	X
Spotted knapweed (*Centaurea maculosa*)	X	X	X	X		X	X	X	X	X
Yellow starthistle (*Centaurea solstitialis*)									X	X
Yellow toadflax (*Linaria vulgaris*)		X	X	X				X	X	X

3.1.8. Major Land Uses

3.1.8.a. Ownership and Land Use Patterns

Public lands account for approximately 91 percent of the Salmon Subbasin (Table 9), with most of this being in federal ownership and managed by seven National Forests or the Bureau of Land Management (Figure 7). Public lands within the subbasin are managed to produce wood products, forage for domestic livestock, and mineral commodities, and to provide recreation, wilderness, and terrestrial and aquatic habitats. Approximately nine percent of the subbasin land area is privately owned. Private lands are primarily in agricultural cultivation, and are concentrated in valley bottom areas within the upper and lower portions of the subbasin.

Table 9. Land ownership patterns in the Salmon Subbasin, Idaho.

Landowner	Major hydrologic unit (watershed)										Entire subbasin
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA	
USDA Forest Service	68.9	45.9	83.7	39.5	99.4	99.2	98.5	98.3	42.0	61.0	76.6
USDI Bureau of Land Management	24.7	41.8	10.4	39.0			0.8	0.1	7.3	4.4	12.6
USDI National Park Service									0.2		0.0
State of Idaho	1.4	3.6	0.3	3.0	0.2	0.3	0.1	0.8	4.7	3.3	1.5
Private	4.6	8.7	5.4	18.4	0.4	0.5	0.6	0.7	45.4	31.0	9.1
Open water	0.4	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.2

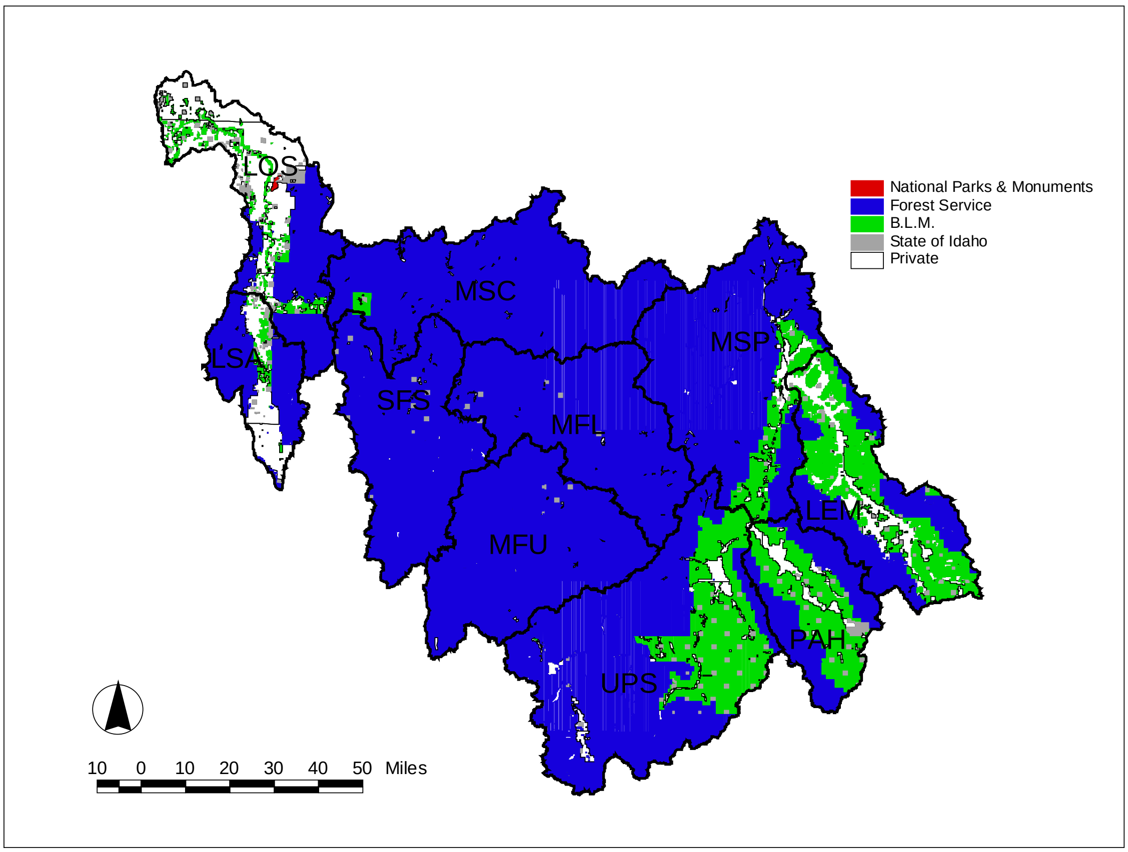


Figure 7. Land ownership patterns within the Salmon Subbasin, Idaho.

Land management practices within the subbasin vary among landowners. The greatest proportion of National Forest lands are federally designated Wilderness Area or are areas with low resource commodity suitability. One third of the National Forest lands in the subbasin are managed intensively for forest, mineral, or range resource commodity production. Bureau of Land Management lands in the subbasin are managed to provide domestic livestock rangeland and habitats for native species. State of Idaho endowment lands within the subbasin are managed for forest, mineral, or range resource commodity production.

Near-stream or in-channel activities of relevance to fish and wildlife conservation include efforts by landowners, private or otherwise, to modify stream channels in order to protect property. Since the State Stream Channel Protection Act became law in 1971, the Idaho Department of Water Resources (IDWR) has issued a total of 1763 stream alteration permits within the Salmon Subbasin (IDWR 2001). Examination of the geographic distribution of permitted channel alterations during the past 30 years suggests that the long-term frequency of these activities was relatively consistent across much of the Salmon Subbasin, but less common in the Upper Middle Fork, Lower Middle Fork, Middle Salmon-Chamberlain, and Pahsimeroi watersheds (Figure 8). It is unclear to what degree channel modifying activities completed without permits may have had on the observed pattern.

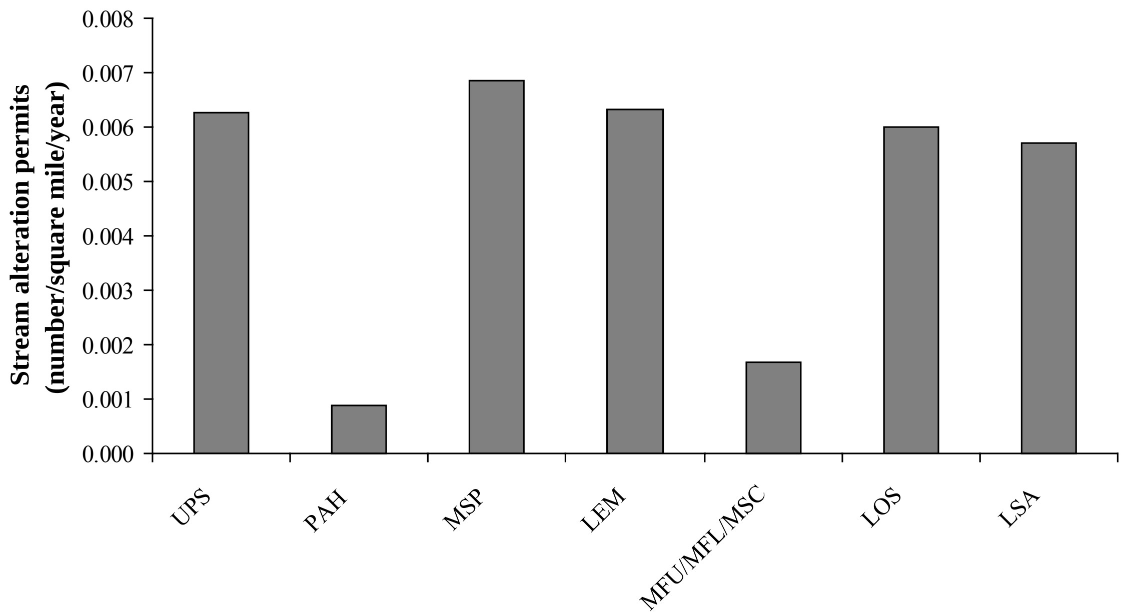


Figure 8. Relative abundance of stream alteration permits issued in the Salmon Subbasin, 1971-2000 (data source: IDWR 2001).

Stream channels in the subbasin are also altered, albeit on a smaller scale, by recreational dredging activities. Until very recently, about 650 permits were issued for such activities each year in the Salmon and Clearwater subbasins combined (IDWR 2001). Since 2000, the State of Idaho has required more detailed permit applications to be filed for recreational dredging in the Salmon Subbasin. During the most recent year for which data are available (2000), 27 permits were issued for recreational dredging along the mainstem Salmon River.

3.1.8.b. Impoundments and Irrigation Projects

Water Diversion Structures and Fish Migration Barriers

No year-round, total barriers to fish migration currently exist on the Salmon River and its larger tributaries, but partial and seasonal barriers have been created on a few of these streams. Partial barriers to anadromous fish exist on Panther Creek in the form of acid mine drainage, and on the Lemhi, Pahsimeroi and upper Salmon rivers at water diversions for irrigation. Twenty minor tributaries contain dams that are used for numerous purposes such as irrigation, recreation and fish propagation (Salmon Subbasin, 1990). The locations of dams and diversions (screened and unscreened) are shown in Figure 9.

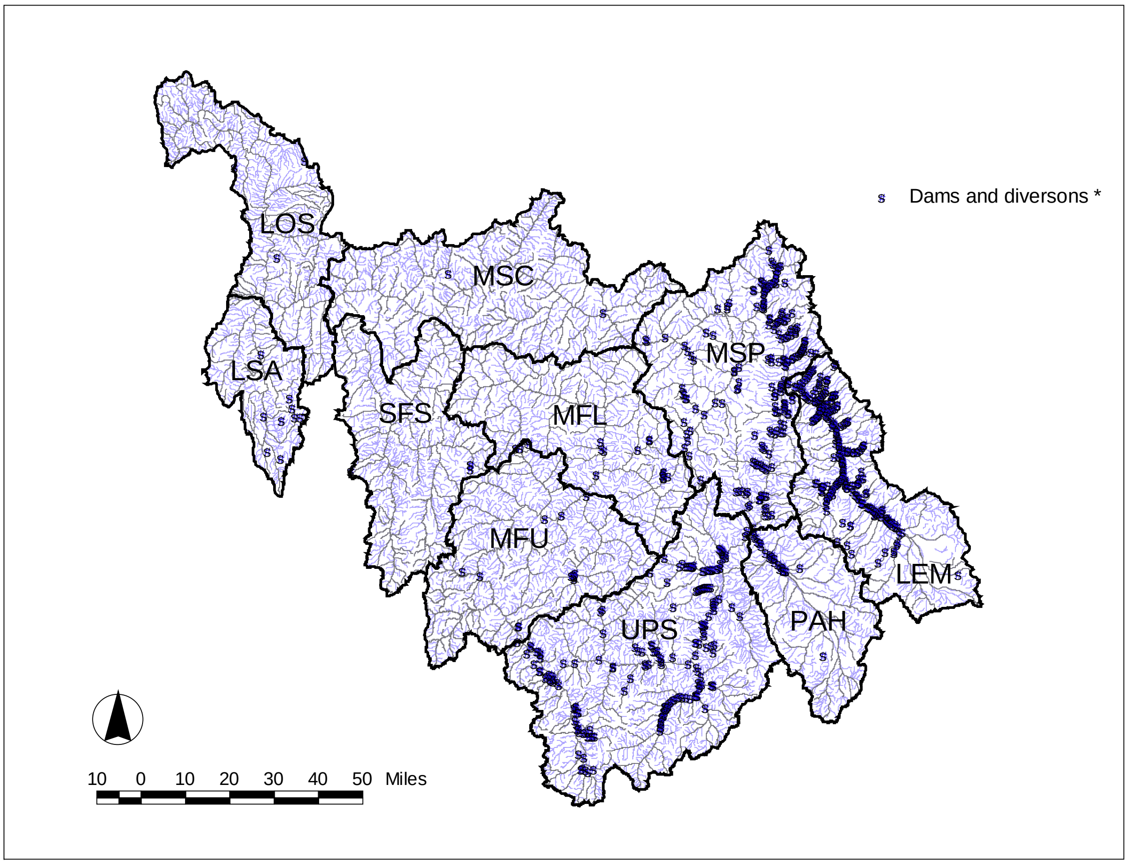


Figure 9. Locations of water diversions with known fish screening status and of small dams, Salmon Subbasin, Idaho, 2001 (sources: IDFG and IDWR).

Two power dams were constructed on rivers in the Salmon Subbasin in the early 1900s but have since been removed. These were Sunbeam Dam on the mainstem Salmon River immediately upstream from the Yankee Fork confluence and a power dam on the lower Lemhi River. Sunbeam Dam was constructed in 1910 by the Golden Sunbeam Mining Company and remained intact until it was intentionally breached in 1934. Constructed of concrete, stone and timber, the dam was approximately 30 feet in height, 100 feet in length at the bottom and 300 feet long at the top. The rounded surface of the top crest acted as the spillway. The downstream face of the dam was sloped and acted as a splash apron. The dam diverted water for power production into a supply tunnel located on the north side of the river. The power house supplied electricity to the mine and mill located on Jordan Creek. Power was supplied for one year before the mine and mill property was sold in 1911.

Sunbeam Dam constituted a complete blockage for adult anadromous fish for most of the period between 1911 and 1934. The original fish ladder, operating in 1911, proved to be completely ineffective. In 1919, a redesigned fish ladder was installed. Completed in 1920, the ladder reportedly passed adult sockeye salmon during its first year of operation. Between 1921 and 1934, fish passage via the redesigned ladder was reported as doubtful. In 1931, chinook salmon reportedly began negotiating the abandoned power supply tunnel. In 1934, the rock abutment on the south side of the dam was breached with explosives.

In the 1920's and 30's, the lower Lemhi River was blocked by a power dam, isolating the Lemhi basin except during high water periods when water bypassed the dam. In addition, fish were trapped at the dam for commercial and hatchery use. Although hatchery personnel attempted to minimize impacts on the Lemhi run by restocking a portion of the hatchery fish, the combination of the dam, hatchery, and commercial take contributed to the collapse of the fishery. By the late 1930's the run had dwindled to about 200 fish.

The power dam was removed in 1938, and fish runs began to rebuild until the 1960's. Idaho Department of Fish and Game redd counts from 1960 to 1965 averaged 1,200 redds (Kiefer et al. 1992). Then for the next 30 years, the run slowly declined; in 1994 an aerial survey found only 7 redds in the Lemhi watershed (ISCC 1995).

Water Use

Since 1987, Idaho water users have been involved in the Snake River Basin Adjudication (SRBA) which includes multiple drainage basins, including the Salmon Subbasin. IDWR has received claims to water rights throughout the Salmon Subbasin, and has made water right recommendations to the SRBA Court for most of the small domestic and stockwater rights throughout the basin. The Court has decreed many of these water rights. In addition, IDWR has begun investigating larger state-based water rights in some watersheds. Simultaneously, federal and tribal claims within the basin are being litigated in the SRBA Court. Presently, it is anticipated that initial review and reporting of all state-based claims in the basin will be completed by 2005. Federal claims are proceeding on a similar timeline.

Surface water rights currently authorized by the state of Idaho have the potential to allow diversions of water from streams in the Salmon Subbasin totaling an estimated 7860 cfs, although not all water rights are exercised each year or even at the same time each year (IDWR 2001). This means that authorized use within the subbasin could potentially reach an average level of use of about 0.59 cfs/mi^2. Approximately 75% of the surface water rights currently recognized by the state are associated with irrigation, with the remainder associated with power production, stock watering, domestic, municipal, and other uses (IDWR 2001).

Variation in the intensity of water use across the Salmon Subbasin is summarized briefly in Figure 10. Water use is most intense in the Lemhi (LEM), Pahsimeroi (PAH), Upper Salmon (UPS), and Middle Salmon-Panther (MSP) watersheds. Consumptive water use is least intense in the Upper Middle Fork (MFU), Lower Middle Fork (MFL), and Middle Salmon-Chamberlain (MSC) watersheds.

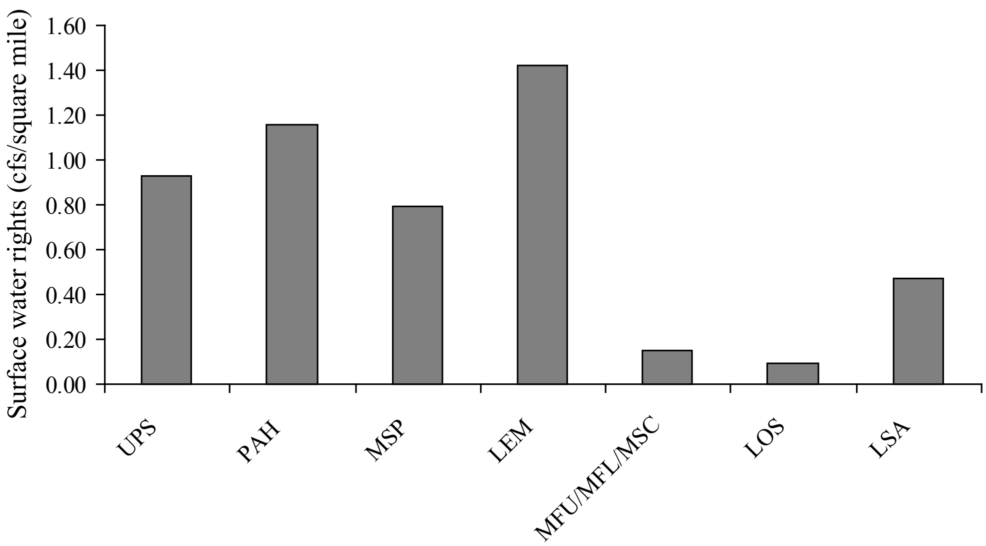


Figure 10. Relative intensity of water use among the major watersheds of the Salmon Subbasin, Idaho (data source: IDWR 2001).

3.1.8.c. Protected Areas

A diverse range of protected areas is present within the Salmon Subbasin. These specially designated areas include vast wilderness and roadless areas, relatively small ecological reference areas, wild and scenic rivers, national recreation areas, and fishing and hunting access areas (Figure 11). Detailed information on these conservation sites and specially managed areas is maintained by federal land managers and the Idaho Conservation Data Center, Idaho Department of Fish and Game.

The Salmon Subbasin encompasses portions of five USDA Forest Service Wilderness Areas. The Frank Church - River of No Return Wilderness Area, one of the five within the subbasin, is the largest wilderness area in the contiguous United States. Specific management guidelines for wilderness areas generally prohibit motorized activities and allow natural processes to function in an undisturbed manner. This principle supercedes, and is typically incorporated by reference into, resource management plans of surrounding federal lands.

In addition to designated wilderness, the Salmon Subbasin has an abundance of unroaded and little-roaded federal lands that have high ecological integrity. Combined with the designated wilderness, these areas account for a substantial portion of the subbasin (Figure 12) and serve as habitat strongholds for multiple species of fish and wildlife, some of which are imperiled or absent across much of their historic range. Recent federal management direction suggests that unroaded areas might remain in their undeveloped state, although this issue is in dispute and may be resolved through court action. Whatever their ultimate fate, these areas are clearly important to the conservation of native fish and wildlife species in the region (ICBEMP 1997).

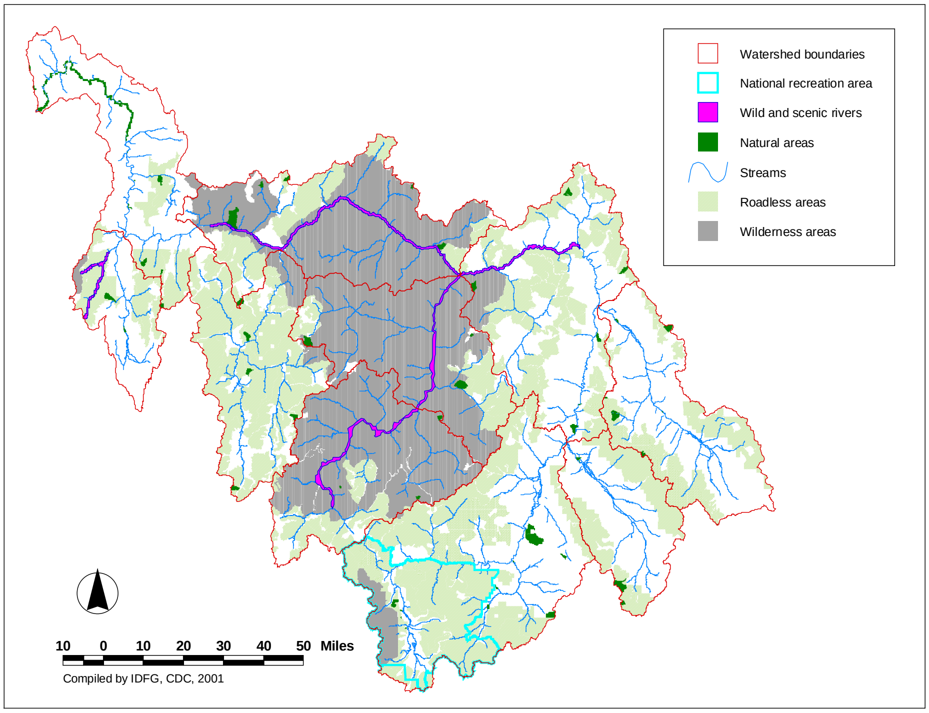


Figure 11. Protected areas within the Salmon Subbasin, Idaho.

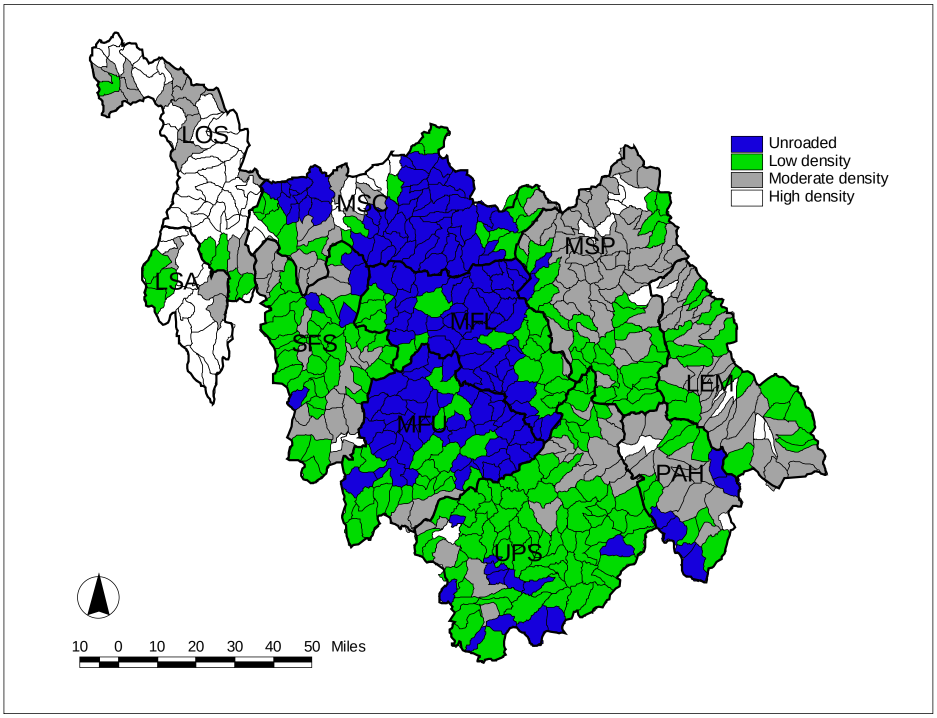


Figure 12. Subwatersheds that are unroaded or that have low (<0.7mi/mi2), moderate (0.7-1.7mi/mi2), or high (>1.7mi/mi2) road densities within the Salmon Subbasin, Idaho (source: ICBEMP 1997).

The abundance of unroaded and little-roaded areas within the Salmon Subbasin makes it relatively unique within the ICRB (Figure 13). While subwatersheds having moderate to high road densities predominate across much of the ICRB, unroaded and little-roaded subwatersheds predominate in the Salmon Subbasin. This is particularly true for the Upper Middle Fork, Lower Middle Fork, and Middle Salmon-Chamberlain watersheds. Given that extensive analyses conducted across the ICRB showed a lack of roads to be the strongest predictor of high aquatic ecosystem integrity, these areas and the opportunities they represent make the Salmon Subbasin central to future regional efforts to conserve aquatic species.

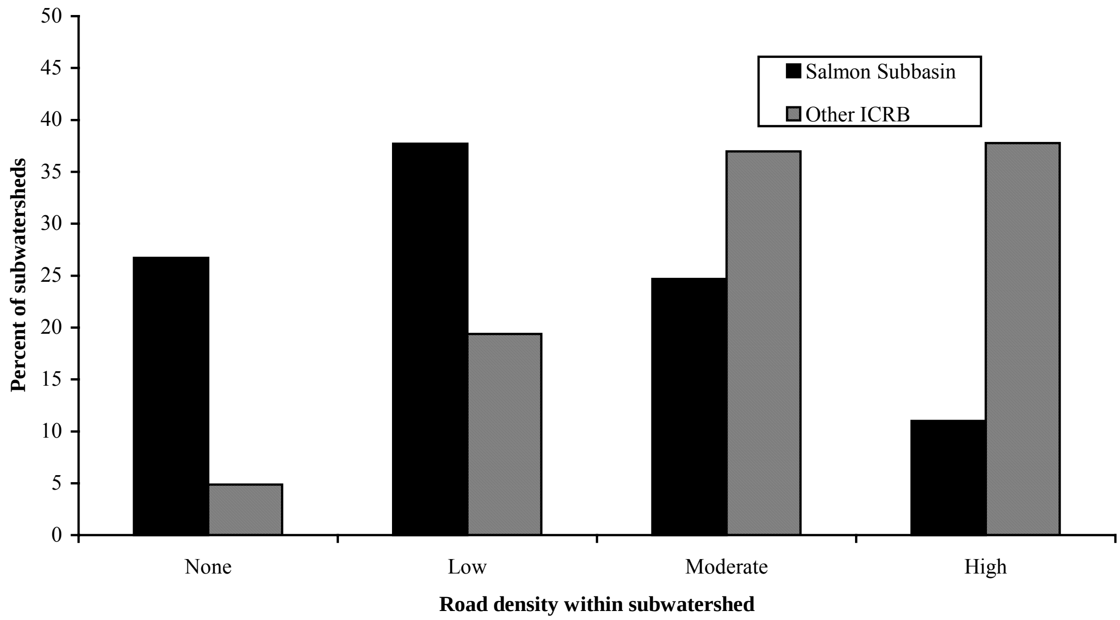


Figure 13. Road densities within subwatersheds of the Salmon Subbasin in relation to those found in subwatersheds within other subbasins of the Interior Columbia River Basin (ICRB). Road density classes were defined as None (no roads), Low (<0.7mi/mi^2), Moderate (0.7-1.7mi/mi^2), and High (>1.7 mi/mi^2). Source: ICBEMP 1997).

Fifty-nine relatively small, highly protected ecological reference areas are present within the subbasin. These include USDA Forest Service Research Natural Areas and Special Interest Areas, USDI Bureau of Land Management Research Natural Areas and Areas of Critical Environmental Concern, and The Nature Conservancy preserves. Research Natural Areas provide pristine, high quality, representative examples of the important ecosystems within the subbasin. These sites combine with the large tracts of undeveloped land within the subbasin to provide excellent opportunities for research regarding physical and biological ecosystem processes. Jankovsky-Jones et al. (1999) provide a guide to the wetland and riparian values of conservation sites within the subbasin. Rust (2000) provides an assessment of the representation of ecological components and identifies targets for selection of new conservation sites within the subbasin. USDA Forest Service Research Natural Areas and USDI Bureau of Land Management Research Natural Areas and Areas of Critical Environmental Concern management guidelines are identified by site-specific establishment documents and decision notices.

3.1.9. Demographics

3.1.9.a Population

The Salmon Subbasin is comprised of portions of eight counties, including small peripheral sections of Adams, Blaine, Lewis and Nez Perce counties; and significant interior sections comprised of Custer, Idaho, Lemhi and Valley counties. Detailed information on populations within these counties, obtained from the 2000 census, are given in Appendix E. The subbasin lacks large population centers, and the largest communities within the subbasin are Salmon, with a population of 3,122; Challis, 909; New Meadows, 533; and Riggins, 410. Stanley, White Bird, Leadore, and Clayton each have populations near or less than 100. In most cases, the rural population contributes significantly to the total population density (US Bureau of the Census, released 2001).

Urban areas adjacent to the subbasin influence economic trends. These include Lewiston with a population of nearly 31,000, Grangeville with 3,228, the Sun Valley area with a combined population over 10,000, and the McCall/Cascade area with over 3,200 people. The inland Port of Lewiston and agriculture in the Palouse region to the north influence Lewiston and Grangeville economies.

3.1.9.b. Economy and Employment

Historically, logging and mining have played important economic roles in the subbasin economy. While wood products continue to sustain some areas, recent years have seen the decline of natural resource-based industries due to a complexity of issues. Stricter environmental standards, sustainability factors, and economic issues have all contributed to this decline. The dominant physiographic features of the region also present transportation obstacles that increase expense.

Government agencies at all levels, including school districts, are consistently among the top employers in Salmon Subbasin counties. Federal land ownership figures prominently within the subbasin, which includes seven National Forests and three districts of the Bureau of Land Management. Employment patterns within the Salmon Subbasin are summarized in (Table 10).

Table 10. Relative employment among economic sectors within the eight counties that are partly or entirely within the Salmon Subbasin, Idaho (source: U.S. Bureau of Economic Analysis).

Sector	Percentage of total employment by county							
	Adams	Blaine	Custer	Idaho	Lemhi	Lewis	Nez Perce	Valley
Farm	20.8	2.5	13.9	10.8	14.7	12.4	2.0	2.4
Ag. Serv., Forest., Fish., & Other	5.6	4.2	2.5	2.2	3.3	(D)	(D)	3.3
Manufacturing	20.9	3.1	1.2	13.7	7.8	9.2	16.0	5.1
Mining	(D)	0.8	17.0	1.5	(D)	(D)	(D)	2.0
Construction	(D)	14.9	5.1	6.4	10.9	4.7	5.7	11.1
Transport., Comm., & Pub. Util.'s	4.3	2.5	3.1	4.7	4.5	4.6	5.3	3.5
Wholesale Trade	(L)	1.9	2.3	2.5	1.7	6.1	3.7	1.2
Retail Trade	17.1	21.7	15.7	14.6	25.2	18.9	20.0	22.1
Finance, Insur., & Real Estate	4.9	9.0	2.8	4.4	5.2	5.3	6.8	7.3
Services	(D)	30.8	19.3	19.0	(D)	17.3	28.0	22.4
Federal Civilian	8.1	0.6	5.1	6.8	8.8	2.4	0.9	5.3
Federal Military	1.2	0.5	0.7	1.0	1.2	0.9	0.7	0.7
State & Local Government	17.2	7.4	11.3	12.4	16.9	18.1	10.9	13.7
Total employment (numbers)	1893	15237	2743	7260	4330	2053	25254	5546

* Source: U.S. Bureau of Economic Analysis

(D) = Not shown to avoid disclosure of confidential material

(L) = Less than 10

Ranching and agriculture play an important role in the area. Irrigation projects, diversions, and dams are common in these areas (see Figure 8). Although the number of farms has declined, recent statistical trends indicate an overall increase in farming and a decline in grazing. This is evidenced by the number of acres with grazing permits compared to the number of acres in wheat and alfalfa. The number of irrigated acres has also increased, along with commercial fertilizer usage. These patterns are summarized in county-by-county summaries given in Appendix E.

Recreation and tourism are also important to the region. Within the subbasin, Stanley, Challis, Salmon, and Riggins rely heavily on seasonal recreation, as do the peripheral areas surrounding McCall and Sun Valley. White water rafting, boating, fishing, botanizing, hiking, camping, and geographic features such as Hells Canyon and the Seven Devils Mountains are popular attractions. Most communities feature annual events that help boost local economies.

4. Fish and Wildlife Resources

4.1. Fish and Wildlife Status

4.1.1. Fish

The Salmon Subbasin is known to support 38 species/races of fish, 27 native and 11 non-native. These fish, their coarse-scale distribution across the subbasin, and their general conservation status are summarized in Table 11.

Table 11. Fish known to inhabit the Salmon Subbasin, Idaho.

Species	Origin	Status	Presence within major watersheds									
			UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Arctic grayling (Thamallus arcticus)	I	R	X			X				X		
Bluegill (Lepomis macrochirus)	I	O									X	
Bridgelip sucker (Catastomus columbianus)	N	C	sw	X	X	X			X	sw	X	X
Brook trout (Salvelinus fontinalis)	I	O	X	X	X	X	X	X	X	X	X	X
Bull trout (Salvelinus confluentus)	N	T	X	X	X	X	X	X	X	X	X	X
Carp (Cyprinus carpio)	I	C			X						X	
Channel catfish (Ictalurus punctatus)	I	C									X	
Chiselmouth (Acrocheilus alutaceus)	N	C		X	X	X			X			
Fall Chinook (Oncorhynchus tschawytscha)	N	T/O								H	X	
Golden trout (Oncorhynchus aquabonita)	I	R	X	X			X	X		X		
Kokanee salmon (Oncorhynchus nerka kennerlyi)	I	O	X							X		
Lake trout (Salvelinus namaycush)	I	R	X							X		
Largescale sucker (Catastomus macrocheilus)	N	C	X	X	X	X	X	X	X	X	X	X
Leatherside dace	N	U			X							
Leopard dace (Rhinichthys falcatus)	N	U							X			X
Longnose dace (Rhinichthys cataractae dulcis)	N	C	sw	X	X	X	sw	sw	X	X	X	sw
Mottled sculpin (Cottus bairdi semiscaber)	N	C	sw	X	X	X	X	X	X	X	X	X
Mountain sucker (Catostomus platyrhynchus)	N	R	X		X				X	X		sw
Mountain whitefish (Prosopium williamsoni)	N	C	X	X	X	X	X	X	X	X	X	X
Northern pikeminnow (Ptychocheilus oregonensis)	N	C	X	X	X	X	X	X	X	X	X	sw
Pacific lamprey (Lampetra tridentata)	N	S	sw		X	H/U	X	X	X	H/U	X	
Paiue sculpin (Cottus beldingi)	N	U							X			X
Peamouth (Mylocheilus caurinus)	N	U			X				X			
Rainbow trout (O. mykiss) unknown origin	I	C	X	X	X	X	X	X	X	X	X	X
Rainbow x Cutthroat trout hybrid	I	C	X		X				X	X	X	
Redband trout (Oncorhynchus mykiss gibbsi)	N	S	X	X	X	X	X	X	X	X	X	X
Redside shiner (Richardsonius balteatus balteatus)	N	C	sw	X	X	X		X	X	X	X	
Shorthead sculpin (Cottus confusus)	N	U	sw	X	X	X	sw	sw	X	sw	X	sw
Slimy Sculpin (Cottus cognatus)	N	U									U	sw
Smallmouth bass (Micropterus dolomieui)	I	C							X		X	
Sockeye (Oncorhynchus nerka)	N	E	X									
Speckled dace (Rhinichthys osculus)	N	C	sw	X	X	X			X	X	X	X
Spring chinook (Oncorhynchus tschawytscha)	N	T	X	X	X	X	X	X	X	sw/U	X	X
Summer Chinook (Oncorhynchus tschawytscha)	N	T	X	X	X		X	X	X	X	X	X
Summer steelhead (Oncorhynchus mykiss)	N	T	X	X	X	X	X	X	X	X	X	X
Torrent sculpin (Cottus rhotheus)	N	C	sw				X	X	X	sw	X	sw
Westslope cutthroat (Oncorhynchus clarki lewisi)	N	S	X	X	X	X	X	X	X	X	X	X
White Sturgeon (Acipenser transmontanus)	N	O			X				X		X	

Origin: N = Native, I = Introduced.
Status: C = Common, O = Occasional, R = Rare, S = Sensitive, T = Threatened, E = Endangered, U = Unknown.
Presence: X = present, H = Historical, sw = Simpson and Wallace(1982), U = Unknown.

Data on fishes in the Salmon Subbasin and elsewhere in the region tend to be focused on salmonids due to their historic dominance in regional ecosystems, perceived social value, and a general association with higher quality habitats. The status of these species is generally considered a good indicator of the condition of aquatic ecosystems and habitats for native fish.

Assessments of native salmonids across watersheds throughout the Interior Columbia River Basin (ICBEMP 2000) suggest that the Salmon Subbasin contains a large portion of the occupied anadromous salmonid habitat and a high proportion of species strongholds relative to other subbasins in the region (Table 12; Figure 14). Many (38%) of the subwatersheds within the subbasin support strong populations of one or more native species of salmonids, including populations with large fluvial (migratory) adults. This is a rarity in many areas of the ICRB. Strong salmonid populations within the Salmon Subbasin are exclusively non-anadromous because factors outside the subbasin cause high levels of mortality to native salmon and steelhead that migrate to and from the ocean. The abundance of resident salmonid strongholds in the Salmon Subbasin is related to natural features, the abundance of relatively less developed and intact watersheds, and a high historic diversity of these fish within the subbasin (ICBEMP 2000). Anadromous salmonids appear to be struggling to persist even in the best habitats available to them within the subbasin.

Table 12. Key salmonid occupancy and status within sixth-field watersheds (subwatersheds) in the ICRB and the Salmon Subbasin, Idaho[1] (sources: ICBEMP 1997, 2000).

Species/race	Conditions in the subbasin relative to the entire ICRB		Condition within sixth-field watershed	Percent of classified sub-watersheds in the Salmon Subbasin's Hydrologic Units that are occupied or classified as a species stronghold									
	Percent of all occupied ICRB subwatersheds	Percent of all ICRB stronghold subwatersheds		UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Stream-type chinook	35	0	occupied	74	12	24	41	79	98	78	100	83	35
			stronghold	---	---	---	---	---	---	---	---	---	---
Summer steelhead	29	0	occupied	75	43	50	76	100	98	94	98	88	53
			stronghold	---	---	---	---	---	---	---	---	---	---
Bull trout	14	44	occupied	84	71	56	77	100	100	81	91	47	44
			stronghold	10	0	25	11	50	92	80	14	0	75
Westslope cutthroat	19	26	occupied	86	77	96	88	100	100	81	91	47	44
			stronghold	16	---	---	0	69	89	50	0	14	0
Redband (rainbow) trout	10	4	occupied	77	58	89	93	31	98	96	100	96	100
			stronghold	---	---	---	---	---	---	---	---	---	---

[1] Stream-type chinook and summer steelhead lack population (not habitat) strongholds above eight hydro-electric dams on the mainstem Snake and Columbia rivers. The status of too few redband trout populations is understood well enough to characterize the species' status across the Salmon Subbasin.

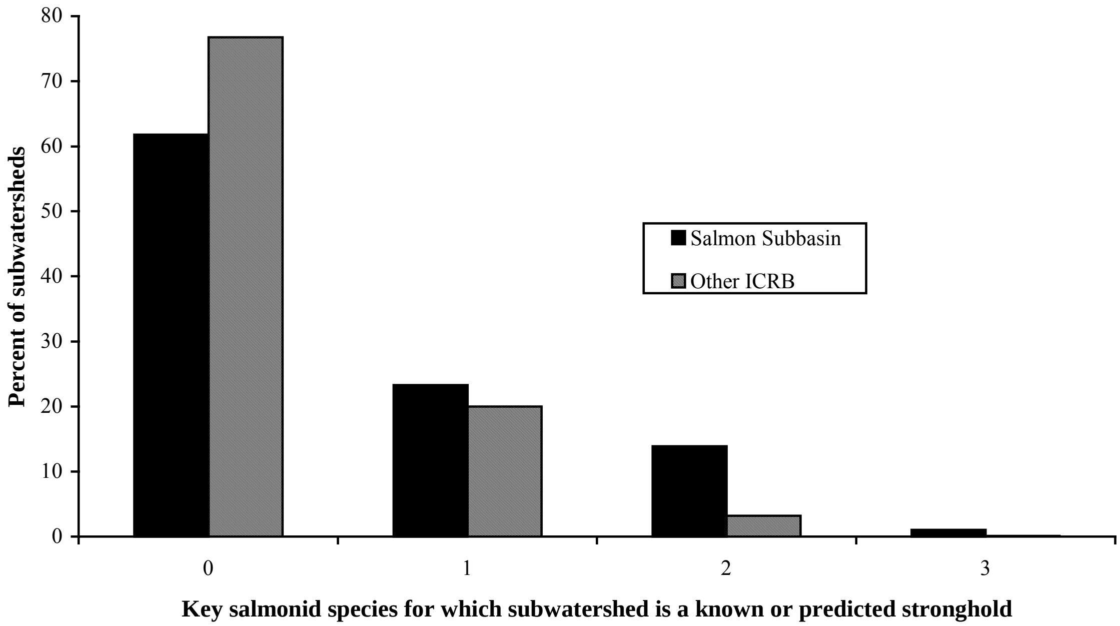


Figure 14. Percent of subwatersheds within the Salmon Subbasin and elsewhere in the Interior Columbia River Basin (ICRB) classified as strongholds for one or more key salmonid species (source: ICBEMP 1997, 2000).

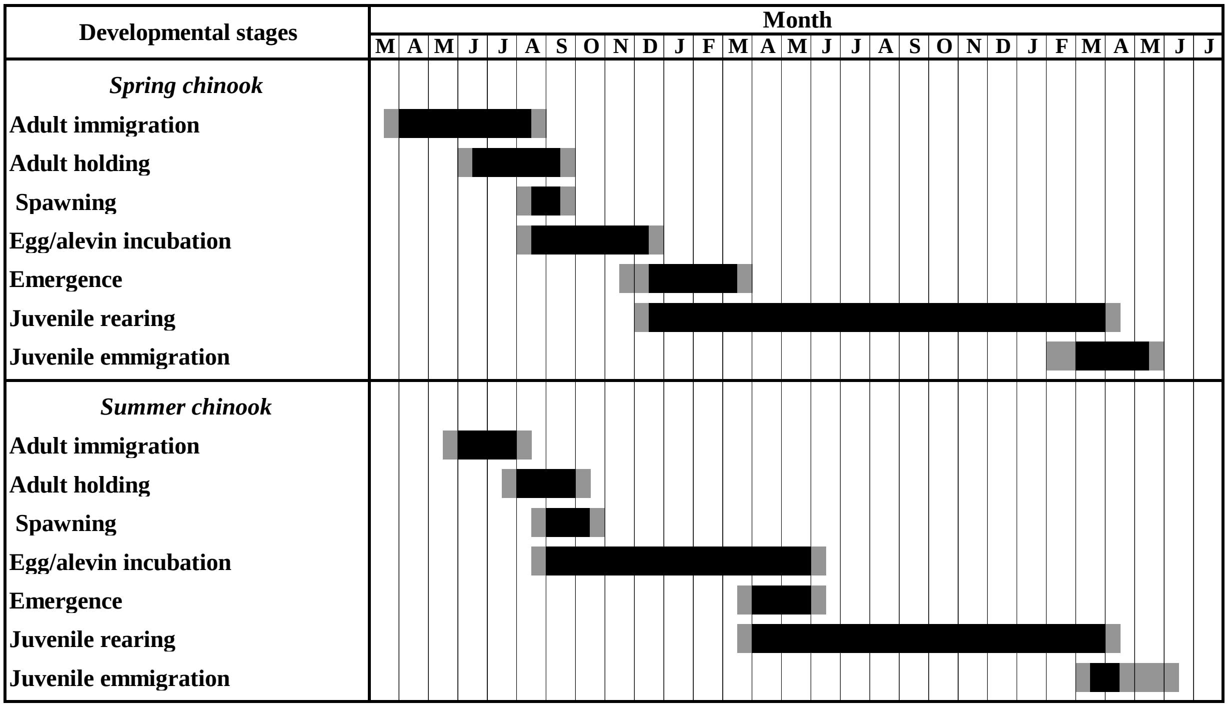
4.1.1.a. Anadromous Fish

The Salmon Subbasin Salmon and Steelhead Production Plan (IDFG et al. 1990) preceded this document in summarizing the life histories, population status and trends, and ongoing efforts to conserve and produce anadromous fish species throughout the Salmon Subbasin. Additional status and trend information was summarized in the Idaho Anadromous Fish Management Plan 1992-1996 (IDFG 1992). The purpose of this summary is not to recreate existing documents, but to characterize the status of anadromous fish in the subbasin and to summarize information gained on them over the past decade.

Spring/summer Chinook Salmon

Two "races" of stream-type chinook salmon enter the Salmon Subbasin, and are classified on the basis of differences in life histories (Table 13) and in the time they pass over Bonneville Dam on the Columbia River. Spring chinook cross Bonneville Dam from March 1 to May 31 and summer chinook cross from June 1 to July 31. Maps depicting the distributions of these two races of chinook within the subbasin are given in Figure 15 and Figure 16, respectively.

Table 13. Freshwater life histories for natural/wild stream-type (spring and summer) chinook in the Salmon Subbasin, Idaho (sources: IDFG et al. 1990; Walters et al. 2001).



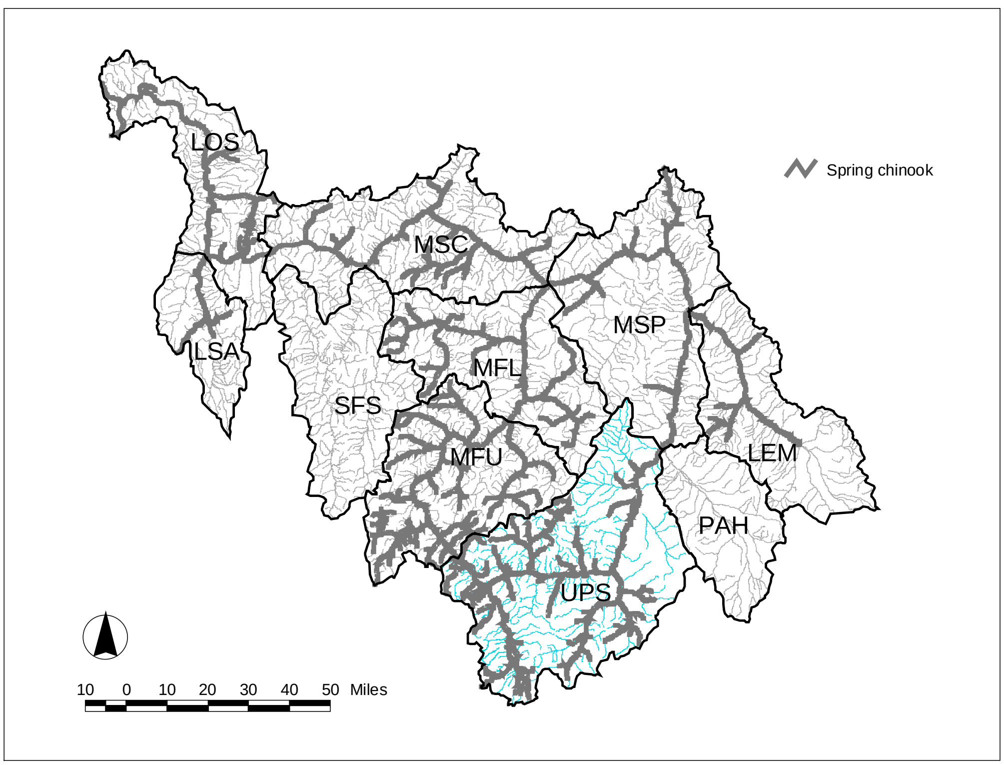


Figure 15. Distribution of spring chinook within the Salmon Subbasin, Idaho (source: StreamNet 2001).

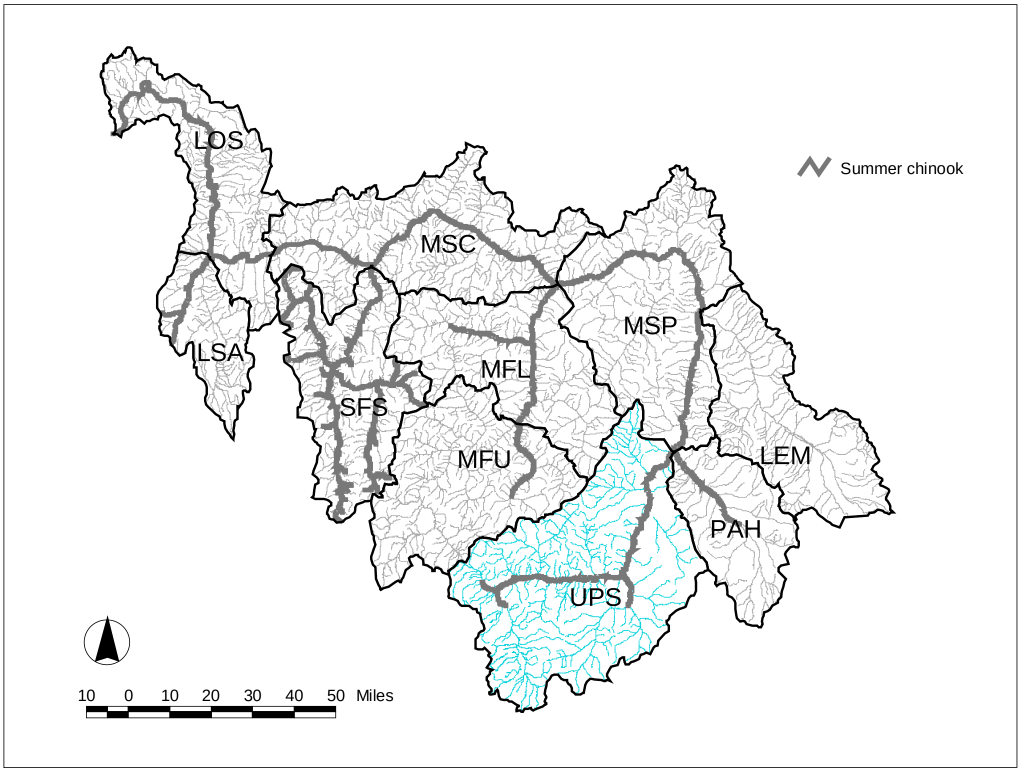


Figure 16. Distribution of summer chinook within the Salmon Subbasin, Idaho (source: StreamNet 2001).

Idaho's stream-type chinook salmon are truly unique. Smolts leaving their natal rearing areas migrate 700 to 950 miles downstream every spring to reach the Pacific Ocean. Mature adults migrate the same distance upstream, after entering freshwater, to reach their place of birth and spawn. The life history characteristics of spring and summer chinook are well documented by IDFG et al. 1990; Healey 1991; NMFS: 57 FR 14653 and 58FR68543). Kiefer's (1987) An Annotated Bibliography on Recent Information Concerning Chinook Salmon in Idaho, prepared for the Idaho Chapter of the American Fisheries Society, provides a reference of information available through the mid-1980s on life history, limiting factors, mitigation efforts, harvest, agency planning, and legal issues. Snake River spring and summer chinook salmon, of which spawning populations in the Salmon Subbasin are a part, were listed as Threatened under the Endangered Species Act in 1992 (57 FR 14653); critical habitat was designated in 1993 (58 FR 68543).

Recent and ongoing research has provided managers with more specific knowledge of the Salmon Subbasin stocks. Intensive monitoring of summer parr and juvenile emigrants from nursery streams has provided insights into freshwater rearing and migration behavior (Walters et al. 2001; Achord et al. 2000; Hansen and Lockhart 2001; Nelson and Vogel 2001). Recovered tags and marks on returning adults at hatchery weirs and on spawning grounds have indirectly provided stock specific measures of recruitment and fidelity (Walters et al. 2001; Berggren and Basham 2000). Since 1992, most hatchery-produced chinook have been marked to distinguish them from naturally produced fish.

Age-length frequencies and age composition of individual stocks are currently being refined for specific stocks (Kiefer et al. 2001). Distribution and abundance of spawning is being monitored with intensity in specific watersheds (Walters et al. 2001; Nelson and Vogel 2001).

Ongoing since the mid-1980s, annual standard surveys continue to provide trends in abundance and distribution of summer parr (Hall-Griswold and Petrosky 1997, 2001 in progress). Resultant data show an erratic trend toward lower abundance of juvenile chinook salmon in their preferred habitat (Rosgen C type channels), both in hatchery-influenced streams and in areas serving as wild fish sanctuaries (Figure 17).

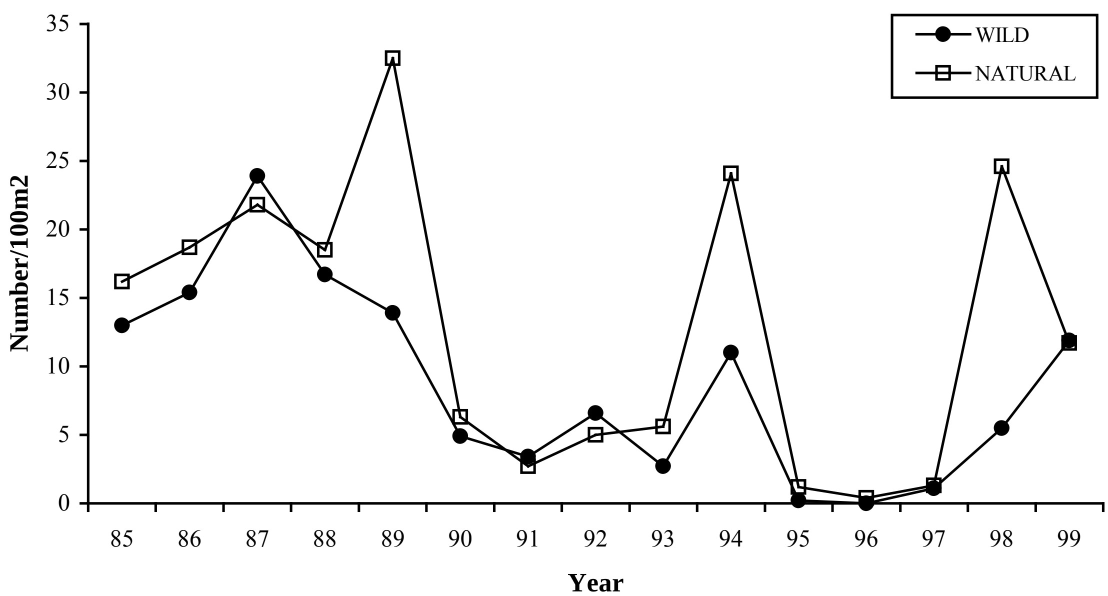


Figure 17. Annual mean density (number/100m^2) of chinook salmon parr (age-0+ fish) in low gradient, C-type channel reaches monitored in the Snake Basin, Idaho, 1985-99 (source: IDFG).

Analysis of recent stock-recruitment data (Kiefer et al. 2001) indicates that much of the freshwater spawning/rearing habitat of Snake River spring/summer chinook is still productive. The average production for brood years 1990-1998 was 243 smolts/female. Stock-recruitment data show modestly density-dependent survival for the escapement levels observed in recent years and have been used to estimate smolt-to-adult survival necessary to maintain or rebuild the chinook populations. A survival rate of 4.0% (this is less than historic levels) would result in an escapement at Lower Granite Dam of approximately 40,000 wild adult spring/summer chinook salmon.

In the mid-1900s, the Salmon Subbasin produced an estimated 39% of the spring and 45% of the summer chinook salmon that returned as adults to the mouth of the Columbia River. Natural escapements approached 100,000 spring and summer chinook from 1955 to 1960; with total escapements declining to an average of about 49,300 (annual average of 29,300 spring chinook salmon and 20,000 summer chinook salmon) during the 1960s. Smolt production within the Salmon Subbasin is estimated to have ranged from about 1.5 million to 3.4 million fish between 1964 and 1970 (IDFG 1985).

Populations of stream-type (spring and summer) chinook in the subbasin have declined drastically and steadily since about 1960. This holds true *despite substantial capacities of watersheds within the subbasin to produce natural smolts and significant hatchery augmentation of many populations*. For example, counts of spring/summer chinook redds in IDFG standard survey areas within the subbasin declined markedly from 1957 to 1999 (Figure 18). The total number of spring and summer chinook redds counted in these areas surveys ranged from 11,704 in 1957 to 166 in 1995 (Elms-Cockrum in press). Stream-type chinook redds counted in all of the subbasin's monitored spawning areas have averaged only 1,044 since 1980, compared to an average 6,524 before 1970. Land management activities have affected habitat quality for the species in many areas of the subbasin, but spawner abundance declines have been common to populations in both high-quality and degraded spawning and rearing habitats (IDFG 1998).

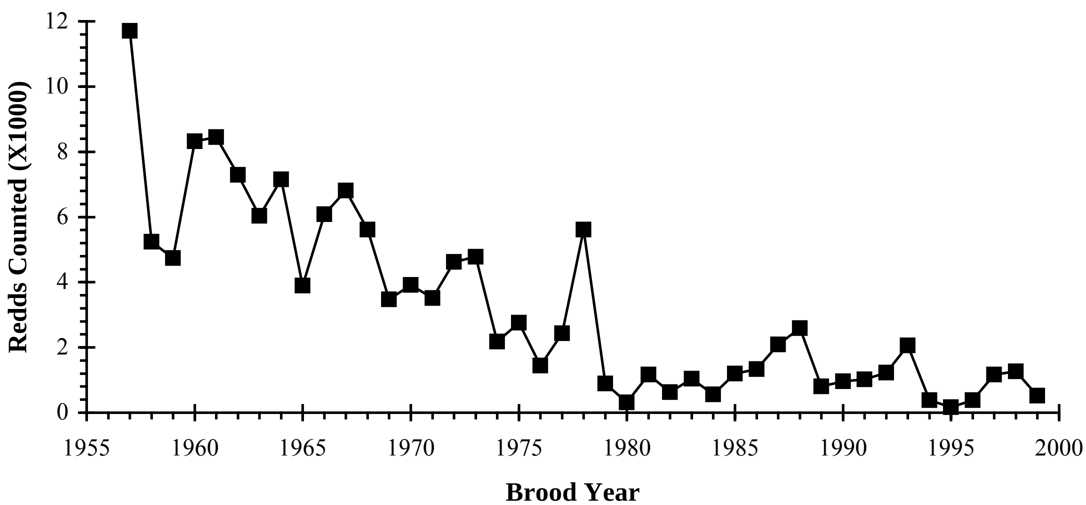


Figure 18. Total number of spring and summer chinook redds counted (thousands) in IDFG standard spawning ground surveys in the Salmon Subbasin, 1957-1999 (Elms-Cockrum in press).

Kucera and Blenden (1999) have reported that all five "index populations" (spawning aggregations) of stream-type chinook in the Salmon Subbasin, fish that spawn in specific areas of the Middle Fork and South Fork Salmon watersheds, exhibited highly significant ($p<0.01$) declines in abundance during the period 1957-95 (Figure 19). NMFS (2000) estimated that the population growth rates (lambda) for these populations during the 1990s were all substantially less than needed for the fish to replace themselves: Poverty Flats (lambda = 0.757), Johnson Creek (0.815), Bear Valley/Elk Creek (0.812), Marsh Creek (0.675), and Sulphur Creek (0.681). Many wild populations of stream-type chinook in the subbasin are now at a remnant status and it is likely that there will be complete losses of some spawning populations. Annual redd counts for the index populations have dropped to zero three times in Sulphur Creek and twice in Marsh Creek, and zero counts have been observed in spawning areas elsewhere within the Salmon Subbasin. All of these chinook populations are in significant decline, are at low levels of abundance, and at high risk of localized extinction (Oosterhout and Mundy 2001).

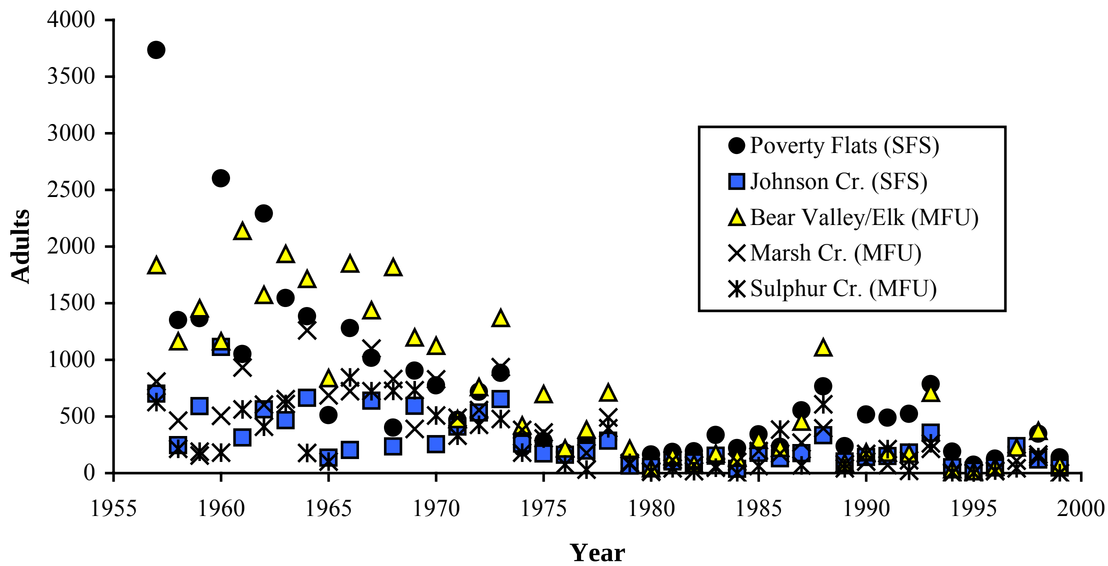


Figure 19. Estimated annual spawner abundance (number of adults) for five “index populations” (spawning aggregations) of stream-type chinook in the Salmon Subbasin, Idaho, 1957-99 (source: ODFW 2000).

Horner and Bjornn (1981) estimated that prior to construction of McNary Dam in 1953, production rates averaged more than three returning adults for every spawner for upriver Columbia Basin spring chinook. When ocean harvest was taken into account, rates averaged better than 5-to-1. After the lower Snake River dams were completed in the 1970s, production rates were estimated to be close to one returning adult per spawner, indicating the population was just maintaining itself. Production rates for the wild Snake River segment of the upriver run showed a more dramatic decline in productivity than the upriver run as a whole.

Large reductions in historic within- and out-of-basin fisheries on spring/summer chinook from the Salmon Subbasin occurred as populations declined. Historic fisheries targeted naturally produced salmon. Current fisheries are focused on the harvest of mitigation hatchery-produced fish while attempting to minimize impacts to fish produced in the wild. Sport harvest is now limited to only hatchery produced salmon. Annual harvests of spring/summer chinook in fisheries within the Salmon Subbasin since 1954 are summarized in Table 14.

Upper Salmon (UPS). Spring chinook salmon of the upper Salmon River migrate farther inland than any other runs of chinook in the lower 48 states, traveling more than 900 miles to spawn and rear at over 6,000 feet above sea level (Hassemer 1998). Summer chinook in the Upper Salmon are classified as wild. Chinook returning to the East Fork Salmon River downstream from Herd Creek are considered summer chinook.

Table 14. Estimated numbers of salmon and steelhead harvested statewide in Idaho, 1954-2000. Watersheds within the Salmon Subbasin where fishing seasons where open for steelhead [S], chinook [C], and sockeye [K] are identified. Fishing may have been allowed only in portions of watersheds, especially in recent years.

Year	Statewide Harvest		Watersheds where fisheries occurred									
	Chinook Salmon	Steelhead	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
1954	15,000	12,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1955	19,000	13,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1956	21,000	8,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1957	39,000	20,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1958	24,000	30,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1959	20,000	31,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1960	21,000	30,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1961	13,000	25,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1962	12,000	19,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1963	12,000	26,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1964	8,000	18,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1965	Closed	20,000	S	S	S	S	S	S	S	S	S	S
1966	8,500	20,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1967	6,500	22,500	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1968	10,000	23,000	S C	S C	S C	S C	S C	S C	S C	S C	S C	S C
1969	11,500	15,500	S C	S C	S C	S C	S C	S C	S C	S	S C	S C
1970	5,500	20,500	S C	S C	S C	S C	S C	S C	S C	S	S C	S C
1971	3,500	17,500	S C	S C	S C	S C	S C	S C	S C	S	S C	S C
1972	6,500	13,500	S C	S C	S C	S C	S C	S C	S C	S	S C	S C
1973	9,500	10,500	S C	S C	S C	S C	S C	S C	S C	S	S C	S C
1974	1,500	3,000	S C	C	S C	C	C	C	S C		S C	C
1975	Closed	Closed										
1976	Closed	2,000	S		S				S		S	
1977	3,500	13,000	S C		S C		C	C	S C		S C	S C
1978	7,000	11,500	S C		S C	C	C	C	S C		S C	C
1979	Closed	5,500	S		S				S		S	
1980	Closed	9,000	S		S				S		S	
1981	Closed	13,000	S		S				S		S	
1982	Closed	20,500	S		S				S		S	
1983	Closed	32,000	S		S				S		S	
1984	Closed	25,000	S		S				S		S	
1985	2,300	34,500	S		S				S		S	S C
1986	1,400	40,000	S		S				S		S	S C
1987	500	30,000	S		S				S			S C
1988	700	21,500	S		S				S			S C
1989	Closed	38,500	S		S				S		S	S
1990	1,000	30,000	S		S				S		S	S C
1991	Closed	28,500	S		S				S		S	S
1992	500	37,000	S		S				S		S	S C
1993	400	35,000	S		S				S		S	S C
1994	Closed	21,500	S		S				S		S	S
1995	Closed	22,500	S		S				S		S	S
1996	Closed	26,000	S		S				S		S	S
1997	3,500	33,000	S		S				S	C	S	S C
1998	300	26,000	S		S				S		S	S C
1999	Closed	32,000	S		S				S		S	S
2000	unavailable	unavailable	S		S				S	C	S	S C

Pahsimeroi (PAH). Summer chinook salmon are native to the Pahsimeroi drainage, but information describing the original stock is limited (Keifer et. al., 1992). Swift stated that, based on available habitat and salmon life history, chinook salmon probably occupied the main stem Pahsimeroi, Big Springs Creek, and several smaller springs (Idaho Soil Conservation Commission, 1995)

A weir and adult trap were constructed on the river in 1969 to intercept summer chinook salmon and steelhead. Hatchery production began when wild summer chinook broodstock were collected at the weir. Natural production of summer chinook has been maintained by releasing fish above the weir or from fish escaping upriver prior to weir installation. Because of sustained hatchery chinook influence on natural production, the run is classified as natural (Kiefer et al 1992).

Lemhi (LEM). The spring chinook population in the Lemhi drainage has been maintained primarily by natural production, spawning mostly upstream from Hayden Creek. Hatchery augmentation from Hayden Creek ended in 1982. Summer chinook, thought to be present historically, have become extinct.

Middle Fork Salmon (MFU and MFL). Historically, the Middle Fork is reported to have supported 27% of Idaho's chinook harvest (Mallet 1974). This estimate was made at a time when the runs had already been substantially depressed by fisheries outside the Salmon Subbasin as well as a variety of disturbances within other areas of the subbasin. The Middle Fork spring chinook is a purely wild run with a strong age 5 component. Summer chinook currently constitute a minor component of the runs in this watershed. The entire Middle Fork is currently serving as a study area for research evaluating the factors influencing spatial dynamics and persistence of chinook salmon within the Frank Church River of No Return Wilderness (Thurow 2000). This research included a complete census and assessment of the spawning distribution of these fish from 1995 through 1998.

Middle Salmon-Chamberlain (MSC). Chinook are indigenous to some of the larger tributaries in the middle main Salmon River, such as Bargamin and Chamberlain creeks. Chinook spawning was also documented historically in Horse Creek. It has not been confirmed whether the chinook in this portion of the subbasin are a spring or summer run. For management purposes they are classified and managed as wild spring run. Hatchery chinook have not been outplanted anywhere within the Middle Salmon-Chamberlain watershed (Kiefer et al 1992).

South Fork Salmon (SFS). Historically the South Fork Salmon River produced 60% to 70% of the annual adult summer chinook salmon return to Idaho (IDFG et al. 1992). Salmon fishing was a major economic resource in the South Fork prior to 1965, when anglers harvested 1,700 to 4,000 wild salmon annually (IDFG 2001). Non-treaty harvest ended in 1975. Hatchery chinook returns, while still below mitigation goals, provided fisheries in 1997 and 2000 (Apperson and Wilson 1997; Apperson and Warburton 2001 in progress).

Lower Salmon (LOS). The stream-type chinook in the Lower Salmon are believed to be spring-run, and for management purposes are classified as wild spring-run. Known naturally producing populations of these fish exist in Slate and Whitebird creeks, and occasionally juveniles are found in other tributaries. No stream-type chinook of hatchery origin have been stocked anywhere within the Lower Salmon watershed. The chinook runs in the area have been maintained by natural spawning of native fish.

Little Salmon (LSA). Spring chinook salmon were brought to the Little Salmon River in 1964 as mitigation for the lost run and fishery in the Snake River when the Hells Canyon dam complex was constructed. Rapid River has a remnant wild run of summer chinook. The most consistent sport and tribal fisheries in the past two decades has occurred on the fully hatchery produced spring chinook run in the Little Salmon River (Hassemer 1991; Janssen 1992, 1993; Janssen and Kiefer 1998, 1999, 2001).

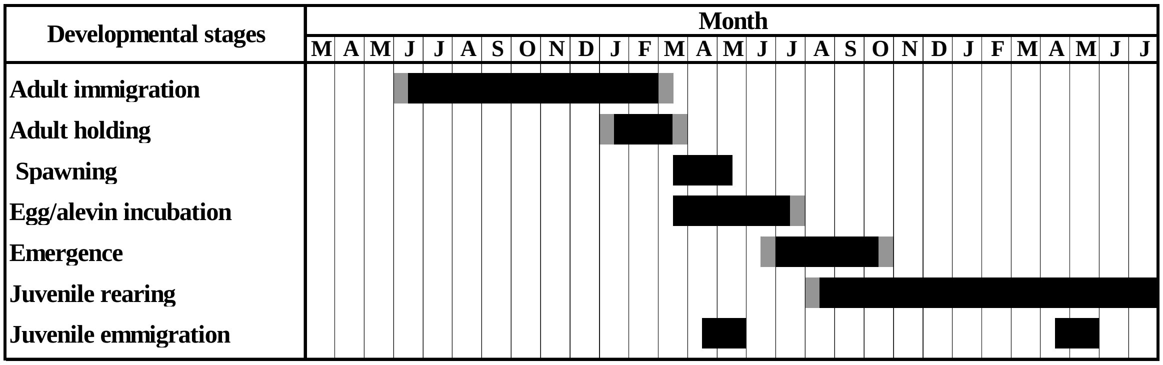
Genetic Status. From 1989 through 1994 NMFS, IDFG, and University of Idaho collected genetic samples from across the Salmon Subbasin to, in part, provide baseline information for evaluation of supplementation research (Waples et al. 1993; Marshall 1994). Overall, analyses of these collections indicated a large amount of heterogeneity among Salmon River populations; though it is not known whether this distinctness is due to reproductive isolation and local adaptation or due to higher rates of genetic drift due to their small population size (Marshall 1994).

Over the past several years, efforts to collect genetic samples from chinook salmon carcasses throughout the Salmon Subbasin, for DNA analyses, have increased (R. Kiefer et al. 2001). Samples are currently being archived for future analytical work but some genetic analyses have already been conducted. Results of some of these analyses are given in Appendix F.

Summer Steelhead

Summer steelhead, native to the Salmon Subbasin, are believed to be an anadromous form of rainbow/redband trout (Behnke 1992). All natural spawning steelhead in the Salmon Subbasin are listed as threatened under the ESA. Both A and B-run steelhead are present. Information on the timing of key life history events for the steelhead native to the Salmon Subbasin is given in Table 15. The combined geographic distributions of A and B-run fish within the subbasin is given in Figure 20.

Table 15. Freshwater life history for natural/wild summer steelhead in the Salmon Subbasin, Idaho (source: IDFG et al. 1990).



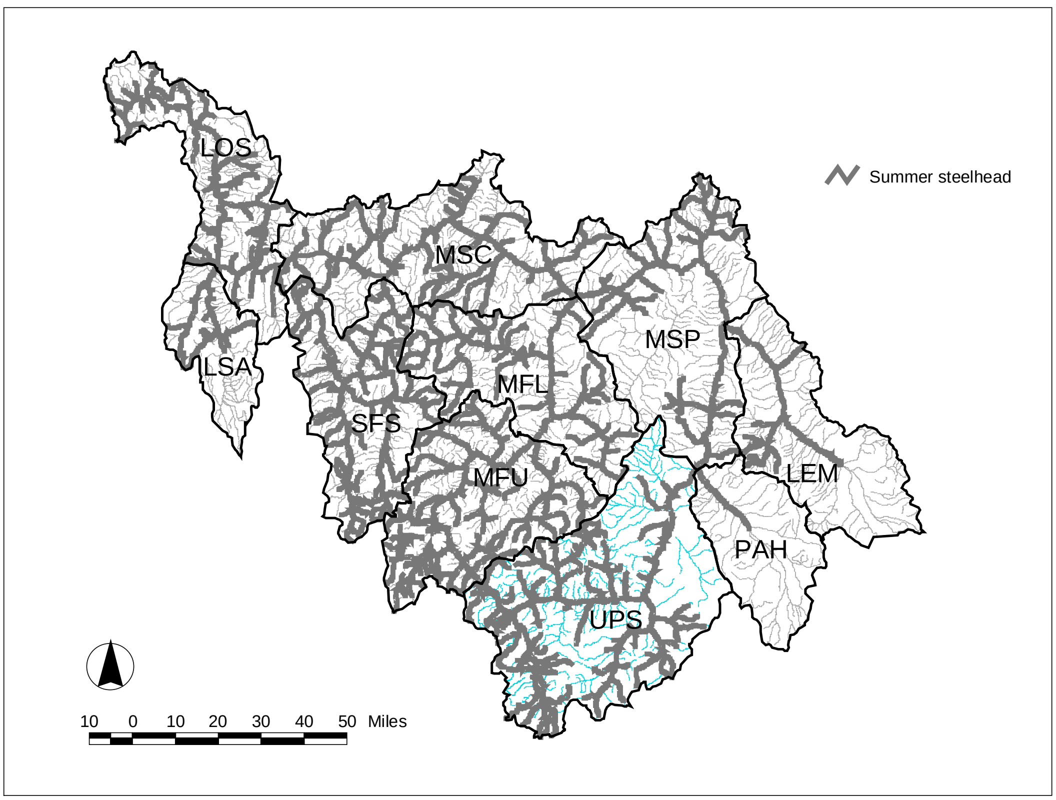


Figure 20. Distribution of summer steelhead within the Salmon Subbasin, Idaho (source: StreamNet 2001).

Spawning by wild A-run fish occurs mostly in Salmon River tributaries below the North Fork Salmon River with the exception of the Middle and South Forks of the Salmon River, which support spawning by wild B-run fish. The Middle Fork and South Fork are managed by the IDFG as sanctuaries for wild B-run steelhead. Hatchery production of both A and B-run steelhead occurs outside the subbasin at Hagerman National Fish

Hatchery (2.4 million smolt capacity, A run) operated by the USFWS under LSRCP and Magic Valley Fish Hatchery, a LSRCP facility (2 million smolt capacity, A run) operated by IDFG. Niagara Springs Fish Hatchery (1.6 million smolt capacity) was built as Idaho Power Company mitigation for the Hells Canyon Dam complex and is operated by the IDFG. Releases of smolts occur at the in-subbasin hatcheries and satellite facilities and near developed areas for sport harvest. Over one million eyed eggs have been placed in streamside incubators for volitional releases of fry to unoccupied tributary streams. Broodstock is collected at in-subbasin traps.

Areas of the subbasin upstream of the Middle Fork have been stocked with hatchery steelhead, and the IDFG has classified these runs of steelhead as natural. The majority of these steelhead are progeny of introduced hatchery stocks from the Snake River. With the construction of Hell's Canyon Dam in the 1960s, the US Fish and Wildlife Service, Army Corps of Engineer, US Forest Service, Bonneville Power Administration, Bureau of Reclamation, and Idaho Department of Fish and Game attempted to mitigate the affects of the dam by establishing a hatchery-managed, sport fishery in the upper Salmon River. Naturally produced steelhead upstream of the Middle Fork are classified as A- run, based upon characteristics of size, ocean age, and timing. Out of subbasin Snake River A-run steelhead have been released extensively in this area, and it is unlikely any wild, native populations still exist.

Both recent and historical data on the spawning populations of steelhead in specific streams within the Salmon Subbasin are very limited. Mallet (1974) estimated that historically 55% of all Columbia River steelhead trout originated from the Snake River basin, which includes the Salmon Subbasin. Though not quantified, it is likely a large proportion of these fish were produced in the Salmon Subbasin.

Monitoring data from subbasins within the Mountain Snake Province (of which the Salmon Subbasin is a primary component) shows a general decline in parr densities for steelhead. Wild/Natural steelhead parr density decreased in 8 of 9 generations from 1985 to 1993 (Figure 21). The analysis combined A-run and B-run steelhead and used a generation time assumption of 5.5 years. All groupings had average ln(progeny:parent) ratios less than replacement, only wild B-run showed more than two years with positive population growth. The average values of $\ln[(\text{Density}_{n+5.5})/(\text{Density}_n)]$ for Wild A-run, Natural A-run, Wild B-run, Natural B-run, and all runs combined were –0.32, -0.68, -0.05, -0.61 and –0.45, respectively, all less than replacement. On average, the parr density in the progeny generation was only 64% ($e^{-0.45}$) of that in the parent generation. This progeny:parent ratio would equate to a lambda value of 0.92 (i.e., $0.64^{5.5}$).

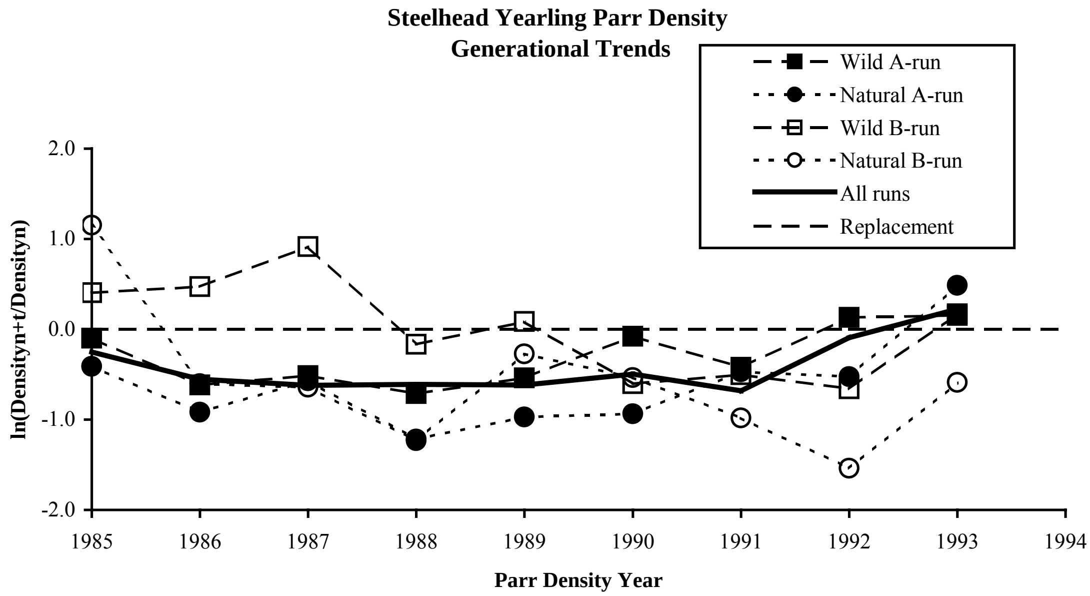


Figure 21. Recent generational trends in steelhead parr abundance at monitored sites within the Mountain Snake Province.

Sockeye Salmon

Historically, Snake River sockeye salmon *Oncorhynchus nerka* were found in headwater lakes along tributaries of the Snake River including: five lakes in the upper Salmon River drainage, Payette Lake on the North Fork Payette River, and Wallowa Lake on the Grand Ronde River. Sockeye salmon may have used Warm Lake, a tributary lake of the South Fork Salmon River. Within the upper Salmon Subbasin, sockeye salmon were found in Redfish, Alturas, Pettit, Stanley, and possibly Yellowbelly lakes (Chapman et al., 1990).

Snake River sockeye salmon have declined dramatically in recent years (Figure 22). Currently, only Redfish Lake supports a remnant anadromous run (Kline 1994; Kline and Younk 1995; Kline and Lamansky 1997; Hebdon et al. 2000) and these fish are found seasonally along the migratory corridor between the lake and the mouth of the Salmon River (Figure 23). Historical accounts of sockeye salmon abundance in the Sawtooth Valley are scarce. Recent investigations by Finney (in progress) used Sawtooth Valley lake sediment records of nitrogen stable isotopes and biological indicators to reconstruct sockeye salmon abundance dating back 3000 years. Information generated from this research suggests that 10 to 30% of the total, annual nutrification of Redfish Lake was provided by anadromous sockeye salmon. These data also suggest that 25,000 to 35,000 sockeye salmon once returned to the Stanley Basin. In the late 1800's Everman (1895) made observations on the distribution and abundance of sockeye salmon in Stanley Basin lakes. Although not quantitatively described, Everman (1895) reported observing sockeye salmon in Alturas, Pettit, and Stanley lakes. He reported that there were even plans to construct a cannery on Redfish Lake to process sockeye salmon. Between 1954 and 1966, adult sockeye salmon escapement to Redfish Lake was monitored. During these years, adult sockeye salmon escapement ranged from a low of 11 fish to a high of 4,361 fish in 1955 (Bjornn et al. 1968). By 1962, sockeye salmon were no longer returning to Stanley, Pettit, and Yellowbelly lakes (Chapman et al. 1990). Since 1990, only 16 adult sockeye salmon have returned to Redfish Lake Creek. In response to this trend, Snake River sockeye salmon were listed as endangered in December, 1991 under the Endangered Species Act (FR Vol. 56. No. 224).

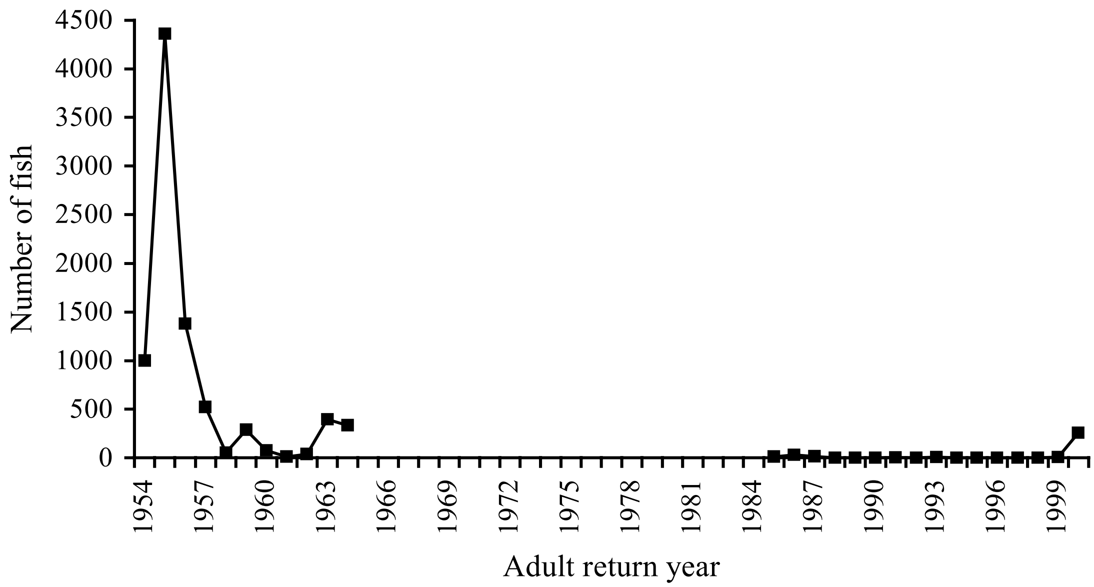


Figure 22. Adult sockeye salmon returning to the upper Salmon River 1954-1966 and 1985-2000 (Keifer et al, 1992; IDFG annually). The first marked returns from captive broodstock occurred in 1999.

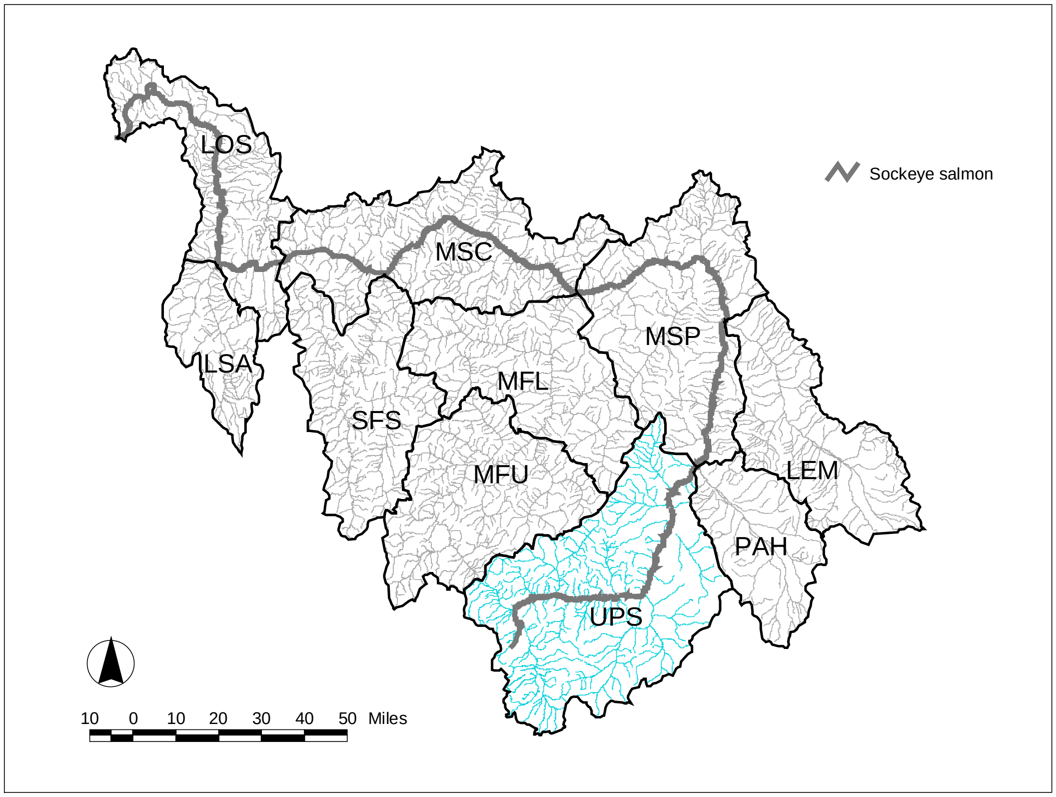


Figure 23. Distribution of anadromous sockeye salmon in the Snake Subbasin, Idaho (source: StreamNet 2001).

Three life history forms of *O. nerka* occur in the Columbia River Basin: anadromous sockeye salmon, residual sockeye salmon, and kokanee. Residual sockeye salmon are typically non-migratory and may be produced by residual or anadromous parents. Residual and anadromous sockeye salmon spawn, at least in part, sympatrically. In the Sawtooth Valley of Idaho, residual sockeye salmon have been confirmed in only Redfish Lake (Waples, 1991). Residual sockeye salmon are included in the Snake River sockeye salmon ESU. Resident kokanee were introduced to Redfish, Alturas, Pettit, and Stanley lakes by IDFG. While no planting has occurred for several years, kokanee populations persist in these lakes. Resident kokanee are non-migratory and are reproductively isolated from anadromous and residual sockeye salmon in Redfish Lake.

Considerable genetic work has been done to characterize sockeye salmon from the Sawtooth Valley and to compare them to other remaining sockeye populations within the Columbia Basin (Brannon et al. 1992; 1994; Robison 1996; Winans et al. 1996; Waples et al. 1997; Powell and Faler 2000). Redfish Lake sockeye are distinct from Redfish Lake kokanee based on allozyme electrophoresis (Winans et al. 1996; Waples et al. 1997) as well as nuclear DNA (Brannon et al. 1994) and mitochondrial DNA (Robison 1996; Powell and Faler 2000). These data also support available history information regarding temporal and spatial separation between spawning sockeye and kokanee. Concomitantly, residual sockeye salmon from Redfish Lake are genetically most similar to anadromous Redfish Lake sockeye salmon and distinct from Redfish Lake kokanee. In the remaining Sawtooth Valley sockeye salmon nursery lakes, Alturas Lake *O. nerka* are genetically most similar to Redfish Lake *O. nerka* while Pettit Lake and Stanley Lake contain *O. nerka* genetically similar to kokanee found stocked in several other lakes in the Pacific Northwest (Waples et al. 1997; Powell and Faler 2000). Within the Sawtooth Valley, remaining anadromous *O. nerka* are not genetically diverse when compared to kokanee populations who's genetic diversity stems in part from historical stocking programs (Howell et al. 1985).

Waples (1991), described Snake River sockeye salmon as a prime example of a species on the threshold of extinction. The ESA recognizes that conservation of listed species may be facilitated by artificial means while factors impeding population recovery persist (Hard et al. 1992). Often, the only reasonable avenue to build populations quickly enough to avoid extinction is through captive broodstock technology (Flagg et al. 1995). Based on critically low population numbers and the risk of extinction, IDFG in cooperation with NMFS, the Shoshone-Bannock Tribes, Bonneville Power Administration, the University of Idaho and others initiated a species conservation program in 1991. At the center of this effort is a captive broodstock program that produces fish for reintroduction back to the habitat and to meet future broodstock needs. Reintroduction efforts have been ongoing in Redfish lake since 1993. The removal of a fish passage barrier on the outlet of Pettit Lake, and of an irrigation diversion on the outlet stream from Alturas Lake, were the first steps in sockeye reintroduction programs that began in 1995 and 1997, respectively. There are currently no plans to expand the sockeye reintroduction program to include Stanley or Yellowbelly lakes.

Since the inception of the sockeye conservation program, all returning anadromous adult sockeye salmon (16 fish), several hundred Redfish Lake wild outmigrants, and several residual sockeye salmon adults have been captured and used to establish captive broodstocks at the IDFG Eagle Fish Hatchery and at NMFS facilities in Washington State. Adaptively managed, the program generates hatchery-produced eggs, juveniles, and adults for supplementation to Stanley Basin waters. In addition, emphasis is placed on the continued development of genetically diverse "safety net" broodstocks.

In 1999, the first adult sockeye salmon produced by the captive broodstock program returned to Idaho. In that year, nine age-3 adults were captured at the IDFG Sawtooth Fish Hatchery weir on the upper Salmon River. In 2000, 257 hatchery-produced, age-4 adult sockeye salmon returned to the upper Salmon River. Adults were captured at the Sawtooth Hatchery weir and at an adult weir on Redfish Lake Creek. The majority of adults were released to Redfish, Alturas, and Pettit lakes to spawn volitionally.

Fall Chinook

Prior to construction of the Hells Canyon complex of dams and the lower four Snake River dams, the Snake River basin was one of the most important producers of fall chinook salmon in the Columbia River basin (Fulton 1968). Before 1958, most fall chinook salmon spawned in the mainstem Snake River in Idaho between Marsing and Swan Falls (Haas 1965).

Although there is no historical record of large-scale spawning by fall chinook in the Salmon River, it is logical to assume that some spawning occurred when adult escapement was high and environmental conditions favorable (USFWS 1999). The opportunity for successful production of subyearling smolts in the Salmon River was probably limited, however, due to cold winter water temperatures that would delay egg incubation and warm summer water temperatures that would impair smoltification and survival (W. P. Connor, USFWS, pers comm., 2001).

Recent temperature analyses of the lower Salmon River suggest that a late emergence timing would be essential for fall chinook salmon in the lower Salmon River (Arnsberg 2001). Fall chinook fry emergence would be around the latter part of May if spawning commenced in early November. However, this is based on recorded water column temperatures and not temperatures of the incubating substrate which may have warmer groundwater influences (Arnsberg et al. 1992). Fall chinook have been reported to select spawning areas where upwelling from hyporeic areas occurs (Geist 2000). Further analysis indicates that if fall chinook growth rates are similar to those documented in the Snake River (Connor et al. 1993), subyearling fall chinook in the lower Salmon River would emigrate downstream by the beginning of July, before temperatures became unfavorable for the species (Arnsberg 2001).

The Nez Perce Tribe began annual surveys of the lower Salmon River for fall chinook redds in 1992, the same year Snake River fall chinook were listed for protection under the Endangered Species Act in 1992 (57 FR 14652 NMFS 1992). A total of 12 redds (0 to 3 per year) were counted in the lower Salmon River from 1992 to 2000 (Table 16; Garcia 2001; BLM 2000). The natal origin of the fish that built these redds is unknown. One possible explanation is that these spawners are of remnant Salmon River stock. A more plausible explanation is that the spawners were strays from the Snake River or downstream hatcheries, which can make up a large portion of the adults that cross Lower Granite Dam to spawn in the wild (Marshall et al. 2000).

Table 16. Fall chinook redds counted in the Salmon River, Idaho (source: Garcia 2001 and BLM 2000).

General location	Year								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Above Cottonwood Creek (RM 15)	1						1		
Below Bentz Cabin (RM 16)				1	1				
Below Pine Bar (RM 26)				1					
Below Telcher Creek and Bingham Ridge (RM 31)		1					1		
About 1 mile below Anderson Ranch (RM 35)						1			
Slate Creek Boat Ramp (RM 65)							1		
Above mouth of Little Salmon River (RM 87)			1						
Above Berg Creek (RM 91)		2							
Total Redds in Salmon River	1	3	1	2	1	1	3	0	0
Adult Escapement past Lower Granite Dam	855	1170	790	1067	1308	1412	1862	3376	3602

Since 1992, the upstream-most fall chinook redd seen in the Salmon River was observed at river mile 94, approximately 7 miles upstream of the Little Salmon River confluence. Occurrences of fall chinook have been reported higher up in the drainage network, even in the lower South Fork Salmon River. A pair of fall chinook was observed spawning in the lower South Fork during November 1982, and earlier observations suggest that other chinook have spawned in the lower South Fork Salmon River at that time of year (Dave Burns, U.S. Forest Service letter to NMFS, 1992).

A recent survey suggests that there is approximately 28,566 m^2 of spawning habitat of good quality available for fall chinook in the lower Salmon River between the South Fork confluence and the mouth (Arnsberg 2001). The Nez Perce Tribe estimates this to represent a capacity for about 1,400 fall chinook redds (J. Hesse, NPT, pers comm.) and believes there is potential for enhancing natural production of Snake River fall chinook in the lower Salmon River. Chinook that spawn in October, a bit earlier than the existing Snake River fall chinook population, have been proposed for re-establishing runs in the upper Clearwater River (Hesse and Cramer 2000) and might be better suited to the lower Salmon River.

Pacific Lamprey

The Salmon Subbasin supports a remnant population of native Pacific lamprey (*Lampetra tridentata*), it's historic distribution within the subbasin and elsewhere in Idaho having been similar to that of salmon and steelhead (Simpson and Wallace 1978). One of the earliest documented occurrences in Idaho was in the Snake River near Lower Salmon Falls, and downstream near Lewiston (Gilbert and Evermann 1895). In the Salmon Subbasin, observations of Pacific lamprey have occurred for almost 50 years. In the late 1950's-early 1960's thousands of larval lamprey (ammocoetes) were observed in the Lemhi River, and were common in irrigation canals off the Salmon River near Challis (S. Gebhards, personal communication 1995). In the period from 1970-2000, small numbers of lamprey have been observed or collected at several locations in the Salmon Subbasin (Table 17). Aside from this anecdotal information, little is known about their current status and distribution.

Culturally important to native tribes (CRITFC 1996), Pacific lamprey were also popular for use of their oily flesh and as sturgeon bait (Gilbert and Evermann 1895). Ecologically, they are an important food for white sturgeon, and the carcasses of spawned adults provide nutrients to tributaries that also rear salmon and steelhead (Kan 1975).

General life history and habitat descriptions for this species can be found in several sources which are summarized in Close (2000). In Idaho, Hammond (1979) described biology of lamprey larvae in selected streams. Ammocoetes collected in the Salmon Subbasin were larger than those found in the Clearwater Subbasin, and Hammond (1979) theorized that something other than size triggers transformation and migration to the ocean.

Throughout their range in the Columbia River Basin, Pacific lamprey have declined to only a remnant of their pre-1940's populations. Lower Snake dam counts numbered over 30,000 in the late 1960's, but have declined to less than 500 fish in recent years (Table 18). Currently, an estimated 3% of the lamprey that pass Bonneville Dam are counted at Lower Granite Dam (Close 2000). Based on these declines, the State of Idaho considers Pacific lamprey to be endangered and imperiled (Conservation Data Center, 1997), and they are a Federal sensitive species.

Table 17. Documented observations of lamprey within the Salmon Subbasin, Idaho.

Hydrologic Unit	Watershed	Year	Observation Type	Number and lifestage	Reference
UPS (201)	Salmon R.	1973	Observation	1 ammocoete	IDFG FIS database 2001
PAH (202)	---	---	---	---	---
MSP (203)	Salmon R.	1977	Collection	35 ammocoetes	Hammond 1979
	Canals off Salmon R.	Late 1950's-early 1960's	Observation	Several thousand ammocoetes	S. Gebhards IDFG retired pers comm. 1995
LEM (204)	Lemhi R.	1957-1958	Observation	Several thousand ammocoetes	S. Gebhards IDFG retired pers comm. 1995
MFU (205)	Salmon R. near Pistol Cr	1979	Observation	1 adult	R. Thurow, USFS pers comm.. 2001
MFL (206)	Salmon R beaches below Big Creek	1959-1960	Observation	ammocoetes[a] and a few adults	J. Mallet, IDFG retired, pers comm. 2001
	Salmon R. beaches between Big Creek and Roaring Creek	1979 1981-1983 1983-1997	Observation	10 ammocoetes[a] ammocoetes[a] ammocoetes[a]	R. Thurow, USFS, pers comm. 2001
	Salmon R. just below Stoddard Cr	1997	Observation	1 ammocoete[a]	R. Thurow, USFS, pers comm. 2001
	Salmon R. at Hospital Bar Hotsprings	2001	Observation	1 dead ammocoete	B. Leth, IDFG, pers comm. 2001
MSC (207)	---	---	---	---	---
SFS (208)	SF Salmon R. near Warm Lake	1977	Collection	23 ammocoetes	Hammond 1979
	Near Reed ranch suctioned while removing sediment	1987-1988	Collection	3 ammocoetes	J. Lund, USFS-retired, pers comm 2001
LOS (209)	Mainstem Salmon	1984 1987 1993 1995 1996 1999	Collection-juvenile smolt trap	16 ammocoetes 3 ammocoetes 109 ammocoetes 2 ammocoetes 1 ammocoetes 1 ammocoetes	E. Buettner, IDFG pers comm. 2001
LSA (210)	---	---	---	---	---

[a] Ammocoetes dug out of sandy beaches

Table 18. Trends in counts of Pacific lamprey in fish ladders at mainstem dams between the Pacific Ocean and the Salmon Subbasin, Idaho.

Dam	Early 1960's	1996	1997	1998	1999	2000
Bonneville	350,000	---	20,891	---	---	19,002
The Dalles	300,000	---	6,066	---	---	8,050
John Day	*no dam*	---	9,237	---	---	6,282
McNary	25,000	---	---	---	---	1,103
Ice Harbor	50,000	737	668	---	---	239
Lower Monumental	*no dam*	---	---	---	---	38
Little Goose	*no dam*	---	---	---	---	4
Lower Granite	*no dam*	490	1,122	---	---	1
Source	Close 2000	FPC 2001	FPC 2001	FPC 2001	FPC 2001	FPC 2001

Factors that may be affecting declines in Pacific lamprey abundance include problems with habitat and the migratory corridor (Close et al 1995). Ammocoete abundance can be affected by water temperature and other physical characteristics during early development (Potter et al 1986 and Young et al 1990 in Stone et al 2001).

Availability and accessibility of suitable spawning habitat may limit the amount of reproduction that occurs within a basin. Factors influencing survival of early life history stages may be critical to determining recruitment to the population (Houde 1987).

Within the Salmon Subbasin, limiting factors include water withdrawals, irrigation canals, and habitat disturbance. Low flows, poor riparian conditions and resultant high water temperatures reduce the quality and quantity of adult spawning and juvenile rearing areas (Close 2000). Downstream of the subbasin, the major limiting factors for ammocoetes and macrothalmia are passage and bypass mortalities at facilities on mainstem Snake and Columbia dams as well as migration delays through the reservoirs (Hammond 1979). For adults, the primary limiting factor is higher water velocities in the adult fish ladders and migration system at mainstem dams. Adults have extreme difficulty negotiating the fish ladder weir orifices (T. Bjornn cited in Close 2000).

Success in rehabilitating Pacific lamprey could depend on whether the species exhibits homing behavior to natal streams (Stone et al. 2001). Their counterparts, the sea lamprey (Petromyzon marinus) do not home to natal streams (Bergstedt and Seelye 1995) but instead respond to a bile acid based larval pheromone released by conspecific larval lamprey (Bjerselius et al. 2000). If Pacific lamprey do exhibit homing behavior, it may be necessary to recognize ecologically significant units (ESU) in any rehabilitation effort, instead of focusing on the metapopulation level.

Basic distribution, life history, population status information is urgently needed to fully understand this species and to begin intensive management before extinction occurs and supplementation programs are implemented (Close et al 1995, Close 2000). Understanding the cause of decline through various data gathering and research efforts will be critical to implementing effective restoration actions for Pacific lamprey in the Columbia River Basin (Close et al 1995).

The Idaho Department of Fish and Game will consider and use knowledge of the species to maintain or enhance their numbers, genetic integrity and habitat. Inventory work is needed to determine its present range and population status (IDFG 1996, IDFG 2001).

4.1.1.b. Native Resident Fishes

Westslope Cutthroat Trout

The native westslope cutthroat subspecies occurs in watersheds throughout the Salmon Subbasin (Figure 24). Although the subspecies is still widely distributed and is estimated to occur in 85% of their historical range (Lee et al. 1997), Rieman and Apperson (1989) contend viable populations exist in only 36% of their historic range. Most strong populations are associated with roadless and wilderness areas. Westslope cutthroat trout are currently listed as federal and state (Idaho) species of concern and sensitive species by the USFS and BLM, and were proposed for listing under the Endangered Species Act (ESA). On April 5, 2000, the United States Fish and Wildlife Service announced their 12-month finding regarding the petition it had received to list the westslope cutthroat trout as threatened throughout its range under ESA. The Service concluded after review of all available scientific and commercial information, that the listing of westslope cutthroat trout was not warranted.

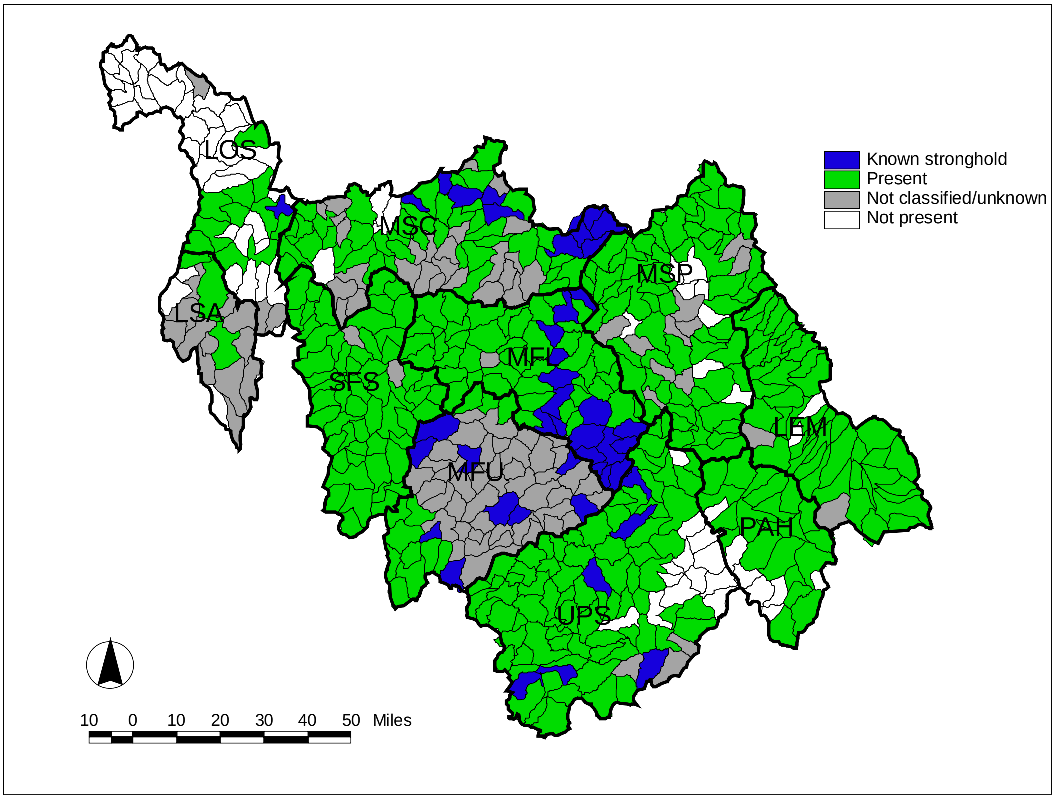


Figure 24. Distribution and status of westslope cutthroat trout within the Salmon Subbasin, Idaho (source: ICBEMP and IWWI 2000).

Current distribution and abundance of westslope cutthroat trout are restricted compared to historical conditions (Liknes and Graham 1988, Rieman and Apperson 1989, Behnke 1992). In Idaho, populations considered strong remain in 11% of historical range and it has been suggested that genetically pure populations inhabit only 4% of this range (Rieman and Apperson 1989), although genetic inventories that would support such a low figure have not been conducted. Many populations have been isolated due to habitat fragmentation from barriers such as dams, diversions, roads, and culverts. Fragmentation and isolation can lead to loss of persistence of some populations (Rieman et al. 1993). Estimated probabilities of persistence for westslope cutthroat indicate that populations with fewer than 2,000 individuals show a marked increase in stochastic risks (extinction from chance events) (McIntyre and Rieman 1995). Because of the high risk of these populations to chance events, conservation of the subspecies will likely require the maintenance and restoration of well-distributed, connected habitats (SNRA 1999).

For the last several decades, IDFG has been stocking predominantly westslope cutthroat in their mountain lake program in lieu of non-native trout species. Because many of these lakes did not have trout present naturally, stocking may have resulted in a local range expansion, and possible compromising of genetic purity where subspecies other than westslope were placed. The current state fish management plan (IDFG 2001) notes that sterile fish will be stocked to eliminate potential interbreeding with native fish. A high proportion of high lakes have received sterile trout in the past year.

Westslope cutthroat trout in the Salmon Subbasin have been documented to exhibit fluvial and resident life histories (Bjornn and Mallet 1964, Bjornn, 1971 cited in Behnke 1992), and adfluvial behavior is suspected (SNRA 1999). Age at maturity ranges from 3-5 years (Simpson and Wallace, 1982). Westslope cutthroat trout are spring tributary spawners with spawning commencing in April and May depending on stream temperatures and elevation. Adult fluvial fish ascend into tributaries in the spring and typically return to mainstem rivers soon after spawning is complete (Behnke, 1992)

Overfishing has been identified by several researchers as a factor in the decline (MacPhee 1966, Behnke 1992) of westslope cutthroat. This subspecies is extremely susceptible to angling pressure. Rieman and Apperson (1989) documented a depensatory effect in fishing (mortality increases as population size decreases) and speculated that uncontrolled harvest could lead to elimination of some populations. However, cutthroat populations have been protected via catch-and-release regulations in large portions of the Salmon Subbasin since the 1970s and no harvest of cutthroat has been permitted in mainstem rivers since 1996. Rieman and Apperson (1989a) reported 400 to 1300% increases in westslope cutthroat populations following implementation of special fishing regulations.

Habitat loss and degradation are other important factors in the decline of westslope cutthroat. In an Idaho study, among depressed populations of cutthroat, habitat loss was the main cause of decline in 87% of the stream reaches evaluated based on a qualitative study of biologists' best judgements (Rieman and Apperson 1989). Land management practices have contributed to disturbance of stream banks and riparian areas as well vegetation loss in upland areas which result in altered stream flows, increased erosion and sediment, and increased temperature.

Brook trout, and introduced rainbow trout, in combination with changes in water quality and quantity appear to have been deleterious to westslope cutthroat (SNRA 1999). Brook trout are thought to have replaced westslope cutthroat in some headwater streams (Behnke 1992). The mechanism is not known, but it is thought that brook trout may displace westslope cutthroat or take over when cutthroat have declined from some other cause. In drainages occupied by both westslope cutthroat and nonnative rainbow, segregation may occur with cutthroat confined to the upper reaches of the drainage. Segregation does not always occur however and hybridization has been documented (Behnke and Zarn 1976, Rieman and Apperson 1989).

Bull Trout

All bull trout populations in the Salmon Subbasin were listed as Threatened under the Endangered Species Act in 1998 (63 FR 31647), and are defined as one recovery unit of the Columbia River distinct population segment. A recovery plan is under development by the USFWS, assisted by an interagency team (Lohr et al. 2000). A draft of Chapter 1 of the plan is expected for public review in summer 2001.

Historical abundance and distribution information throughout most of the subbasin is largely anecdotal. The best long-term population trend data exist for Rapid River, tributary to the Little Salmon River. Additional trend data for large fluvial bull trout are available from the East Fork Salmon Chinook weir (Schill 1992; Elle 2000; Lamansky et al. 2001) Schill (1992) reported a declining bull trout density trend in 112 sites snorkeled within the Salmon River Subbasin from 1985 to 1990. However, a longer-term summary of those sites sampled for a longer time period indicated the opposite trend (D. Schill, IDFG, personal communication).

General life history and status information can be found in the Final Rule of the Federal Register and in the State of Idaho Bull Trout Conservation Plan (1996). A thorough discussion of habitat requirements and conservation issues is presented by Rieman and McIntyre (1993); and in respective Problem Assessments referred to for specific fourth-code hydrologic units (major watersheds).

Rieman et al. (1997) used a basin-wide ecological assessment (Quigley and Arbelbide 1997) and current status knowledge regarding bull trout populations to predict distribution, strength, and future trends of populations in unsurveyed sub-watersheds. Bull trout display wide, yet patchy distribution throughout their range. Within the entire Columbia Basin, the Central Idaho Mountains (more than half of which falls within the Salmon Subbasin) support the most secure populations of bull trout. What is known of the species' current distribution and status within the Salmon Subbasin is depicted graphically in Figure 25. Sport harvest of bull trout in the Salmon Subbasin has been prohibited since 1994.

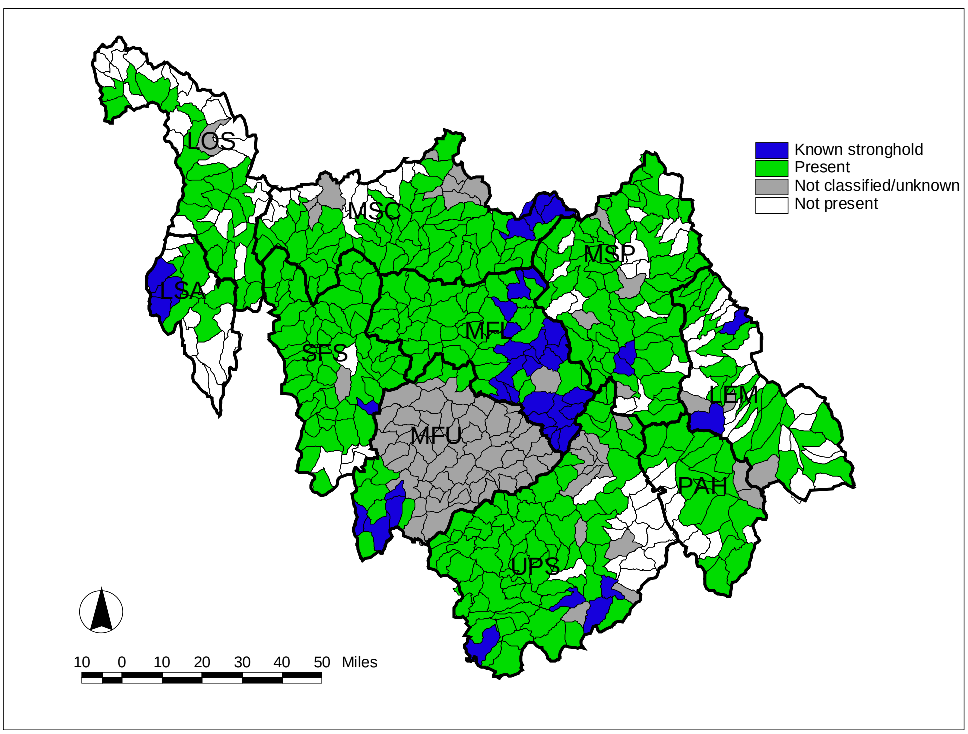


Figure 25. Distribution and status of bull trout within the Salmon Subbasin, Idaho (source: ICBEMP and IWWI 2000).

In an effort to better understand the population structure of bull trout within the Salmon Subbasin, tissue samples are being taken for later genetic analysis whenever bull trout are captured by researchers operating adult or juvenile traps targeted on anadromous salmonids.

Upper Salmon (UPS). Upstream migrating bull trout have been monitored in the mainstem Salmon River within this hydrologic unit since 1986, incidental to chinook salmon trapping operations (Lamansky et al. 2001). Numbers of bull trout intercepted annually have ranged from four to 38, with no evident trends. Bull trout have been documented in 54 streams within this unit (T. Curet, IDFG, pers comm.), including the mainstem and multiple tributaries of the East Fork Salmon River (BLM 1998). Upstream migrating bull trout have been partially monitored in the East Fork since 1984, incidental to chinook salmon trapping operations (Lamansky et al. 2001). Number of bull trout intercepted annually in the East Fork have ranged from 2 to 175, with no evident trends.

Pahsimeroi (PAH). Bull trout are present in the Pahsimeroi River from the mouth to above Big Creek and in Little Morgan, Tater, Morse, Falls, Patterson, Big, Ditch, Goldburg, Big Gulch, Burnt, Inyo, and Mahogany creeks (T. Curet, IDFG, pers comm.).

Middle Salmon-Panther (MSP). Bull trout are known present in 47 streams within this hydrologic unit (T. Curet, IDFG, pers comm.). These streams include Allison, Poison, McKim, Cow, Iron, Twelvemile, Lake, Williams, Carmen, Freeman, Moose Sheep, Twin Boulder, East Boulder, Pine, Spring, Indian, Corral, McConn, Squaw, Owl, multiple streams in the Panther Creek system, and the main Salmon and N.Fk. Salmon rivers.

Lemhi (LEM). Bull trout are present in Big Eightmile, Big Timber, Eighteen Mile, Geertson, Hauley, Hayden, Kenney, Bohannon, Kirtley, Little Eightmile, Mill, Pattee, and Texas creeks, their tributaries, and in the Lemhi River. Hybridization with brook trout may occur in some tributary streams.

Middle Fork Salmon (MFU, MFL). Bull trout appear well distributed and abundant in all six identified key watersheds of the Middle Fork Salmon River (Middle Fork Salmon River Technical Advisory Team 1998). Key watersheds are: upper and lower Middle Fork Salmon River, Wilson / Camas creeks, Big, Marble, and Loon creeks. Bull trout and brook trout are known to be sympatric only in the headwaters of Big Creek. Bull trout in the Middle Fork Salmon have been excluded from harvest for over three decades and this drainage is believed to contain one of the strongest bull trout populations in the Pacific Northwest (D Schill, IDFG, personal communication).

Middle Salmon-Chamberlain (MSC). Spawning bull trout populations exist in the Chamberlain, Sabe, Bargamin, Warren, and Fall Creek watersheds. Spawning and early rearing is suspected to occur in the Crooked Creek, Sheep Creek, and Wind River watersheds (Clearwater Basin Bull Trout Technical Advisory Team 1998).

South Fork Salmon (SFS). The East Fork of the South Fork Salmon River and the Secesh River support the strongest fluvial populations of bull trout in the South Fork watershed (IDFG GPM database). Thurow (1985) identified Sugar, Tamarack, and Profile Creeks as principal spawning tributaries. Thurow and Schill (1996) documented high juvenile densities in Profile Creek that approach those of a westslope cutthroat population. More recent research has documented specific distribution, seasonal migration, and spawn timing and locations of bull trout throughout the lower South Fork and East Fork of the South Fork Salmon River (Hogan 2001, in progress).

From 1996 to 2000, bull trout captured incidental to salmon smolt trapping were tagged with PIT tags to gain life history information (K. Apperson, personal communication). Adams (1999) reported occasional sightings of brook trout x bull trout hybrids in tributaries.

Lower Salmon (LOS). Slate, John Day, and Partridge creeks have been identified as key bull trout watersheds for spawning and rearing (Clearwater Basin Bull Trout Technical Advisory Team 1998). Race, Lake, and French creeks support limited bull trout spawning and rearing in their lower reaches. The mainstem Salmon River within this area provides for migration, adult and sub-adult foraging, rearing, and winter habitat.

Little Salmon (LSA). Rapid River and Boulder Creek have been identified as key bull trout watersheds (Clearwater Basin Bull Trout Technical Advisory Team 1998). Upstream migration of bull trout has been monitored in Rapid River since 1973 (Schill 1992; Lamansky et al. 2001). Annual runs have ranged from 91 to 461 adult fluvial bull trout, with no evident trends. Radio telemetry studies on potential spawners initiated in 1992 documented timing of spawning migrations, spawning locations, spawning fidelity, spawning mortality, and range of wintering habitat (Schill et al. 1994; Elle and Thurow 1994; Elle 1998). The USFS is continuing to study use of headwater habitats for spawning and rearing (R. Thurow, personal communication). Age information has also been collected and analyzed by Elle (1995).

Bull trout and brook trout are sympatric in some headwater reaches of Rapid River and Boulder Creek.

Interior (Redband) Rainbow Trout

The great majority of steelhead originally ascending the Columbia River are believed to be descendants of redband trout (Behnke 1992). Redband trout are native to the Salmon Subbasin and continue to be widely distributed across their historical range within the subbasin. However, their population status and genetic connectivity are not well understood across large areas (Figure 26). It could be theorized the current distribution of wild redband trout is related to the historic distribution of summer steelhead. However, in the Middle Salmon-Chamberlain (MSC) and Lower Salmon (LOS) hydrologic units, suspected redband trout have been found above natural barriers in tributaries whose lower reaches are utilized by steelhead. Five populations of redband/rainbow trout have been genetically characterized in the MSC (Bargamin, Sheep, Chamberlain and Fivemile creeks) and LOS (Fish Creek, tributary to Whitebird Creek) hydrologic units. The Fivemile population was genetically distinct from all other rainbow (anadromous and non-anadromous) populations in the upper Columbia River drainage (Reingold 1985). The Fish Creek population was determined to be redband trout with the lowest amount of genetic variation of the five populations. All populations are genetically different among themselves (Letter from Robb Leary to Wayne Paradis, November 1, 2000). Unique populations may also be present in Rice, Little Slate, and French creeks in the Lower Salmon watershed.

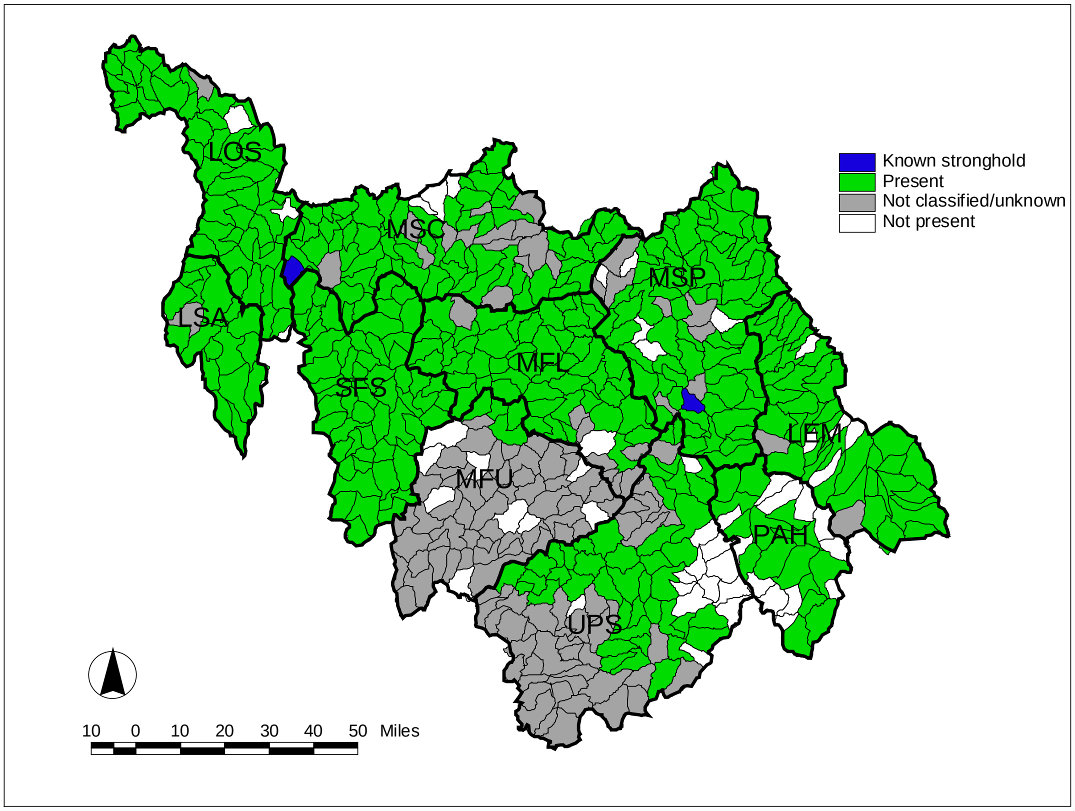


Figure 26. Distribution and status of resident rainbow (redband) trout within the Salmon Subbasin (source: ICBEMP and IWWI 2000). The status of these fish is not well understood in most areas where they are classified as present.

To protect resident redband and steelhead trout within the upper portions of the Salmon Subbasin, hatchery catchable rainbow trout are released in only the mainstem Salmon River. Released fish are marked with an adipose fin clip so harvest is targeted only on hatchery stocks. In other areas of the subbasin, catchable hatchery trout are stocked only in areas where there is minimal or no risk to native fish. The Idaho Department of Fish and Game has adopted a policy where sterile resident salmonids will be stocked in waters accessible to wild/native salmonids unless there is a need to supplement the wild populations (IDFG 2001). All wild fish harvest is prohibited in all mainstem rivers in the upper portions of the drainage (MF to headwaters). No differentiation of resident redband trout from juvenile steelhead has been attempted in the Salmon Subbasin. Consequently, the distribution of the former remains poorly understood.

Mountain Whitefish

Mountain whitefish (*Prosopium williamsoni*) are abundant and well distributed in the Salmon Subbasin, but tend to be less widely distributed at the lower (downstream) end of the subbasin (Figure 27). Their life history and distribution is closely influenced by water temperature (Sigler 1951; Brown 1952; Davies and Thompson 1976; Erickson 1966; Liebelt 1970; Pettit and Wallace 1975; Thompson 1974), and cold mountain streams or rivers are their preferred habitat. Extensive downstream movement by pre- and post-spawning whitefish has been documented in the Clearwater Subbasin (Pettit and Wallace 1975, Rockhold and Berg 1995). Mountain whitefish were caught 50 miles (? Km) downstream of tagging sites, and displayed strong homing in the spring and early summer to the streams where they were tagged (Rockhold and Berg 1995). Spawning activity occurred when water temperatures approached 6°C.

Aside from basic distribution data, little is known about the life history of mountain whitefish in the Salmon Subbasin.

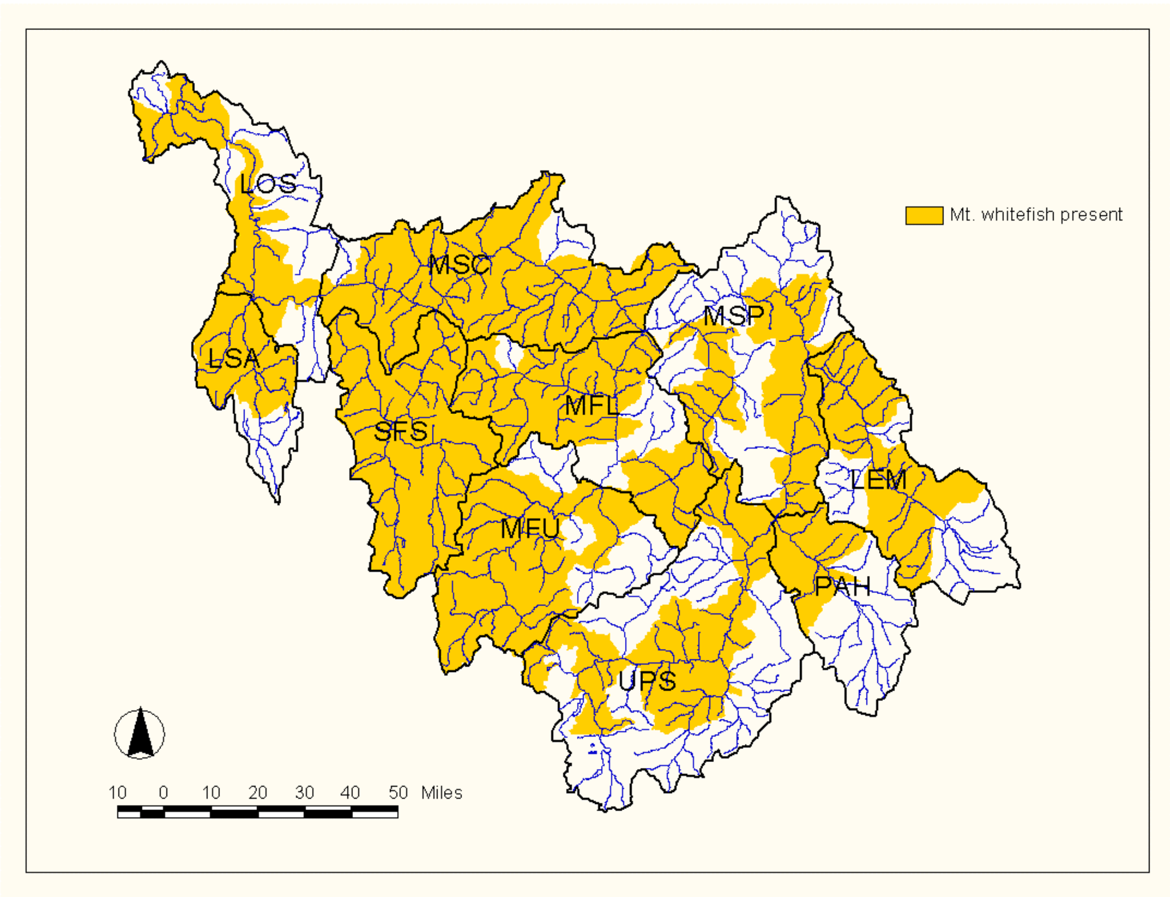


Figure 27. Mid-scale (fifth-field watershed) distribution of mountain whitefish in the Salmon Subbasin, Idaho (source: ICBEMP 1997).

White Sturgeon

White sturgeon in Idaho are classified by IDFG as a Species of Special Concern (IDFG 2001). The BLM considers white sturgeon a sensitive species, and the USFWS lists Snake River white sturgeon on its "to watch" category (Mosley and Groves 1990). The White

Sturgeon Management Framework Plan (PSMFC 1992) provides life history, habitat needs, and conservation issues concerning all Pacific Coast white sturgeon populations. White sturgeon have been reported in the Salmon River as far upstream as Corn Creek (near the Middle Fork Salmon River).

The Salmon River is the only unregulated stream in Idaho that supports white sturgeon. Natural flow conditions are key to successful spawning of the species. White sturgeon is susceptible to overexploitation by harvest due to a population's dependence on slowly maturing and long-lived spawning life history. A minor catch-and-release sport fishery for white sturgeon exists in the lower Salmon River (IDFG 1992 draft). Sport harvest was closed throughout the Snake River drainage in 1970. Idaho's current management strategy for white sturgeon throughout the Salmon River prioritizes conservation. Limited sampling conducted by IDFG since 1991 indicates some movement between the Snake and Salmon rivers (L. Barrett, pers comm.).

Traditionally, the Nez Perce people harvested white sturgeon in the Salmon River for subsistence, which is now severely limited as a result of low sturgeon numbers. Sampling conducted by Nez Perce tribal biologists in 1999 and 2000 documented sub-adult and adult fish between the Salmon River mouth and Hammer Creek. In 2000, eggs were sampled between river km 54 and 84 (Hammer Creek) (Tuell and Everett 2001, in press). Additional data are needed to assess the status of white sturgeon in the Salmon River, including this population's relationship with Snake River population(s).

4.1.1.c. Non-native Resident Fishes

Brook Trout

Brook trout, a char native to eastern North America, was first introduced into the Salmon Subbasin in 1913 (MacCrimmon and Campbell 1969; see Section 4.5.2) and is now found in multiple areas of the subbasin (Figure 28). A summary of the life history of brook trout can be found in Meehan and Bjornn (1991). For thorough life history information see Power (1980). Adams (1999 and 2000) investigated biological and physical factors that control invasion of brook trout in streams, and found actual dispersal rates to be relatively slow given findings of abilities of fish to move upstream in high gradient systems. Adams (1999) provides a thorough review of brook trout dispersal, population dynamics, and population control efforts.

Stream reaches in the subbasin that have abundant brook trout are often void of bull trout (Thurow 1985 and 1987). In order to avoid contributing to new interactions between brook and bull trout, IDFG has ceased stocking brook trout into native trout streams and now allows anglers a bonus harvest of brook trout in addition to the standard trout limit.

Non-native rainbow trout

Rainbow trout of non-native origin were first stocked into the Salmon Subbasin in the mid-1910's. Initial stocking was concentrated along streams with road systems developed for mining and timber harvest. Rainbow trout have also been stocked extensively in alpine lakes throughout the Subbasin. Over the past decade, stocking of several streams within the Subbasin have been discontinued, driven by minimum exploitation goals, and because of concern regarding competition and introgression with native salmonids. Current fisheries management policy for IDFG is to stock only sterile rainbow trout (IDFG 2001).

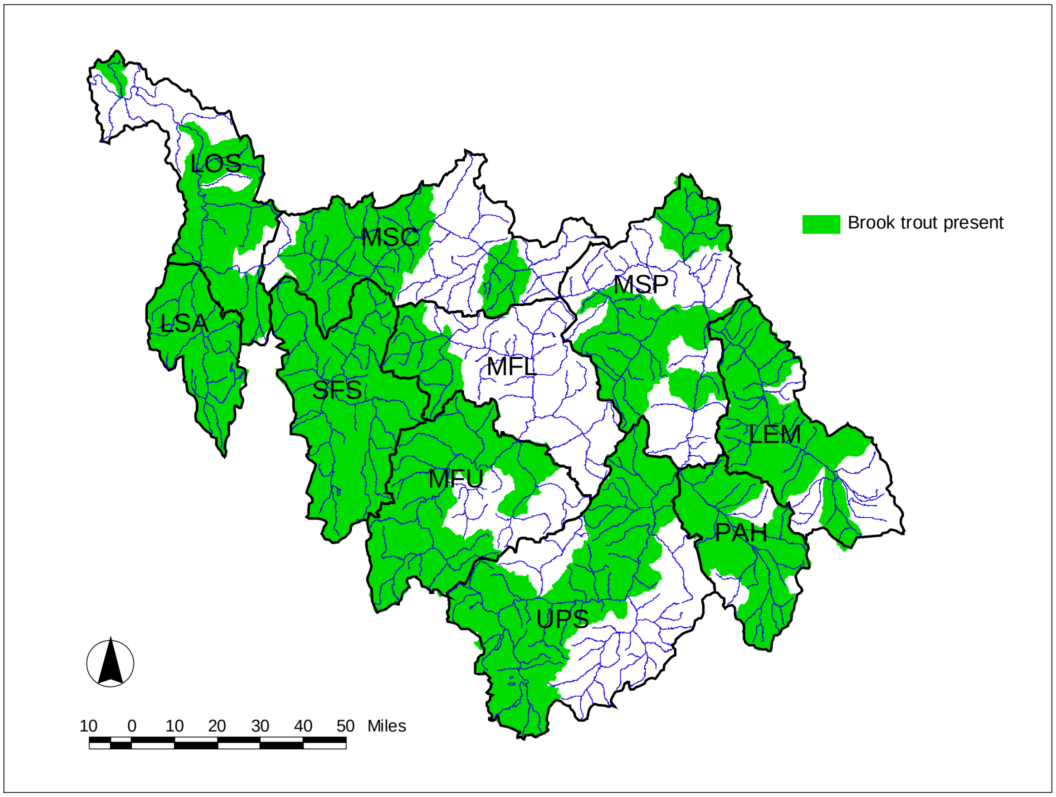


Figure 28. Mid-scale (fifth-field watershed) distribution of introduced brook trout within the Salmon Subbasin, Idaho (source: ICBEMP 1997).

Smallmouth Bass

Smallmouth bass (*Micropterus dolomieui*) are present in the lower Salmon River, with a distribution that extends upstream to approximately the mouth of the South Fork Salmon River. It is believed these fish pioneered upstream from release points in the mainstem Snake River. There are no records to indicate they have ever been stocked into the lower Salmon Subbasin.

Other Non-native Fishes

To support sport fisheries, the IDFG and other agencies and individuals have historically stocked numerous waters with non-native salmonids throughout the Salmon Subbasin (see Section 4.5.2). In recent years many in-stream stockings have been substantially reduced or eliminated in order to reduce impacts on wild/native fish. All exotic salmonid releases in the upper basin are confined to alpine lakes. There have been no documented sightings of exotics being captured in any mainstem rivers or creeks, and it is therefore believed these releases have no or minimal impact on native salmonids.

In the late 1990's sterile rainbow trout were evaluated for their performance to provide sport fisheries, and to be used in waters where introgression with native salmonids was a concern. Beginning in 2001 all rainbow trout stocked by IDFG will be sterile (IDFG 2001).

4.1.2. Wildlife

The Salmon Subbasin supports diverse populations of wildlife, including species that have become uncommon or extirpated across large portions of their historic geographic ranges. For summary purposes, these species have been grouped into the following categories: threatened and endangered species; mammals (big game, forest carnivores, and small mammals); birds (raptors, upland birds, cavity nesters, and migratory birds); herpetofauna; and exotic species. A matrix table summarizing the distributions of 272 vertebrate species across the subbasin's 10 major watersheds is given in Appendix F. These species constitute all those know to be present in the Salmon Subbasin on an at least seasonal basis.

Data on the current status and distribution of many wildlife species in the subbasin is limited. Most information is related to big game management and includes winter-spring aerial surveys and harvest data for big game species elk, mule deer, pronghorn antelope, sheep, mountain goats, moose, black bears, cougars, and the furbearers such as bobcats. More limited and short-term information exists for such threatened and endangered species as Grey wolves, bald eagle, and peregrine falcon. Data on other wildlife species are based on occasional presence/absence surveys, predictive habitat relationship models, and incidental observations. The major source for priority species information is the Conservation Data Center.

4.1.2.a. Threatened and Endangered Species

In the Salmon Subbasin there are 36 wildlife species of concern, 4 federally listed Threatened species, and a population of wolves designated as "experimental non-essential". Documented occurrences of rare animals within the subbasin are summarized in Table 19.

Gray Wolf. Gray wolf populations were extirpated from the subbasin in the early 1900's. In 1995-96, 35 wolves from southwestern Canada were reintroduced to central Idaho as Nonessential Experimental Populations. These reintroduced wolves have successfully reproduced and expanded their ranges. At least 6 wolf packs now reside within the Salmon Subbasin.

In Central Idaho, the gray wolf Nonessential Experimental Population Area covers most of the subbasin. The Nez Perce Tribe is carrying out ongoing monitoring of wolf populations. Lemhi County currently is finishing a three-year study on wolf impacts to ungulates and mountain lions. The effects of wolf reintroduction on big game and other prey populations are unknown. Wolf populations are expected to expand within the subbasin until they are constrained by resource and/or human imposed limitations.

Table 19. Documented occurrences of threatened, endangered, or otherwise rare animal species within the major hydrologic units (watersheds) of the Salmon Subbasin, Idaho. Federally listed species are identified in bold. Abundance of documented occurrences can be biased toward areas where there have been greater levels of research and other human activity.

Species/guild	G-rank/S-rank	Documented ccurrences by watershed									
		UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Forest Carnivores											
Fisher (Martes pennanti)	G5/S1	3		3		5	1	8	5	14	
Lynx (Lynx canadensis)	G5/S1	26	1	19	22	8	3	8	1	2	1
North American wolverine (Gulo gulo luscus)	G4T4/S2	39		10	2	20	1	12	4	5	4
Small Mammals											
California myotis (Myotis californicus)	G5/S1?			2							
Fringed myotis (Myotis thysanodes)	G4G5/S1?						1			3	
Kit fox (Vulpes macrotis)	G4/S1	1									
Long-eared myotis (Myotis evotis)	G5/S3?	2		7	1		1			2	
Long-legged myotis (Myotis volans)	G5/S3?	2	1	7			3	1		1	3
Merriam's shrew (Sorex merriami)	G5/S2?	1									
Northern Idaho ground squirrel (Spermophilus brunneus brunneus)	G2T2/S2										3
Pallid bats (Antrozous pallidus)	G5/S1?									1	
Pygmy rabbit (Brachylagus idahoensis)	G4/S3	4	23		41						
Spotted bat (Euderma maculatum)	G4/S2						1				
Townsend's big-eared bat (Corynorhinus townsendii)	G4/S2?		1	4			2			6	1
Western pipistrelle (Pipistrellus hesperus)	G5/S1?									1	
Western small-footed myotis (Myotis ciliolabrum)	G5/S4?	2	1	10	3		1				
Yuma myotis (Myotis yumanensis)	G5/S3?	1			2		1				1
Raptors											
Bald eagle (Haliaeetus leucocephalus)	G4/S3B,S4N	2	1	1	1						
Northern goshawk (Accipiter gentilis)	G5/S4	2				1	1	3	1	5	6
Peregrine falcon (Falco peregrinus anatum)	G4T3/S1B,SZN	3		3						2	2
Upland Birds											
Mountain quail (Oreortyx pictus)	G5/S2									37	14
Cavity Nesters											
Black-backed woodpecker (Picoides arcticus)	G5/S3	1				1		3			1
Boreal owl (Aegolius funereus)	G5/S2	1		3		1		6	4	1	
Flammulated owl (Otus flammeolus)	G4/S3B,SZN	1		13				4	1	10	3
Great gray owl (Strix nebulosa)	G5/S3			1		5		3			3
Pygmy nuthatch (Sitta pygmaea)	G5/S2S3	1								1	1
Three-toed woodpecker (Picoides tridactylus)	G5/S3?	5				1		4			
White-headed woodpecker (Picoides albolarvatus)	G4/S2B,SZN							1		4	
Migratory Birds											
Long-billed curlew (Numenius americanus)	G5/S3B,SZN	1	4		1					2	
Herptifauna											
Ringneck snake (Diadophis punctatus)	G5/S1?									2	
Western toad (Bufo boreas)	G4/S4	2			2				3		
Invertebrates											
Boulder pile mountainsnail (Oreohelix jugalis)	G?/SU									2	
Columbia pebblesnail (Fluminicola fuscus)	G2G3/S1									2	
Columbia river tiger beetle (Cicindela columbica)	G2/S2									13	
Costate mountainsnail (Oreohelix idahoensis idahoensis)	G1G3/SU									2	
Lava rock mountainsnail (Oreohelix waltoni)	G1G3/SU									1	
Shortface lanx (Fisherola nuttalli)	G2/S1									5	
Striate mountainsnail (Oreohelix strigosa goniogyra)	G5TU/SU									2	
Whorled mountainsnail (Oreohelix vortex)	G1G3/SU									1	

Grizzly Bear. Grizzly bears were historically present in the subbasin but were extirpated with settlement. The grizzly bear was listed as a threatened species in the lower 48 States under the Endangered Species Act in 1975. The USFWS proposes to reintroduce grizzly bears to the Salmon and Clearwater subbasins in the Mountain Snake Province as an Experimental Nonessential Population (USFWS 2000). A completed EIS and Record of Decision have been completed for this project. The proposed action under Alternative 1 is to reintroduce a minimum of 5 bears per year for 5 years. The recovery target is 280 bears within the Bitterroot recovery area. A 15-member citizen committee would manage the implementation of the reintroduction and grizzly bear recovery in the Bitterroots. Anadromous fish were believed to be a large part of the historic grizzly population diet. It has been hypothesized that the lack of strong salmon runs in the Bitterroot recovery area will affect potential bear density, and perhaps recovery rates, but not success of recovery.

Lynx. The USFWS listed the lynx as a threatened species on March 24, 2000. The status and distribution of lynx within the subbasin in largely unknown. Although their documented occurrences are widespread, they are rare. Field studies in similar habitats (Koehler et al. 1979, Smith 1979, Brained 1985, and Brittle et al. 1989) provide some information on lynx on the periphery of their range. Forage, denying, and travel habitats include lodgepole pine habitats and early successional habitat resulting from fire and other disturbances. Lynx are felids that prey upon small mammals with a preference for snowshoe hares. The different denning and foraging habitat needs result in the species requiring a mosaic of different-aged forest stands. Conservation measures for this species include: habitat management to enhance early seral stages and potential prey populations; minimizing snow compaction to protect lynx habitat integrity; providing interconnected foraging habitats; providing security habitats; reducing incidental harm or capture during regulated trapping activity; reducing lynx mortality and losses of habitat connectivity through improved highway and road management (Ruediger et al. 2000).

Northern Idaho Ground Squirrel. The Idaho ground squirrel is the state's only endemic mammal. The northern Idaho ground squirrel is a federally listed threatened species. It has the most restricted distribution of any North American ground squirrel and its range is one of the smallest among mainland North American mammals (IDFG 1995). It was originally found in two counties and now only occurs in Adams County. There are four existing populations in the Little Salmon Subbasin (LSA). The northern Idaho ground squirrel occurs in meadows and adjacent forest clearings surrounded by ponderosa pine and Douglas-fir forests at 1200-1750 m elevation. The inhabited meadows are isolated from each other due to habitat fragmentation as a result of conifer encroachment. The threats to northern Idaho ground squirrel recovery are, in order of priority: destruction and modification of habitat or range over-utilization, disease or predation, and the inadequacy of existing regulatory mechanisms. A conservation agreement between the USFWS and the USFS for the protection of ground squirrel populations and habitats has been signed.

Bald Eagle. The USFWS coordinates a nationwide survey of wintering bald eagles (*Haliaeetus leucocephalus*) in select areas of the subbasin. There are currently no known bald eagle nests in the subbasin. Bald eagles winter along the entire length of the Salmon River and many of its larger tributaries, such as the Lemhi and Pahsimeroi Rivers.

Peregrine Falcon. Nesting peregrine falcons have been documented within Lower Salmon watershed. The Nez Perce National forest monitors these nesting falcons. Suitable a large amount of suitable but unoccupied habitat occurs within along the mainstem river above and below this nesting pair in LOS and MSC. Four BLM and IDFG cooperative raptor surveys along the mainstem from Hammer Creek to the confluence of the Salmon and Snake rivers have identified nesting golden eagles and red-tailed hawks but no other nesting peregrines.

4.1.2.b. Mammals

Several groups of mammals of interest or concern but not discussed earlier in this section of the report (i.e., Section 4.1.2) are described below.

Big Game

Big game, including furbearers, are widespread in the subbasin and highly valued for subsistence, cultural, recreational, and economic reasons. The relative importance of these species to local culture and economics is viewed by many to be in conflict with current wolf and grizzly bear recovery efforts. The Idaho Department of Fish and Game (IDFG) establishes and enforces harvest seasons and bag limits for non-Indian sportsmen, while the Shoshone-Bannock Tribe does the same for harvest activities on ceded lands by Shoshone-Bannock Tribal members.

Elk and Deer. Elk and mule deer are presumed to have been locally abundant in the subbasin before 1900 (Lehmkuhl et al. in press). As miners, trappers, and loggers settled the area in the late 1800's and early 1900's, elk and deer populations were reduced or locally extirpated by unregulated subsistence and market hunting. To protect and increase depleted elk and mule deer herds, game preserves were established and Yellowstone Park elk were released in such places as Panther Creek and New Meadows in the 1930's. Regulated hunting beginning in 1938 and coupled with the positive effects of previous fires, elk and deer populations increased through the 1950's and 1960's. Either sex hunting was maintained through the 1960's in part to protect winter ranges from over grazing by big game. Within this century, elk populations peaks have occurred during the 1960's and the late 1980's. The former peak is attributed to habitat while the latter has been attributed to hunting regulations. Mule deer have been in decline since the 1960's. White-tailed deer are locally abundant in the lower Salmon River and Little Salmon River watersheds.

In the Clearwater and lower portions of the Salmon Subbasin, approximately 36,000 elk were estimated to use Forest Service habitats in the late 1980's and early 1990's (Idaho Fish and Game 1998).

Since 1990, elk population productivity, measured in calves per 100 cows and as total elk numbers, has remained stable or slightly increasing, except in the Upper and Lower Middle Fork watersheds where productivity has declined precipitously. Reasons for this decline are unknown, but thought to be associated with high elk densities. Combined elk populations in the basin are estimated to total approximately 22,650. Idaho Fish and Game management objectives for this area call for elk populations between 20,900-31,630 elk including maintaining bull-to-cow ratios of either 25-29:1 in backcountry units or18-24:1 in more accessible areas.

Mule deer populations have remained steady in this area since the 1960's because of slow habitat change and light hunting pressure. There is insufficient information to provide deer population estimates. State population objectives include a minimum 25:100 buck:doe ratio and at least 50% 4+ points bucks in the harvest in the more remote Salmon Subbasingame management units. The more accessible areas of the Salmon Subbasinhave population objectives of minimum 15:100 buck:doe ratio and at least 30% 4+ points bucks in the harvest. Mule deer harvest has averaged about 3800 deer/year over the past 7 years.

Habitat ultimately determines deer and elk densities and productivity. Vast shrub winter ranges, created and maintained by wildfire disturbances, have not been sustained. More controlled livestock grazing and fire suppression allowed grasses and conifers to out-compete shrub seedlings; shrub ranges began to revert to grasslands and forests. Also, the spread of noxious weeds through livestock and road vectors has and will continue to significantly impact the productivity of big game ranges.

Canadian wolves were introduced into the subbasin in 1995. To date, there is no indication the wolves are currently affecting production, but the possibility exists for future impacts. Recent fires have burned thousands of acres of big game range . These fires should ultimately provide benefits to elk and deer forage abundance and quality but how and at what level these benefits and impacts will be manifested needs to be determined..

Pronghorn Antelope. There were 123 antelope harvested in the upper Salmon River portion of the subbasin in 1999. The buck harvest of 87 animals was by far the lowest in three decades. The doe harvest of 36 animals was 6% of the 1992 peak harvest, and also the lowest doe harvest in decades. All doe/fawn permits were eliminated in 1998, compared to 100 issued in 1997 and 825 in 1992-93. A total of 1,918 pronghorn antelope was counted in all units, down 53% from 1990. Pronghorn numbers are down substantially from 30 years ago and this decline is most pronounced in the Pahsimeroi watershed.. Intentionally high harvest rates designed to reduce antelope depredations on irrigated agricultural lands have caused this decline.

Bighorn Sheep. Central Idaho's bighorn sheep populations experienced dramatic and sudden population losses, up to 50% in several major herds, between 1988 and 1990. Sampling of nearly 100 live and dead animals during winter 1988-89 identified a high prevalence of several different serotypes of pneumonia (*Pasteurella haemolytica* and *Pasteurella trehalosi)* in Morgan Creek and Panther Creek sheep. Lungworm (*Protostrongylus* spp.) loads were relatively high in both herds, and *Brucella ovis* was detected in the Morgan Creek herd.

Over a decade later, most central Idaho sheep herds are still stagnant to slowly declining, despite the 50% reduction in sheep densities and favorable weather conditions (Table 20). Adult mortality has stabilized since the die-off, but lamb recruitment in most herds persists at or below herd maintenance levels of approximately 25-30 lambs per 100 ewes. Lamb recruitment rates vary within the herds in central Idaho and range from very low on the East Fork of the Salmon River, to moderate in the Lost River Range, Main Salmon, and Unit 21/Panther Creek), and high in the Morgan Creek, and South Lemhi ranges.

Table 20. Recent abundance and population trends of Bighorn sheep in Big Game Units within the Salmon Subbasin (source: IDFG).

Big Game Unit(s)	Location	1990 population estimate	Population trend
11	Lower Salmon River (LOS)	30	Increasing
14	Lower Salmon River (LOS)	15	Static
19	Middle Salmon Canyon (MSC)	120	Static
19A	Middle Salmon Canyon (MSC)	15	Static
20	Middle Salmon Canyon (MSC)	200	Static
20A	Middle Salmon Canyon (MSC)	400	Increasing
21	Middle Salmon (MSP)	250	Static
26	West Lower Middle Fork (MFL)	250	Increasing
27	Lower and Upper Middle Fork (MFL)	800	Increasing
28	Main Salmon (MSP)	400	Static
30, 30A	Lemhi (LEM)	60	Increasing
36, 36A	Upper Salmon (UPS)	300	Static
36B	Upper Salmon (UPS)	350	Static
37A, 29	Pahsimeroi (PAH)	80	Increasing

The reduction in overall sheep numbers coupled with poor lamb recruitment has resulted in a significant decline in viewing and recreational opportunities for Idaho residents and nonresidents alike. Rocky Mountain bighorn sheep permits, one of the most highly sought hunting opportunities in Idaho, have declined from 198 permits in 1991 to only 62 permits in 1999 and 2000.

In the winter of 1999-2000, bighorn sheep were sampled for disease agents in the Big Creek area. Of the eleven sheep captured, seven were found to be carrying the same virulent strain of Pasteurella spp. (beta-hemolytic Pasteurella trehalosi biotype 2) that was found in sheep during the1988-1990 die-off. With the exception of samples collected during winter 1999-2000 from the Big Creek sheep herd, central Idaho sheep herds have not been sampled for possible disease agents since the original die-off. Disease vectored through domestic livestock, may be a primary limiting factor on bighorn sheep populations in the Salmon Subbasin.

The Hells Canyon Initiative is a capture and transplant cooperative project to release bighorns on the Idaho and Oregon sides of Hells Canyon and in Washington on the Asotin Creek drainage adjacent to Hells Canyon. The focus area of the Initiative is adjacent to and affects big horn sheep populations in the lower Salmon River. The Foundation for North American Wild Sheep has a 10- year commitment to generate at least 10 million dollars to re-establish the wild sheep herd in this canyon, which includes portions of the lower Salmon River. , Management authorities estimate Hells Canyon can support 13,000 bighorn sheep in areas that now have only isolated sheep bands.

Mountain Goats. As with other herds in Idaho, population trends of mountain goat in the Salmon Subbasin over the past 20-25 years have varied considerably among individual herds. Some herds, particularly in accessible areas, have been drastically reduced or eliminated. Other herds have declined and then recovered to near historical high numbers. Presently, most herds in the subbasin are stable, whether or not the herds are hunted (Table 21).

Table 21. Recent abundance and population trends of mountain goats in Big Game Units within the Salmon Subbasin (source: IDFG).

Big Game Unit(s)	Location	2000 population estimate	Population trend
18, 22, 23	Seven Devils (LSA)	190	Increasing
19	Lower Salmon Breaks (MSC)	40	Static
19A	Lower S.Fk.Salmon River (SFS)	10	Static
20	Upper Salmon Breaks (MSC)	60	Increasing
20A	Salmon River (MSC)	30	Static
21	Bitterroot Range (MSP)	50	Static
21	Spring Creek (MSP)	Unknown	Unknown
21A, 30	Beaverhead Range (MSP)	100	Static
25	Mid S.Fk. Salmon River (MFL)	30	Decreasing
26	Big Creek (MFL)	30	Static
27	M.Fk. Salmon River (MFL)	180	Increasing
27, 36	Loon Creek (MFU)	50	Static
28	Panther Creek (MSP)	25	Decreasing
29, 37A	North Lemhi Range (LEM)	60	Static
30, 30A	Goat Mountain (LEM)	Unknown	Unknown
35, 36	Sawtooth Mountains (UPS)	90	Decreasing
36, 36A	White Clouds (UPS)	140	Decreasing
36A	Pioneer Mountains (UPS)	100	Static
36A, 36B	Yankee Fork (UPS)	120	Increasing

During the past 15 years, elk numbers have increased dramatically. Portions of mountain goat winter ranges in the subbasin now receive substantial use by elk during winter. The capacity of these ranges to support mountain goats may be reduced because of this elk competition.

Moose. Because of dense cover, low densities, and solitary habits, formal population surveys and data on moose are not available for this area. Management is based on moose sighting reports, field observations of moose activity, and data from moose harvest and miscellaneous mortalities. Increasing moose sightings and sign, as well as hunter success, have allowed permit levels to reach an all-time high of 14 permits.

Black Bear. Although the black bear was classified as a game animal by IDFG in 1943, true big-game status and protection was not achieved until 1983 with the elimination of year-round hunting seasons and two bear bag limits. No economically feasible methods are available to monitor the abundance of black bears in the subbasin. As a result, IDFG biologists have relied on a variety of indirect measures of harvest data to assess population trends. Harvest data from the mandatory check and report system are the primary source of information used to make management decisions. Hunters in the subbasin harvested

380bears in 2000, according to IDFG's mandatory report system. All data analysis units within the subbasin currently meet or exceed criteria established by the IDFG to ensure the long-term viability of black bear populations in the subbasin and provide recreational opportunity for the hunting and non-hunting public.

Mountain Lion. The management of mountain lion has changed dramatically during the past 30 years. Through 1971, the mountain lion was classified by the IDFG as a predator, with a continuous open season and no bag limit, and, in many years, a bounty was paid for dead lions. With reclassification as a game animal in 1971, more conservative management was initiated with corresponding increases in the mountain lion population. A four-fold increase in harvest has also been documented by IDFG mandatory reports in the subbasin during the past 10 years. All data analysis units with the subbasin currently meet or exceed criteria established by the IDFG to ensure the long-term viability of mountain lion populations in the subbasin and provide recreational opportunity for the hunting and non-hunting public.

Forest Carnivores

The fisher, marten, wolverine together are classified as forest carnivores. Each have been petitioned for listing under ESA. All are generally solitary, territorial, medium-sized carnivores that prey upon small or medium-sized mammals, some fruits and berries (wolverine), and birds. All were thought to be previously wide ranging across North America. Predicted distribution and habitats in Idaho for these species closely correspond to the forested habitats described in Chapter 1. Priority habitats include grand fir, subalpine fir, and whitebark pine-limberpine forests.

Fisher were nearly extirpated in Idaho as a result of large fires and over-trapping. Reintroduction of fishers beginning in the 1960’s has successfully reestablished fishers in Idaho but it is unlikely that many occur south of the Salmon River (Jones 1991, Maj and Garton 1994). Fisher habitat is structurally complex with multiple canopy layers, diverse prey populations, and available dens and rest sites. Most preferred habitats in Idaho were closed canopy, later-seral, mesic forests close to water (Jones 1991). Marten habitats are similar (Koehler and Hornocker 1977, Spencer et al. 1983, and Jones and Raphael 1991). Wolverines utilize ungulate carrion as a winter food item. In Idaho, wolverines prefer secluded subalpine talus sites for natal and kit rearing dens (Copeland and Harris 1993, 1994). The character of wolverine habitat most commonly described is its isolation from the presence and influence of humans.

Conservation strategies for these 3 species can be broadly grouped. They include: protection from modification of species habitats through fragmentation, protection from human presence and disturbance, maintaining refugia areas, linkages and critical dispersal corridors, and maintaining habitat disturbance processes such as fire and disease. Lack of basic biological knowledge of these species, especially as it varies by spatial scale, is an important need.

Small Mammals

Information on the distribution and status of small mammals within the subbasin is limited. There are 49 seven species of small mammals resident to the Salmon Subbasin. These include 12 species of bats, 15 species of rodents, 3 lagomorphs, 14 sciurids, and 5 soricidae. Those listed as sensitive or listed species include the spotted bat, fringed myotis, western pipestrelle, and Townsend's big-eared bat.

The Townsend's big-eared bat occurs in a wide variety of habitats but its distribution is strongly correlated with the availability of caves or cave-like roosting habitat (Idaho Department of Fish and Game 1999). Populations occur in areas with substantial surface exposures of cavity forming rock and in old mining districts, both of which are common in the Salmon basin. This species is relatively sedentary and displays a high degree of site fidelity. Greater than 80% of Townsend's bats return to the same maternity roost. Townsend's bats prefer edge habitat along intermittent streams and open areas adjacent to wooded habitat. One hibernacula and some capture occurrences of Townsend's have occurred in the Salmon Subbasin. The primary threats to this species in order of priority include: abandoned mine closures, recreational caving, renewed mining on historical sites, toxic mineral impoundment's, pesticide spraying, and riparian habitats degradation.

Little is know about the fringed myotis, western pipestrelle, and spotted bat. The pipestrelle tends to roost alone so the status of the species and the identification and protection of roost sites is difficult to determine. Biological surveys for these 3 species are needed. Habitat fragmentation of upland shrub-steppe areas and pesticide spraying are threats to the pipestrelle and spotted bat. Recreational caving and disturbance of roost caves may potentially threaten pipestrelle and spotted bat roosts.

4.1.2.c. Birds

There are 243 species of birds believed to breed in Idaho. Of these, 119 are neo-tropical migrants, birds that breed in Idaho but migrate to winter in the neo-tropics of Mexico, Central America, the Caribbean and South America (Idaho Partners in Flight 2000). In the Salmon Subbasin, the following have been documented: 70 species that are yearlong residents, 94 that are summer residents, 12 that are winter visitors, 63 that are migrants, and 6 were accidentals. Despite the high numbers of species present both in the State and within the subbasin, little attention has been given to identifying the distribution and status of most of these avian species.

Additional information on the status, distribution and trends of avian species that occur in the subbasin is needed. The lack of information regarding avian species contributes to the difficulties of developing sound management decisions for addressing the needs of these species. However, efforts will prove most effective when concentrated on habitat-based initiatives that protect and enhance habitats for key species guilds. The primary areas where habitat-based efforts would have the greatest beneficial effect on the most migratory bird species include riparian and ponderosa pine habitats protection and restoration.

Several groups of birds of interest or concern that have not been discussed earlier in this section of the report (i.e., Section 4.1.2) are described below.

Raptors

Northern Goshawk. The Northern goshawk has a range that spreads through large parts of North America. In the Salmon Subbasin, they are uncommon but widespread among the forested habitats. Goshawks prey upon small birds and mammals (Marshall 1996). Northern goshawks inhabit coniferous forests and require three kinds of habitats - nesting, post-fledgling family and foraging areas. Mature timber tends to be selected for nest sites. Post-fledgling family habitat should contain mid-seral forested stands, forest openings with a herbaceous layer and large trees, downed logs and snags. Foraging habitat is the prey species' habitat combined with areas that allow for goshawks to hunt and capture prey (Graham et al. 1994).

Upland Birds

Sage Grouse. The sage grouse is a large upland game bird once abundant throughout sagebrush (Artemisia) habitats of the western U.S. and Canada. The number of sage grouse in Idaho and within the Salmon Subbasinis at a record low. Sage grouse are dependent on large acreage's of sagebrush/grassland habitat that have a 15-25% sagebrush canopy cover. These areas provide critical winter habitats and breeding range. Meadows, riparian areas, and other moist areas provide important summer ranges. Sagebrush and understory grasses and forb covers are important components of nesting and brood-rearing habitat. Insects provide a high-protein diet to sage grouse chicks.

The quality and quantity of sagebrush habitats have declined for at least 50 years (Connelly et al. 2000). The reasons for habitat loss vary from site to site but include wildfire, agricultural expansion, herbicide treatments, prescribed fire, abusive livestock grazing, and rangeland seedings. The amount of historical shrub-steppe has declined dramatically (ICBEMP 1997).

In the short-term, spring and early summer weather is often the primary factor influencing sage grouse populations. Late May and early June snows and cold rains can cause young chicks to die from hypothermia. Cool spring and dry summer weather can limit insect populations. Young chicks may then die from starvation, increased exposure or predation while forced to travel longer distances to find food.

Management efforts directed at this native grouse are often fragmented between different agencies and landowners without common goals or direction. To rectify this, the 1997 Idaho Sage Grouse Management Plan identifies how the signatories including IDFG, BLM, Forest Service, and Natural Resources Conservation Service, the Idaho Department of Lands, and Pheasants Forever will work together to recover sage grouse habitats and populations.

Sage grouse habitat quality and quantity has declined throughout the subbasin and coincided with declines in sage grouse numbers (Figure 29). In the Salmon Subbasin, the Plan identifies 3 primary sage grouse management areas. These include the Upper Big Lost/Copper Basin, Lemhi/Birch Creek, and Morgan Creek/East Fork Salmon and

Sawtooth Valley. Recommended conservation strategies include increasing population information, improving riparian habitats, restoring brood habitats through work with water diversions, reducing mineral development impacts on sage grouse habitats, and identifying lek areas.

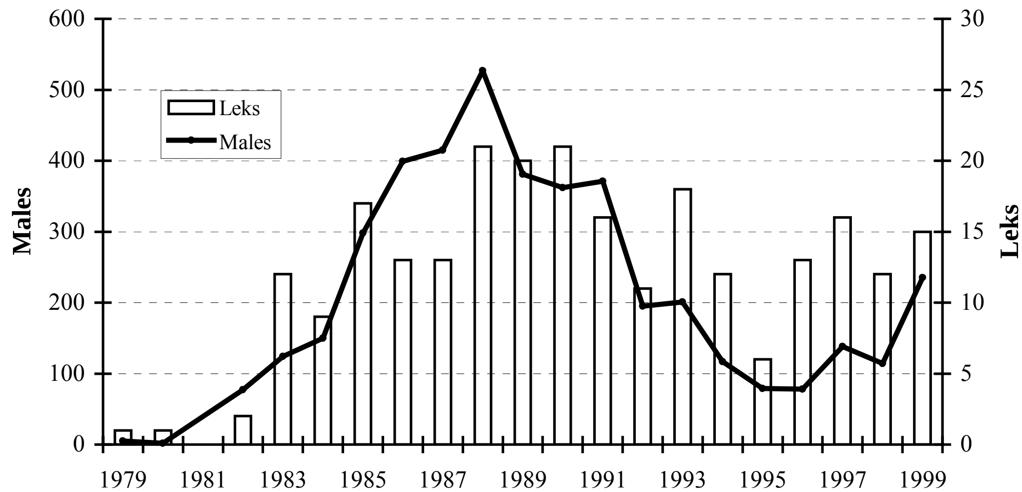


Figure 29. Male sage grouse lek attendance in the Salmon Region.

<u>Mountain Quail</u>. The mountain quail was historically common throughout western Idaho (Sands et al. 1998, Idaho Power 1998, Andy Ogden, pers. comm.), including the Little Salmon River (LSA). Of the 11 existing mountain quail populations known to exist in Idaho, 10 are found in the Little Salmon River (LSA) and Lower Salmon River (LOS) areas (Sands et al. 1998). Habitat loss, degradation, and fragmentation are factors identified in the decline of mountain quail distribution and abundance. Existing and potential habitats along the Salmon River are threatened with development, changed fire frequencies, riparian habitats degradation, grazing, noxious weeds, timber harvest, and domestic pets acting as mountain quail predators. There is a need for more population research and the mountain quail conservation strategy calls for the reestablishment of mountain quail populations through reintroduction.

Cavity Nesters

<u>Flammulated Owl</u>. The flammulated owl is a small, nocturnal, insectivorous owl. Common food sources during the breeding season are grasshoppers, beetles and moths (Marshall 1996). The flammulated owl is a documented nesting species in Idaho. Population trends are not knowing the subbasin. Flammulated owl habitats include ponderosa pine and Douglas fir woodlands described in Chapter 1. These stands have multiple canopy layers and tend to be open forests with grassland and dense forest patches. These habitats are threatened by fire exclusion.

<u>Black-backed Woodpecker</u>. Black-backed woodpeckers are widely distributed but rare in the Salmon Subbasin. There are a limited number of element occurrences in the Salmon

basin. Because suitable habitat often shifts as a result of fire occurrence, trend and abundance data are limited on these species. Large severe fires have positive consequences for black-backs, so fire suppression and post-fire salvage logging may negatively affect the species (Dixon and Saab 2000).

White-headed Woodpecker. The white-headed woodpecker is considered uncommon throughout its range. Of 12 element occurrences cited in IDFG (1995), 10 occurred within the Salmon Subbasin. The white-headed woodpecker has a close association with mature ponderosa pine forests. Preferred nest sites include use of large (>21 inch dbh) dead trees most often excavated within 16 feet of the ground. White-headed woodpeckers display a distinct preference for broken-topped trees and rely heavily upon the seeds of conifers to supplement their diet of insects (Ligon 1973, Raphael and White 1984, Frederick and Moore 1991). Problems facing the species include the modification or elimination of mature ponderosa pine stands, loss of habitat through fire, motorized access and firewood cutting, and lack of biological information (IDFG 1995).

Migratory Birds

Although migratory birds are affected by out-of-basin changes in wintering habitats, migration weather, and wintering conditions; those summer resident and breeding species that occur in the subbasin are dependent on habitats in the basin to maintain population viability. Important and sensitive breeding land birds in the Salmon Subbasin include the long-billed curlew and pygmy nuthatch.

4.1.2.d. Herpetofauna (amphibians and reptiles)

There are 8 species of amphibians and 12 species of reptiles known or predicted to occur in the Salmon Subbasin, but information on their distribution and status in the area is limited. However, an intensive, five-year amphibian study has been conducted in the Bighorn Crags located in the Salmon River Mountains, within the Middle Fork Salmon River and Main Salmon River drainages. This study documented the distribution, habitat associations, and movements of Columbia spotted frogs (*Rana luteiventris*) and long-toed salamanders (*Ambystoma macrodactylum*). Specifically, the occurrence and abundance of both species was studied to document impacts of introduced trout species. Both species were negatively impacted by introduced trout, especially in drainages with a high percentage of lentic surface area occupied by trout. Habitat associations and conservation strategies for these two species in alpine lentic habitats within the subbasin can be found in Hoffman and Pilliod (1999), Pilliod and Peterson (1995), Pilliod et al (1996), Pilliod and Peterson (2000) and Pilliod and Peterson (2001). These studies have shown source populations of frogs move among mountain lakes within a subbasin (C. Peterson, pers comm.). These movements may maintain genetic diversity in populations and serve to restore extirpated populations within a basin metapopulation.

BLM Technical Bulletin No. 98-10, June 1998, titled, Amphibian and Reptile Distribution and Habitat Relationships in the Lost River Mountains and Challis-Lemhi Resource Areas provides some inventory and management needs for the upper portions of the subbasin. These include: gathering and reporting data on amphibian and reptile observations; conducting further surveys; monitoring selected sites at a 5 to 10 year interval; avoiding stocking any currently fishless wetlands with fish; protecting any isolated wetlands with amphibians and supporting/promoting public education efforts concerning snakes to reduce persecution of snake populations. An expansion of this effort to the entire subbasin is needed to adequately protect these species.

4.1.2.e. Exotic Species

Several exotic wildlife species have been introduced into the Salmon Subbasin to increase hunting opportunities for Idaho sportsmen. Such introduction efforts have been concentrated on upland bird species such as the California quail (*Callipepla californica*), Gambel's quail (*Callipepla gambelii*), ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), chukar (*Alectoris chukar*) and wild turkey (*Maleagris gallopavo*).

The bull frog (*Rana catesbeiana*) is also known to occur in the subbasin. Additional widespread and abundant species include the House sparrow, (*Passer domesticus*), European starling (*Sturnus vulgaris*) and Rock Dove (*Columba livia*). There is little known of the interactions between exotic and native species within the subbasin. More information detailing the status and distribution of these species throughout the subbasin is needed, as well as information detailing their interactions with native wildlife fauna.

4.2. Habitat Areas and Quality

4.2.1. Fish

The Salmon Subbasin contains an abundance of streams and lakes, including 3393 miles of streams that provide habitat for anadromous fish (StreamNet 2001). The quality of fish habitat in the subbasin varies by location, but in general there is a clear pattern of higher quality habitats in areas where there has been little or no watershed development and declining habitat quality with increased levels of development or resource use (Appendix G). For fish that are most productive in valley bottom settings, like stream-type (spring/summer) chinook or large fluvial adults in resident salmonid populations, this means that a sizeable portion of their historic habitats have been altered by a variety of human activities.

The degrees to which watershed and aquatic conditions within various areas of the subbasin differ from historic conditions are depicted in Figure 30 and Figure 31. Conditions less favorable to the subbasin's native fish populations are common in all major watersheds except the three dominated by wilderness and roadless areas: the Upper Middle Fork, Lower Middle Fork, and Lower Salmon-Chamberlain. Areas of high watershed and aquatic integrity are present but disjunct in the other seven major watersheds within the subbasin, where deviations from historic conditions are common and sometimes pronounced.

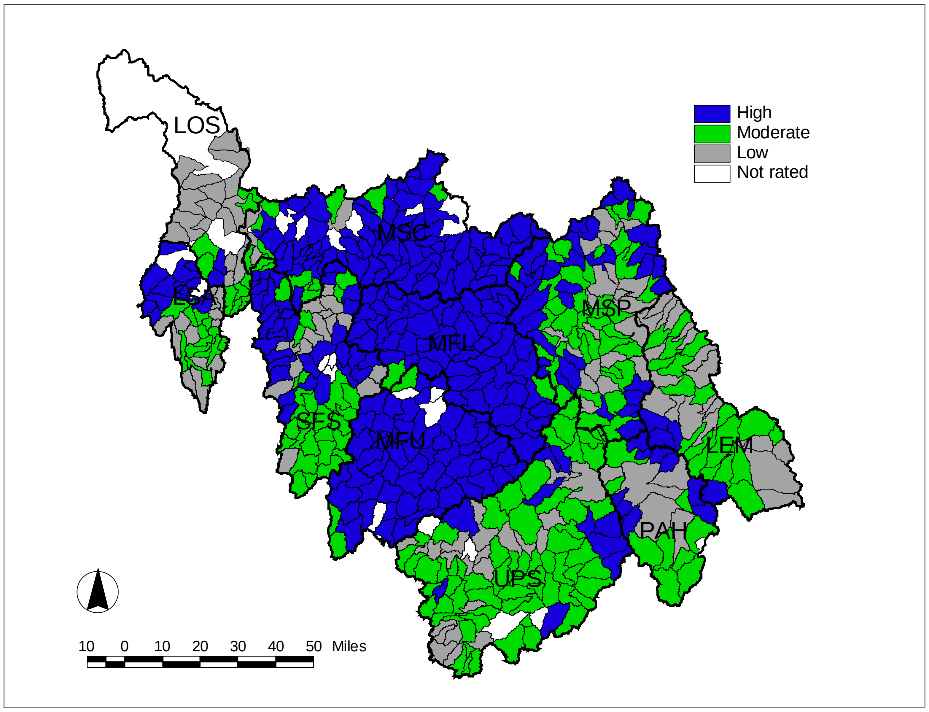


Figure 30. Watershed (geomorphic) integrity of subwatersheds within the Salmon Subbasin, Idaho (source: IWWI 2001).

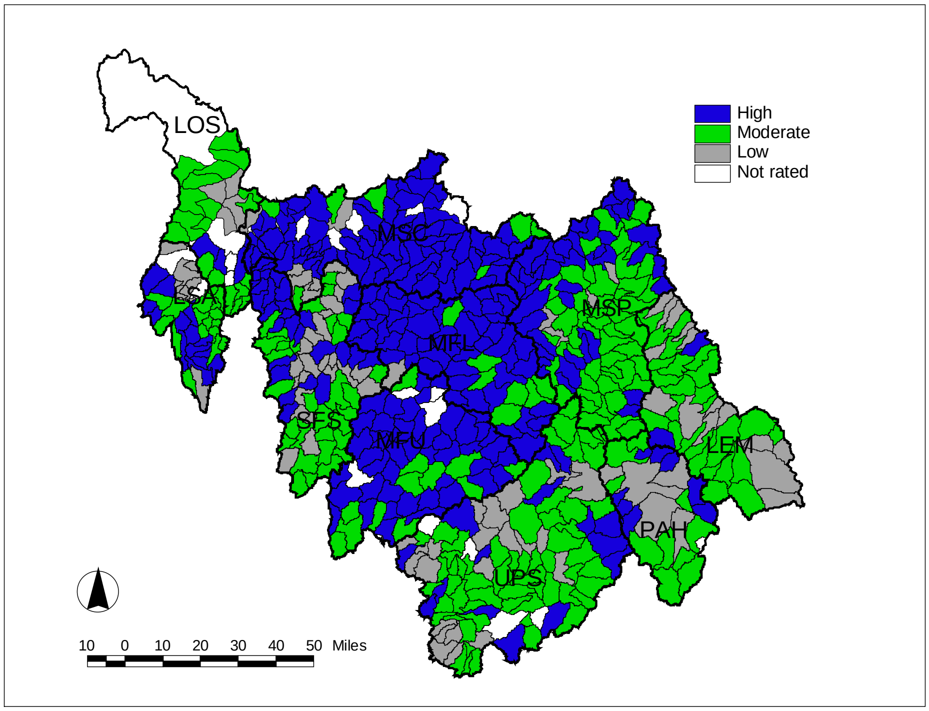


Figure 31. Water quality integrity of subwatersheds within the Salmon Subbasin, Idaho (source: IWWI 2001).

Although many watersheds and streams have been altered, biologists in the subbasin estimate that undeveloped and other areas continue to provide approximately 875 of miles of good to excellent habitat for stream-type chinook and about 2,320 miles of good to excellent habitat for summer steelhead (Figure 32; Appendix G). Habitat rated good to excellent for stream-type chinook is most abundant in the Upper Middle Fork, Lower Middle Fork, and Upper Salmon watersheds. Good to excellent habitat for steelhead is relatively common in each major watershed, with excellent habitat particularly abundant in the Upper Middle Fork, Lower Middle Fork, and Middle Salmon-Chamberlain watersheds.

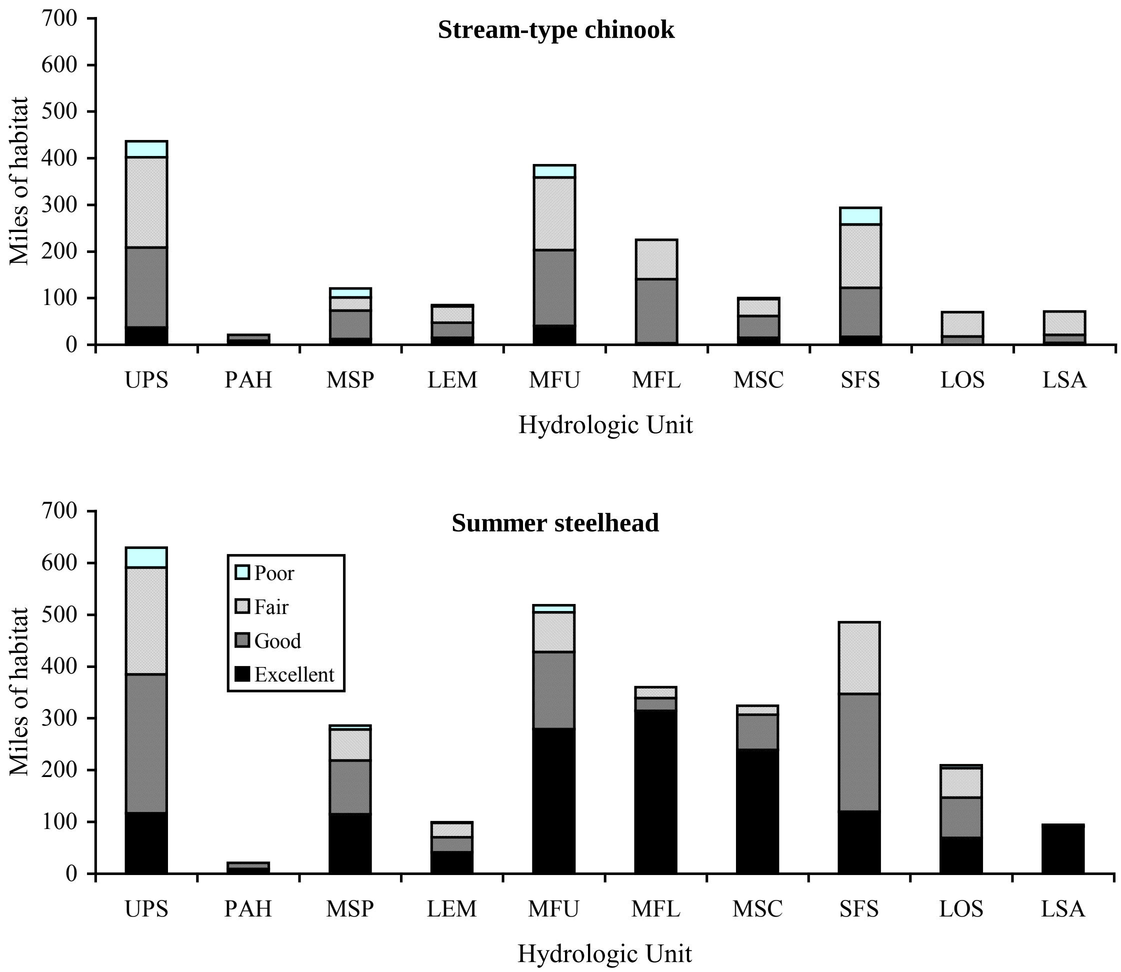


Figure 32. Quantity and rated quality of habitat available to stream-type (spring/summer) chinook and summer steelhead in the Salmon Subbasin, Idaho (source: StreamNet 2001).

Despite the abundance of good to excellent habitat in the subbasin, many streams clearly have habitat problems. Nearly half (854 miles) of the habitat available for stream-type chinook has been rated as being of fair to poor quality, much of it in valley bottom settings where good to excellent chinook habitat would be expected in the absence of human disturbance. Lowered habitat quality in valley bottom areas has important implications for aquatic species in many parts of the subbasin, because of the naturally (historically) high productivity of these areas as well their importance in maintaining connected habitats and populations. About one-fourth (632 miles) of the habitat available to steelhead has been rated as being of only fair or poor quality. As indicated earlier, degraded habitat can be found within each major watershed in the subbasin, but is most common in the seven major watersheds that have been most heavily developed.

2.2.2. Wildlife

The subbasin has many areas of relatively pristine wildlife habitat as well as other areas which are in an altered condition. Large tracts of high quality habitat occur within the core of wilderness and roadless areas in the subbasin. Wildlife habitats tend to be more modified or degraded in the major watersheds with broad valleys and easier human access, such as the Little Salmon, Lower Salmon, Pahsimeroi, and Lemhi.

Alterations in ecosystem processes have resulted in changes in the distribution, quality, and quantity of wildlife habitats within the subbasin. These changes were discussed earlier, in the context of vegetation, in Section 3.1.7. Adverse effects to wildlife habitats have occurred through historic timber harvest activities, the alteration of fire disturbance regimes in forested environments, changes in sagebrush-steppe plant species composition resulting from livestock grazing, and the introduction of exotic species.

4.3. Watershed and Related Assessments

4.3.1. Regional-scale Assessments

Two regional-scale assessments of ecological or watershed conditions have been conducted recently in the Intermountain area that include the Salmon Subbasin. These include highly detailed ecological analyses by federal land managers (the US Forest Service and Bureau of Land Management) during the Interior Columbia Basin Ecosystem Management Project (ICBEMP 1997, 2000) and a smaller Forest Service effort called the Inland West Watershed Initiative (IWWI). ICBEMP evaluated current ecological conditions and trends at multiple spatial scales across the entire Columbia River Basin east of the Cascade Mountains of Oregon and Washington. Information provided by ICBEMP is now being used in support of a new cycle of federal land management planning. The IWWI effort assessed watershed and fish status at the sub-watershed level to construct spatial databases that could be used to examine patterns important to future conservation or restoration efforts. Geographically explicit information developed during both of these efforts, much of which may be useful in a future subbasin-wide assessment, are identified in Appendix H.

The ICBEMP assessment concluded that historic development of the ICRB over the last 150 years has greatly altered ecological processes to the detriment of many native species of fish and wildlife (ICBEMP 2000). Land and water use practices contributing to these changes included unrestricted or little-restricted livestock grazing, road construction, timber harvest and fire management, certain intensive agricultural practices, placer and dredge mining, dam construction, and stream channelization. These watershed disturbances have caused risks to ecological integrity by reducing biodiversity and threatening riparian-associated species across broad geographic areas (ICBEMP 2000). Among many findings of relevance to the Salmon Subbasin, the assessment concluded that:

- aquatic diversity and resilience are dependent on the maintenance of complex habitats and networks of those habitats at multiple spatial scales
- conserving the remaining watersheds and habitats that have a high value for aquatic species is key to maintaining system integrity
- designated wilderness and roadless areas are important building blocks for aquatic restoration throughout the ICRB
- restoring or maintaining the integrity of river corridors bordered by private lands will be particularly important to conserving migratory salmonids because these corridors are essential to assuring habitat and population connectivity between areas of high integrity on federal lands
- in spite of degraded habitats in many areas, the Salmon Subbasin (and the Central Idaho Mountains of which it is a part) still contains much of the highest quality habitat remaining for anadromous fish in the ICRB.

4.3.2. Assessments within the Subbasin

Because of the high proportion of federal land within the Salmon Subbasin, there have been a large number of large watershed, small watershed, subwatershed, and species-specific assessments conducted and written on conditions in the area. We were able to locate more than a hundred such written assessments, reviewed them for content, and evaluated the information they contained that might be of importance to a future subbasin assessment. A summary matrix that identifies these documents and provides a brief summary of the types of information available within each one is given in Appendix H.

Assessment-type documents are available for areas within each of the 10 major watersheds of the Salmon Subbasin, ranging in number from a high of (at least) 28 for the Upper Middle Fork watershed to a low of 5 for the Lower Middle Fork (Table 22). Additional assessments are in process or planned by entities within the subbasin. Sources (authors) of the documents examined included 11 different entities, including federal and state agencies, the Nez Perce Tribe, and an irrigation district. The documents provide information of varying detail on watershed conditions, channel conditions and dynamics, water quality, aquatic habitat (quality, quantity, and connectivity), ESA-listed species, non-listed species, and aquatic monitoring. Most of the documents contain considerably more information related to aquatic species than to terrestrial or semi-aquatic species, which were not often a focus of the assessment.

Table 22. Numbers of watershed and related conservation assessments known to provide information on areas within specific hydrologic units (watersheds) in the Salmon Subbasin, Idaho.

Hydrologic Unit	Code	Entities	Number of assessments
Upper Salmon	UPS	BLM, IDEQ, SCNF, SNRA	19
Pahsimeroi	PAH	BLM, IDEQ, SCNF	7
Middle Salmon-Panther	MSP	BLM, IDEQ, SCNF	7
Lemhi	LEM	BLM, BPA, IDEQ, LID, SCNF	13
Upper Middle Fork	MFU	IDEQ, IDFG, BNF	28
Lower Middle Fork	MFL	IDEQ, PNF, SCNF	5
Middle Salmon-Chamberlain	MSC	BLM, IDEQ, NPNF, PNF	6
South Fork Salmon	SFS	BNF, IDEQ, PNF	16
Lower Salmon	LOS	BLM, BPA, IDEQ, IDFG, NPNF, NPT	9
Little Salmon	LSA	BLM, IDEQ, NPNF, PNF	8

Entities: BLM - Bureau of Land Management; BNF - Boise National Forest; BPA - Bonneville Power; Administration IDEQ - Idaho Department of Environmental Quality; IDFG - Idaho Fish and Game; LID - Lemhi Irrigation District; NPNF - Nez Perce National Forest; NPT - Nez Perce Tribe; PNF - Payette National Forest; SCNF - Salmon-Challis National Forest; SNRA - Sawtooth National Recreation Area.

4.4. Major Limiting Factors

4.4.1. Within the Subbasin

4.4.1.a. Fish

High-quality freshwater habitats are critical to the long-term strength and persistence of native resident and anadromous salmonid populations in the Salmon Subbasin and elsewhere within the Columbia River Basin. These fish have generally fared best in areas least disturbed by humans. High-quality habitats, especially those in wilderness or roadless areas, represent the only remaining strongholds for them and other sensitive aquatic species (Lee et al. 1997). Assuring a well distributed and connected network of high-quality habitats over the long term will be critical to maintaining or expanding the genetic and ecological diversity for which the Salmon Subbasin's salmonid populations are recognized across the region.

Multiple sources of information were reviewed to identify factors limiting fish populations in the Salmon Subbasin. These included results of the ICBEMP and IWWI assessments discussed earlier in this document (see Section 4.3.1), assessments that have been completed within the subbasin (see Section 4.3.2), information that the Northwest Power Planning Council compiled on reach-specific factors limiting anadromous salmonid production within the subbasin, the 1998 303(d) list IDEQ and the EPA developed when identifying factors failing to support effective habitat use by coldwater biota, research documents, and current professional judgments by knowledgeable experts.

Hatchery influences on fish populations are not addressed here as limiting factors. However, they are recognized as potential factors both in the extended decline of certain native species in selected areas (for example, streams where introduced brook trout appear to have replaced bull trout) and where hatchery supplementation of wild fish stocks of anadromous fish has had the potential to adversely affect their genetic or biological integrity (Busby et al. 1996; Evans et al. 1997). However, the degree of impact is often site-specific and dependent on numerous factors including stocking densities, distribution, and the status of existing wild/natural stocks (McElhany et al. 2000).

Anadromous fish production in the Salmon Subbasin is limited at present by two primary factors. First, adult escapements of salmon and steelhead are being determined by out-of-subbasin issues and are insufficient to fully seed the available habitat. When populations levels are low enough, this limiting factor has the effect of keeping yearly effective population size (N_b) low, increasing genetic risks and risks of local extinctions. Second, the carrying capacity of the habitat and fish survival have been reduced by land and water management activities within the subbasin that have affected hydrology, sedimentation, habitat distribution and complexity, and water quality (Columbia Basin Fish and Wildlife Authority 1999).

Populations of salmonids and other aquatic species within the Salmon Subbasin are constrained by a number of in-subbasin factors. These are summarized at the level of the subbasin's major hydrologic units (watersheds) in Table 23 and at multiple finer scales of resolution in Appendix I.

Table 23. Factors constraining populations of salmonids and other aquatic species in the Salmon Subbasin, Idaho.

Major factors that are particularly severe or widespread within a given hydrologic unit are identified as a large, bold "**X**"; lesser factors are identified by a small "x".

Hydrologic Unit	Code	Factors limiting salmonids and/or other aquatic species															
		Harvest	Artificial production programs	Reduced cycling of marine nutrients	Migration problems/blockages	Riparian alteration	Channel alteration	Streamflow alteration	Water temperatures	Other water quality problems	Streambed sedimentation	Reduced habitat complexity	Wetland destruction	Ecological interactions with exotics	Diseases	Toxics/Contamination	Human interactions/ disturbances
Upper Salmon	UPS	x	x		**X**	**X**	x	x	x	x	**X**	**X**	x	**X**			
Pahsimeroi	PAH		x		**X**	x		x	x		**X**	x		x	**X**		
Middle Salmon-Panther	MSP				x	x	x		**X**	**X**	**X**	x				x	
Lemhi	LEM				**X**	**X**	**X**	**X**	x		**X**	**X**		x			
Upper Middle Fork	MFU			x						x	x	x	x	x			x
Lower Middle Fork	MFL			x						x				x			
Middle Salmon-	MSC	x		x	x	x	x	x	**X**	x	x	x		x		x	
South Fork Salmon	SFS			**X**	x	**X**	**X**			x	**X**	x	x	x			
Lower Salmon	LOS	x		x	x	x	x	x	**X**	x	x	x		x		**X**	x
Little Salmon	LSA	x		x	**X**	**X**	**X**	**X**	**X**	x	**X**	**X**	**X**	x			x

As noted earlier, habitat conditions within the subbasin tend to be best where watersheds have been least developed. Habitat constraints on salmonid populations and other aquatic species are generally minor across broad areas of the Upper Middle Fork, Lower Middle Fork, and Middle Salmon-Chamberlain watersheds. These watersheds are dominated by large unroaded and wilderness areas. In contrast, habitat limitations are more prevalent in much of the Little Salmon, in roaded portions of the South Fork Salmon, and in significant developed portions of the Lemhi, Pahsimeroi, Middle Salmon-Panther, and Upper Salmon watersheds.

Predominant habitat limitations in the more developed areas of the subbasin include riparian degradation and associated bank instability, streambed sedimentation, reduced streamflows and associated migration barriers, channel alterations, elevated summer temperatures, and reduced habitat complexity. Livestock grazing, roads, mining, and irrigation diversions are the most frequent causes of these problems in the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, and Lemhi watersheds (IWWI 2001). Past road construction and timber harvest are more prevalent sources of aquatic habitat problems in the subbasin's other six major watersheds (IWWI 2001). Recent catastrophic fires in the South Fork Salmon watershed have added additional fine sediments to a stream network that had already been affected by increased sediment delivery associated with roads constructed in highly erodible terrain.

The following discussion of aquatic habitat conditions within the 10 major watersheds of the Salmon Subbasin focuses on major limiting factors, unless a lesser factor plays a particularly limiting role to fish and wildlife. Descriptions of ongoing efforts to address current limiting factors are found in Section 4.6 of this report.

Upper Salmon (UPS)

The Upper Salmon contains three large watersheds, each with distinctive limiting factors.

East Fork Salmon River. Most spawning and rearing by anadromous fish in the East Fork watershed is confined to valley bottom areas that are privately owned, although populations of resident salmonids appear dependent on spawning and rearing areas in tributary streams. The mainstem river contains adequate flows for fish migration, spawning, and rearing, but channelization has degraded riparian communities and reduced habitat complexity and channel stability.

Yankee Fork Salmon River. Historic mining and mining-related activities altered most of the valley bottom areas that once provided highly productive habitats for resident and migratory salmonids, including spring chinook salmon. Resultant channel alterations disconnected tributaries from the mainstem river in several locations. Upslope instability problems contribute fine sediments to the channel, reducing habitat quality and survival rates for incubating embryos.

Salmon Headwaters. Fish habitat in the Salmon River watershed upstream of the Yankee Fork is affected by riparian degradation, bank instability, high summer temperatures, and migration barriers that water diversions create on tributary streams. Spawning and rearing by anadromous fish occurs on both public and private lands in this watershed.

Pahsimeroi (PAH)

The lower 17 miles of the Pahsimeroi River, which is bordered almost exclusively by private land, provides the only spawning, rearing, and migration habitat that remains for chinook salmon and steelhead trout in this major watershed. Limiting factors along the lower Pahsimeroi include fish passage barriers created by water diversions, high summer water temperatures, reduced stream bank vegetation and stability, and high sediment levels in spawning gravels caused by poor bank stability and head cuts.

The distribution of chinook salmon in the Pahsimeroi is restricted by channel dewatering in upper portions of the river, particularly during low flow years.

Tributaries. Anadromous fish are entirely excluded from tributaries to the Pahsimeroi River due to (spring and summer) channel dewatering by irrigation diversions. These tributaries currently support populations of bull trout, westslope cutthroat, or rainbow trout that are poorly connected to other populations of their species in the mainstem or adjacent streams.

Middle Salmon-Panther (MSP)

In recent history, the only documented spawning by wild/natural chinook salmon in this major watershed occurred in the North Fork Salmon River. The mainstem Salmon River serves primarily as a migration corridor for adult anadromous fish here. Opportunities for rearing by resident and juvenile anadromous salmonids are limited during summer in the mainstem, due to high water temperatures. Tributaries to the mainstem Salmon River have been documented to provide thermal refuge for juvenile fish, but many tributaries are inaccessible from the mainstem during summer due to channel dewatering associated with irrigation. Tributary fragmentation and the loss of functional mainstem riparian corridors are critical limiting factors.

Lemhi (LEM)

Mainstem Lemhi River. Key land uses that have had limiting effects on habitat in the Lemhi River and its tributaries are irrigation, grazing, and road construction. The mainstem Lemhi can be divided into three distinct segments, each having distinctive limiting factors. The lower 27 miles of the mainstem, from the mouth to Agency Creek, serves resident and anadromous salmonids primarily as a migration corridor and provides only limited spawning and rearing habitat. In years of low snowpack and insufficient June rain, a three-mile stretch of the lower river can become intermittently dewatered. Streamside vegetative cover and pools for adult holding and juvenile rearing are largely absent, due to channelization and past overgrazing.

The 11 mile section of the Lemhi River between Agency and Hayden creeks supports rearing and possibly spawning by resident and anadromous fish, and serves as a critical adult staging area for spring chinook. Improved riparian conditions would provide shade to improve stream temperature and, stabilize banks.

More than 95% of the known chinook salmon use of the river as a spawning and rearing area occurs along the upper 28 miles of the Lemhi, between Hayden Creek and the town of Leadore. Habitat here is also heavily used by resident rainbow trout This section of river is bordered by private land, frequently lacks high quality pools and the bank stability provided by vigorous riparian vegetation, and apparently experiences high and widely fluctuating water temperatures during the mid-to-late summer.

Tributaries. Although resident salmonids were documented to be "very abundant in the mainstem Lehmi River as recently as 1941 (USFS 1989), tributary streams now appear to provide much of the available habitat for these species. Degraded riparian areas along these streams, allow bank erosion in many areas, contributing substantial volumes of fine sediments to streams during periods of high flow. Instream flows, as well as the abundance and diversity of riparian plants have been reduced, which has led to elevated summer stream temperatures.

Lower reaches of the Lemhi's tributary watersheds have substantially reduced flows due to irrigation withdrawals between April and October, and flows in most streams reach the Lemhi only during the peak of spring runoff, if at all. Water withdrawals along many of the tributaries are not screened to protect down-migrant fish because the channels downstream are completely dewatered. Migration blockage limits resident fish populations, such as bull trout, in many of these streams to the upper portions of relatively small watersheds, which affects expression of fluvial (migratory) life histories. This may increase local the risk of local population extinctions.

Middle Fork Salmon (Upper and Lower; MFU, MFL)

Most of the Upper and Lower Middle Fork watersheds are within designated wilderness and contain streams that are in essentially pristine condition. Some streams within them do, however, have habitat limitations related primarily to past mining, grazing, road building, C channel alterations, and elevated delivery of fine sediments affect native salmonids and other sensitive aquatic species in headwater reaches of Big and Monumental creeks The presence of exotic brook trout is also suspected of having a negative ecological affect on native species. Historic riparian alterations along Bear Valley and Elk creeks, and portions of some of their tributaries, led to channel destabilization and elevated bedloads that continue to affect bank stability and habitat quality today (Burton 1999).

Middle Salmon-Chamberlain (MSC)

Wilderness designation has protected most of the middle mainstem of the Salmon River from the South Fork to the Middle Fork from development, and thus it has remained in relatively pristine condition. High summer water temperatures are a concern (NPNF 1994), but are a reflection of both natural conditions and human activities upstream.

Many of the smaller tributaries in the Middle Salmon-Chamberlain watershed have very steep gradients and fish migration barriers near their mouths. Reingold (1970) reported that over 90 percent of the 108 named tributaries in the Salmon River Canyon between Corn Creek and Vinegar Creek are small, steep, intermittent streams with little fishery value.

The most degraded aquatic habitats within the Middle Salmon-Chamberlain watershed are generally west of Wind River (including the Meadow Creek area of the Wind River drainage), in the Marshall Mountain mining area, and in the upper Crooked Creek drainage. Past mining activities, road construction, and grazing, have altered riparian areas, streambank stability, and fine sediment levels in streambeds. Legacy effects remain in each of the watersheds.

South Fork Salmon (SFS)

Aquatic habitats within developed watersheds in the South Fork system have been degraded by streambed sedimentation. A key source of this problem has been a combination of extreme storm events (particularly in 1964-65) and road construction on highly erodible landforms (Nelson et al. 1999). Historic mining along the headwater reaches of the East Fork South Fork Salmon River severely altered meadow complexes and other areas historically important to anadromous salmonids as spawning and rearing habitat. The East Fork South Fork Salmon River is currently listed as water quality limited for sediment and metals (IDEQ 2000).

Lower Salmon (LOS)

The primary factor limiting anadromous salmonids in the lower mainstem Salmon River is warm summer water temperatures. Land uses that have affected riparian areas along the river include construction of State Highway 95, historic mining (i.e. hydraulic), residential development,livestock grazing, feedlots, recreation sites, and dispersed recreation.

Larger tributaries to the lower mainstem Salmon include Whitebird, John Day, Slate, Race, and Skookumchuck creeks. Logging, road building and mining on unstable lands has caused severe sedimentation and instability in important tributaries, notably in Slate Creek. Streambed sedimentation caused by roads may lower the quality and quantity of juvenile rearing and spawning habitat along these tributaries. Agricultural development of bottomlands has also contributed to habitat degradation. These streams may have functioned historically as habitat refugia for salmonids seeking to escape high temperatures in the mainstem Salmon during summer. If so, this function may now be impaired by elevated water temperatures in the tributaries.

The smaller tributaries along the lower Salmon River are mostly high gradient streams in deep canyons with very unstable soils. Primary factors limiting fish production in these steep streams are migration barriers, low flows, a lack of good quality pools, poor pool/riffle ratios, limited availability of spawning gravels, sedimentation, and high summer water temperatures. The small tributaries provide limited, localized cold-water refugia for fish at their confluences with the mainstem Salmon River because they often lack surface flow at their mouths when summer temperatures in the Salmon River are at their peak.

Noxious weeds are expanding by about fourteen percent per year in the Lower Salmon watershed. Besides biological and ecological effects, infestation of significant portions of Lower Salmon tributaries may have increased surface sediment yields from lands where noxious weeds have completely replaced native vegetation.

Little Salmon (LSA)

The Little Salmon River is divided into two distinct reaches, the boundary being a barrier falls of potentially recent origin downstream from Round Valley Creek. Oral history of the Nez Perce Tribe and an old name for meadows above the falls (i.e., "Salmon Meadows") suggest that construction of Highway 95 or some other modification may have turned a once-negotiable falls into an impassable barrier to anadromous fish. The upper reach of the mainstem above the falls today flows through expansive meadows dominated by private grazing land. Salmonid spawning and rearing are limited along this upper reach by altered stream temperatures and channel simplification. Tributaries to the upper mainstem have mixed ownership and are generally not in good condition. Below the barrier falls, the mainstem Little Salmon has a steeper and more confined channel affected by upstream landuse and encroachment from a state highway. High stream temperatures limit salmonid use of the mainstem during summer downstream of approximately Hazard and Boulder creeks. Boulder Creek and Rapid River provide the most significant spawning and rearing habitat for the watershed's anadromous salmonids. Natural channel function has been substantially compromised along much of Boulder Creek. Rapid River, upstream from the salmon hatchery, provides high quality habitat.

4.4.1.b. Wildlife

Land-use activities have adversely affected habitat for native wildlife in the Salmon Subbasin over the last 200 years. Agriculture, livestock grazing and urbanization account for significant wetland and native species losses. Past impacts to wildlife habitat within the subbasin, particularly to riparian, floodplain and wetland habitats within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther and Lemhi watersheds will prove difficult to overcome. Currently, the primary threats to existing wildlife habitat with the subbasin are the continuing increases in recreational and home development and the continuation of existing land management practices, including agricultural and forest management related activities in critical habitat areas. Increased recreational use and noxious weed invasions are the major threats to the wilderness portions of the subbasin. The cumulative impacts associated with the decline and loss of these habitats can be felt across the entire Salmon Subbasin and is evident from the number of fish and wildlife species currently at risk.

The conversion and management of upland, forested, floodplain, riparian and wetland areas for agricultural and recreation purposes has greatly reduced the quantity and quality of habitat available to wildlife populations in the subbasin. Soil erosion has reduced the long-term productivity of the soils and their ability to support native plant and animal species. Agricultural practices tend to create mono-culture type food sources with limited seasonal availability. Although these croplands often provide high value food sources, they are only available for a portion of the year and use of these areas as feeding grounds tends to be discouraged because of the impacts to landowner profits. Tillage reduces the availability and quality of year-round food and security in wildlife habitats.

The alteration of forest types has reduced available habitats for those species that prosper in old growth conditions such as cavity nesting birds and woodpeckers, northern goshawk, fisher, several species of bats and other wildlife species. Alterations of low elevation areas, especially wetland, transitional forest and riparian corridors, have greatly reduced the availability and suitability of these areas for supporting wildlife species during critical times of the year. Riparian conversion has reduced the capabilities of these areas to provide critical breeding and rearing areas for multiple wildlife species.

4.4.2. Outside the Subbasin

4.4.2a. Fish

Hydropower System Development and Operations

Development and operation of the Federal Columbia River Power System (FCRPS), which includes 13 mainstem dams used for hydropower, navigation, flood control, and irrigation in the Columbia River basin, resulted in widespread changes in riparian, riverine, and upland habitats. Because of the significant loss of mainstem habitat and habitat function associated with the FCRPS, tributary habitat has become more critical to the survival and recovery of Endangered Species Act listed species throughout the Columbia basin, especially in the Salmon Subbasin.

Because of direct and indirect effects of the FCRPS on fish and wildlife, tributary habitat improvements have been recommended as part of the off-site mitigation activities required of the Corps of Engineers, the Bureau of Reclamation, and the Bonneville Power Administration. Such improvements are required in order for continued operation of the hydrosystem to be allowed under the Endangered Species Act. Such habitat improvement activities were specified as reasonable and prudent alternatives in a NMFS Biological Opinion (BiOp) in December, 2000, entitled, "Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin". Tributary habitat improvement is also referenced in the Federal Caucus' December 2000 Salmon Recovery Strategy, entitled" Conservation of Columbia Basin Fish: Final Basin-wide Salmon Recovery Strategy".

The BiOp concluded that the hydropower system places many Columbia Basin anadromous fish stocks in jeopardy. On this point there is widespread agreement. It is generally accepted that hydropower development on the lower Snake and Columbia rivers is the primary cause of decline and continued suppression of Snake River salmon and steelhead (IDFG 1998, CBFWA 1991, NPPC 1992, NMFS 1995, 1997, NRC 1995, Williams et al. 1996). However, there is less agreement that the hydropower system is the primary factor limiting recovery (Mamorek and Peters 1998). The BiOp suggests that it may be possible to recover Snake River stocks through restoration of freshwater spawning and rearing habitat in addition to some mainstem actions. While it is generally agreed that habitat restoration will be important for declining anadromous runs returning to degraded habitats within the Salmon and other subbasins of the Snake River system, it is not clear the runs can be recovered without large survival improvements in the Snake and Columbia River mainstem passage conditions. For example, in high-quality habitats, there is little opportunity to substantially improve egg-to-smolt survival of fish spawning in the wild, thus survival improvement must come from out-of-subbasin means.

There is substantial skepticism among fishery biologists about whether it will be possible to restore listed Snake River (and thus Salmon Subbasin) anadromous species without major improvements to the hydrosystem. This is based on the recent biological performance of Snake River spring/summer chinook runs. Survival from spawner to recruits returning to the Columbia River mouth declined and became more variable for

Snake River runs following hydrosystem completion in the mid-1970s (Fig. 33; Schaller et al. 1999). Index stocks from the Snake, upper Columbia and lower Columbia regions all showed recent declines, but upriver stocks showed greater declines coincident with the development and operation of the hydrosystem. Survival rates express the difference in the observed recruits/spawner compared to the expected recruits/spawner before hydrosystem completion in natural log scale (Schaller et al. 1999). An increase or decrease of 1 unit indicates an increase or decrease in numbers of recruits/spawner of 2.7 fold. The magnitude of decline was –1.95 for Snake region, -1.70 for upper Columbia region, and –0.80 for lower Columbia region. Post hydrosystem productivity in terms of recruits/spawner was only 14% of that before the dams for Snake River stocks, compared to 18% for upper Columbia stocks and 45% for lower Columbia stocks.

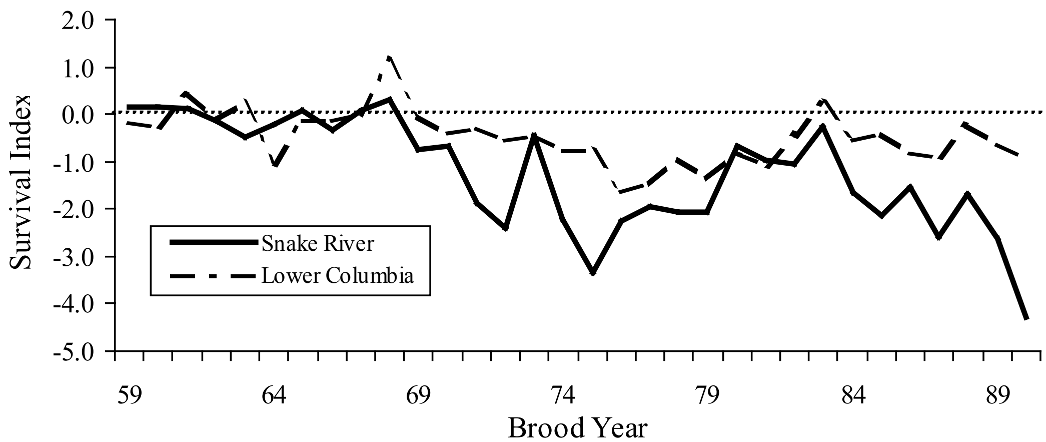


Figure 33. Spawner-recruit residuals showing average changes from the pre-1970 relationship for Snake River spring/summer chinook and lower Columbia River spring chinook stocks, brood years 1959-1990 (source: Schaller et al. 1999).

Within the Snake River region, the pattern of survival rate decline was similar for populations from the Salmon Subbasin (Bear Valley Creek, Marsh Creek and Sulphur Creek in the Middle Fork Salmon; Poverty Flat and Johnson Creek in the South Fork Salmon) and from the Minam River (Grande Ronde Subbasin) and Imnaha River (Imnaha Subbasin). The pattern of survival rate decline was also similar for populations from both high-quality and degraded spawning and rearing habitats (Schaller et al. 1999). If freshwater habitat were the primary cause for decline or the key factor limiting rebuilding, then stocks in high quality habitats should be faring much better than stocks in degraded habitats. Redd counts in a variety of habitats have declined similarly since the mid-1970s (Elms-Cockrum, 2001),

The decline in life-cycle survival for Snake River spring/summer chinook since the 1970s (see Figure 33) occurred primarily in the smolt-to-adult stage, rather than in the spawner-to-smolt stage (Figure 34). The life stage where the largest increases in mortality have occurred as a result of human activities is in the smolt-to-adult stage. Smolt-to-adult return rates (SAR), from smolts at the uppermost dam to adults returning to the Columbia River mouth, averaged 5.2% in the 1960s before hydrosystem completion and only 1.2% from 1977-1994 (Petrosky et al. in press). In contrast, numbers of smolts per spawner from Snake River tributaries did not decrease during this period, averaging 62 smolts per spawner before hydrosystem completion and 100 smolts per spawner afterward (Petrosky et al. in press). In this summary both spawner escapement and smolt yield are measured at the uppermost mainstem dam (currently Lower Granite). The increase in smolts per spawner was due to a reduction in density dependent mortality as spawner abundance declined. Accounting for density dependence, there was a modest decrease in smolts/spawner from Snake River tributaries over this period, but not of the magnitude to explain the severe decline in life-cycle survival, so losses in the egg-to-smolt survival stage have not been the cause of decline in Snake River stocks since hydrosystem development (Petrosky et al. in press).

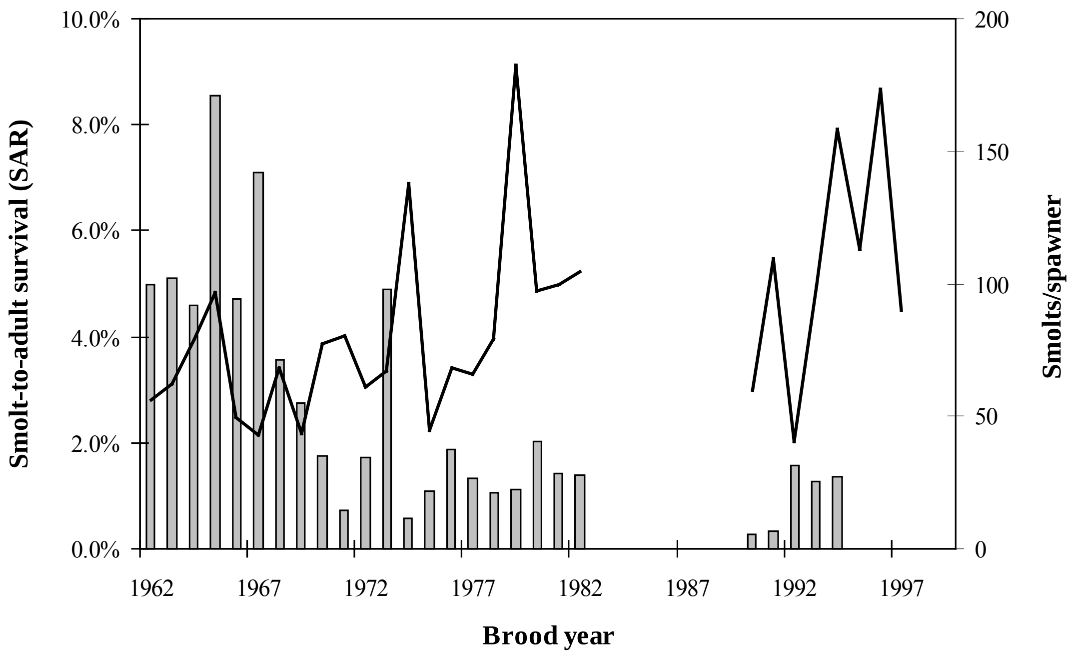


Figure 34. Smolt-to-adult survival rates (bars; SAR) and smolts/spawner (solid line) for wild Snake River spring and summer chinook. The SAR describes survival during mainstem downstream migration back to returning adults whereas the number of smolts per spawner describes freshwater productivity in upstream freshwater spawning and rearing areas (source: Petrosky et al. *in press*).

Schaller et al. (1999) concluded that factors other than hydropower development have not played a significant role in the differential decline in performance between upriver and downriver stocks. The Snake River stocks above eight dams survived one-third as well as downriver stocks migrating through 3 dams (Schaller et al. 1999, Deriso in press) for this time period, after taking into account factors common to both groups. The additional decline in productivity of upriver stocks relative to downriver stocks indicates this portion of the mortality is related to factors unique to upriver stocks. Patterns of Pacific Decadal Oscillation and salmon production would indicate that poor ocean conditions existed for Columbia River salmon after the late 1970s (Hare et al. 1999). However, the natural fluctuations of ocean productivity affecting all Columbia River stocks, in combination with mortality as a result of the hydrosystem, appear to have caused the severe declines in productivity and survival rates for the Snake River stocks. Temporal and spatial patterns of hatchery release numbers did not coincide with the differential changes in survival rates between upriver and downriver stocks (Schaller et al. 1999). Given that changes in smolts/spawner cannot explain the decreases in SAR or overall survival rates for Snake River stocks, it appears the altered migration corridor has had a strong influence on the mortality that causes these differences in stock performance. As further corroborative evidence, during years of high stream flows and improved passage conditions, differences in mortality rates between downriver and upriver stocks narrow (Deriso et al. 1996; IDFG 2000). Shrinking of the difference in mortality between up- and downriver stocks would not be expected with higher flows if ocean conditions were the proximate cause of mortality.

Harvest rates were drastically reduced in the early 1970s, in response to declines in upriver stream-type chinook abundance (Schaller et al. 1999). Mainstem harvest rates of spring and summer chinook ranged from 35%-63% in the 1960s, and averaged less than 10% since the 1980s. Direct harvest of wild salmon within the Snake River tributaries, which was previously upwards of 30%, has been non-existent since the late 1970s.

The SAR and smolt/spawner observations (Figure 34) indicate that the overall survival decline (Figure 33) is consistent primarily with hydrosystem impacts and poorer ocean (out-of-subbasin factors), rather than large-scale impacts within the subbasins between the 1960s and present (Schaller et al. 1999; Petrosky et al. in press). Because the smolt/spawner data represent aggregate populations from a mix of habitat qualities throughout the Snake River basin, and are from a period after development, they do not imply there is no room for survival improvement within the Salmon, Clearwater, Grand Ronde and Imnaha subbasins, but the scope is limited. Because factors outside the subbasin result in critically reduced life-cycle survival for populations even in pristine watersheds, it is unlikely that potential survival improvements within the Salmon Subbasin alone can increase survival to a level consistently that ensures recovery of spring and summer chinook salmon. However the restoration of freshwater spawning and rearing habitat will have considerable benefits for a variety of aquatic and terrestrial organisms

For the Salmon Subbasin's anadromous stocks in the short term, only the most productive populations may retain the resilience to persist in the face of natural and human caused disturbance (Lee et al. 1997; Thurow et al. 2000). Restoration of degraded habitats within the subbasin will be of long-term benefit to regionally important populations of native salmonids, but will improve chances for persistence or recovery of anadromous populations only where there are legitimate opportunities to increase survival and productivity in freshwater habitats. In the Yankee Fork and Lemhi rivers, for example, restoration of more natural stream flows, channel characteristics and spawning gravels will benefit both resident and anadromous stocks.

The dominance of out-of-basin limiting factors discussed above for spring/summer chinook also generally applies to other anadromous fish species in the Salmon Subbasin with minor caveats. Mainstem harvest rates on wild B-run steelhead, in particular, remained high after hydro-system completion until the late 1990s. Steelhead data are generally less available and comprehensive than data for spring/summer chinook. However, Snake River wild steelhead SARs also declined following hydrosystem completion, though not as severely as the SARs of spring/summer chinook (Marmorek et al. 1998).

Vestigial wild runs of chinook, steelhead, and sockeye provide limited prey bases (juvenile anadromous fish) for large resident trout and few nutrients to support aquatic food webs. The marine-derived nutrients (and associated organic materials) that large runs of anadromous fish can import to watersheds like the Salmon Subbasin are known to be important parts of aquatic food webs, including the production of salmonids (Cederholm et al. 1999; Gresh et al. 2000; Bilby et al. 2001). For these reasons, improving downriver survival and upriver escapements of the subbasin's salmon and steelhead may also benefit regionally important populations of westslope cutthroat, bull, and redband trout. Restoring abundant anadromous fish runs to widely distributed watersheds within the subbasin is likely to be an integral component of restoring the aquatic community as a whole.

4.4.2.b. Wildlife

Wildlife species found in the Salmon Subbasin are affected by habitat conditions outside the subbasin and by the availability of suitable migration corridors to critical habitats outside the subbasin. This is true of species with sizeable home ranges as well as migratory species that travel large distances to find suitable habitats on a seasonal basis. Wildlife in the subbasin also have been affected by reduced returns of anadromous fish. Historic large returns that have been reduced by past fisheries and development of the hydrosystem provided an important component of the natural food web. Continued low returns of anadromous fish, even to pristine landscapes within the Salmon Subbasin, continue to affect species that would otherwise benefit from the energy and nutrients these fish import from the marine environment.

4.5. Artificial Production of Fish

4.5.1. Anadromous Species

The Idaho Department of Fish and Game operates anadromous artificial production programs in the subbasin for harvest mitigation, supplementation, and conservation. Locations of the hatcheries and satellite facilities are given in Figure 35. These programs conform to statewide fisheries policies and management goals identified in the 2001-2006 Fisheries Management Plan (IDFG 2001). Hatchery Genetic Management Plans (HGMPs), specified in the National Marine Fisheries Service's (NMFS) 2000 Federal Columbia River Power System and 1999 Hatchery biological opinions, are being prepared for all anadromous hatchery programs in Idaho. The complete HGMPs were not available for inclusion in this document but will eventually be available at the Salmon Subbasin website.

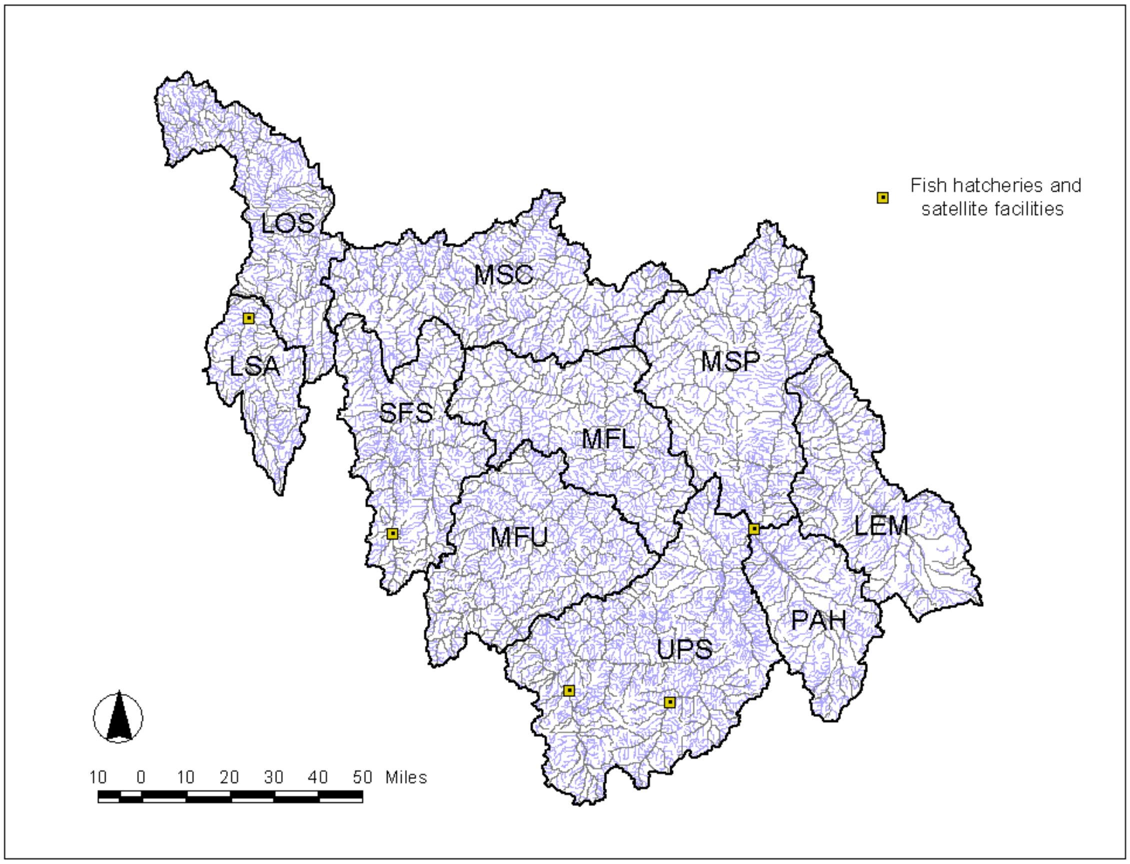


Figure 35. Locations of fish hatcheries and satellite facilities in the Salmon Subbasin, Idaho.

Harvest Mitigation Programs. Chinook salmon and steelhead harvest mitigation is provided through hatchery programs funded by the Idaho Power Company (IPC) and the USFWS-Lower Snake River Compensation Plan (LSRCP). The Idaho Department of Fish and Game operates hatchery programs funded by the Idaho Power Company; LSRCP authorized programs are operated by IDFG and the USFWS. The IDFG strongly emphasizes maintaining selective fisheries with the steelhead and chinook salmon programs. All harvest mitigation fish production (also called reserve production) is currently externally marked with an adipose fin clip, to enable selective fisheries and provide for origin-specific stock monitoring and brood stock management at trapping and spawning sites. General magnitudes of mitigation releases of hatchery-produced anadromous fish that have occurred in each of the major watersheds of the Salmon Subbasin since 1980 are summarized qualitatively in Table 24. Numbers of these fish released during the last 20 years are summarized by species, lifestage, and 5-year interval in Appendix J. There have been minimal to no mitigation releases of hatchery fish into the many subwatersheds of the Upper Middle Fork, Lower Middle Fork, and Middle Salmon-Chamberlain watersheds.

Table 24. General magnitudes of releases of hatchery salmon and steelhead into major watersheds of the Salmon Subbasin, Idaho, 1981-2000.

Program type/period	Magnitude of hatchery releases within major watersheds									
	UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA
Harvest Mitigation										
1981-85	**X**	**X**	**X**					**X**	**X**	**X**
1986-90	**X**	**X**	**X**					**X**	**X**	**X**
1991-95	**X**	**X**	**X**	**X**				**X**	**X**	**X**
1996-2000	**X**	**X**	**X**	**X**				**X**	**X**	**X**
Supplementation										
1981-85	**X**	**X**	**X**	**X**				x		**X**
1986-90	**X**	**X**	**X**	**X**				x		**X**
1991-95	**X**	**X**						x		x
1996-2000	**X**	**X**	**X**	x				x		

X = sizeable releases of fish during period; x = lesser releases of fish during period.

Idaho Power Company provides funding for the operation of Oxbow, Rapid River, Pahsimeroi, and Niagara Springs hatcheries. Rapid River and Pahsimeroi fish hatcheries are located within the Salmon Subbasin. Rapid River Fish Hatchery is located on Rapid River, tributary to the Little Salmon River, tributary to the Salmon River, near Riggins. Pahsimeroi Hatchery is located on the Pahsimeroi River approximately one mile upstream of its confluence with the Salmon River, near the town of Ellis. Chinook salmon trapped at the Oxbow (Snake River, Hells Canyon) facility are transferred to Rapid River Fish Hatchery for holding, spawning, incubation, and juvenile rearing. Niagara Springs Fish Hatchery provides only steelhead incubation and juvenile rearing; a portion of fish reared here is released into the Salmon Subbasin.

The purpose of the IPC facilities is to mitigate for anadromous production habitat lost as a result of construction of the Hell's Canyon complex dams on the Snake River. The annual mitigation objective for the IPC hatcheries is to release 400,000 pounds of steelhead smolts (at approximately 4.5 fish per pound) and 4 million chinook salmon smolts. No adult return objectives are specified in the IPC mitigation agreement.

The LSRCP program in Idaho attempts to provide in-kind mitigation for spring/summer chinook salmon and steelhead losses associated with the construction of the four lower Snake River hydroelectric projects. LSRCP hatcheries in the subbasin include Sawtooth Fish Hatchery and its East Fork Salmon River satellite, and McCall Fish

Hatchery and its South Fork Salmon River satellite. Sawtooth Fish Hatchery, located on the upper Salmon River near the town of Stanley, Idaho, became operational in 1985. Adult trapping, spawning and juvenile rearing occur at Sawtooth Fish Hatchery. The East Fork Salmon River satellite serves only adult trapping and spawning functions for chinook salmon; all rearing is performed at Sawtooth Fish Hatchery. McCall Fish Hatchery, completed in 1980, is located in McCall, Idaho, in the Payette River basin. The hatchery produces summer chinook salmon for release into the upper South Fork Salmon River. This is the only summer chinook salmon program operated within the LSRCP. Magic Valley Fish Hatchery (IDFG operated) and Hagerman National Fish Hatchery (USFWS operated), part of the LSRCP program but not located in the subbasin, only provide steelhead egg incubation and juvenile rearing. Juvenile steelhead produced at Magic Valley and Hagerman National fish hatcheries are released into the Salmon Subbasin. The original adult return goals, for LSRCP hatcheries in the Salmon Subbasin, are 8,000 summer chinook salmon, 20,000 spring chinook salmon, and 25,000 steelhead (numbers rounded to the nearest thousand). Adult return goals are specified as fish returning to the LSRCP project area, above Lower Granite Dam.

An extensive monitoring and evaluation program is conducted in the basin to document hatchery practices and evaluate the success of the hatchery programs at meeting LSRCP mitigation objectives, Tribal and IDFG management objectives, and to monitor and evaluate the success of supplementation programs. Tribal LSRCP hatchery evaluations have emphasized determining natural:hatchery ratios of adult salmon in spawning areas, and genetic stock structure and genetic uniqueness or similarity between spawning aggregates. The IDFG-LSRCP hatchery monitoring and evaluation program identifies hatchery rearing and release strategies that will allow the LSRCP program to meet its mitigation requirements and improve the survival of hatchery fish while avoiding negative impacts to natural (including listed) populations. In some cases, particularly in light of ESA requirements and Idaho Supplementation Study (ISS) plans, hatcheries may be used to enhance naturally reproducing populations.

To properly evaluate the LSRCP program, adult returns to facilities, spawning areas, and fisheries that result from hatchery releases are documented. IDFG's LSRCP program requires the cooperative efforts its Hatchery Evaluation Study, Harvest Monitoring Project, and Coded Wire Tag Laboratory. The Hatchery Evaluation Study evaluates and provides oversight of certain hatchery operational practices (brood stock selection, size and number of fish reared, disease history, and time of release). Hatchery practices are assessed in relation to their effects on adult returns, and recommendations for improvement of hatchery operations are made. The Hatchery Evaluation Study and IDFG's BPA-funded supplementation research projects are continuously coordinated because these programs overlap in several areas including: juvenile outplanting, brood stock collection, and spawning (mating) strategies. LSRCP hatchery production plays a substantial role in IDFG's supplementation research.

The Harvest Monitoring Project provides comprehensive harvest information which is key to evaluating the success of the LSRCP in meeting adult return goals. Numbers of hatchery and wild/natural in the fishery and in overall returns to the project area in Idaho are estimated. Data on the timing and distribution of the marked hatchery and wild stocks in the fishery are also collected and analyzed to develop LSRCP harvest management plans. Harvest data provided by the Harvest Monitoring Project are coupled with hatchery return data to provide an estimate of returns from LSRCP releases. Coded-wire tags are used extensively to evaluate fisheries contribution of representative groups of LSRCP production releases. However, most of these fish serve experimental purposes as well, for evaluating hatchery-controlled variables such as size, time, and location of release, rearing densities, and natural rearing.

Supplementation Programs. The geographic pattern of hatchery fish releases made during the last 20 years to supplement the Salmon Subbasin's anadromous salmonid populations were given earlier, in Table 2-14. As was the case for mitigation programs, there have been minimal to no supplementation releases of hatchery fish into the many subwatersheds of the Upper Middle Fork, Lower Middle Fork, and Middle Salmon-Chamberlain watersheds. Numbers of hatchery fish released into the subbasin since 1980 to supplement salmon and steelhead populations are summarized by species, lifestage, and 5-year interval in Appendix J.

Two tiers of supplementation programs are carried out in the subbasin. Tier 1 supplementation consists of intensive research projects approved within the NPPC Fish and Wildlife Program and funded by BPA. Separate projects for steelhead (Steelhead Supplementation Studies in Idaho Rivers) and chinook salmon (Idaho Supplementation Studies) supplementation are currently active in the subbasin.

Brood stock and juvenile production for the Tier 1-supplementation programs are managed and maintained separate from other hatchery programs. Supplementation brood stock typically consists of natural origin adult recruits and adult returns from prior supplementation brood stocks. Adults from the reserve (or harvest mitigation) production programs may be incorporated into some supplementation brood stocks. The progeny of a supplementation brood stock are marked differently (pelvic fin clip or CWT-no fin clip) than reserve production fish. McCall, Sawtooth, and Pahsimeroi fish hatcheries have been involved in chinook salmon supplementation evaluations since the early 1990s. If a hatchery is at juvenile rearing capacity, the rearing of Tier 1 supplementation fish may displace some reserve production.

Tier 2 supplementation actions are those not associated with the on-going intensive evaluations. Returns of reserve production adults in some years may exceed a hatchery's need with respect to an egg-take goal. This has occurred at Rapid River and McCall hatcheries, but not at Sawtooth or Pahsimeroi hatcheries, in the recent past. Excess adults or their progeny (eggs, fry, parr) have primarily been used in on-site and off-site tribal supplementation programs. Tier 2 supplementation actions are coordinated and agreed to among state and tribal co-managers. Hatcheries may be involved in rearing eggs or juveniles for Tier 2 supplementation. Attempts are being made to identify unique marks for fish released as juveniles so they may be adequately monitored and managed when returning as adults. Rearing space priority at hatcheries, if at production capacity, is 1) reserve production, 2) Tier 1 supplementation production, and 3) Tier 2 supplementation production.

Conservation Programs. Two artificial production programs addressing anadromous fish population conservation are currently occurring in the subbasin, the Stanley Basin Sockeye Salmon Captive Brood Stock program and the Chinook Salmon Captive Rearing program. These programs are different from typical artificial production programs in that fish culture, not propagation, is the primary activity used to achieve program objectives. Hence production, as used in classical hatchery terminology, is not an objective of the programs. These programs represent the application of two different captive culture strategies, brood stock and rearing, to achieve conservation and rebuilding objectives. These captive culture efforts are consistent with Section 9.6.4 (Artificial Propagation Measures) direction in the 2000 FCRPS Biological Opinion and with sections III.C (biological objectives) and III.D (strategies) of the Northwest Power Planning Council's 2000 Columbia River Basin Fish and Wildlife Program.

Captive culture programs for salmonid conservation, especially captive rearing strategies, are experimental at this time. Substantial scientific uncertainty exists centering around the adult salmon spawner abundance required for species conservation and long-term population persistence, and the ability to prevent localized extinction in the short term. Other uncertainties include the potential effect of inbreeding depression at low population sizes, and the ability to maintain necessary yearly effective population size to buffer against demographic risks. These uncertainties exist for natural populations with no hatchery intervention, as well as populations with hatchery intervention (supplementation or captive rearing or brood stock). The two captive culture programs described below were initiated to provide immediate short-term population conservation (sockeye) or evaluate new conservation approaches (chinook). A part of each of these programs is assessment and resolution of the uncertainties stated above.

- *Sockeye Salmon.* In 1991, the Idaho Department of Fish and Game initiated a Captive Brood Stock Program to maintain Snake River sockeye salmon and prevent species extinction. Ultimately, our goal is to reestablish sockeye salmon runs to Stanley Basin waters and to provide for sport and treaty harvest opportunity. Without the boost provided by this program, it is virtually certain that Redfish Lake sockeye salmon would be extinct.

  Since the inception of the program, returning anadromous adult sockeye salmon, Redfish Lake wild outmigrants, and several residual sockeye salmon adults have been captured and used to establish captive brood stocks at the IDFG Eagle Fish Hatchery and at NMFS facilities in Washington State. Adaptively managed, the program generates hatchery-produced eggs, juveniles, and adults for release into Stanley Basin waters. In addition, emphasis is placed on the continued development of genetically diverse "safety net" brood stocks. Captive brood stock techniques used in this program reflect the Regions best protocols for maintaining maximum genetic diversity, survival, and production success. Fish culture variables including brood stock lineage, survival to maturation, fecundity, egg survival to eye, and fish health are continuously monitored and evaluated to insure maximum program success. Juvenile outmigrant monitoring (using PIT tag technology) and adult sonic telemetry studies provide information critical for the evaluation of program supplementation strategies. Program methods and results undergo constant review through the Stanley Basin Sockeye

Technical Oversight Committee process.

Although not without risk, captive brood stock technology is sufficiently advanced to provide the measures necessary to amplify depressed populations and reduce extinction risk (Flagg and Mahnken 1995). For Redfish lake sockeye salmon, captive techniques may represent the only means of rebuilding population strength and genetic variability quickly enough to avoid the consequences of genetic bottlenecks, drift, inbreeding, and possible population extinction. While conservation of Snake River sockeye salmon remains the primary objective of this program, the program is adaptively evolving to address population-rebuilding objectives.

- *Chinook Salmon.* The IDFG initiated a captive rearing research program for populations at high risk of extinction to maintain metapopulation structure. Captive rearing is a short-term approach to species preservation. The main goal of the captive rearing approach is to avoid demographic and environmental risks of cohort extinction; maintaining the genetic identity of the breeding unit is an important but secondary objective. The strategy of captive rearing is to prevent cohort collapse in the specified target populations by providing captive-reared adult spawners to the natural environment, which in turn, maintain the continuum of generation to generation smolt production. Each generation of smolts, then, provides the opportunity for population maintenance or increase should environmental conditions prove favorable for that cohort. A captive rearing approach is most appropriate when the primary limiting factors depressing a population operate during the smolt to adult return life-cycle stage (outside of the subbasin). In this case, captive-rearing intervention for a portion of a cohort preempts exposure to external limiting factors. Freshwater spawning and production for the cohort is maintained while limiting factors external to the subbasin are addressed.

The captive rearing program was developed primarily as a way to maximize the number of breeding units that can be cultured while minimizing intervention impacts through the collection and subsequent rearing of early life stages through adulthood. Only enough juveniles or eggs are collected from target populations to provide an adequate number of spawners, about 20, to ensure that acceptable genetic diversity could be maintained without additional natural escapement. (According to the Stanley Basin Sockeye Technical Oversight Committee, it is reasonable to assume that 20 fish could encompass 95% of the genetic diversity of the population.) However, this number remains somewhat speculative because of uncertainties associated with the ability of the captive rearing approach to produce adults with the desired characteristics for release into the wild (Fleming and Gross 1992, 1993; Joyce et al. 1993; Flagg and Mahnken 1995). Juveniles and/or eggs would be collected each year from cohorts of low resiliency populations, those expected to return 10 or fewer spawning pair to their respective spawning areas. In order to meet program objectives, we must be able to produce an adequate number of adults with the proper morphological, physiological, and behavioral attributes to successfully spawn and produce viable offspring in their native habitats.

Little scientific information regarding captive culture techniques for Pacific salmonids was available at the inception of this program. Flagg and Mahnken (1995) reviewed the status of captive brood stock technology. Following Flagg and Mahnken's (1995) work the IDFG captive rearing program was initiated to develop the technology for captive culture of chinook salmon and to monitor and evaluate captive-reared fish during both the rearing and post-release/spawning phases. In addition to technology development, the IDFG program also addresses population dynamics and population persistence concerns. These population level concerns are: 1) maintaining a minimum number of spawners in high-risk populations, and 2) maintaining metapopulation structure by preventing local extinction.

The Idaho chinook salmon captive rearing program was initiated in 1995 with the collection of brood year 1994 chinook salmon parr from the Lemhi River, East Fork Salmon River, and West Fork Yankee Fork Salmon River. Since then, naturally spawned chinook salmon progeny from brood years 1995-2000 have been brought into captivity to continue the project. Hassemer et al. (1999; 2001) summarized the project's activities from inception through 1999.

4.5.2. Non-anadromous Species

Existing databases and a variety of old stocking records available from IDFG provide an extensive but not entirely complete set of information on historic releases (stocking) of hatchery fish into the major watersheds of the Salmon Subbasin. This information has been summarized briefly in Table 25, and should be considered reasonably accurate but in need of further verification . Older stocking information incorporated into the summary table, particularly for years prior to 1968, requires additional scrutiny by knowledgeable biologists.

Beginning in the 1910s, non-native rainbow trout, cutthroat trout, and brook trout were stocked into each of the 10 major watersheds of the Salmon Subbasin. In many cases, early stocking records are unclear as to the exact origins and points of release for some of the cutthroat and rainbow trout released into the system. Many releases of all three species have been small in scale or restricted to headwater lakes, but in some situations the releases have been relatively large, widespread, or both within certain major watersheds. All of these releases were made during efforts to provide increased fishing opportunities for anglers.

In the late 1990s, sterile rainbow trout of hatchery origin were evaluated for their potential ability to provide sport fisheries in waters where introgression with native salmonids was a concern. Beginning in 2001, all rainbow trout stocked by IDFG will be sterile (IDFG 2001).

Table 25. Non-anadromous fish species stocked in the Salmon Subbasin, by major watershed, 1913-1967 (o) and 1968-1999 (x). Information contained in this summary is considered the best available as of May 2001, but may be incomplete and requires further verification.

Species Code	Species/stock	Range of Years Stocked	Releases into major watersheds											Comments
			UPS	PAH	MSP	LEM	MFU	MFL	MSC	SFS	LOS	LSA	UNK	
GR	Arctic Grayling	1921-1999	o		x					x				
AS	Atlantic Salmon	1925-1928	o											
BBS, BS	Blueback Salmon	1939-1952	o	o			o			o		o		
BG	Bluegill	1994 (only)				x								Haden Cr. Pond
BK	Brook Trout	1913-1998	o	o	o	o	o	o	o	o	o	o		
BN	Brown Trout	1936-1937											o	Wilson Pond
BU	Bull Trout	1992-1993	x									x		
FC	Chinook (fall race)	1984-1986											x	lakes only
CO	Coho Salmon	1981 (only)	x											
RR	Colorado River Rainbow	1995-1999	x		x									
CT	Cutthroat	1913-1981	o	o	o	o	o	o	o	o	o	o		
C7	Cutthroat (Bear River)	1933-1949	o			o	o		o		o	o		
C4	Cutthroat (Finespotted)	1982-1983										x		
C3	Cutthroat (Henry's Lake)	1982-1999	x		x	x	x	x	x	x		x		
C1	Cutthroat (unspecified)	1942-1952	o	o	o	o	o	o	o	o	o	o		
C2	Cutthroat (westslope)	1982-1999	x		x	x	x	x	x	x	x	x		
GN	Golden Trout	1939-1999	o				x		x	o		o		
KS	Kamloops X Steelhead	1992 (only)										x		
KE	Kokanee (early spawners)	1988-1993	x							x		x		
KL	Kokanee (late spawners)	1990-1991										x		
KO	Kokanee (October spawners)	1922-1995	o									x		
KU	Kokanee (unspecified)	1921-1967	o							o				
LT	Lake Trout	1975-1983								x				
LB	Largemouth Bass	1994 (only)				x								Hayden Cr. Pond
RA	Rainbow (Arlee)	1991-1999	x		x	x		x						
K3	Rainbow (Blk. Canyon Kamloops)	1993-1994			x				x		x			
RC	Rainbow (Cutthroat hybrid)	1968-1998	x		x	x	x		x	x		x	x	
K1	Rainbow (domestic Kamloops)	1984-1999	x		x		x		x			x		
R7	Rainbow (Eagle Lake)	1986-1993			x		x			x		x		
R9	Rainbow (Hayspur)	1986-1999	x		x	x	x	x	x	x	x	x		
KM	Rainbow (Kamloops)	1942-1991	o		x									
R6	Rainbow (McConnaughey)	1987-1988	x		x		x							
R4	Rainbow (Mt. Lassen)	1984-1998	x		x	x	x	x	x	x	x	x		
R5	Rainbow (Mt. Shasta)	1985-1993	x		x	x		x		x		x		
R2	Rainbow (Mt. Whitney)	1982-1984	x			x	x				x	x		
RB	Rainbow (Redband trout)	1945 only	o	o		o			o	o	o	o		
R1	Rainbow (unspecified)	1914-1998	o	o	o	o	o	o	o	o	o	o		
K2	Rainbow (wild Kamloops)	1993 (only)										x		
SP	Splake	1996 (only)										x		
SN	Sunapee	1925-1931	o											
WF	Whitefish	1922-1958				o								

4.6. Existing and Past Conservation Efforts

The following section describes existing and past efforts undertaken by federal, state, tribal, local and private entities in addressing the needs of fish and wildlife resources in the Salmon Subbasin. The challenge for resource managers is to find an appropriate analytical and institutional framework for assuring that past, ongoing, and future efforts are integrated into an effective conservation strategy. Such a strategy would restore the Salmon

Subbasin's valuable anadromous fish runs and conserve the other natural resources that make the subbasin unique within the ICRB.

4.6.1. BPA-funded Actions and Programs (listed by lead entity; excludes focused research and monitoring projects)

Directly or indirectly, BPA-funding has supported a hundred or more projects directed toward conserving or restoring fish and wildlife in the Salmon Subbasin. These efforts have varied from habitat restoration to the establishment of conservation easements along critical salmon streams, water right acquisitions, diversion screening and other fish passage improvements, hatchery-based fish conservation and supplementation efforts, emergency preservation of genetic material from near-extinct anadromous salmonid populations, enforcement of conservation laws, and other activities. Much of the recent restoration work that has been done on private lands in the Upper Salmon, Pahsimeroi, Middle Salmon-Panther and Lemhi watersheds has been stimulated by the efforts of what is now called the Upper Salmon SubbasinWatershed Project (USBWP). BPA helped the USBWP become established and continues to provide critical funding and other support to this effort. No similar model watershed-type group exists to help stimulate effort on private lands in the other two major watersheds in the subbasin that have substantial lowland areas that are privately owned, the Lower Samon and the Little Salmon.

Descriptions of many of the projects BPA has funded to conserve or restore fish and wildlife in the Salmon Subbasin are provided below. Additional conservation-related projects the agency funded are summarized in Appendix K. BPA funded projects that focus entirely on research, monitoring, and evaluation of the subbasin's fish, wildlife, and habitats, is summarized in Section 5.3.1 of this report.

National Marine Fisheries Service

Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research (Project No. 9204000). The National Marine Fisheries Service (NMFS) is maintaining captive broodstocks of ESA-listed endangered Redfish Lake sockeye salmon (*Oncorhynchus nerka*) to protect and enhance the population. The NMFS project complements Idaho Department of Fish and Game (IDFG) Project 199107200 to reduce the risk of catastrophic loss of this valuable gene pool. NMFS rears fish full term to adult in fresh well water, or from smolt to adult in a pumped, filtered, and UV-sterilized seawater system. Spawning protocols are designed to maximize genetic diversity. Pre-spawning adults, eyed eggs, and juveniles are returned to Idaho to aid recovery efforts. *Results:* Fish have been maintained since 1991 and rearing strategies researched and employed to maximize survival. Egg to adult survival of fish in captive broodstock culture currently averages over 50%. NMFS has returned a total of 742,000 eyed eggs, 181 pre-spawning adults, and over 90,000 smolts to Idaho for recovery efforts. Fall 2000 marked a milestone in the use of captive broodstock technology to help restore the region's ESA-listed salmon stocks. A total of 257 adult sockeye salmon from releases of juveniles from the captive broodstock program returned to Redfish Lake—16 times the number that had been seen in the entire decade of the 1990s. It is a virtual certainty that without the boost provided by these captive broodstocks, Redfish Lake sockeye salmon would soon be extinct.

Nez Perce Tribe

- *Preserve Salmonid Gametes (Project No. 9703800)*. Since 1997, this project has used cryogenic techniques to preserve gametes taken from male anadromous salmonids in order to maintain genetic diversity in populations with low levels of abundance and at high risk of localized extinction. The basic approach has been to collect samples from the fish and then to store gametes in a germplasm repository. Through 2000, semen samples from 1,867 chinook from 11 spawning aggregates, and from 536 steelhead, have been cryopreserved. The germplasm is being stored in repositories at the University of Idaho and at Washington State University, in case of catastrophic failure at either facility. It represents the largest fish germplasm repository in the United States.
- *Johnson Creek Artificial Propagation Enhancement (JCAPE) Project (BPA No. 9604300)*. Initiated in 1996, the JCAPE project is small-scale summer chinook salmon supplementation initiative, located on Johnson Creek, a tributary in the S.F. Salmon River. This project is designed to increase the survival of a weak but recoverable spawning aggregate of summer chinook salmon. The project collects local broodstock for spawning, with rearing at the McCall Fish Hatchery, and acclimated smolt releases back into Johnson Creek. Additional rearing facilities are being developed at the McCall Fish Hatchery, as well as acclimation and adult trapping/holding facilities on Johnson Creek. Broodstock were first collected in 1998 and again in 2000. In 1998, 54 adults (34 females) were retained for broodstock, which produced a total of 78,950 smolts that were released back into Johnson Creek in March 2000. In 2000, 73 adults (16 females) were retained for broodstock, which produced 55,000 fry to be released in 2002. Adult trapping will continue in 2001 and beyond. A comprehensive monitoring and evaluation (M&E) program is also part of the project (Described in Section 5.3 of this report).

Shoshone-Bannock Tribes

- *Bear Valley, Yankee Fork, & East Fork Habitat Work (Project No. 8335900)*. The project was initiated by the Shoshone-Bannock Tribes to improve chinook salmon and steelhead runs in traditional Tribal fishing areas. The overall goal of the project was to increase adult escapement back to the Salmon River by improving egg-to-parr survival of chinook salmon and steelhead, primarily through habitat improvements. The project sponsored major habitat enhancements in three systems: 1) Bear Valley Creek (MFU); 2) Yankee Fork Salmon River (UPS); and 3) East Fork Salmon River (UPS). The Bear Valley Creek habitat enhancement project (construction phase 1985 to 1989) has resulted in a substantial decrease in sediment input due to past mining activities. Reclamation of 2.5 km of floodplain eliminated a substantial source of fine sediment into the remaining 50 km of stream and the Middle Fork Salmon River. The Yankee Fork Salmon River habitat enhancement project (construction phase 1987-1988) successfully interconnected four series of remnant dredge ponds with the mainstem Yankee Fork, creating over 1.5 ha of additional rearing habitat for anadromous salmonids. The East Fork Salmon River habitat enhancement project has resulted in benefits to two major tributaries to the East Fork: Herd Creek and Big Boulder Creek. Fencing was built on Herd Creek in 1992 to discourage livestock use of streambank and riparian areas, thus improving streambank stability and reducing sediment input into the stream. In conjunction with the fencing project, willow plantings were utilized to improve stream/riparian habitat. On Big Boulder Creek in 1991, a debris jam was modified and an abandoned dam breached to provide anadromous fish access to upstream spawning and rearing habitat (an additional 3.2 km of spawning habitat and 7.7 km of rearing habitat). In 1994, vertical banks in a cutoff channel in Big Boulder Creek were sloped, and the stream was diverted away from high cut-banks and returned to a more natural meander pattern within 0.5 km of affected floodplain. Enhancement efforts have eliminated the cutoff channel of Big Boulder Creek as a major source of fine sediment to the system. Project No. 8335900 has been replaced by Project No. 9405000, Salmon River Habitat Enhancement M&E, which provides ongoing monitoring and evaluation (see Section 5.3.1.a).

- Salmon River Production Program (Project No. 9705700). Utilizes hatchery brood stock to supplement and reintroduce chinook and steelhead eggs, fry, pre-smolts, smolts and adults in the upper South Fork Salmon River, Lemhi River, East Fork Salmon River, Yankee Fork, and upper Salmon River. Presently developing a Master Plan for salmon and steelhead supplementation and hatchery program reform in the upper Salmon River. The program also assists the IDFG Captive Rearing Project for Salmon River Chinook Salmon by outplanting F2 generation progeny in addition to the IDFG outplanting of F1 generation adult salmon. Monitors fish production in order to evaluate success of restoring or enhancing natural production. Results: Since 1994, the program has side-stream incubated over 4 million steelhead eggs with an 85% hatching success in various upper Salmon River tributaries that are functionally devoid of naturally spawning populations; have in-stream incubated approximately 0.5 million summer chinook eggs in the South Fork Salmon River with a hatching success of 85%; and have initiated acclimated releases of 480,000 steelhead smolts in the Lemhi and Yankee Fork Salmon rivers.

Idaho Department of Fish and Game

- *Idaho Fish Screen Improvements (Project No. 9401500)*. Maintains fish screening operations with funds provided by the NMFS through the Mitchell Act and the BPA. The program fabricates, deploys and maintains fish screens, consolidates diversions, replaces diversions with pumps and infiltration galleries, constructs fish ladders and conducts pump and diversion surveys throughout the basin. Results: Old screens have been updated to meet current NMFS criteria (BPA funded) and new screens have been constructed (Mitchell Act). A new screens workshop facility was constructed in 1995 for statewide service. Table 26 summarizes efforts completed by the Idaho Screen Program to date.
- *Protect Bear Valley Salmon & Steelhead Spawning Habitat (Project No. 2000-005-00)*. Initiated in 2000, this project is removing livestock grazing from approximately 48,000 acres of federal land along Elk Creek in the Bear Valley watershed. Elk Creek provides critical habitat for a wild population of native spring/summer chinook salmon. During the past ten years, the reach of Elk Creek affected by this project has produced more than one-third of the Middle Fork Salmon River's entire annual spawning escapement of this species. The Middle Fork contains the only remaining wild spring chinook, unaltered by hatchery supplementation, in the entire Snake River Basin. Monitoring and evaluation of this effort is being conducted in collaboration with the Forest Service and the Shoshone-Bannock Tribe (BPA Project No. 1994-050-00, Salmon River Habitat Enhancement).

Table 26. Summary of the Idaho Fish Screen Program in the Salmon Subbasin, as of December 31, 2000 (source: IDFG).

Salmon Subbasin	
Number of known diversions	773
Estimated unknown diversions	200+
Occupied anadromous habitat	
Number of known diversions	194
Number of diversions screened to NMFS criteria	154
Number of diversions not screened to NMFS criteria	40*
Number of diversions not screened	NA
*Projected to all be replaced within 5 years	
Unoccupied anadromous habitat	
Number of known unscreened diversions	574
Unscreened with bull trout and o. mykiss present	134
Unscreened with O. mykiss present	201
Unscreened with bull trout present	71
Other Related Activities	
Number of ditch consolidations	35
Ditches eliminated by providing wells/pumps	7
Infiltration galleries	4
Headgate replacement/installations	57
Number of screens maintained	264
Number of miles of road maintained	60
Number of bridges for screen access	45
Number of culverts placed	155
Number of pumps screened	159
Number of screens eliminated	43
Number of diversion dams improved for fish passage	9
Number of safety fences installed around screens	19

- sites on anadromous fish streams

- *Captive Rearing Project for Salmon River Chinook Salmon (Project No. 9700100)*. This is an ongoing project in place to develop captive rearing techniques for chinook salmon and to evaluate the success and utility of captive rearing for maintaining stock structure and a minimum number of adult spawners in three Salmon River tributaries. Success of the program is dependent on synchronous development of effective rearing technology and the evaluation of post-release adult chinook salmon behavior and spawning success. Therefore, program activities are divided into two functional bodies: hatchery propagation and monitoring and evaluation. *Results*: Wild parr, smolts or eyed-eggs have been collected successfully from source streams since 1995. Fish have been reared from collection to sexual maturity in the hatchery environment. Mature adult chinook salmon have been released for natural spawning continuously since 1997. Successful redd development by hatchery-produced adults has been documented. Milt from unique program males is cryopreserved to facilitate the development of limited safety net broodstocks to manage genetic and demographic risks associated with low natural escapement.
- *Redfish Lake Sockeye Salmon Captive Broodstock Program (Project No. 9107200)*.

This is an ongoing project in place to protect the remnant Redfish Lake population by developing captive broodstocks to meet augmentation and future broodstock objectives.

Spawning protocols are designed to maximize the existing genetic diversity of the population. Eyed-eggs, juveniles and adults are produced annually for reintroduction to the habitat. Genetically diverse progeny are generated annually to maintain the captive component. A monitoring and evaluation element is in place to track nursery lake conditions and to evaluate the relative success of the various reintroduction strategies used in the program. *Results*: Captive broodstocks have been produced each year since the inception of the program in 1991. Eyed-eggs and fish for augmentation have been produced each year since 1993. To date, over 500 adults, 280,000 eyed-eggs, 580,000 pre-smolts, and 106,000 smolts have been released to Stanley Basin waters. Spawning protocols reflect the regions "best practices" and undergo annual review by State, Federal, and Tribal cooperators. Cryopreservation is used to "bank" milt from unique program males. The first adult sockeye salmon produced in the captive broodstock program returned to Idaho in 1999. In that year, nine age-3 adults returned to the upper Salmon River. In 2000, 257 hatchery-produced, age-4 adult sockeye salmon returned to the upper Salmon River.

- *Dworshak Wildlife Mitigation Trust (Project No. 9205700)*. The 78,679 acre Craig Mountain Wildlife Management Area (CMWMA) is located south of Lewiston, Idaho, just north and east of the confluence of the Snake and Salmon rivers. The 60,000 acre Peter T. Johnson Wildlife Mitigation Unit was purchased by Bonneville Power Administration (BPA) under terms of the 1992 Dworshak Dam Wildlife Mitigation Agreement among BPA, the State of Idaho, and the Nez Perce Tribe. Because of its size and elevation ranges the CMWMA provides a unique laboratory to study and manage wildlife and habitats on an ecosystem basis. The Craig Mountain Wildlife Management Area Plan (IDFG 1998) gives a thorough description of the history, natural resources, goals, management direction and monitoring plans for the CMWMA.

From 1992 to 1994, IDFG and other entities conducted an exhaustive and unprecedented survey of baseline wildlife and wildlife habitat conditions on the CMWMA. Surveys included rare plants, various habitat types, timber volumes, sensitive wildlife species, target wildlife species, wildlife communities, big game aerial surveys, undesirable plants (noxious weeds), amphibians and reptiles, aquatic macroinvertebrates (Rabe, 1994a, 1994b) and physical structures. All data has been or is currently being entered into the IDFG Geographic Information System (GIS). Cultural resource surveys have been conducted in areas where ground-breaking activities have taken place.

Management of the CMWMA is directed at restoring habitats impacted by past logging and grazing activities, providing biologically diverse plant and wildlife communities, and providing for opportunities for wildlife wildlife-associated recreation and solitude. Target species of wildlife specifically identified include elk, white-tailed deer, river otter, pileated woodpecker, yellow warbler, and black-capped chickadee. A-run steelhead and spring and fall chinook occur in the major streams on the CMWMA and in the Snake and Salmon mainstems. Special management direction is provided to protect and provide habitat for these species. Under the 1992 Dworshak Wildlife Mitigation Agreement (BPA 1992), IDFG is responsible for monitoring and evaluating the effect of management activities on wildlife and wildlife habitat on the Peter T. Johnson Wildlife Mitigation Unit.

Upper Salmon SubbasinWatershed Project (formerly the Lemhi Model Watershed Project)

- *Upper Salmon SubbasinWatershed Project (Project Nos. 9202603, 9306200, and 9401700)*. Initiated in 1992, the Upper Salmon Watershed Project (USBWP; originally the Idaho Model Watershed Project) has focused on improving occupied anadromous and resident fish habitat on private land in the Lemhi, East Fork Salmon, and Pahsimeroi river systems. Restoration projects have been directed toward private land because over 95% of the occupied anadromous habitat exists on private ground. Efforts have included bank stabilization through fencing, riparian plantings, stream reconnects to provide access to historical habitat, elimination of fish passage barriers and other actions. The USBWP facilitates dialogue and assists in coordination activities between Federal, State, and Tribal entities and private landowners. The USBWP has assisted in completing 72 important habitat restoration or fish passage projects since 1993, all of them on private land (Appendix K).

Lemhi and Custer Soil and Water Conservation Districts

Both of these Soil and Water Conservation Districts have provided guidance and administration for implementation of various habitat restoration projects, including USBWP conservation projects funded by BPA (Nos. 9306200, 9410700, 9401701, 9401702, and 9600700). Most of the projects the Districts participated in were in conjunction with the USBWP and are included in the USBWP project summary (Appendix K).

- *Springs Creek In-stream Flow Restoration (Project No. 9401701)*. Benefits of this project included an water savings of 6 cfs that would remain in the river, improved fish passage structure and of stream stock water system to improve habitat.
- *Fish Habitat Improvement Project (Project No. 9607600)*. Goals of this project, implemented in FY 96 and FY97, included the enhancement of 2-3 miles of high priority stream segments identified in the Model Watershed Plan. *BPA Project No. 9401702* was a continuation of the previous habitat project. Biological benefits of the effort included increased stream flows (specifically 11 cfs on one project), increased riparian vegetation, protection of critical spawning and rearing habitat, and reduced sedimentation in the East Fork and Pahsimeroi drainages.
- *Upper Salmon River Diversion Consolidation Project (Project No. 9600700)*. Implemented between 1997 and 2001, this project increased instream flows by up to 20 cfs, and improved fish passage by converting five stream diversions and one unscreened pump diversion into two larger diversions. Five "push up" gravel diversions were removed from the river. Two new fish screens meeting NMFS criteria were installed, replacing four outdated screens.

4.6.2. Non-BPA-Funded Activities and Programs

Time constraints prevented a complete accounting of recent fish and wildlife conservation efforts within the Salmon Subbasin not funded by BPA. However, information that has been compiled to date makes clear that these efforts have been substantial, particularly on federal lands. Nearly 250 habitat conservation programs or projects, including efforts in all 10 of the subbasin's major watersheds, were summarized for this report. Some of these programs and projects are described in the section that follows. Many additional habitat conservation or restoration projects not funded by BPA are summarized in Appendix K.

Considerable non-BPA funded research and environmental monitoring related to the Salmon Subbasin's fish, wildlife and natural habitats is ongoing or has recently been completed. This work is discussed in Section 5.3.2 of the report.

Federal Land Managers (USDA Forest Service and USDI Bureau of Land Management)

The USFS and BLM are managing lands within the component watersheds of the Salmon Subbasin to reduce sedimentation and allow for recovery of riparian vegetation. In addition to modified timber harvest, road construction, and grazing management practices, these agencies have fenced water gaps and riparian areas, installed culverts, improved and obliterated roads to reduce sediment inputs, implemented improvement structures, and imposed road closures. Habitat improvement projects these two agencies have completed within the subbasin since the early 1990s are identified in Appendix K.

The Forest Service has also conducted large-scale restoration programs in specific focal areas of the subbasin. These efforts have included, but not been limited to:

- *Yankee Fork Dredge Tailings Restoration Project*. The Yankee Fork was once a major salmonid-producing stream in the Upper Salmon watershed. It provided spawning and rearing habitat for chinook salmon, steelhead trout, bull trout, and westslope cutthroat. Approximately six miles of theYankee Fork stream channel within private and public lands were severely altered by dredge-mining in the 1930s to 1950s, eliminating the natural channel pattern, stream access to the flood plain, fish habitat, and riparian vegetation. The altered stream corridor now containsof unconsolidated and unvegetated dredge tailings, degraded and aquatic habitat that is fragmented and simplified. As the Yankee Fork has downcut, it has triggered headcutting and instability problems along many tributary streams.

The objectives of the Yankee Fork Dredge Tailings Restoration Project are to: 1) restore natural hydraulic and sediment regimes; 2) restore floodplain and riparian function; 3) reconnect West Fork Yankee Fork and mainstem Yankee Fork salmon and steelhead spawning and rearing habitat; and 4) develop a monitoring program that allows evaluation of the effectiveness of the restoration techniques applied to this system. The project will provide long-term benefits to water quality, fish, and wildlife. It is being designed and implemented through a technical-expert group consisting of the Shoshone-Bannock Tribe, the US Forest Service Yankee Fork Ranger District and Rocky Mountain Research Station, Idaho Department of Fish and Game, US Geological Survey and the University of Idaho Ecohydraulics Branch. Additional cooperators include the Idaho Soil Conservation Commission, the J.R. Simplot Company, county agencies, and community leaders.

- *South Fork Salmon Restoration Program*. In response to mass wasting events that have caused severe sedimentation of key anadromous salmonid habitats in the South Fork Salmon (SFS) during the mid-1960s, the Forest Service greatly reduced timber harvest and roading activities. Since that time extensive restoration activities have been conducted within the area by the Boise and Payette national forests (Nelson et al. 1999;USFS 1992; Jenny Fischer, BNF, personal communication; BNF aquatics database; other restoration summaries).

National Marine Fisheries Service

NMFS is part of the National Oceanic and Atmospheric Administration, an agency within the U.S. Department of Commerce. NMFS administers programs which support the domestic and international conservation and management of living marine resources. NMFS provides services and products to support domestic and international fisheries management operations, fisheries development, trade and industry assistance activities, enforcement, protected species and habitat conservation operations, and the scientific and technical aspects of NOAA's marine fisheries program.

NMFS has the responsibility to implement the Endangered Species Act of 1973 (ESA) for marine and anadromous species. In 1990, NMFS initiated a status review of Snake River sockeye (Oncorhynchus nerka) to determine whether its listing was warranted under ESA. Also in 1990, NMFS received petitions to list Snake River spring, summer and fall chinook salmon (Oncorhynchus tshawytscha). Upon finding that Snake River sockeye, spring/summer chinook, and fall chinook salmon qualified as species under the ESA, and that each species had experienced such a substantial decline in abundance that it could only be found over a fraction of its former range, NMFS listed Snake River sockeye salmon as an endangered species on November 20, 1991 (56 FR 58619), and Snake River spring/summer and fall chinook salmon as threatened species on April 22, 1992 (57 FR 14653). On August 18, 1997, NMFS also listed Snake River steelhead (Oncorhynchus mykiss) as a threatened species (62 FR 43937).

To qualify for listing as a threatened or endangered species, the identified populations of salmonids must be considered "species" under the ESA. The ESA defines a "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." In 1991, NMFS published a policy describing its application of the ESA's definition of "species" to anadromous Pacific salmonid species. NMFS uses the term Evolutionarily Significant Unit (ESU) to define anadromous salmon and steelhead populations listed under the ESA. An ESU is a population that (1) is substantially reproductively isolated from conspecific populations and (2) represents an important component of the evolutionary legacy of the species. The term ESU may include portions or combinations of more commonly used definitions of stocks within or across regions (NMFS 2000).

NMFS' goal is to recover listed species so that they no longer need the protection of the ESA. That is accomplished through a variety of tools, including consultation and recovery planning.

Under Section 7 of the ESA, all Federal agencies must consult with either NMFS or FWS (depending on the species) when any activity permitted, funded or conducted by that agency may affect a listed species or designated critical habitat. All Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

The recent FCRPS Biological Opinion and the Basinwide Salmon Recovery Strategy contain actions and strategies for habitat restoration and protection for salmonids in the Columbia River Basin. Action agencies are identified that will lead fast-start efforts in specific aspects of restoration on non-Federal lands. Federal land management will be implemented by current programs that protect important aquatic habitats (PACFISH, ICEBEMP). Actions within the FCRPS Biological Opinion are intended to be consistent with or complement the NWPPC's amended Fish and Wildlife Program and state and local watershed planning efforts.

- *Section 7 Consultations*. Under Section 7 of the ESA, all Federal agencies must consult with either NMFS or FWS (depending on the species) when any activity permitted, funded or conducted by that agency may affect a listed species or designated critical habitat. All Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

NMFS has consulted on a myriad of activities in the Salmon Subbasin. Those activities include timber harvest, prescribed burns, grazing, mining, road stabilization and maintenance, stream bank stabilization, recreational activities, hatchery operations, and habitat restoration efforts, among others. In addition, within the subbasin, NMFS has consulted or is consulting on broader, or programmatic, issues such as a National Forest's Land Resource Management Plan, or the Environmental Protection Agency's establishment of water quality standards.

The vast majority of these consultations are conducted informally. Only a handful of formal consultations, which result in the issuance of biological opinions are conducted. That is due to the Section 7 consultation streamlining procedures that were put in place in 1995 by NMFS, FWS, the Forest Service and the Bureau of Land Management.

Under these procedures, NMFS and FWS become involved in the action agencies' projects early in the planning process so that those projects can be designed in a way that is not likely to adversely affect listed species. In addition, the regulatory and action agencies can assume that most proposed actions will not jeopardize listed species if these actions are consistent with the guidance that has undergone Section 7 consultation such as the Northwest Forest Plan, Land and Resource Management Plans, Resource Management Plans, Inland Native Fish Strategy (INFISH), Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH), or the other applicable management strategies.

- *Hydro Program*. The NMFS Hydro Program, based in Portland, Oregon, is responsible for salmon passage and survival issues associated with the major mainstem hydroelectric projects of the Columbia River system, including review of related activities under the ESA. Specific areas of emphasis include the 14 dams and reservoirs of the Federal Columbia River Power System and the Hells Canyon Complex on the Snake River.

Staff in the Hydro Program provide engineering support for fish passage facilities at all dams and water diversions throughout the Pacific Northwest. They provide technical advice and guidance to the Army Corps of Engineers' management and project personnel on measures to reduce take of listed and unlisted salmon, and conduct on-site inspections of fish passage structures and monitoring facilities. Review and approval of fish passage designs related to water use activities including non-Federal hydropower and municipal, industrial and agricultural diversions in critical habitat is also provided.

In Idaho, program responsibilities include Hells Canyon and other Idaho Power Company projects on the middle and upper Snake River, operation of US Bureau of Reclamation irrigation projects in the Upper Snake River, and design support and review for irrigation screens, assessing the water quantity and quality effects of water withdrawals.

Finally, the program has issued juvenile fish screen criteria and pump intake screen criteria. The criteria can be found on NMFS Northwest Region website at www.nwr.noaa.gov.

- *Sustainable Fisheries Program*. The ESA emphasizes the restoration of listed fish in their natural habitats. However, Section 3(3) of the ESA recognizes the potential for artificial propagation to help achieve rebuilding objectives. Hatcheries have been used for many decades to offset loss of salmon at the dams. To ensure the conservation and recovery of listed ESUs, NMFS requires a Hatchery and Genetic Management Plan (HGMPs) as a mechanism for addressing the take of listed species that may occur as a result of artificial propagation. In addition, hatcheries that are Federally operated or receive Federal funding must undergo Section 7 consultation with NMFS and/or FWS.

There are several hatcheries operating in the Salmon Subbasin to offset take at the dams. Specifically, the McCall and Sawtooth hatcheries are operated by the U.S. Fish and Wildlife Service for the Lower Snake Compensation Plan. Rapid River, Pahsimeroi, and Oxbow hatcheries operate for Idaho Power mitigation. Magic Valley State Fish Hatchery also produces fish.

- *Habitat Restoration Program*. NMFS has an active marine, estuarine and anadromous fresh water habitat restoration program. The NOAA Community-Based Restoration Program began in 1996 to inspire local efforts to conduct meaningful, on-the-ground restoration of marine, estuarine and riparian habitat. The Program is a systematic effort to catalyze partnerships at the national and local level to contribute funding, technical assistance, land, volunteer support or other in-kind services to help citizens carry out sound restoration projects that promote stewardship and a conservation ethic for living marine resources. The program links seed money and technical expertise to citizen-driven restoration projects, and emphasizes collaborative strategies built around improving NOAA trust resources and the quality of the communities they sustain. Community-based habitat restoration helps repair habitats required by marine and anadromous fish, endangered species and marine mammals. $3 million is available for funding habitat restoration projects for fiscal year 2001.

- *Research Program*. NMFS Northwest Fisheries Science Center is one of five NMFS research centers and is responsible for providing scientific and technical support for the management, conservation, and development of the Pacific Northwest region's anadromous and marine fishery resources. It is organized into several divisions, including Conservation Biology Division, Environmental Conservation Division, Resource Enhancement and Utilization Technologies Division, Fish Ecology Division, and the Fishery Resource Analysis and Monitoring Division.

The Conservation Biology Division uses appropriate genetic and quantitative methods to characterize components of biodiversity in living marine resources and identifies factors that pose risks to these components. The Environmental conservation Division investigates the impacts of human-caused and natural perturbations on fishery resources, protected species, and the quality of marine habitat. The Resource Enhancement and Utilization Technologies Division resolves existing and developing challenges associated with captive rearing, disease control, hatchery technology, smolt quality, and utilization. The primary focus of the research is to improve technology to better serve NOAA Fisheries' priority on fish enhancement/culture and full utilization of resources.

Additional information on specific research projects being conducted by the Northwest Science Center, can be found on its website at: http://research.nwfsc.noaa.gov.

USDI Fish and Wildlife Service (USFWS)

The Snake River Basin Office of the Fish and Wildlife Service represents the Ecological Services branch of the agency in the Salmon basin. Much of this work is under the authority of the Endangered Species Act. Under Section 4 of the Endangered Species Act, there are activities associated with identifying candidates for listing as threatened and endangered, making listing decisions, and developing and implementing recovery plans. Relevant to the Salmon River Basin, the Service is developing recovery plans for bull trout and lynx and implementing recovery actions for wolf.

For species listed threatened or endangered, the Service consults with Federal action agencies and sometimes others to evaluate effects of their actions (Figure 36). A primary focus is Forest Service and Bureau of Land Management impacts on bull trout, lynx, and several other animals and plants listed under the Act. The Service is also involved in consultation with other agencies, such as the Federal Highway Administration and Army Corps of Engineers. The Service works with non-Federal partners under Section 10 of the Act, developing plans to reduce and avoid take of species from state and private actions.

Since the reintroduction of wolves in Central Idaho, the Service has worked in close partnership with the Nez Perce Tribe in monitoring and management of the species. This effort has required close coordination with livestock operators, recreational interests, and conservation organizations.

The Service's Partners for Fish and Wildlife program provides technical and financial assistance to private landowners to improve fish and wildlife habitat on their land. This work is closely associated with National Resource Conservation Service and State of Idaho programs.

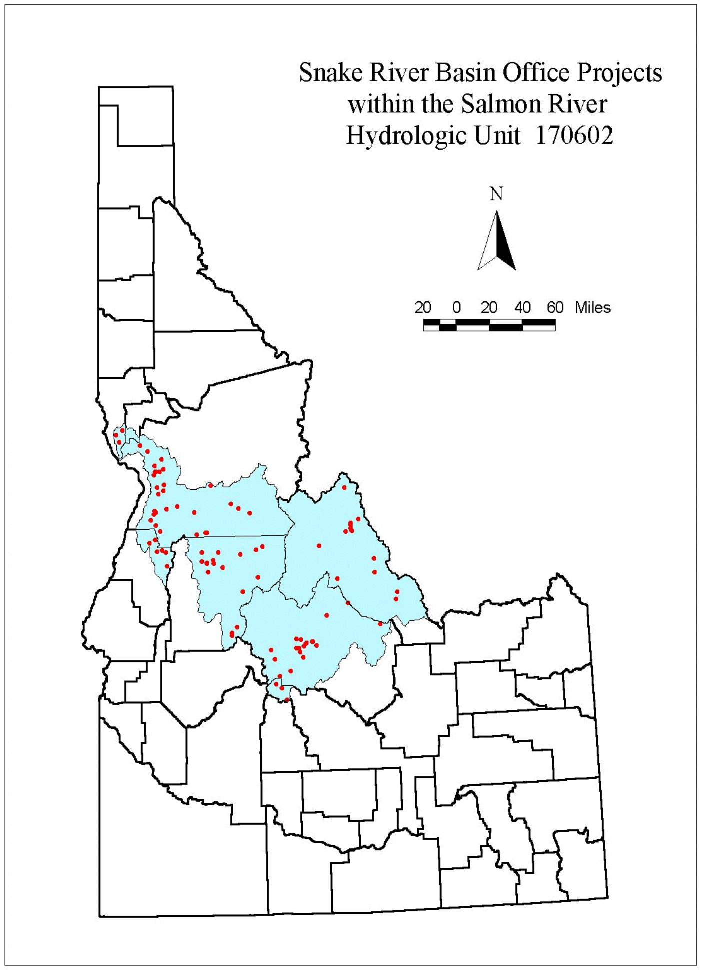


Figure 36. Location map of the U.S. Fish and Wildlife Service's recent ESA-related consultations in the Salmon Subbasin, Idaho.

The Service's Environmental Contaminants branch has been involved in work associated with mining in the Salmon River basin. In both technical assistance and treaty trust capacities; the Service works closely with other agencies in matters associated with active and historic mines.

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

USDI Bureau of Reclamation

In cooperation with the Idaho Department of Fish and Game, a Reclamation fisheries biologist has been stationed in Salmon, Idaho since May, 2000. This biologist provides technical assistance on fish barrier, passage, and other habitat issues in the Salmon

Subbasin and serves to enlist technical assistance from other Reclamation engineers and resource specialists as needed.

- *Lemhi River Basin Study*. Discussions for a Lemhi River basin study began in 1992. The Bureau of Reclamation contracted with Water District 74 to collect groundwater levels in over 80 irrigation and domestic wells on a biweekly basis from 1995 through 1998. These data were used to develop a spreadsheet model used to calculate Lemhi River streamflow depletions owing to groundwater pumping by wells from the adjacent aquifer (Spinazola, 1998). Reclamation contracted with USGS and Water District 74 to determine seasonally distributed water gains and losses between the aquifer and the Lemhi River and to estimate annual groundwater flow from the Lemhi River basin to the Salmon River (Donato, 1998). NRCS was the lead agency and is working to complete the basin report.
- *Water Conservation Programs near Salmon, Idaho*. Reclamation is providing engineering design and environmental assessment services for consolidation of the S-13 and S-14 irrigation diversions from the Salmon River to be completed in the spring of 2001. Reclamation will provide these same services for the S-11 and S-12 consolidation scheduled for completion in the fall of 2001. These diversion consolidations are a cooperative effort among Reclamation, NRCS, Idaho Department of Fish and Game, BPA, BLM, Lemhi SWCD, and the Upper Salmon SubbasinWatershed Project. Reclamation is conducting an appraisal-level study that is scheduled for completion in 2002 to evaluate the potential for a dam on Texas Creek to provide flow augmentation in the Lemhi River during critical low flow conditions. Reclamation specialists will provide technical services to examine potential to maintain irrigation diversions and provide flow continuity in reaches of the Pahsimeroi River and its tributaries.

As part of its Water Conservation Field Services Program, Reclamation provides annual cost-share grants to the Lemhi SWCD. Grant monies have been distributed to the Lemhi Irrigation District and Water District 74 to install weirs and flumes to measure irrigation diversions from the Lemhi River and its tributaries.

Reclamation also stationed a fisheries biologist in Salmon from 1996 to 1999. In this period, irrigation diversions from the S-25, S-27, S-30, and S-32 diversions were consolidated and diverted at S-32. Also, the Gini, Laverty, and Jose ditches were consolidated at the S-28 diversion. Gravel push-up dams associated with all of these diversions that formerly diverted irrigation water from the Salmon River near Challis were replaced with the new S-32 and S-28 diversion structures, and new fish screens were installed in cooperation with NRCS, IDFG, BPA, and local landowners. Four center pivots were installed as part of the S-28 diversion consolidation.

In 1991, the Northwest Power Planning Council requested Reclamation to undertake water conservation demonstration projects in selected Columbia River tributary subbasins. Reclamation, in cooperation with the Lemhi SWCD, Water District 74, Lemhi Irrigation District, FSA, NRCS, BPA, IDFG and private interests, completed projects related to diversion structures, sprinkler irrigation systems, instream enhancement, conservation easements, monitoring, and other miscellaneous projects (Table 27) in the Lemhi watershed. Most of these projects were completed between 1995 and 1998.

Table 27. Water conservation (demonstration) projects completed by the U.S. Bureau of Reclamation and other partners in the Lemhi watershed, Idaho.

Project	**Location**	**Description**
L-6 Diversion	Lemhi River	Replaced gravel push-up diversion dam with structure that included fish ladder, measuring devices, and upgraded fish screen
L-7, L-7A Diversions	Lemhi River	Replaced L-7 and eliminated L-7A gravel push-up diversion dams with one structure at L-7 that included fish ladder, measuring devices, and upgraded fish screen
L-4 Diversion	Lemhi River	Eliminated L-4 gravel push-up diversion dam. Transferred diversion supply to L-6 diversion point. Installed pressurized pivot system on L-4 irrigated lands allowing up to additional 24 cfs, or about 1,000 acre-ft in an average year, to remain in the Lemhi River
L-3A Diversion	Lemhi River	Replaced gravel push-up diversion dam with rock reefs, a new diversion headworks and fish ladder, and new fish screen
L-5 Diversion	Lemhi River	Eliminated L-5 gravel push-up dam. A conservation easement established through the Nature Conservancy allowed transfer of diversion supply from L-8A diversion point
Hannah Slough	Salmon River	Reinforced banks of Salmon River to protect anadromous fish rearing habitat
Big Flat Ditch	Carmen Creek	Installed flume on ditch under creek to reconnect rearing habitat in the creek
Channel Stabilization	Lemhi River	Installed barbs to reduce streambank erosion
L-31 canal	Agency and Pattee Creeks	Replaced drop and regulating structures to reconnect creeks to the Lemhi River
Diversion	Canyon Creek	Replaced gravel push-up diversion with structure to restore degraded creek channel.
Knight Dairy	Lemhi River tributary	Control livestock waste
Water quality monitoring	Lemhi River	Identify possible water quality degradation in Lemhi River
Surface and groundwater monitoring	Lemhi River	Quantify surface and groundwater interaction and groundwater yield to Salmon River as part of Lemhi River basin study

USDA Farm Services Administration

- *Conservation Reserve Program (CRP).* There are currently many hundreds of acres enrolled in either CRP or Continuous Conservation Reserve Program (CCRP) in the counties that include the Salmon Subbasin. Currently the database does not delineate between watersheds, so some of this acreage is outside of the subbasin.

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

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

USDA Natural Resources Conservation Service

- *Wildlife Habitats Incentive Program (WHIP).* The WHIP provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and USDA agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. USDA and program participants enter into a cost-share agreement for wildlife habitat development. This agreement generally lasts a minimum of 10 years from the date that the contract is signed.
- *Environmental Quality Incentive Program (EQIP).* The EQIP provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourages environmental enhancement. The program is funded through the Commodity Credit Corporation. The purposes of the program are achieved through the implementation of a conservation plan that includes structural, vegetative, and land management practices on eligible land. Five- to ten-year contracts are made with eligible producers. Cost-share payments may be made to implement one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more land management practices, such as nutrient management, pest management, and grazing land management.
- *Wetlands Reserve Program (WRP).* The WRP is a voluntary program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30-year duration, or can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land and 100 percent of the restoration costs for restoring the wetlands. The 30-year easement payment is 75 percent of what would be provided for a permanent easement on the same site and 75 percent of the restoration cost. The voluntary agreements are for a minimum 10-year duration and provide for 75 percent of the cost of restoring the involved wetlands. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement.

Idaho Department of Fish and Game (IDFG)

IDFG has worked on a number of non-BPA sponsored projects directed toward conserving fish and their habitat in the Salmon Subbasin. Many of these projects are identified below.

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

In counties that include portions of the Salmon Subbasin, many acres have habitat for upland birds and waterfowl have been improved through the HIP program. Nesting cover, woody cover, food plots, ponds and nest structures were the main practices implemented.

- *Critical Habitat Mapping*. The IDFG is working with the University of Idaho Landscape Lab to map critical wildlife habitat and vertebrate species richness. This information can be used interested parties to identify which habitats are most critical to protect, and where conservation of soil, water and open space resources is most critical, and where and how restoration efforts might be most effective.
- *Conservation Data Center*. The CDC maintains information on the occurrence of elements of biological diversity (plant and animal species and plant communities) and conservation sites and managed areas. The CDC has conducted inventory and monitoring projects within the subbasin related to rare and endemic plant species; the distribution and condition of old growth forest stands; the selection and establishment of ecological reference areas; vegetation and wildlife habitat mapping; and the conservation of high priority wetland and riparian sites. These studies produce recommendations for site-specific conservation action, assessments of conservation status, rankings of statewide or global rarity, and classifications and descriptions of plant communities.

University of Idaho (UI)

The UI has been directly involved several activities addressing fish, wildlife and water quality issues in the Salmon Subbasin. For example, UI student chapters of professional societies, such as the American Fisheries Society, the Wildlife Society, and Society of American Foresters, actively participate in surveys, educational outreach and watershed improvement activities within the subbasin.

Graduate students at UI, as well as other Idaho institutions of higher learning, conduct research and write theses, doctoral dissertations, and journal articles relating to fish and wildlife in the Salmon Subbasin. A partial list of some of these documents is given in Appendix L.

- *Taylor Ranch*. Taylor Ranch is managed to provide university students a field laboratory in which to observe and practice what they have learned about watershed, wildlife, and range management, to provide an area in which to demonstrate to the public the latest land management techniques, and to provide a land-base for research projects conducted by faculty and students of the college.

Idaho Department of Transportation

The Idaho Department of Transportation funded the construction of rock weirs in the Lemhi River downstream of Tendoy, ID as mitigation for channelization of the Lemhi at five bridges on Highway 28. These weirs should provide more pool habitat in the lower Lemhi River (Loucks 2000). IDT, along with IDFG and IDL, are planning on enhancing and restoring 16 acres of wetland and riparian function to areas disturbed by Highway 95 construction and gravel mining activities near Lucille in the Lower Salmon.

Idaho Soil Conservation Commission (ISCC)

The Idaho Soil Conservation Commission (ISCC) provides funding for conservation-related projects through direct grants, grants and loans through the Resource Conservation and Rangeland Development Program (RCRDP), and through financial incentives under the Water Quality Program for Agriculture (WQPA). All of this support supplements EPA 319 funds on agricultural lands. The ISCC also provides administrative support to the USBWP.

The purpose of the RCRDP is to improve those rangeland and riparian areas with the greatest public benefit. Loans and grants are given to landowners who work with the appropriate technical agency and sponsoring conservation district to install practices that enhance soil and water resources, improve riparian areas and fish and wildlife habitat, and increase agricultural productivity.

The WQPA protects and enhances the quality and value of Idaho's waters by controlling and abating water pollution from agricultural lands. The program provides financial assistance to Soil Conservation Districts who conduct water quality planning studies and to private landowners who implement water quality projects. Water quality goals are achieved by farmers and ranchers who apply appropriate Best Management Practices (BMPs) from the Idaho Agricultural Pollution Abatement Plan. Priority areas include TMDL watersheds; watersheds with threatened aquatic species under the Endangered Species Act, and ground water quality protection areas.

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

- *Lemhi Water Quality Project*. The ISCC is currently providing cost-sharing to reduce agricultural water quality pollution from seven livestock feeding areas on the Lemhi River, tributaries to the Lemhi River, and the Salmon River. The Lemhi Soil and Water

Conservation District (SWCD) sponsor the project, with technical assistance provided by the USDA-Natural Resources Conservation Service and the Soil Conservation Commission. The Lemhi SWCD has submitted a grant proposal through the Idaho Nonpoint Source Program for 319 funds to extend this effort on the Lemhi and Salmon Rivers. These funds will be supplemented by additional cost-sharing assistance from the Commission.

Idaho Department of Water Resources

The Idaho Department of Water Resources is involved in the adjudication of water rights and managing a permit system for stream channel alterations. The Department is currently attempting to improve its permitting process to "ensure the state's surface water resources are not degraded to the detriment of water quality, fish and wildlife habitat, aquatic life, recreation, and aesthetic beauty".

Idaho Association of Soil Conservation Districts (IASCD)

The Idaho Association of Soil Conservation Districts, through local Soil and Water Conservation Districts, has occasionally funded water quality monitoring at stations in the Salmon Subbasin.

Boise Cascade Corporation

Boise Cascade owns grazing land on Mud Creek in the headwaters of the Little Salmon River that was the site of a historical railway stockyard. Since 1992, the corporation has worked with IDFG and Trout Unlimited to exclude livestock from the stream and riparian corridor, plant riparian vegetation, and/or use rotational grazing practices to improve stream function and habitat (John Kwader, personal communication).

5. Present Subbasin Management

5.1. Existing Plans, Policies, and Guidelines

As is the case throughout the western United States, multiple agencies and entities are involved in the management and protection of fish and wildlife populations and their habitats in the Salmon Subbasin. Because of the migratory nature of many fish and wildlife populations, the animals do not recognize jurisdictional boundaries and their populations must therefore be managed through coordinated efforts. Management entities and their associated plans, policies, regulations, and guidelines for resource management and protection are outlined below.

5.1.1. Federal Government

As a result of the federal government's significant role in the Columbia Basin, not only through the development of the federal hydropower system but as a land manager, and its responsibilities under Section 7(a) of the Endangered Species Act (ESA), several important documents have been published in the last year that will guide federal involvement in the Salmon Subbasin and the Mountain Snake Province. These documents are relevant to and provide opportunities for states, tribes, local governments, and private parties to strengthen existing projects, pursue new or additional restoration actions, and develop the institutional infrastructure for comprehensive fish and wildlife protection. The key documents include the Federal Columbia River Power System Biological Opinion (FCRPS BiOp; discussed previously), the federal All-H paper entitled, *Conservation of Columbia Basin Salmon -- A Coordinated Federal Strategy for the Recovery of the Columbia-Snake River Basin Salmon*, and the Interior Columbia Basin Ecosystem Management Project (ICBEMP). All are briefly outlined below.

- *FCRPS BiOp.* The BiOp was issued by NMFS in December 2000, and relates to operation of the federal hydropower system on the Columbia River by the U.S. Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration. It fulfills consultation requirements with the U.S. Army Corps of Engineers (USACE), the Bureau of Reclamation (USBR), and the Bonneville Power Administration (BPA) under Section 7 of the ESA. Significantly, the BiOp concluded that off-site mitigation in tributaries is necessary to continue to operate the hydropower system. The Reasonable and Prudent Alternative to prevent jeopardy to 12 stocks of anadromous fish considered in the BiOp includes quick actions to conduct off-site habitat improvements to correct all barrier, screen, and flow deficiencies on non-federal lands in certain tributary watersheds.

- *Federal Caucus All-H Paper.* This document is a framework for Columbia Basin-wide salmon recovery and identifies strategies for harvest management, hatchery reform, habitat restoration, and hydropower system operations. Watersheds within the Salmon Subbasin identified as being of critical near-term priority for habitat improvements identified as necessary in the FCRPS BiOp include the Lemhi, Upper Salmon, and Little Salmon. Of these three watersheds, the Lemhi has been given highest immediate priority for federal financial and technical assistance.

- *ICBEMP*. This document is a framework for land management for federal lands over the interior Columbia Basin, and was produced by the primary federal land management agencies, including the Forest Service (USFS) and the Bureau of Land Management (BLM). Significantly for this subbasin summary, this document will influence how these federal agencies prioritize actions and undertake and fund restoration activities.

By understanding the priorities outlined in these documents, significant opportunities for federally-funded restoration activities can be refined and further identified for the Salmon Subbasin.

5.1.1.a. Bonneville Power Administration (BPA)

BPA, a power marketing agency of the United States Department of Energy (DOE), supplies roughly half of the electricity used in the Northwest. The marketed power comes primarily from 31 federal hydro projects (known collectively as the Federal Columbia River Power System, or FCRPS), as well as from one non-federal nuclear plant, wind facilities and other renewable resources, conservation efforts, and acquisition of power from traditional energy sources. BPA does not own or operate any of these dams. Such responsibilities belong to the U.S. Army Corps of Engineers (Corps) and the U.S. Bureau of Reclamation (Bureau). BPA does own and operate about three-quarters of the region's high-voltage electric transmission grid.

BPA's fish and wildlife responsibilities have several sources, including the following:

- The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Regional Act) extended BPA's responsibilities to include development of energy conservation resources and enhancement of the Northwest's fish and wildlife that have been affected by the construction and operation of federal hydropower plants in the Columbia River Basin. Under the Regional Act, BPA has specific duties:
    1) to protect, mitigate, and enhance fish and wildlife adversely affected by the construction and operation of the FCRPS, and
    2) to do so in a manner that provides equitable treatment for such fish and wildlife with the other purposes of the FCRPS.

- BPA also has specific duties regarding fish and wildlife under ESA:
    1) BPA must avoid jeopardizing listed species, and
    2) BPA must use its authorities to conserve listed species.

5.1.1.b. National Marine Fisheries Service (NMFS)

The ESA was designed to protect and conserve endangered and threatened species and the ecosystem upon which they depend. As such, it requires Federal agencies to protect and conserve threatened and endangered species. The goal of NMFS with respect to the Salmon Subbasin is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye and steelhead resources. This requires the development of watershed-wide properly functioning conditions at a population level that is viable according to standards and criteria identified by NMFS in two key documents [Matrix of Pathways and

Indicators (1996) and Viable Salmonid Populations (2000)]. Actions which contribute to these objectives include development of riparian vegetation, restoration of streamflow and appropriate hydrologic peak flow conditions, passage improvements and screening, among other activities.

As discussed above, the Federal Basin-wide strategy for salmon recovery identifies actions in the hydropower, hatchery, harvest, and habitat arena for short and long term actions. The habitat goals of the Basinwide Strategy are: the existence of high quality habitats that are protected, degraded habitats that are restored and connected to other functioning habitats, and a system where further degradation of tributary and estuary habitat and water quality is prevented.

In its Section 7 consultations and in prioritizing restoration projects, NMFS relies upon its habitat model, watershed analyses and the Federal Basin-Wide strategy.

5.1.1.c. USDI Fish and Wildlife Service (USFWS)

The USFWS administers the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). This plan was authorized by the Water Resources Development Act of 1976, Public Law (P.L.) 94-587, to mitigate and compensate for fish and wildlife resource losses caused by the construction and operation of the four lower Snake River dams and navigation lock projects. The plan identified the need to replace adult salmon and steelhead and resident trout fishing opportunities, and the size of the anadromous program was based on estimates of salmon and steelhead adult returns to the Snake River basin prior to the construction of the four lower Snake River dams.

5.1.d. Federal Land Managers (US Forest Service and Bureau of Land Management)

The U.S. Forest Service is required to manage habitat to maintain viable populations of anadromous fish and other native and desirable non-native vertebrate species. Land and Resource Management Plans (Forest Plans) were developed for each of the national forests within the subbasin in the late 1980s or early 1990s, and are now undergoing a process of revision. These Forest Plans guide all natural resource management activities, establish forest-wide multiple-use goals and objectives, and establish management standards and guidelines for the National Forests.

The Bureau of Land Management, in accordance with the Federal Land Policy and Management Act of 1976, is required to manage public lands to protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values. Both the USFS and BLM are required by the Clean Water Act to ensure that activities on administered lands comply with requirements concerning the discharge or run-off of pollutants.

In the Salmon Subbasin, the Forest Service and the Bureau of Land Management manage salmonid habitat under the direction of PACFISH (USDA and USDI 1994). This program provides interim management strategies that aim to protect areas that contribute to salmonid recovery and improve riparian habitat and water quality throughout the subbasin. The PACFISH strategies have also facilitated the ability of the federal land managers to meet requirements of the ESA and avoid jeopardy. To meet recovery objectives, these strategies:

- Establish watershed and riparian goals to maintain or restore all fish habitat.

- Establish aquatic and riparian habitat management objectives.
- Delineate riparian management areas.
- Provide specific standards and guidelines for timber harvest, grazing, fire suppression and mining in riparian areas.
- Provide a mechanism to delineate a system of key watersheds to protect and restore important fish habitats.
- Use watershed analyses and subbasin reviews to set priorities and provide guidance on priorities for watershed restoration.
- Provide general guidance on implementation and effectiveness monitoring.
- Emphasize habitat restoration through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and replanting native vegetation along streams and rivers.

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) is a regional-scale land-use plan that covers 63 million acres of federal lands in Oregon, Washington, Idaho, and Montana (www.icbemp.gov). The BLM and USFS released a Supplemental Draft Environmental Impact Statement for the ICBEMP Project in March 2000. The EIS focuses on the critical broad scale issues related to landscape health; aquatic and terrestrial habitats; human needs; and products and services. ICBEMP will guide efforts to develop revised Forest Plans, which will then replace the interim management strategies. The intent to provide for longer-term ecosystem management of federal lands in the ICRB. As new strategies are implemented, subbasin and watershed assessments and plans will target further habitat work (NMFS 2000).

5.1.1.e. US Environmental Protection Agency (EPA)

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

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

5.1.1.f. USDA Natural Resources Conservation Service (NRCS)

The Natural Resource Conservation Service (NRCS) provides technical support to the various Soil and Water Conservation districts, Upper Salmon River Watershed Project and agricultural landowners, and distributes federal cost-share monies to reduce soil erosion and provide streambank protection. The NRCS assists landowners to develop farm conservation plans and provides engineering and other support for habitat protection and restoration (PL 566). NRCS programs include the following: Conservation Reserve Program (CRP), Continuous Conservation Reserve Program (CCRP), Wildlife Habitat Improvement Program (WHIP), Environmental Quality Incentives Program (EQIP), Public Law 566 Small Watersheds Program, River Basin Study Program, and Wetlands Reserve

Program. The NRCS works closely with the Farm Service Agency in conducting many of its programs.

5.1.1.g. US Army Corps of Engineers (COE)

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

5.1.1.h. USDI Bureau of Reclamation (BOR)

As a water management agency, the Bureau of Reclamation manages a number of hydropower and irrigation projects in the Columbia River basin. Although none of these projects is located in the Salmon Subbasin, Reclamation provided technical assistance to address water conservation, fish passage, and water quality issues in several parts of the Salmon Subbasin. Reclamation plans to work with existing organizations to eliminate fish passage barriers, ensure fish screens meet current criteria, and acquire instream flows in the Lemhi River, upper Salmon River, and Little Salmon River watersheds in accordance with the December 2000 FCRPS BiOp.

5.1.2. Tribes and Tribal Coordinating Bodies

5.1.2.a. Nez Perce Tribe (NPT)

The Nez Perce Tribe is responsible for managing, protecting, and enhancing treaty fish and wildlife resources and habitats for present and future generations. Tribal government headquarters are located in the Clearwater River subbasin in Lapwai, with offices in Kamiah and Orofino. The Nez Perce Tribe has treaty reserved fishing, hunting and gathering rights pursuant to the 1855 Treaty with the United States. Article 3 of the 1855 treaty states, in part:

> "The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land."

The Nez Perce Tribe individually and/or jointly (with state and federal agencies) implements fish and wildlife restoration and mitigation activities throughout areas of interest and influence in north-central Idaho. These lands include but are not limited to portions of the Salmon Subbasin in which the Nez Perce Tribe held aboriginal title.

The Tribe's Department of Fisheries Resources Management has offices McCall and Lapwai, Idaho responsible for conducting fisheries management in the Salmon subbasin. The vision of the Department is to manage fisheries resources to provide for healthy, self sustaining populations of historically present species, to manage and promote healthy ecosystem processes and rich species biodiversity. Inherent in this vision is the desire to provide for harvestable fish populations.

Nez Perce Tribal fish and wildlife activities relate to all aspects of management, including recovery, restoration, mitigation, enforcement, and resident fish programs. Nez Perce Tribal policies and plans applicable to subbasin management include the *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon* (Columbia River Inter-tribal Fish Commission 1996a, 1996b) and the Nez Perce Fish and Wildlife Code, Reports to General Council, and Nez Perce Tribe Executive Committee Resolutions.

5.1.2.b. Shoshone-Bannock Tribes (SBT)

The Shoshone-Bannock Tribes have off-Reservation treaty rights under the 1868 Fort Bridger Treaty, 15 Stat. 673, as reaffirmed in State v. Tinno, 497 P.2d 1386, 94 Idaho 759 (1972). As set forth under this decision, the Shoshone-Bannock Tribes have the right to hunt, fish and gather on unoccupied lands of the United States. The Idaho Supreme Court has defined unoccupied lands to include state public lands as well, which would include the navigable waterways of the State of Idaho, including the Snake River. The Tribes understand that the treaty-guaranteed land base is the core and integral foundation of Tribal existence and is crucial to its autonomy as a sovereign nation. Accordingly, the Tribes successfully undertook a land acquisition program to purchase fee lands located within the Reservation from monies received in their land claims settlement. Today the Fort Hall Indian Reservation is comprised of 96% tribal/trust lands and individual Tribal members and non-Indians hold the remaining 4% in fee. The approximate Reservation population is 5,500 with the Tribal resident membership approximately 3600. Today, the Tribes' territory forms a sizable geographic area for the exercise of jurisdiction, supports a residing population, is the basis of the Tribal economy, and provides a irreplaceable forum for cultural vitality based on religious practices and cultural traditions premised on the sacredness of land.

Since 1975, the Tribes have demonstrated a key long-range commitment to preserving and enhancing the air, water, open space, and quality of life for present and future generations of the Tribes who reside on the Tribal homelands. Indeed, the Tribal government has established environmental protection, land use, fisheries, fish and game, cultural resources, and natural resources departments funded by the Environmental Protection Agency, Bonneville Power Administration and Department of Energy. Tribal programs are also funded by the Tribal license and permit fees set forth in various ordinances and codes.

5.1.2.c. Columbia River Intertribal Fish Commission (CRITFC)

The tribal Columbia River Anadromous Fish Restoration Plan, or *Wy-Kan-Ush-Mi Wa-Kish-Wit* (CRITFC 1995) was developed by the Nez Perce, Umatilla, Warm Springs and Yakama tribes. Recommendations set forth in this plan for salmon recovery address three types of actions: institutional, technical, and watershed, with the over-riding goal of simply putting fish back in the river (gravel to gravel management). Objectives and strategies specific to the Salmon Subbasin are included in *Wy-Kan-Ush-Mi Wa-Kish-Wit.*

5.1.3. State

5.1.3.a. Idaho Department of Fish and Game

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

Idaho Conservation Data Center (CDC), located within the Department, was initially established in 1984 (as Idaho Natural Heritage Program) through a cooperative effort involving the Department, Idaho Department of Parks and Recreation, and The Nature Conservancy. In 1987 the program merged with the Department. The name was changed to Idaho Conservation Data Center in 1992. The Idaho CDC is part of an expanding international network of Natural Heritage Programs. Through the leadership of The Nature Conservancy similar heritage programs have been established (primarily within state government) throughout North America. Programs within the natural heritage network collect and maintain information on the status of rare, threatened, and endangered plant and animal species; exemplary ecological reference and natural areas; and terrestrial and aquatic habitats and plant communities using standardized methods and protocols in the framework of an integrated, relational data management system (The Nature Conservancy 1982; The Nature Conservancy et al. 1996).

5.1.3.b. Idaho Department of Environmental Quality

Statutory Responsibilities

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

The Idaho Department of Environmental Quality administers several programs designed to monitor, protect, and restore water quality and aquatic life uses. These include BURP monitoring; 305(b) water quality assessments; 303(d) reports of impaired waters and pollutants; TMDL assessments, pollutant reduction allocations, and implementation plans; Bull trout recovery planning; 319 nonpoint source pollution management; Antidegradation policy; Water quality certifications; Municipal wastewater grants and loans; NPDES inspections; Water quality standards promulgation and enforcement; General ground water monitoring and protection; Source water assessments; and specific watershed management plans identified by the legislature. The Idaho Board of Environmental Quality oversees direction of the agency to meet responsibilities mandated through Idaho Code, Executive Orders, court orders, and agreements with other parties.

5.1.3.c. Governor's Office of Species Conservation

Bull Trout Conservation

Former Idaho Governor Batt's Bull Trout Conservation Plan (State of Idaho 1996) identifies key watersheds that contain streams with the greatest potential for protecting and restoring bull trout populations. The plan has two phases: 1) development of problem assessments and conservation strategies by Technical Advisory Teams, and 2) implementation of conservation measures, monitoring, and progress evaluation, to be directed by citizen-led Basin and Watershed Advisory Groups (BAGs and WAGs).

5.1.3.d. Idaho Department of Lands

The Idaho Department of Lands (IDL) manages Idaho's Trust and Endowment Lands within the Salmon Subbasin, including both forest and rangeland areas, under the direction of the State Board of Land Commissioners. Endowment forestlands are managed following forestry Best Management Practices, while the endowment rangelands are operated under coordinated resource management plans. IDL assists private landowners in developing timber management plans that comply with site-specific best management practices, and local area offices develop independent annual and five-year timber management plans. The agency is also involved in assisting local groups in firefighting efforts. The IDL administers the Forest Improvement Program (FIP) and the Stewardship Program (SIP). The agency is also responsible for administering the state's surface mining laws, including the closure and rehabilitation of old mine sites.

IDL also has responsibility for enforcing Idaho laws that require permits for work on or above the beds of navigable waterways, below the ordinary high water mark. This includes riprap, breakwaters, bridges, and aids to navigation such as docks, piers, pilings, buoys and boat ramps. State agencies, including the IDEQ and IDFG, have the opportunity to review and comment on the potential environmental effects of the projects.

5.1.3.e. Idaho Department of Water Resources

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

5.1.3.f. Idaho Water Resource Board

The eight member Idaho Water Resource Board (Board) is appointed by the Governor, and has responsibilities that include development of comprehensive basin water plans and establishing water rights, including minimum streamflows. Under Idaho law (Chapter 15, Title 42, Idaho Code) in-stream uses can be protected under water rights held by the Idaho Water Resource Board in trust for the people of the state of Idaho. The Board's financial program assists local governments, water and homeowners associations, non-profit water companies, canal companies and irrigation districts with funding for water system infrastructure projects. The Board also manages the operation of Idaho's Water Supply Bank. The purposes of the Bank are to encourage the highest beneficial use of water;

provide a source of adequate water supplies to benefit new and supplemental water uses; and to provide a source of funding for improving water user facilities and efficiencies.

Consistent with the Board's responsibilities, a basin water plan has been drafted for the Little Salmon River. This plan is currently being revisited by the local citizens' advisory group and a final plan is scheduled to be approved by the Board for ratification by the 2002 State Legislature. No other comprehensive basin water plans exist for drainage basins within the Salmon Subbasin.

• *Comprehensive State Water Plan for the Little Salmon Subbasin*. The Board is nearing completion of this plan component. The draft plan, which will undergo 60-day public review commencing June 4, 2001, calls for the Board to designate the following stream reaches as state Recreational Rivers:

- Little Salmon River from "The Falls" to its confluence with the Salmon River.
- Boulder Creek from its headwaters to its confluence with the Little Salmon River.
- Hard Creek from its headwaters to its confluence with Hazard Creek.
- Hazard Creek from its headwaters to its confluence with the Little Salmon River.

The plan also calls for the Board to file applications for minimum streamflow water rights on the Little Salmon River from "The Falls" to its confluence with the Salmon River, and Rapid River from the National Forest boundary to the confluence with the Little Salmon, as state Recreational Rivers.

The Plan contains additional recommendations that pertain to flood management, water quality, fisheries, water rights, interagency coordination and recreation.

• Minimum Streamflows for Key Salmon Rivers. The Board has approved, or is in the process of approving, minimum streamflows for the lower reaches of key salmon rivers within the Salmon Subbasin that are strongly affected by consumptive water use. These reaches include:

- *Pahsimeroi River* - Two reaches commencing at fish rearing facilities approximately 7 miles upstream of Salmon River confluence and extending to its mouth; Upper reach, in the amount of 45 cfs, extends from fish rearing facilities to Big Springs; Lower reach, in the amount of 75 cfs, from Big Springs to mouth. This minimum streamflow is licensed as water right no. 73-7045.
- *Lemhi River* - Commences at the L6 diversion, and extends downstream approximately 7 miles to its confluence with the Salmon River. This water right, in the amount of 35 cfs, is in the application phase with a 4/12/01 priority date.
- *Salmon River*- Commences at Hammer creek and extends downstream approximately 53 miles to the confluence with the Snake River. This water right is in the application phase. The flows applied for include: August 1 to March 31 – 4000 cfs; April 1 to April 30 – 9200 cfs; May 1 to June 30 – 31,000 cfs and July 1 to July 31 – 10,400 cfs.

5.1.3.g. Idaho Department of Transportation

In Idaho the state and federal highway system is managed and maintained by the Idaho Department of Transportation (ITD) through federal, state and local funding. District 6 and a portion of Highway District 2 of the Idaho Department of Transportation include 405 miles of roadways that require maintenance and improvement activities. In coordination with the Idaho Department of Fish and Game, Federal Highways Administration, the Army Corps of Engineers, the US. Fish and Wildlife Service and the National Marine Fisheries Service, ITD provides fish and wildlife species protection (with the mitigation sequence: avoidance, minimization, mitigation) "to the maximum extent practicable," to prevent impacts to threatened and endangered species or their habitat. For listed fish species these mitigations are generally focused on restoring habitat to maintain or improve water temperature and turbidity, maintaining or improving spawning habitats, and maintaining or improving fish migration or passage through culverts and bridges. Constant road maintenance by way of snow removal and road repair is also evaluated and required to meet the same environmental criteria and protection as new construction.

A statewide, focused campaign to improve or replace fish passage barriers caused by any ITD construction action is now being formulated. Also being considered, is a determination if mitigation for highway construction should be considered on a basin wide (or ecoregion) priority or should it be maintained only as an on site action.

ITD's project program for the period from 2001 to 2005 comprises 34 projects. These include 8 pavement rehabilitations, 5 resurfacings, 4 sealcoat, 4 bridge replacements, 4 reconstructions, 1 major rewidening, and 8 other miscellaneous projects.

5.1.3.h. Idaho Association of Soil and Water Conservation Districts

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

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

5.1.3.i. Idaho Soil Conservation Commission

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

5.1.3.j. Idaho Association of Counties

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

5.1.4. Local Government

5.1.4.a. Counties

The Idaho State Local Land Use Planning Act (Idaho Code Section 67-6502) sets forth guidelines for County Planning. Nez Perce, Adams and Valley counties have developed comprehensive plans, revised in 2000, in accordance with those guidelines. Idaho County does not have a comprehensive plan.

5.1.4.b. Municipalities

The city of Riggins has a comprehensive plan that includes a program to promote stream bank conservation, a cooperative relationship with other government agencies, and maintenance of perennial vegetation.

5.1.5. Local Collaborative Groups

There are a number of local, collaborative groups in the Salmon Subbasin that take actions important to species conservation. These groups are both watershed-based and resource-based.

5.1.5.a. Watershed-based Groups

Basin and Watershed Advisory Groups

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

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

The code specifically calls for creation of WAGs for water bodies that were labeled as “high priority” on the Total Maximum Daily Load schedule established for the state of Idaho.

Soil and Water Conservation Districts

Authorized under Title 22, Chapter 36 Idaho Code, soil and water conservation districts are non-regulatory subdivisions of Idaho State government. A board of five or seven supervisors, who are local residents, and who serve without pay, governs each. All supervisors are elected officials and must be landowners (including urban property owners located within district boundaries) or farm operators in the district to which they are elected. Soil and water conservation districts develop and implement programs to protect and conserve natural resources on nonfederal lands. Districts organize technical advisory groups for projects and call upon local, state, tribal and federal agency specialists, industry representatives, and interested individuals. Districts in the Salmon Subbasin include Custer SWCD, Lemhi SWCD, Blaine SWCD, Nez Perce SWCD, Idaho SWCD and Nez Perce SWCD.

Districts receive limited funds from local (county) and state (general fund) government, and may receive other funds for local project work through the Water Quality Program for Agriculture program (ISCC) and other funding agencies, institutions, or organizations. Working cooperatively with other entities, districts provide technical assistance to agriculturists and other private landowners based on long-standing agreements with the USDA Natural Resources Conservation Service, Idaho Soil Conservation Commission, and other federal and state agencies.

Custer Soil and Water Conservation District. Since 1992 the CSWCD has been a partner in the USBWP program. By combining the Districts resources with the USBWP, LSWCD, BPA and other natural resource agencies the CSWCD has been instrumental in assisting local landowners put conservation projects efficiently and effectively on the ground. Among the CSWCD top four objectives is: "addressing fisheries, wildlife, water quality and water resource conditions within the boundaries of the CSWCD". The CSWCD continues to work within the USBWP, and with the recent expansion of the USBWP boundaries, the CSWCD can now assist the USBWP in conservation projects throughout Custer County.

Idaho County Soil and Water Conservation District. The Idaho County Soil & Water Conservation District was originally formed in the Clearwater Subbasin in 1954 and expanded to include portions of the county within the Salmon Subbasin in 1956. The group attempts to set high standards for conservation of natural resources and hopes that through knowledge and cooperation, all landowners, government agencies, private organizations and elected officials can ensure an adequate natural resource base for present and future generations.

*Lemhi Soil and Water Conservation District***.** In 1990 the LSWCD adopted an action item to initiate dialogue between all interested parties for purposes of increasing fish returns to the Lemhi River. Representatives of the LSWCD met with membership of the Lemhi Irrigation District (LID) and Water District 74 (WD74) at their annual meetings in 1990 and 1991. As a result of this dialogue, a committee with representation from the LSWCD, LID, WD74, Lemhi ASCS County Committee, IDFG, Lemhi County Agricultural Agent, and the Soil Conservation Service (now NRCS) was formed in early 1991 to review fisheries and habitat studies conducted in the Lemhi Basin and to advice LSWCD, CSWCD, LID, and WD74 on potential actions to enhance anadromous fish recovery. In

June 1992 LSWCD, LID, and WD74 adopted the Irrigators Plan to Improve Fish Passage on the Lemhi River (Swift and Loucks, 1992) and indicated that this plan should be the basis on which private landowners would cooperate with federal and state agencies in anadromous fish recovery efforts. These efforts initiated by the LSWCD eventually helped lead to the formation of the Lemhi Model Watershed Project.

Nez Perce Soil and Water Conservation District (NPSWCD). The NPSWCD develops an area-wide resource conservation plan, which provides a strategy to identify, prioritize, and treat resource issues within the district. The NPSWCD coordinates 22 different programs/projects addressing watershed health, resource productivity, land management, water quality, and fisheries habitat. The NPSWCD accomplishes its mission by working with conservation partners including private landowners, businesses, local, state, and federal governments, the Nez Perce Tribe, and special interest groups. The NPSWCD responsibilities range from resource assessment, project management, grant administration, project coordination, public outreach, BMP design and implementation, to the promotion of innovative practices and new technologies. The NPSWCD's strong partnership with private landowners allows for the implementation of watershed programs on private lands.

Upper Salmon Subbasin Model Watershed (formerly the Lemhi Model Watershed)

The Idaho Model Watershed Project (MWP) was initiated in 1992 by the Idaho Soil Conservation Commission(SCC) as part of the Northwest Power Planning Council's plan for salmon recovery in the Columbia River Basin. This project is located in Central Idaho and originally involved three watersheds; the Lemhi River, the Pahsimeroi River, and the East Fork of the Salmon River, but has since expanded to the entire upper Salmon Subbasin. The SCC designated the Lemhi and Custer Soil Water Conservation Districts to take the lead in developing the project. The SCC hired a project coordinator and administrative staff to provide the necessary project support. The Districts organized a local advisory committee and requested assistance from agencies and the Shoshone-Bannock tribes in the form of a technical advisory committee. The 15-member advisory committee represents a cross-section of landowners, federal land managers, conservation interests, and local industry representatives. These committees worked to develop a vision statement, goals, and objectives for the Model Watershed. The objective of this project is to promote anadromous and resident fish habitat enhancement on private and public land using a watershed approach in the upper Salmon Subbasin. The vision of the MWP is to provide a basis of coordination and cooperation between local, private, state, tribal and federal fish and land managers, land owners and others to protect, restore and enhance anadromous fish habitat. This group has guided a dynamic planning process that has been effective in implementing projects to benefit fish and fish habitat, while developing a long-term plan to address some of the more controversial aspects of watershed management. Since the Model Watershed plan was published, in November 1995, the MWP has been very successful at planning and implementing habitat enhancement projects while raising the level of understanding of natural resource management centered around fish habitat. The MWP has been responsible for implementing over 77 projects. The USBWP is coordinated by the ISCC, LSWCD, CSWCD and partners include Tribal, Federal, State, and local governments and private interests.

Custer County Watershed Group (CCWG)

The CCWG is an organization comprised of County, various Federal, State and Tribal governments, private property owners and interested parties that was organized with the intent to support voluntary efforts to help restore and maintain healthy watersheds within Custer County. The main emphasis of the group to date has been planning and designing the restoration/protection of a 14-mile stretch of the Salmon River near Challis, Idaho. The CCWG is now merging into the USBWP now that the USBWP has expanded its project area to include all portions of the Upper Salmon Subbasin.

Lemhi County RIPCON

Through the Lemhi County Riparian Habitat Conservation Agreement (RIPCON), the County attempts to address the ecology of riparian habitat and therefore, the needs of many species. The purpose of RIPCON is to develop coordinated efforts to minimize and mitigate risks to riparian habitat, which is crucial to the majority of listed or potentially listed species in this area, through a conservation strategy to enhance and maintain specific riparian habitat in Lemhi County, Idaho. These efforts will help keep management driven locally, by the people within Lemhi County. Lemhi County has worked cooperatively with land users, special interest groups, land management and regulatory agencies, city and state governments, and local citizens in a multitude of efforts for 10 years to improve the health of the land and support the communities within it.

Challis Experimental Stewardship Program

Challis Experimental Range Stewardship Program was an outgrowth of the Public Rangelands Improvement Act, passed by Congress in 1978. The act called for "innovative grazing programs" that result in " an improvement of range conditions of lands under permit or lease. The Challis Steering Group, which provides information for the program's decision makers, consists of representatives from the BLM, USFS, Idaho Department of Lands, IDFG, NRCS, FSA, University of Idaho Cooperative Extension Service, Idaho Rangeland Committee and numerous other federal, state and county entities as well as local landowners. The Stewardship Committee has evolved into the Watershed Advisory Group for the watershed.

East Fork Watershed Group

The purpose of the East Fork Salmon River Watershed Group is to work together toward a healthy, properly functioning, and multiple use landscape. The watershed group and other interested parties will cooperate to find efficient and collaborative solutions to resource issues in the watershed. A cooperative effort will be made to provide for conservation, restoration and enhancement of fish and wildlife habitat quality and quantity for the multiple uses of future generations. This includes working ranches, open spaces, scenic values, natural areas, healthy and functional grasslands, forests, waterways, riparian systems and alpine systems and a balanced fish and wildlife population. The EFWG is now merging into the USBWP now that the USBWP has expanded its project area to include all portions of the Upper Salmon Subbasin. The EFWG will continue to play an active roll in the decision making process from a local watershed perspective.

5.1.5.b. Resource-based Groups

A number of resource-based groups are active in the Salmon Subbasin. These include irrigation districts in the Lemhi, Pahsimeroi, and Little Salmon watersheds.

5.1.6. Private Entities (unaffiliated)

A number of unaffiliated private entities are significant landholders and are active in the Salmon Subbasin. These include Idaho Power Company, Boise Cascade, multiple mining companies, J.R. Simplot, and others.

5.1.7. Conservation Organizations

5.1.7.a. Payette Land Trust

The Payette Land Trust has enrolled 80 acres within Little Salmon River drainage (Steve Millemann, personal communication). Information can be found at http://www.lta.org/findlandtrust/ID2.htm#Payette Land Trust.

5.1.7.b. Little Salmon Watershed Alliance, Inc.

The Alliance is an Idaho nonprofit corporation, organized in 1997, and comprised of residents of the Little Salmon Subbasin. On June 26, 1998, the Alliance formally asked the Idaho Department of Water Resources to undertake a survey of the water and related resources in the watershed. As a result, the Idaho Water Resource Board decided to complete a component of the State Comprehensive Water Plan for the Little Salmon Subbasin.

5.1.7.c. The Nature Conservancy

The mission of The Nature Conservancy (TNC) is to preserve plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. TNC works collaboratively with a variety of public and private partners to accomplish its conservation goals and is instrumental in working with willing landowners to acquire private lands and conservation easements for habitat protection. TNC is actively involved in conservation efforts in Salmon Subbasin and participates as a member of the USBWP advisory committee. In addition, TNC manages conservation easements in the Stanley Basin and along the Lemhi and Pahsimeroi Rivers.

5.1.7.d. *Others*

A number of other conservation organizations are active in the Salmon Subbasin. These include the Idaho Watersheds Project, Foundation for North American Wild Sheep (FNAWS), Rocky Mountain Elk Foundation (RMEF), Trout Unlimited (TU), Ducks Unlimited (DU), Idaho Wildlife Foundation, Idaho Rivers United (IRU), Idaho Salmon and Steelhead Unlimited (ISSU), Boulder-Whitecloud, and Sawtooth Wildlife Council. None of these organizations submitted materials for this subbasin summary.

5.1.8. United States v. Oregon

The November 9, 1987 Columbia River Fish Management Plan was an agreement entered into by the parties pursuant to the September 1, 1983 Order of the United States District Court for the District of Oregon (Court) in the case of *United States et al. v, Oregon, Washington et al.*, (Case No. 68-513). The purpose of the management plan was to provide a framework within which the parties could exercise their sovereign powers in a coordinated and systematic manner in order to protect, rebuild, and enhance upper Columbia River fish runs while providing harvests for both treaty Indian and non-Indian fisheries. The agreement established goals (rebuild weak runs and fairly sharing harvest), means (habitat protection, enhancement, artificial production and harvest management), and procedures (facilitate communication and resolve disputes) to implement the plan.

The 1987 agreement was in effect until December 31, 1998, when it expired. The parties have agreed to continue meeting to address harvest and production issues until a new process has been developed for negotiating a long-term agreement.

5.1.9. Professional Organizations

Members of a number of professional organizations are active within the Salmon Subbasin. These include the Idaho Chapter of the American Fisheries Society, the Idaho Chapter of the Wildlife Society, the Native Plant Society, the Idaho Cattlemen's Association, the Idaho Woolgrower's Association, and the Idaho Farm Bureau.

5.2. Existing Goals, Objectives, and Strategies

5.2.1. Federal Government

The Federal Caucus of multiple agencies developed the Basinwide Salmon Recovery Strategy (All-H Paper) as a basis for recovering federally listed species of salmon in the Columbia River Basin. Success in this effort will require the development of watershed-wide properly functioning habitat conditions and population levels that are viable according to standards and criteria identified by NMFS in two key documents [Matrix of Pathways and Indicators (1996); Viable Salmonid Populations (2000)]. The recovery planning framework and effort will need to build upon existing conservation measures and develop additional critical information useful to fish and wildlife managers.

The All-H Paper identifies immediate and long-term actions in the hydropower, hatchery, harvest, and habitat arenas. Importantly for this summary, it commits federal assistance to local efforts. Specific goals and objectives are outlined below.

- *Habitat Goal*

The habitat goals of the All-H Paper are: the existence of high quality habitats that are protected, degraded habitats that are restored and connected to other functioning habitats, and a system where further degradation of tributary and estuary habitat and water quality is prevented. Near-term objectives, strategies, and actions for high-priority habitat within the Salmon Subbasin include:

Objective 1. Restore and increase tributary flows to improve fish spawning, rearing, and migration.

Objective 2. Screen diversions, combine diversions, and re-screen existing diversions to comply with NMFS criteria to reduce overall mortality.

Objective 3. Reduce passage obstructions to provide immediate benefit to migration, spawning, and rearing.

Strategy 1. Federal agencies, state, and other to address all flow, passage, and screening problems over the next 10 years in the Salmon Subbasin.

Action 1.1. USBR to implement actions in the Lemhi watershed in 2001

Action 1.2. BPA to expand on measures under the NWPPC program to complement USBR's actions.

Action 1.3. NMFS to provide USBR with passage and screening criteria and methodologies for determining instream flows that satisfy ESA requirements.

Strategy 2. BPA funds protection of currently productive non-federal habitat, especially if at risk of being degraded.

Action 2.1. BPA and NMFS will develop criteria and priorities by June 2001.

Action 2.2. Protect habitats through conservation easements, acquisitions, or other means.

Action 2.3. BPA works with non-profit land conservation organizations and others to achieve habitat protection objectives.

Strategy 3. Increase tributary flows through innovation actions.

Action 3.1. Establish a water brokerage as a transactional strategy for securing flows.

Action 3.2. Develop a methodology acceptable to NMFS for ascertaining instream flows that meet ESA requirements.

Strategy 4. Action Agencies to coordinate efforts and support off-site habitat enhancement measures undertaken by others.

Action 4.1. Support development of state/tribal 303(d) lists and TMDLs by sharing water quality and biological monitoring information.

Action 4.2. Participate in TMDL coordination or consultation meetings

Action 4.3. Build on and use existing data management structures to improve data sharing.

Action 4.4. Share technical expertise and training with federal, state, tribal, regional, and local entities.

Action 4.5. Leverage funding resources through cooperative projects, agreements, and policy development

The program for tributary habitat is premised on the idea that securing the health of these habitats will boost productivity of listed stocks.

- *Hatchery Goal*

The overarching goal for hatchery reform is reduced genetic, ecological, and management effects of artificial production that are adverse on the natural population. Objectives that are relevant to the Salmon Subbasin include:

Objective 1. Manage the number of hatchery-produced fish that escape to spawn naturally.

Objective 2. Employ hatchery practices that reduce unwanted straying of hatchery fish. For naturally spawning populations in critical habitats, non-ESU hatchery-origin fish do not exceed 5%; ESU hatchery fish do not exceed 5%-30%.

Objective 3. Mark hatchery-produced fish to distinguish natural from hatchery fish on spawning grounds and in fisheries.

Objective 4. Design and conduct fishery programs so fish can be harvested without undue impacts on weaker stocks.

- *Research, Monitoring and Evaluation Goal*

Identify trends in abundance and productivity in populations of listed anadromous salmonids. Relevant objectives and strategies include:

Objective 1. Conduct population status monitoring to determine juvenile and adult distribution, population status, and trends.
Objective 2. Monitor the status of environmental attributes potentially affecting salmonid populations, their trends, and associations with salmonid population status.
Objective 3. Monitor the effectiveness of intended management actions on aquatic systems, and the response of salmonid populations to those actions.
Objective 4. Assess quality of available regional databases, in terms of accuracy and completeness, which represent habitat quality throughout the basin.
Objective 5. Monitor compliance of management actions toward proper implementation and maintenance.
Strategy 1. Conduct Tier 1 sampling to monitor broad-scale population status and habitat conditions.
Strategy 2. Conduct Tier 2 monitoring to obtain detailed population assessments and assessments of relationships between environmental characteristics and salmonid population trends.
Strategy 3. Conduct Tier 3 monitoring to establish mechanistic links between management actions and fish population response.

5.2.1.a. Bonneville Power Administration

BPA has suggested broad, basinwide objectives for implementing actions under the NMFS and USFWS 2000 FCRPS Biological Opinions. These objectives include:

Objective 1. Avoid jeopardy and assist in meeting recovery standards for Columbia Basin salmon, steelhead, bull trout, sturgeon, and other aquatic species that are affected by the FCRPS.
Objective 2. Conserve critical habitats upon which salmon, steelhead, bull trout, sturgeon, and other listed aquatic species depend, including watershed health.
Objective 3. Assure tribal fishing rights and provide non-tribal fishing opportunities.
Objective 4. Balance other needs.

BPA favors a fundamental strategy that would implement recovery actions broadly and comprehensively across all aspects of the salmon life cycle. This broad strategy is supported by recent scientific reviews (Bevan, et al., 1994; NMFS 1995; NRC 1995; Independent Scientific Group (ISG) 1996) and is consistent with principles in the NWPPC Fish and Wildlife Program and the Tribal Salmon Recovery Plan (CRITFC, 1995). Although these reviews and plans have differed in their emphasis on the approach to recovery deemed most appropriate, they share this common theme -- the importance of implementing recovery actions broadly and comprehensively across all aspects of the ecosystem.

Habitat

Under the FCRPS Biological Opinions, BPA proposes to implement habitat actions to improve life stage survival by protecting and restoring the aquatic ecosystem to a properly functioning condition. BPA's efforts would focus on incentives-based or voluntary efforts for non-federal lands. BPA has three key habitat strategies:

Strategy 1. Prevent degradation of existing high quality habitat.
Strategy 2. Restore degraded habitat.
Strategy 3. Restore and increase habitat complexity.

These habitat strategies recognize that various human activities have reduced the production of listed stocks, degraded their spawning and rearing habitat, and affected downstream habitat conditions (National Research Council, 1996; Independent Scientific Review Group, 1996). Nevertheless, BPA concurs with the proposition of the USFS/BLM (1997) that "Although much of the native ecosystem has been altered, core areas remain for rebuilding and maintaining functional native aquatic ecosystems." BPA will focus on protecting and rehabilitating ecologically healthy areas on private lands, and will take advantage of time sensitive opportunities.

Targeted areas will include important headwaters, diverse riparian areas, biotic refuges, and biological hot spots. For disturbed areas within each habitat zone, restoration actions will focus on water quality and quantity, connectivity, riverine-riparian habitat diversity, channel condition and dynamics, and watershed condition. The habitat strategy is designed to be preventative as well as curative, and to address the causes as well as the symptoms of habitat degradation.

Priority will be given to actions that protect good habitat, improve habitat carrying capacity, and increase the survival rates of anadromous fish. These include: improving riparian habitat; securing additional riparian and estuary habitat; improving water quality, including reduction of sediment loads and temperature; restoring tributary flows; screening water diversions; addressing passage obstructions; preserving productive habitat; and, restoring degraded habitats connected to viable habitat.

Hatcheries

Hatcheries can play an important role in the recovery of anadromous fish. This strategy is designed to meet the objective of ensuring species viability by: increasing the number of biologically-appropriate naturally spawning adults; improving fish health and fitness; and improving hatchery facilities, operation, and management and reducing potential harm to listed fish.

BPA supports the following strategies for hatcheries:

Strategy 1. Reduce potentially harmful hatchery practices
Strategy 2. Use a safety net program on an interim basis to avoid extinction while other recovery actions take place for sturgeon and anadromous fish.
Strategy 3. Use hatcheries in a variety of ways and places to aid recovery.

5.2.1.b. National Marine Fisheries Service (NMFS)

The goal of NMFS in the Salmon Subbasin is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye and steelhead resources. The biological goals of the recent Basin-wide Salmon Recovery Strategy are to halt the decline in salmon populations within five to ten years, and establish increasing trends in abundance within 25 years. Ultimately, NMFS's goal is the achievement of self-sustaining, harvestable levels of salmon populations which no longer require the protection of the Endangered Species Act.

5.2.1.c Fish and Wildlife Service

The Fish and Wildlife Service, LSRCP Office administers and funds the operation, maintenance, and evaluation of all LSRCP facilities in the Salmon Subbasin through cooperative agreements with the agencies and tribes. As the agency who markets Columbia River generated power, the Bonneville Power Administration (BPA) reimburses the FWS for all power-related LSRCP costs. The basis for the development of the LSRCP was derived from the Special Report, Lower Snake River Fish and Wildlife Compensation Plan, Lower Snake River, Washington and Idaho, June 1975 . (Corps, 1975) and further described in "A Review of the Lower Snake River Compensation Plan Hatchery Program" (Herrig, 1990). The USFWS is also required to comply with the Endangered Species Act, to meet tribal trust responsibilities, to adhere to various federal laws, agreements, and court orders, and to pursue the USFWS Mission and Vision (USFWS 1998).

The LSRCP spring/summer chinook program in the Salmon Subbasin consists of two hatcheries and associated satellite facilities (Sawtooth FH and East Fork Salmon River SF and McCall FH and South Fork Salmon SF). The LSRCP goal for Salmon Subbasin programs is to return 27,232 spring/summer chinook adults to the Snake River basin above Lower Granite Dam (USFWS, 2001). Both hatcheries and associated satellite facilities are operated by Idaho Department of Fish and Game.

The LSRCP steelhead program in the Salmon River consists of two hatcheries that rear steelhead (Magic Valley FH and Hagerman NFH). The LSRCP goal is to return 25,260 steelhead adults to the Snake River Basin above Lower Granite Dam. Magic Valley FH is operated by Idaho Department of Fish and Game while Hagerman NFH is operated by the USFWS.

As LSRCP cooperators, the Nez Perce Tribe and Shoshone-Bannock Tribes also participate in operation and management decisions in all LSRCP spring/summer chinook and summer steelhead programs in the Salmon Subbasin. All cooperators except the Shoshone-Bannock Tribes are funded to conduct monitoring and evaluation studies and fish health.

- *Goal: Return 27,232 spring/summer chinook and 25,260 summer steelhead to the Snake River Basin above Lower Granite Dam.*

Objective 1. Provide harvest for sport anglers and tribes.
Objective 2. Provide brood stock for hatchery programs.
Objective 3. Provide some natural spawning escapement where appropriate.
Objective 4. Comply with the Endangered Species Act.

Objective 5. Meet tribal trust responsibilities.
Objective 6. Adhere to federal laws, agreements, and court orders.
Objective 7. Pursue the USFWS Mission and Vision.

5.2.1.d. Federal Land Managers (US Forest Service and BLM [PACFISH])

Fish and Fish Habitat

PACFISH established the following management goals for federal lands in the Columbia River Basin east of the Cascade Crest, including the Salmon Subbasin:

- *Restored water quality that provides for stable and productive riparian and aquatic ecosystems.*
- *Restored stream channel integrity, channel processes, and sediment regimes under which riparian and aquatic ecosystems developed.*
- *Restored instream flows supporting healthy riparian and aquatic habitats, stable and effectively functioning stream channels, and rerouted flood discharges.*
- *Restored natural timing and variability of the water table elevation in meadows and wetlands.*
- *Restored diversity and productivity of native and desired non-native plant communities in riparian zones.*
- *Restored riparian vegetation a) providing large woody debris characteristic of natural aquatic and riparian ecosystems, b) providing adequate summer and winter thermal regulation within the riparian and aquatic zones, c) achieving rates of surface erosion, bank erosion, and channel migration characteristic of those under which the communities developed.*
- *Restored riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.*
- *Restored habitat to support populations of well-distributed native and desire non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities.*

Fish and Fish Habitat Objectives (Riparian Management Objectives - RMO)

Objective 1. Establish Pool Frequencies (#pools/mi) dependent on width of wetted stream, with interim widths as follows:

Width	10	20	25	50	75	100	125	150	200
# pools	96	56	47	26	23	18	14	12	9

Objective 2. Comply with state water quality standards in all systems (max < 68°F)
Objective 3. Establish large woody debris in all forested systems (> 20 pieces/mi, > 12 in diameter, > 35 ft length).
Objective 4. Ensure > 80% bank stability in non-forested systems
Objective 5. Reduce bank angles (undercuts) in non-forested systems (> 75% of banks with < 90% angle).

Objective 6. Establish appropriate width/depth ratios in all systems (< 10, mean wetted width divided by mean depth).

General Riparian Area Management

Objective 1. Identify and cooperate with federal, Tribal, and state and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat

Objective 2. Fell trees in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

Objective 3. Apply herbicides, pesticides, and other toxicants/chemicals in a manner to avoid impacts that are inconsistent with attainment of RMOs.

Objective 4. Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows.

Watershed and Habitat Restoration

Objective 1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserve the genetic integrity of native species, and contributes to attainment of RMOs.

Objective 2. Cooperate with federal, state, and tribal agencies, and private landowners to develop watershed-based CRMPs or other cooperative agreements to meet RMOs.

Fisheries and Wildlife Restoration

Objective 1. Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of the RMOs.

Objective 2. Design, construct, and operate fish and wildlife interpretive and other use-enhancement facilities in a manner that is consistent with attainment of RMOs.

Objective 3. Cooperate with federal, state, and tribal wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of RMOs.

Objective 4. Cooperate with federal, state, and tribal fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, fish harvest, and poaching that threaten the continued existence and distribution of native fish stocks inhabiting federal lands

5.2.1.e. USDA Natural Resources Conservation Service (NRCS)

- *Goal 1. Enhance natural resource productivity to enable a strong agricultural and natural resource sector.*

Objective 1.1. Maintain, restore, and enhance cropland productivity.

Strategy 1.1.1. NRCS will work with the conservation partnership to:

Strategy 1.1.2. Provide coordinated assistance in watersheds with pervasive soil health problems.

Strategy 1.1.3. Promote conservation planning and management approaches that improve multiple soil factors by focusing efforts on the most serious soil health problems.

Strategy 1.1.4. Help USDA program participants remain in compliance with requirements to protect highly erodible cropland and to take additional steps to improve the land.

Strategy 1.1.5. Help operators examine alternatives to crop production, such as enterprise diversification or conversion to hay or grazing.

Strategy 1.1.6. Provide assistance to landowners and land managers who are removing land from CRP to plan and apply systems with suitable plant materials that adequately control erosion and address other soil health issues.

Strategy 1.1.7. Ensure that small, limited-resource and minority farmers and ranchers receive appropriate conservation planning and management assistance.

Strategy 1.1.8. Improve technical capacity and develop and implement a method to determine soil health and monitor changes.

Strategy 1.1.9. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about the production benefits of conservation practices.

Objective 1.2. Maintain, restore, and enhance irrigated land.

Strategy 1.2.1. NRCS will work with the conservation partnership to:

Strategy 1.2.2. Encourage long-range water management planning to help communities develop strategies to address future water needs for irrigation and municipal and rural water use.

Strategy 1.2.3. Provide coordinated assistance in watersheds with substantial irrigated acreage.

Strategy 1.2.4. Promote comprehensive irrigation and water management systems that increase irrigation efficiency, address nutrient and pest management, and, otherwise, manage irrigation return flow to reduce potential adverse effects.

Strategy 1.2.5. Provide technical assistance to facilitate conversion to alternative crops or to dryland farming systems for those operators transitioning from irrigated agriculture.

Strategy 1.2.6. Provide training to help irrigation equipment suppliers and contractors plan equipment installation and provide services to help operators increase efficiencies in irrigation water delivery and application systems.

Strategy 1.2.7. Use appropriate, targeted communication strategies to educate irrigators, farmers, and others about the importance of water management and the availability of assistance.

Objective 1.3. Maintain, restore, and enhance grazing land productivity.

Strategy 1.3.1. NRCS will work with the conservation partnership to:

Strategy 1.3.2. Promote conservation planning and management approaches that prevent grazing land damage, reduce the impact of drought, and help ensure that resources can remain healthy and productive.

Strategy 1.3.3. Promote grazing practices that provide multiple benefits for operators, including productivity, wildlife, and water quality.

Strategy 1.3.4. Promote cooperative, watershed or regional approaches to grazing lands conservation and reclamation.

Strategy 1.3.5. Strengthen inventory and assessment capabilities throughout NRCS to improve the ability to determine the status and condition of grazing land resources.

Strategy 1.3.6. Increase efforts to develop approaches for suppression of noxious and invasive species.

Strategy 1.3.7. Strengthen assistance to small, limited-resource and minority owned farms and ranches.

Strategy 1.3.8. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about grazing land productivity and water quality benefits of conservation practices.

Objective 1.4. Maintain, restore, and enhance forestland productivity.

Strategy 1.4.1. NRCS will work with the conservation partnership to:

Strategy 1.4.2. Promote conservation planning and management approaches that prevent forestland damage and help ensure that resources can remain healthy and productive.

Strategy 1.4.3. Promote forest management that maintains yield of forest products with protection of watersheds for clean water, wildlife habitat, fiber production, and mixed land uses.

Strategy 1.4.4. Promote cooperative, watershed, or regional approaches to forestland conservation.

Strategy 1.4.5. Strengthen inventory and assessment capabilities to improve the ability to determine the status and condition of forestland.

Strategy 1.4.6. Strengthen assistance to small, limited-resource and minority owners of private, non-industrial forestland.

Strategy 1.4.7. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about forestland productivity and water quality benefits of conservation practices.

- *Goal 2. Reduce unintended adverse effects of natural resource development and use to ensure a high quality environment.*

Objective 2.1. Protect farmland from conversion to non-agricultural uses.

Strategy 2.1.1. NRCS will work with the conservation partnership to:

Strategy 2.1.2. Provide technical assistance to units of government to assist them with development of policies and programs to protect farmland.

Strategy 2.1.3. Complete and implement the Computer Assisted Land Evaluation System to provide a tool for local government units, Tribes, and others to effectively evaluate the potentials and limitations of their land resources relative to proposed uses.

Strategy 2.1.4. Provide training and support to relevant agencies to undertake site assessments in accordance with the Farmland Protection Policy Act requirements.

Strategy 2.1.5. Strengthen local partnerships and other mechanisms to increase the availability of technical assistance in rapidly developing areas.

Strategy 2.1.6. Ensure that local, State, and Tribal governments and non-government organizations have the information on natural resource and environmental issues needed to help guide balanced growth management decision making.

Strategy 2.1.7. Help individuals and communities, through the locally led process, identify resource concerns and develop and implement watershed-based plans to ensure that their quality of life is protected.

Strategy 2.1.8. Assist Tribal, State, and local governments; non-government organizations; communities; and others to protect their locally important lands through a variety of approaches, including easements, zoning, and other growth management strategies.

Strategy 2.1.9. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about the natural resource and agricultural production benefits of conserving rural land and other green space.

Objective 2.2. Promote sound urban and rural community development.

Strategy 2.2.1. NRCS will work with the conservation partnership to ensure that designated, trained staff are available to provide conservation assistance to communities on soil erosion prevention and control, land use planning, engineering support, open space conservation, floodplain protection, stormwater management, soil survey, and natural resource inventories.

Strategy 2.2.2. Develop specialized training, guidance, and practices for employees and partners.

Strategy 2.2.3. Extend coverage of RC&D areas.

Strategy 2.2.4. Enhance efforts in urban and suburban areas, particularly newly developing areas, to undertake comprehensive watershed planning that addresses the potential offsite impacts of development.

Strategy 2.2.5. Work with long-standing and new partners to promote technologies and improved practice standards for reducing runoff of nutrients, pesticides, and sediment from rural and urban residential and community facility sites.

Strategy 2.2.6. Promote conservation activities that can help address air quality problems in non-attainment areas.

Strategy 2.2.7. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about the benefits of conservation for urban and suburban areas.

Objective 2.3. Protect water and air resources from agricultural non-point sources of impairment.

Strategy 2.3.1. NRCS will work with the conservation partnership to provide area-wide planning and coordinated assistance in watersheds with non-point source pollution problems on all non-Federal and Tribal lands.

Strategy 2.3.2. Promote innovative watershed level approaches in areas where the rural-urban interface may constitute unique challenges and offer different opportunities for mixed solutions to locally identified problems.

Strategy 2.3.3. Intensify efforts to protect rivers and streams from the effects of excess nutrient loading and siltation.

Strategy 2.3.4. Intensify efforts to protect rivers and streams from the effects of hydrologic alterations and structural changes to natural geomorphic characteristics, including loss of streamside vegetation, that affect the quality of aquatic habitat.

Strategy 2.3.5. Evaluate the potential to abate sources of air quality impairment and greenhouse gas emissions and increase carbon sequestration on U.S. forest, range, and croplands (e.g., emissions from AFOs, fugitive dust from erosion, agricultural burning).

Strategy 2.3.6. Develop accurate, scientifically validated soil carbon measurement models.

Strategy 2.3.7. Develop economical methods/practices to control erosion and mitigate greenhouse gas emissions on a wide variety of parcel sizes and for landowners and land managers with limited financial resources.

Strategy 2.3.8. Promote streambank restoration and riparian area establishment in locally important watersheds.

Strategy 2.3.9. Support the National Conservation Buffer Initiative to help reduce movement of eroded soil and attached chemicals into waterways.

Strategy 2.3.10. Use appropriate communication strategies to educate the public, landowners, land managers, and government entities about the role of conservation practices and programs in protecting water and air quality.

Objective 2.4. Enhance animal feeding operations to protect the environment.

Strategy 2.4.1. NRCS will work with the conservation partnership to:

Strategy 2.4.2. Promote innovative watershed level approaches in areas where animal waste is a key concern to consider centralized nutrient accounting, storage and distribution of manure nutrients, and other approaches that can link nutrient-rich and nutrient-poor areas.

Strategy 2.4.3. Provide coordinated assistance in watersheds with AFO concentrations.

Strategy 2.4.4. Invest in development of technology and practice standards to support improved waste management.

Strategy 2.4.5. Foster greater private sector capacity to develop and implement animal waste management and riparian technology.

Strategy 2.4.6. Develop innovative partnerships to advance alternatives for animal waste management.
Strategy 2.4.7. Work with partners to encourage integrator-supported cooperative efforts for waste management and utilization where production is concentrated.
Strategy 2.4.8. Coordinate with EPA, partners, Tribes, individuals, and communities to identify TMDL program requirements and integrate these with NRCS watershed level planning and technical assistance activities.
Strategy 2.4.9. Work with operators to increase adoption of waste management practices that address water and air quality concerns.
Strategy 2.4.10. Strengthen assistance to small, limited-resource and minority owned farms and ranches and develop and provide low cost alternatives that meet their needs.
Strategy 2.4.11. Use appropriate communication strategies to publicize traditional and alternative solutions for managing animal waste.

Objective 2.5. Maintain, restore, or enhance wetland ecosystems and fish and wildlife habitat.
Strategy 2.5.1. NRCS will work with the conservation partnership, State agencies, other Federal agencies, and private conservation organizations to identify priority wetlands that could benefit from application of conservation practices in the surrounding landscape to improve wetland habitat and wetland-landscape habitat linkages.
Strategy 2.5.2. Work through the locally led process to identify community goals for fish and wildlife and wetland conservation.
Strategy 2.5.3. Conduct functional assessments on wetlands before and after conservation treatment to validate conservation practice effects in support of outcome measurement.
Strategy 2.5.4. Focus efforts on “no-net loss of wetlands” and on the most highly vulnerable areas of the Southeast, South Central, Midwest, and Northeast regions.
Strategy 2.5.5. Integrate multiple use planning in wetland and wildlife conservation approaches that consider recreation and other non-consumptive uses of resources in conservation planning.
Strategy 2.5.6. Provide needed technical assistance for delineation of wetland areas and ensure continued compliance with swamp-buster requirements.
Strategy 2.5.7. Provide coordinated assistance to promote conservation in watersheds with important wildlife populations.
Strategy 2.5.8. Work with partners and private groups to enhance habitat for important game species.
Strategy 2.5.9. Develop and use adapted native plant materials for wetland restoration and improved wildlife habitat.
Strategy 2.5.10. Use appropriate communication strategies to promote the value and benefits of healthy wetlands and fish and wildlife habitat.

- *Goal 3. Reduce risks from drought and flooding to protect individual and community health and safety.*

Objective 3.1. Protect upstream watersheds from flood risks.

Strategy 3.1.1. NRCS will work with the conservation partnership to help watershed project sponsors to evaluate and assess the need to repair, upgrade, or decommission watershed structures.

Objective 3.2. Protect watersheds from the effects of chronic water shortages and risks from drought.

Strategy 3.2.1. NRCS will work with the conservation partnership to promote watershed level planning to address water supply and drought mitigation, including land treatment as well as structural development or enhancement.

Strategy 3.2.2. Help communities assess conditions and needs and develop plans to prepare for and minimize the effects of drought.

Strategy 3.2.3. Provide science-based information to help individuals and communities plan and undertake proactive mitigation to lessen the potential impacts of drought.

Strategy 3.2.4. Promote cooperative approaches to conservation of ground water resources.

Strategy 3.2.5. Acquire, develop, and transfer applicable technology on plant species that can survive drought conditions and mitigate its impact.

Strategy 3.2.6. Encourage locally led efforts to define water needs and priorities that integrate agricultural needs in the decision-making process.

Strategy 3.2.7. Inform and educate NRCS specialists regarding interpretation of ground water data including rates of decline, recharge, safe yield, and potential for contamination.

Strategy 3.2.8. Strengthen assessment and interpretation capabilities within NRCS to improve ability to determine condition of ground water resources.

Strategy 3.2.9. Evaluate opportunities to improve programs to increase their flexibility for responding to drought emergencies.

Strategy 3.2.10. Use appropriate communications techniques to educate communities about the importance of watershed planning on water conservation and drought preparedness planning.

- *Goal 4. Deliver high quality services to the public to enable natural resource stewardship.*

Objective 4.1. Deliver services fairly and equitably.

Strategy 4.1.1. NRCS will work with the conservation partnership to engage in a continuing review of all agency activities, including program requirement, to ensure that discriminatory aspects do not exist.

Strategy 4.1.2. Increase program flexibility to allow innovative strategies using existing authorities to reach historically underserved landowners and land managers and seek new authorities.

Strategy 4.1.3. Strengthen ties with minority serving academic institutions and community based organizations to develop and deliver services to meet the needs of minority, underserved, and nontraditional customers.

Strategy 4.1.4. Encourage incorporation of environmental justice issues and equal delivery of services into annual plans of operation.

Strategy 4.1.5. Work with Tribal governments to establish offices and assistance delivery approaches that meet their needs.

Strategy 4.1.6. Undertake an assessment of the progress made in meeting the Civil Rights Action Team objectives of improving assistance and service to minority, underserved, and nontraditional customers.

Strategy 4.1.7. Encourage innovative strategies using existing authorities to reach historically underserved landowners and land managers and seek new authorities to broaden and strengthen the conservation partnership.

Strategy 4.1.8. Recognize the multilingual and multicultural needs of our customers. Ensure that agency information, tools, and technologies are in formats that can be used effectively by minority, underserved, and nontraditional groups.

Objective 4.2. Strengthen the conservation delivery system.

Strategy 4.2.1. NRCS will work with the conservation partnership to strengthen our ability to deliver assistance to our diverse customer base by providing our employees innovative training in cross-cultural relations, outreach, and communication.

Strategy 4.2.2. Accurately identify new or updated technical skills needed by our workforce to deliver sound technical assistance to an increasingly diverse customer base through timely queries of partners, employees, employee groups, and customers.

Strategy 4.2.3. Work with partners to identify incentives and develop a program to retain experienced employees to train and mentor new staff.

Strategy 4.2.4. Provide our workforce the best work environment possible by creating an institutional culture that welcomes diversity, encourages innovation, and rewards creativity and achievement.

Strategy 4.2.5. Ensure adequate investment in employee development to maintain technical excellence in an environment of rapidly expanding knowledge and technology.

Strategy 4.2.6. Enhance communication and coordination within the conservation partnership and with other Federal agencies and the private sector to ensure the availability of adequate technical expertise as the workforce of NRCS and other Federal partners changes.

Strategy 4.2.7. Ensure that local conservation district leaders and RC&D councils have the skills and information they need to lead their communities toward effective stewardship.

Strategy 4.2.8. Acquire and deploy the electronic communications and information technology needed to ensure easy, rapid, reliable flow of information within the partnership.

Strategy 4.2.9. Ensure that essential data about resource condition and conservation treatment collected and maintained by NRCS are collected according to consistent definitions and methodology and stored in systems that permit merging of data from many sources.

Strategy 4.2.10. Ensure that the public and others have easy, electronic access to agency directives, technical information, and forms.

Strategy 4.2.11. Encourage American Indian and Native Alaskan participation on conservation district boards and RC&D councils.

Objective 4.3. Ensure timely, science-based information and technologies.

Strategy 4.3.1. NRCS will work with the conservation partnership to strengthen the investment in the agency's technical components to ensure that they are able to provide needed technologies and tools to support conservation.

Strategy 4.3.2. Integrate expertise from the field, partners, and others in the technology development and transfer process.

Strategy 4.3.3. Develop conservation practices designed around traditional methods of Tribes or other minority, underserved, and nontraditional customers to improve their use and acceptability.

Strategy 4.3.4. Complete, update, and maintain soil surveys for all private and non-Federal lands. Complete the production of soils information in digital form.

Strategy 4.3.5. Enhance ability to provide soils information and interpretations by fully populating data in the National Soil Information System.

Strategy 4.3.6. Cooperate with other local, State, and Federal agencies in joint inventory activities and data management agreements to ensure compatibility and consistency of resource information.

Strategy 4.3.7. Ensure that the field staff are provided with the needed technology, tools, and additional technical support to deliver conservation. Field Office Technical Guides (FOTGs) should reflect current technology and knowledge. Make digital orthophoto quads (DOQs) available at the field level for use as a basic conservation planning tool with land users.

Strategy 4.3.8. Develop planning and resource assessment tools and data collection systems for resource planning and to assess resource status, conditions, and trends.

Strategy 4.3.9. Use appropriate communications strategies to publicize new science and technology on natural resource conservation and ensure that new information is widely disseminated within the agency and among the partnership.

5.2.1.f. U.S. Bureau of Reclamation (BOR)

Reclamation plans to work with willing private landowners through the existing local infrastructure to improve habitat conditions related to instream flow, barriers, and screens for anadromous fish. This work is proposed in conjunction with Reclamation responsibilities related to the December 2000, FCRPS BiOp. Work related to this program is planned to begin in 2001 in the Lemhi, 2002 in the upper Salmon, and 2006 in the Little Salmon watersheds of the Salmon Subbasin. Work is planned to last 10 years in each watershed.

Objective 1. Restore and increase main stem and tributary flows to improve anadromous fish spawning, rearing, and migration.

Strategy 1. Obtain methodology to determine flow targets from NMFS.
Strategy 2. Conduct research required to quantify flow targets.
Strategy 3. Acquire streamflows from willing providers.
Strategy 4. Plan and design pipelines, canal lining, diversion automation, and other water conservation measures to provide water to meet irrigation demands and retain residual in stream.
Strategy 5. Plan and design stream restoration modifications to enhance natural stream function.
Strategy 6. Fund construction, if authorized; otherwise, seek funding mechanism for construction.

Objective 2. Work with Idaho Department of Fish and Game to screen diversions, consolidate diversions, and rescreen existing diversions to comply with NMFS criteria to reduce overall mortality of anadromous fish.
Strategy 1. Inventory condition of screened and non-screened diversions.
Strategy 2. Provide planning and engineering design assistance to IDFG.
Strategy 3. Fund construction, if authorized; otherwise seek funding mechanism for construction.

Objective 3. Eliminate barriers to anadromous fish passage.
Strategy 1. Inventory barriers to fish passage.
Strategy 2. Provide planning and engineering design assistance to replace barriers with permanent structures that will freely pass fish.
Strategy 3. Fund construction, if authorized; otherwise seek funding mechanism for construction.

5.2.2. Tribes

5.2.2.a. Nez Perce Tribe (NPT)

Department of Fisheries and Resource Management

The Fisheries and Watershed program focuses on protecting, restoring, and enhancing watersheds and treaty resources within the ceded territory of the Nez Perce Tribe under the Treaty of 1855 with the United States Federal Government. These activities are accomplished using a holistic approach, which encompasses entire watersheds, ridgetop to ridgetop, emphasizing all cultural aspects. The result of our work strives toward maximizing historic ecosystem productive health, for the restoration of anadromous and resident fish populations. (General Council Report 1999)

<u>Goals</u>

- *Goal 1. Restore anadromous fish in rivers and streams at levels to support the historical, cultural, and economic practices of the tribes.*
- *Goal 2. Restore degraded stream and riparian habitat in order to create healthy river systems.*
- *Goal 3. Protect Tribal sovereignty and treaty rights.*
- *Goal 4. Reclaim anadromous and resident fish resource and the environment on which the resource depends for future generations.*

- *Goal 5. Conserve, restore and recover native resident fish populations including sturgeon, westslope cutthroat trout, and bull trout (NPT DFRM 2000).*

Management Objectives

Objective 1. Restore and recover historically present fish species.
Objective 2. Provide for harvestable, self-sustaining populations of anadromous and resident fish species in their native habitat.
Objective 3. Manage salmon and steelhead for long-term population persistence.
Objective 4. Manage aquatic resources for healthy ecosystem function and rich species biodiversity.
Objective 5. Implement and enforce existing federal laws for protection of water quality, habitat and aquatic resources.
Objective 6. Protect and enhance treaty fishing rights and fishing opportunities.
Objective 7. Provide optimum tributary stream flows to meet life stage specific habitat requirements of resident and anadromous fish species and all other aquatic species.
Objective 8. Provide optimum mainstem river flows for anadromous fish passage and water spill at mainstem dams to maximize fish survival.
Objective 9. Integrate aquatic habitat and species management with terrestrial species management.
Objective 10. Maintain a natural smolt-to-adult survival rate of 2 to 6% for salmon and steelhead.
Objective 11. Meet federal fisheries mitigation responsibilities for LSRCP program.
Objective 12. Provide for Tribal hatchery production needs in federal and state managed facilities.
Objective 13. Address key limiting survival factors at mainstem hydroelectric facilities.
Objective 14. Coordinate with the National Marine Fisheries Service and U.S. Fish and Wildlife Service to fund and implement actions identified in the Biological Opinions, and to implement other emergency actions that address imminent risk to listed salmon, steelhead, and bull trout populations.
Objective 15. Develop conservation hatcheries for supplementation of ESA listed fish populations.

Management Strategies

Strategy 1. Implement natural river drawdown strategy, for recovery of anadromous fish stocks, with necessary investments in community infrastructure.
Strategy 2. Implement a no-net decline management criteria for anadromous fish stocks.
Strategy 3. Implement Nez Perce Tribal Hatchery production releases for recovery and restoration of fall chinook and spring chinook salmon.
Strategy 4. Monitor steelhead in key tributary streams.
Strategy 5. Implement native steelhead broodstock development in conservation hatcheries.

Strategy 6. Implement effective monitoring and evaluation of supplementation and habitat enhancement programs on project-specific and reference stream (control) locations.
Strategy 7. Conduct necessary planning activities.
Strategy 8. Restore the natural production potential of anadromous and resident fish species.

Habitat Objectives

Objective 1. Increase anadromous and resident fish populations through tribal, federal, and state coordinated supplementation, management, and habitat restoration.
Objective 2. Restrict or eliminate land management activities such as logging, road building, grazing, and mining that are harming the health of riparian ecosystems including water quality degradation, stream habitat degradation, loss of riparian vegetation, streambank destabilization, and altered hydrology.
Objective 3. Improve water quality including reducing temperatures (for cold water biota T<60F), sedimentation, and agricultural runoff.
Objective 4. Restore riparian ecosystems
Objective 5. Restore in-stream habitat to natural conditions.
Objective 5. Restore spawning and rearing habitat

Habitat Strategies

Strategy 1. Coordinate habitat protection and restoration as co-managers with federal, state, and local agencies.
Strategy 2. Develop watershed assessments to help prioritize restoration work, resource management, and planning efforts.
Strategy 3. Continue and implement projects designed to restore hillslope hydrology.
Strategy 4. Reduce sedimentation, cobble embeddedness, stream temperature to CRITFC water quality standards for streams supporting cold water biota.
Strategy 5. Continue and implement projects designed to protect and restore riparian areas, restore wetlands and floodplain areas, restore the hydrologic connectivity between terrestrial and aquatic ecosystems.
Strategy 6. Continue and implement projects to reduce grazing impacts on stream systems and riparian areas.
Strategy 7. Implement projects that investigate the impacts of invasive exotic plants and participate in coordinated control efforts.
Strategy 8. Implement projects to restore areas impacted by mining activity.
Strategy 9. Continue and implement projects to reduce road densities
Strategy 10. Inventory and evaluate natural and artificial passage barriers.
Strategy 11. Provide passage for aquatic species as a part of developing sustainable and productive aquatic ecosystems.
Strategy 12. Develop a monitoring and evaluation program to determine the extent and quality of habitat available to anadromous and resident fishes.

Strategy 13. Continue and expand monitoring to evaluate the success of restoration projects.
Strategy 14. Coordinate monitoring programs at the subbasin scale in order to facilitate data sharing.
Strategy 15. Use data from all monitoring and evaluation efforts to improve watershed scale planning, decision-making, as well as refine management and restoration practices.
Strategy 17. Inventory riparian and wetland areas
Strategy 18. Acquire lands for improved habitat protection, restoration, and connectivity and for mitigation of lost fisheries/wildlife habitat
Strategy 19. Develop projects designed to research the link between aquatic and terrestrial ecosystems including understanding the importance of salmon carcasses in nutrient cycles.

Artificial Production Objectives

Objective 1. Restore runs of salmon, steelhead, and other native species in all parts of the Nez Perce Tribe territory.
Objective 2. Prevent further decline of salmon, steelhead and other species stocks through the use of artificial propagation.
Objective 3. Reestablish runs of salmon, steelhead and other species that are no longer present in the salmon subbasin

Artificial Production Strategies

Strategy 1. Continued implementation of the Johnson Creek Artificial Propagation Enhancement (JCAPE) Project for recovery and restoration of summer chinook. Implementation strategies for the program are outlined in the JCAPE Benefit Risk Assessment (PRRG 2000) and JCAPE HGMP (NPT and PRRG 2001).
Strategy 2. Develop new supplementation facilities and programs in the Salmon Subbasin where a need is identified through U.S. v Oregon processes, monitoring and evaluation and stock risk assessment.
Strategy 3. Begin to reestablish runs of salmon, steelhead and other species into vacant habitat throughout the salmon subbasin.

Research Monitoring and Evaluation

Objective 1. Implement the Johnson Creek Artificial Propagation and Enhancement project monitoring and evaluation plan to increase program effectiveness and minimize risk.
Strategy 1. Determine if program targets for contribution rate of hatchery fish are being achieved and can be improved.
Strategy 2. Determine the increases in natural production that results from supplementation in Johnson Creek and relate them to limiting factors.
Strategy 3. Estimate ecological and genetic impacts to fish populations.
Strategy 4. Effectively communicate monitoring and evaluation program approach and findings to resource managers.

Objective 2. Implement the Idaho Salmon Supplementation study design to assess the use of hatchery chinook salmon to increase natural populations of spring and summer chinook salmon in the Salmon River drainage.

- Strategy 1. Monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapements of naturally produced salmon.
- Strategy 2. Monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation.
- Strategy 3. Determine which supplementation strategies (brood stock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity.
- Strategy 4. Coordinate supplementation research planning and field evaluation program activities and management recommendations for the Nez Perce Tribe.

Objective 3. Conduct Lower Snake River Compensation Plan (LSRCP) hatchery evaluations.

- Strategy 1. Conduct salmon spawning ground surveys in the South Fork Salmon River and other reference streams.
- Strategy 2. Determine hatchery:natural adult salmon composition in natural production areas in the South Fork Salmon River.
- Strategy 3. Conduct genetic analysis to examine stock structure and genetic introgression of listed hatchery salmon in the South Fork Salmon River.
- Strategy 4. Develop small-scale experiments to determine contribution of hatchery origin adults to juvenile production.
- Strategy 5. Develop a conservation framework for South Fork Salmon River adult returns that promotes long-term population persistence.
- Strategy 6. Continue chinook salmon spawning ground survey in reference streams for population trend monitoring.
- Strategy 7. Cooperatively conduct marking and mark efficiency evaluation studies of LSRCP hatchery production.
- Strategy 8. Estimate survival of hatchery chinook salmon presmolt and parr releases from the South Fork Salmon River to Snake River dams.
- Strategy 9. Collect adult male gametes from LSRCP hatcheries and from selected tributary streams for gene conservation efforts (cryopreservation).

Objective 4. Preserve the genetic diversity of salmonid populations at high risk of extirpation through application of cryogenic techniques.

- Strategy 1. Coordinate salmonid gamete preservation with management agencies in the Snake River basin.
- Strategy 2. Refine gene bank cryopreservation project goals for salmonid spawning aggregates at high risk of extirpation in the Snake River basin.
- Strategy 3. Collect gametes from ESA-listed chinook salmon and steelhead for application of cryopreservation techniques and conduct genetic analysis of fish represented in the germplasm repository for salmonid conservation units at low levels of abundance and high risk of extirpation.

Strategy 4. Technology transfer through annual reports.
Strategy 5. Operation and maintenance of germplasm repository.

Objective 5. Conduct conservation evaluation of Middle Fork Salmon River chinook salmon spawning aggregates.

Strategy 1. Coordinate development of a benefit risk assessment with management agencies and independent scientists.
Strategy 2. Assess status of spring and summer chinook salmon in tributary streams of the Middle Fork Salmon River.
Strategy 3. Assess potential management alternatives that achieve and promote long-term population persistence.
Strategy 4. Identify the preferred management action(s) needed to achieve and promote long-term persistence of chinook salmon in the Middle Fork Salmon River.
Strategy 5. Effectively communicate project results to management agencies and independent scientists.

Objective 6. Accurately determine adult chinook salmon spawner abundance and spawner migration timing into the Secesh River and Lake Creek on an annual basis.

Strategy 1. Coordinate the listed stock escapement monitoring project with state and federal management agencies in the Snake River basin.
Strategy 2. Coordinate the escapement monitoring evaluation study with the National Marine Fisheries Service.
Strategy 3. Monitor the abundance and timing of migration of adult chinook salmon into the Secesh River and Lake Creek drainage.
Strategy 4. Transfer the technology through annual project reports.

Objective 7. Determine the need and identify potential measures for protecting and rebuilding sturgeon populations and mitigating for effects of the hydropower system.

Strategy 1. Determine the status and characteristics (reproductive and early life history) of the white sturgeon population.
Strategy 2. Determine habitat used for spawning and rearing of white sturgeon.
Strategy 3. Develop plans to address other informational needs identified in the BRAT not covered by the above strategies.
Strategy 4. Coordinate with fisheries co-managers and funding agencies and disseminate project information.

Objective 8. Conduct juvenile and adult population status monitoring of steelhead in the South Fork Salmon River.

Strategy 1. Quantify adult steelhead spawner abundance and calculate spawner to spawner ratios.
Strategy 2. Quantify juvenile steelhead abundance and determine smolt-to-adult survival.

5.2.2.b. Shoshone-Bannock Tribe (SBT)

Objective 1. Finalize the Salmon River Production Master Plan and implement supplementation evaluation and hatchery reform projects in the Salmon River.

- Strategy 1. Incubate and rear salmon and steelhead in a more natural way than traditional hatchery production in order to maximize their success at restoring naturally-spawning populations.
- Strategy 2. Release fish from acclimation ponds and use other release strategies that more naturally transition the fish from an artificial to the natural environment.
- Strategy 3. Utilize available and appropriate hatchery-origin fish to develop locally adapted supplementation brood stock for areas that are functionally devoid of naturally-spawning populations above the Middle Fork Salmon River (e.g., Lemhi River, Panther Creek, East Fork Salmon River, Yankee Fork Salmon River, Basin Creek, Valley Creek, and Headwaters of the Salmon River).
- Strategy 4. Maintain the Middle Fork Salmon River as a wild fish refuge until all other recovery methods fail or there are no other viable recovery options.
- Strategy 5. Develop a conservation framework for Salmon River adult returns that promotes long-term population persistence, maximizes genetic diversity and maintains minimum escapement.

Objective 2. Increase, when necessary, productivity of Sawtooth Valley sockeye nursery lakes to provide habitat that supports optimal growth and survival of juvenile sockeye.

- Strategy 1. Conduct fish community interaction studies in Sawtooth Valley nursery lakes to better understand competition/predation interactions of juvenile sockeye with other species.
- Strategy 2. Monitor the growth and survival of introduced juvenile sockeye.
- Strategy 3. Monitor limnological conditions of Sawtooth Valley nursery lakes in order to predict carrying capacity.
- Strategy 4. Monitor kokanee densities and escapement in Sawtooth Valley nursery lakes.

Objective 3. Protect and restore salmonid spawning, incubation, rearing and passage habitat.

- Strategy 1. Reduce fine sediment inputs and improve channel morphology (width-to-depth ratios, pool habitat, streambank stability and undercuts, sinuosity, riparian conditions).
- Strategy 2. Maintain and restore stream temperature and in-stream flows required for survival and recovery of critical life stages of native salmonids.
- Strategy 3. Evaluate water quality including toxic pollutants and pursue actions to maintain and where necessary restore water quality to native salmonid standards.

5.2.3. State

5.2.3.a. Idaho Department of Fish and Game

General

- *Goal 1. Preserve, protect, perpetuate, and manage Idaho's 500+ fish and wildlife species, as steward of public resources.*

Objective 1. Minimize the number of Idaho species identified as threatened or endangered under provisions of the Endangered Species Act of 1973, as amended.

Strategy 1. Protect, preserve, and perpetuate fish and wildlife resources for their intrinsic and ecological values, as well as their direct benefit to man.

Strategy 2. Actively support and participate in efforts to protect or enhance the quality of water in Idaho's lakes, rivers, and streams.

Strategy 3. Advocate land management practices that protect, restore and enhance fish and wildlife habitat, especially habitats such as wetlands and riparian areas that benefit a wide variety of fish and wildlife species.

Strategy 4. Be an advocate for wildlife and wildlife users in legislation, land and water use activities, policies, or programs that result in significant and unwarranted loss of fish and wildlife habitat or populations, and encourage project designs that eliminate or minimize such losses.

- *Goal 2. Increase opportunities for Idaho citizens and others to participate in fish- and wildlife-associated recreation.*

Objective 1. Emphasize recreational opportunities associated with fish and wildlife resources.

Strategy 1. Support hunting, fishing, and trapping as traditional and legitimate uses of Idaho's fish and wildlife resources.

Strategy 2. Manage fish and wildlife resources for recreational and other legitimate benefits that can be derived primarily by residents of Idaho.

Strategy 3. Manage fish and wildlife to provide a variety of consumptive and nonconsumptive recreational opportunities as well as scientific and educational uses.

Strategy 4. Manage wildlife at levels that provide for recreational opportunity but do not result in significant damage to private property.

Strategy 5. Use the best available biological and social information in making and influencing resource decisions.

Fisheries Bureau

- *Goal 1. To provide viable fish populations now and in the future for recreational, intrinsic, and aesthetic uses.*

Objective 1. Provide the diversity of angling opportunities desired by the public, within guidelines for protection of existing fish populations.

Strategy 1. Develop and implement statewide fisheries programs.

Strategy 2. Operate fish hatcheries to provide eggs and fish for the angling public.

Strategy 3. Prepare and distribute information to the general public about fishing areas, rules, and techniques for angling.

Strategy 4. Maintain and enhance the quality of fish habitat so natural production of fish can be maintained.

Strategy 5. Provide access sites and related facilities for the boating and fishing public.

- *Goal 2. To preserve Idaho's rare fishes to allow for future management options.*

Objective 1. Maintain or restore wild populations of game fish in suitable waters.

Strategy 1. Provide technical expertise to the Executive and Legislative branches, Idaho Northwest Power Planning Council representatives, Idaho Fish and Game Commission and to the citizens of Idaho.

Strategy 2. Work closely with other regulatory agencies to provide adequate passage for anadromous fish to and from Idaho and the ocean environment.

Strategy 3. Assist in recovery of rare species through captive rearing projects, supplementation, and protection.

Strategy 4. Provide input to land management agencies on how fishery resources may be affected by various proposed activities.

Strategy 5. Conduct periodic surveys of Idaho anglers to determine their preferences and opinions.

Objective 2. Maintain and improve habitats, including water quantity and water quality, to preserve aquatic fauna.

Strategy 1. Provide technical guidance to land management agencies and private landowners to minimize impacts to aquatic habitats from their activities.

Strategy 2. Coordinate with Natural Resources Policy Bureau, Department of Water Resources, and the Department of Environmental Quality to develop minimum stream flows and lake levels, water quality standards, and riparian habitat standards that maintain or improve habitats.

Statewide Fisheries Management

Idaho's overall goal is to restore and maintain wild native populations and habitats of resident and anadromous fish to preserve genetic integrity, ensure species and population viability, and provide sport fishing and aesthetic benefits.

Objective 1. Wild native populations of resident and anadromous fish species will receive priority consideration in management decisions.

Objective 2. Maintain or enhance the quality of fish habitat.

Strategy 1. Use spatial databases to assist in prioritization of habitat improvement projects.

Strategy 2. Coordinate with other agencies and landowners to develop comprehensive conservation and restoration plans.

Action 1. Develop a Model Watershed program in the Little Salmon River drainage.

Action 2. Restore channel function and connectivity for native salmonids in the Stibnite mining district of the South Fork Salmon River.

Action 3. Install Upper Big Creek (Middle Fork Salmon) channel gradient control to maintain chinook spawning gravels.

Action 4. Work with irrigators to restore instream flows in dewatered tributary stream reaches and restore connectivity to at least 100 miles of tributary habitat in the Salmon, Lemhi, and Pahsimeroi Rivers for migratory fluvial trout and char.

Objective 3. Fully utilize fish habitat capabilities by increasing populations of suitable fish species to carrying capacity of the habitat.

Strategy 2. Conduct applied research to investigate the potential impact of lost productivity due to declining salmon and steelhead runs on native resident fish.

Action 1. Determine if findings on nutrient supplementation developed on coastal waters are applicable and practical for increasing resident trout/char abundance in the subbasin.

Objective 4. Maintain genetic integrity of wild native stocks of fish and naturally managed fish when using hatchery supplementation.

Resident Fish Management

There are two goals for resident fish and aquatic communities: The first is to ensure that native species are well distributed and represented in the aquatic communities of the Salmon subbasin, such that these species are not prone to extinction. The second is to provide abundant, diverse sport fishing opportunities around the subbasin which place emphasis on, but are not restricted to, sport fishing opportunities for native and self-sustaining populations of fish. Hatchery programs will also be used to provide opportunities in appropriate waters.

Objective 1. Maintain or restore wild native populations of bull trout, westslope cutthroat trout, resident rainbow trout and white sturgeon to ensure species viability and sport fishing opportunity.

Strategy 1. By 2005, evaluate the current status of all major bull trout metapopulations within the subbasin.

Action 1. Summarize trends in bull trout densities for all available general parr monitoring sites with existing data and expand field sample locations as needed to provide sufficient statistical power for effective monitoring.

Action 2. Estimate effective population sizes of bull trout stocks residing in all 4^{th} code HUCs within the subbasin using DNA sampling and linkage disequilibrium techniques.

Action 3. Validate accuracy of genetically derived bull trout EPS estimates from 2 above in a sub-sample of HUCS using density estimates, maturity schedules, and longevity.

Action 4. Evaluate bull trout extinction risk (PVA) using existing literature guidelines and EPS estimates from 2 and 3 above.

Action 5. Conduct DNA genetic inventory of a random sample of subbasin bull trout populations to assess brook trout introgression rates and identify unique bull trout stocks.

Action 6. Evaluate the interaction of Riordan Lake bull trout with the South Fork Salmon River metapopulation.

Action 7. Assess interactions of Stanley Basin moraine lake stocks of bull trout with Upper Salmon River fish and evaluate associated predatory impacts on Endangered sockeye salmon.

Strategy 2. By 2003, ascertain the genetic purity status of at least 50 wild westslope cutthroat trout stocks in the subbasin to aid in the prioritization of fishery management decisions.

Action 1. Conduct DNA-based genetic inventories of westslope cutthroat stocks.

Action 2. Evaluate "natural" introgression rates between native rainbow trout and westslope cutthroat stocks in the subbasin.

Strategy 3. By 2005, determine the status and distribution of redband trout in the subbasin.

Action 1. Describe the basic life history, geographic distribution and habitat utilization of redband populations in sympatry and allopatry with steelhead populations.

Action 2. Collect baseline genetic profiles and relationships of populations within and outside the subbasin.

Action 3. Develop strategies to protect, improve and restore degraded habitat.

Strategy 4. By 2005, determine the status and distribution of white sturgeon populations in the subbasin.

Action 1. Describe the population size, age structure, recruitment.

Action 2. Determine the connectivity with Snake River sturgeon populations.

Action 3. Evaluate the effects of incidental mortality, illegal and tribal harvest on the population.

Action 4. Develop plan to ensure population viability.

Strategy 5. Control non-native brook trout where interactions with native salmonids limit the survival and production of native salmonid populations.

Objective 4. Increase sport-fishing opportunities in Idaho and provide a diversity of angling opportunities desired by the public.

Strategy 1. Develop fishing ponds in areas where stream-fishing opportunity is limited by conservation efforts on native fishes

Action 1. Develop one or two catchable trout ponds in the South Fork Salmon River drainage.

Action 2. Develop one or two fishing ponds in the Lower Salmon watershed

Strategy 2. Practice current public review process for developing management plans and regulations.

Strategy 3. By 2010, provide catch rates of at least 1.0 fish per hour on westslope cutthroat trout in the Salmon River between North Fork and Stanley.

Action 1. Implement restrictive fishing regulations where warranted.

Objective 5. Where desirable and feasible, some lakes will be maintained as fishless. Fishless lakes will allow for maintenance of natural conditions for native fauna within alpine ecosystems.

Strategy 1. Coordinate with other agencies on data availability and identify additional data gaps.

Anadromous Fish Management

Idaho's overall anadromous fisheries goal is to recover wild Snake River salmon and steelhead populations and restore productive salmon and steelhead fisheries. Idaho believes long-term direction must improve in-river conditions enough to provide sustainable 2% to 6% smolt-to-adult survival to achieve recovery (Idaho's comments to NMFS on draft supplemental Biological Opinion for the FCRPS from Governor Batt, April 3, 1998, as included in IDFG (1998) Idaho's anadromous fish stocks; their status and recovery options). Specific objectives and strategies of IDFG, to meet the overall Idaho anadromous fisheries goal, are as follows.

Objective 1. Maintain genetic and life history diversity and integrity of both naturally-and hatchery-produced fish.

- Strategy 1. Prepare genetic management and conservation plans for salmon and steelhead populations using known genetic diversity and genetic structure data.
  - *Action 1.* Complete a province-wide chinook salmon genetic assessment.
  - *Action 2.* Continue to monitor hatchery steelhead introgression into wild populations, continuing and expanding on the steelhead genetic assessment currently being done.
  - *Action 3.* Monitor hatchery chinook salmon introgression into wild populations.
  - *Action 4.* Quantify the types and extent (amount) of straying occurring in within subbasins, within the Mountain Snake Province, and within designated ESUs.
  - *Action 5.* Identify spatial segregation of anadromous vs. resident life history forms of *O. mykiss.*
  - *Action 6.* Identify relationship of O. nerka population in Warm Lake (South Fork Salmon River) to other populations.
- Strategy 2. Maintain and establish wild production refugia for salmon and steelhead populations.
  - *Action 1.* Assess complete distribution of wild salmon and steelhead spawning and rearing.
  - *Action 2.* Take steps to assure salmon and steelhead in refuge areas are protected.
- Strategy 3. Minimize harvest impacts on protected naturally reproducing fish stocks through selective fisheries on marked fish and harvest regulations.
- Strategy 4. Establish facilities for captive culture of salmon and steelhead populations likely to become extirpated in the near-term future.
- Strategy 5. Monitor appropriate population parameters to assess population status, trends, and persistence.
- Strategy 6. Establish captive populations for stocks or populations likely to become extinct in the near-term future.
- Strategy 7. Preserve genetic diversity through gamete cryopreservation.

Objective 2. Rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level.

- Strategy 1. Use appropriate and proven supplementation techniques to restore and rebuild populations outside of wild production refugia.

Strategy 2. Achieve and maintain production level in wild populations at 70% of parr carrying capacity.

Action 1. Develop appropriate intensity and spatial distribution of monitoring to estimate parr carrying capacity.

Action 2. Minimize harvest impacts on protected naturally producing fish through selective fisheries on marked fish and harvest regulations.

Strategy 3. Continue selective sport fisheries, based on adipose fin-clips, to safeguard naturally produced fish while providing fishing opportunity for surplus hatchery fish.

Action 1. Obtain adequate support of fish marking program to improve and maintain quality control.

Strategy 4. Implement proven hatchery intervention where necessary and ecologically prudent to provide a safety net for selected populations at risk.

Strategy 5. Balance genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction.

Strategy 6. Implement proven nutrient fertilization programs where feasible in conjunction and coordination with on-going studies and coordinated with appropriate land management agencies.

Action 1. Interagency project oversight and coordination committee with CBFWA membership.

Objective 3. Achieve equitable mitigation benefits for losses of anadromous fish to utilize existing and potential habitat at an optimal level.

Strategy 1. Improve survival associated with juvenile and adult migration through the federal hydroelectric system by strengthening the scientific foundation from which management alternatives are considered and assessed.

Strategy 2. Pursuant to the current configuration of federal dams and reservoirs, take more aggressive actions to address significant sources of direct and delayed discretionary mortality while providing risk assessment to judge effectiveness of actions within the context of environmental variability.

Strategy 3. Maintain current mitigation hatchery programs at design capacity to fulfill mitigation harvest objectives.

Strategy 4. Mark all hatchery harvest production to maximize harvest potential.

Strategy 5. Reduce potential ecological impacts of hatchery produced fish on wild.

Strategy 6. Produce fish that maintain optimum survival to adults through disease control, fish culture practices, and release strategies.

Objective 4. Improve overall life cycle survival sufficient for delisting and recovery by addressing key limiting factors identified in all "H’s" of hydropower, habitat, harvest, and hatchery effects.

Strategy 4.1. Safeguard naturally produced fish while providing fishing opportunity for surplus hatchery fish by externally marking hatchery production (e.g. adipose fin clip).

Strategy 4.2. Balance genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction.

Objective 5. Allow consumptive harvest by sport and treaty fishers.

Strategy 1. Minimize harvest impacts on protected naturally producing fish through selective fisheries on marked fish and harvest regulations.

Strategy 2. Maintain current mitigation hatchery programs at design capacity to fulfill mitigation harvest objectives.

Objective 6. Coordinate regional management with Idaho management to ensure achievement of Idaho fish escapement and other goals.

Strategy 1. Participate in regional management forums to enable harvest restrictions and passthrough provisions that allow sufficient escapement to achieve Idaho harvest objectives.

Objective 7. Restore and maintain healthy, viable populations of Pacific lamprey populations in the subbasin.

Strategy 1. Determine the status, life history and distribution of pacific lamprey.

Strategy 2. Develop techniques for collection and estimating population size.

Strategy 3. Describe habitat utilization and limiting factors in the subbasin..

Strategy 4. Develop and implement strategies to protect, improve and restore habitat.

Strategy 5. Develop plans to mitigate for ongoing activities.

Strategy 6. Coordinate with the Columbia Basin Lamprey Workgroup to exchange information that will enhance knowledge of the species and help develop recovery actions.

Supplementation Research – Stream-dwelling Anadromous Salmonids

Two goals for supplementation research on stream-type chinook in the Salmon Subbasin have been identified. These are to: (1) assess the use of hatchery chinook salmon to increase natural populations of spring and summer chinook salmon, and (2) evaluate the genetic and ecological impacts of hatchery chinook salmon on naturally reproducing chinook salmon populations. Associated with these goals are four specific objectives:

Objective 1. Monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapements of naturally produced salmon.

Objective 2. Monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation.

Objective 3. Determine which supplementation strategies (brood stock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity.

Objective 4. Develop supplementation recommendations.

A single goal has been identified for supplementation research on steelhead in the Salmon Subbasin. This is to assess how or if artificial propagation can be used to rebuild natural populations of steelhead to self-sustaining and harvestable numbers without an adverse impact on the existing natural populations. Associated with this goal are seven specific objectives:

Objective 1. Assess the performance of hatchery and wild brood sources to reestablish steelhead in streams where extirpated.

Objective 2. Evaluate the ability of returning adults from hatchery smolt and fingerling releases to produce progeny in natural streams.
Objective 3. Estimate recovery rates and the frequency of supplementation required to establish viable steelhead populations in restoration rivers.
Objective 4. Evaluate brood stock management at existing weirs in relation to natural production objectives.
Objective 5. Assess the abundance, habitat, and life history characteristics of existing steelhead populations in the Salmon River and Clearwater River drainages.
Objective 6. Assess the behavioral and ecological effects of supplementation on natural chinook, steelhead, and resident trout populations.
Objective 7. Evaluate post release survival of fish raised by alternative hatchery techniques in comparison to conventional hatchery practices.

Terrestrial Habitats and Wildlife

Forest Carnivores

Objective 1. Monitor marten populations and harvest opportunities.
Objective 2. Improve knowledge through research and monitoring of harvest and populations.
Objective 3. Determine presence/absence of forest carnivores in potential habitats to delineate distribution, size, and isolation of populations.
Strategy 1. Conduct surveys for fishers within areas of unverified presence but having potential occupancy and in potential habitat linkage zones following (Zielinski and Kucera 1994).
Action 1. Develop methodologies for monitoring marten populations and harvest.
Objective 4. Expand marten, fisher, and lynx distribution.
Strategy 1. Prioritize recolonization and augmentation areas.
Objective 5. Manage vegetation consistent with historical succession and disturbance regimes.
Strategy 1. Restore fire as an ecological process.
Action 1. Evaluate historical conditions and landscape patterns to determine historical vegetation mosaics across landscapes through time.
Objective 6. Provide sufficient core and linkage habitats to support will distributed forest carnivore populations throughout their historic range.
Strategy 1. Protect integrity of forest carnivore habitats.
Action 1. Assess the effects of habitat fragmentation and mortality from roads and highways on lynx population viability.
Action 2. Determine the effects of open forest roads and associated human use on populations and habitat use.
Action 3. Determine the size and characteristics of refugia for forest carnivores.
Action 4. Determine to what extent lynx use shrub-steppe habitats.
Action 5. Provide a landscape of interconnected blocks of forging habitat.
Strategy 2. Delineate potential habitats.
Action 1. Map habitats using 1:250,000-1:1,000,000 scale maps with attributed coverages at the drainage, subdrainage, and stand scales.

Action 2. Identify connectivity and core habitats for priority protection and conservation.

Strategy 3. Identify habitat linkage zones connecting regional populations demographically and genetically.

Action 1. Manage linkage zones as primary conservation areas.

Action 2. Examine roading impacts to linkage habitats and populations.

Action 3. Identify core areas that possess high quality habitats and high-density populations.

Small Mammals

Objective 1. Survey and identify roost, foraging and hibernacula habitats, individuals and populations of fringed myotis, Townsend's Big-eared bat, and western Pipistrelle.

Objective 2. Protect and conserve pygmy rabbit shrub-steppe habitats from fire, grazing, agricultural conversion.

Strategy 1. Identify and record population and individual sitings of pygmy rabbits.

Migratory Birds

Objective 1. Maintain existing distribution and extent of each riparian system.

Objective 2. By 2025, restore at least 10% of the historical extent of each riparian system within each ecoregion subsection, to conditions that would support productive populations of designated focal species.

Strategy 1. Determine the potential bird communities within each riparian ecosystem.

Strategy 2. Determine the habitat requirements and habitat associations of focal and priority species and the effects of management activities and land use.

Action 1. Determine habitat requirements and population trends of focal and priority species using published and unpublished data.

Action 2. Initiate research and monitoring programs for focal and priority species (Barrow's Goldeneye, Hooded Merganser, Blue Grouse, Mountain Quail, Black-chinned, Calliope, and Rufous Hummingbirds, Willow Flycatcher, Dusky Flycatcher, American Dipper, Yellow Warbler, MacGillivray's Warbler).

Strategy 3. Accumulate information on the current and potential distributions of each riparian system.

Action 1. Develop a GIS data repository for riparian associated information.

Action 2. Complete the National Wetland Inventory mapping of riparian habitats for areas not yet completed.

Action 3. Identify areas of potential good quality riparian habitat and areas where restoration should occur.

Strategy 4. Restore riparian habitats based on feasibility, land ownership, size of existing patches, existing land matrix, quality, and habitat connectivity.

Action 1. Preliminarily protect or restore Salmon River from Challis to the Narrows, East Fork of the Salmon, Lemhi River, and Pahsimeroi River.

Objective 3. Obtain a net increase in the number of acres of non-riverine wetlands in Idaho, focusing on the same types and amounts that historically occurred there.

Strategy 1. Write habitat management recommendations for wetland birds.

Objective 4. By the end of 2009, reverse declining trends of species associated with sagebrush habitats in Idaho, while maintaining current populations of other associated species.

Strategy 1. Assess existing condition and extent of shrub-steppe habitat in Idaho at three levels: statewide, administrative unit, and management unit.

Action 1. Use remote sensing, existing information, and ground data to identify, map, assess, and prioritize shrub-steppe habitats.

Objective 5. In dry ponderosa pine/Douglas-fir/grand fir forests, restore as much as possible but at least 10% (100,000 acres) of the historical range of these forests meeting the conditions needed for White-headed woodpeckers.

Strategy 1. Identify stands of ponderosa pine that are in historical conditions and those that are at least 10 acres sizes with a large tree component.

Action 1. Define historical conditions of ponderosa pine stands and use remote sensing data and ground inventory information to map them.

Action 2. Prioritize potential restoration sites based on feasibility, land ownership, land management, and existing conditions.

Action 3. Work to develop conservation agreements, land or resource trades or other incentives to protect privately owned priority ponderosa pine stands.

Action 4. Develop a snag management strategy to optimize large ponderosa pine snags distributed across the landscape.

Action 5. Conduct studies on the effects of fire-management in ponderosa pine for focal and priority species.

Objective 6. Manage vegetation consistent with historical succession and disturbance regimes for Black-backed woodpeckers.

Strategy 1. Restore fire as an ecological process.

Action 1. Monitor nests and breeding and foraging behavior in logged and unlogged burned forests.

Action 2. Protect post-fire forests from salvage activities.

Action 3. Conserve selected burned forest stands >387 ha.

Owls

Objective 1. Develop information on Northern Pygmy, boreal, flammulated, and great grey owl habitat use, population trends, and demographics.

Objective 2. Protect existing and potential habitats from loss and degradation.

Strategy 1. Develop permanent monitoring sites.

Action 1. Establish and conduct owl survey transects and surveys.

Action 2. Erect and monitor nest boxes.

Strategy 2. Retain snags and primary cavity nesters.

Action 1. Protect or implement uneven-aged management practices in Ponderosa pine stands.

Action 2. Retain suitable boreal owl habitat in spruce-fir forests.

Action 3. Restore aspen forests.

Action 4. Retain large snags and habitat near and in riparian areas.

Northern Goshawk

Objective 1. Determine biology and ecology of northern goshawks.

Strategy 1. Use long-term studies to measure nest territory fidelity, home range, habitat use, and metapopulation dynamics.

Objective 2. Determine the abundance and distribution of goshawks.

Strategy 1. Use standardized survey protocols for surveying habitats.

Objective 3. Protect nesting goshawks and foraging habitats in home ranges of nesting goshawks.

Strategy 1. Develop conservation agreements with private landowners.

Action 1. Develop management guidelines that are standardized across regional boundaries for forest cover types, and climates.

Action 2. Manage riparian habitat in mature forest to include buffer zones to protect potential goshawk nesting and foraging habitat.

Mountain Quail

Objective 1. Identify and remove or lessen threats to mountain quail population recovery in Dough, Eagle, Skookumchuck, White Bird, Slate, John Day, Cow, Lightning, Allison, Race, Kessler, Papoose, and Squaw Creeks and the Riggins/Pollock/Pinehurst area.

Strategy 1. Develop local management plans.

Objective 2. Identify, protect, and enhance habitats that link existing and future populations at the landscape level.

Strategy 1. Inventory mountain quail range.

Action 1. Use the habitat suitability model (Brennan et al. 1986) to assess and identify habitat quality, improvements needed, and monitor rehabilitation efforts.

Objective 3. Conduct experimental transplants and habitat management actions to more precisely determine habitat relationships.

Objective 4. Enhance degraded habitat and increase the distribution of mountain quail habitat.

Strategy 1. Rehabilitate riparian habitats.

Action 1. Manage grazing in riparian habitats to maintain dense overstory of mature shrubs and an open understory.

Action 2. Plant native and other desirable food-producing shrubs in riparian areas

Sage Grouse

Objective 1. Identify, protect, and enhance existing and potential sage grouse habitat within each Management Area.

Strategy 1. Manage nesting and early brood habitats to provide 15-25% sagebrush canopy coverage and about 7 inches or more of grass and forb understory during the May nesting period.

Strategy 2. Manage for late summer brood habitat that includes a good variety of succulent vegetation adjacent to sagebrush escape and loafing cover.

Strategy 3. Manager for winter habitat that provides sagebrush exposed under all possible snow depths.

Strategy 4. Implement grazing management and big game regulations to achieve and maintain sagebrush and riparian/meadow habitats in good ecological condition.

Strategy 5. Do everything possible to protect remaining sage grouse habitats where natural fire frequency is 50-130 years and recent fire has greatly reduced sage grouse habitat.

Strategy 6. Establish priority areas for sage grouse habitat management.

Strategy 7. Monitor the condition and trend of sage grouse habitat.

Action 1. Prepare cover type maps and evaluate habitat conditions using standards methods for key seasonal habitats.

Action 2. Offer conservation easements or acquire critical habitats from willing sellers through land exchange, reserved interest deed, or direct purchase of mapped important sage grouse habitats.

Action 3. Develop strategically placed firebreaks using greenstripping, mechanical removal of fuel and/or special grazing which will slow or stop the spread of wildfires.

Action 4. Control noxious weeds along roads.

Action 5. Include forbs and native grasses in seeding mixtures on critical habitat areas.

Action 6. Rehabilitate gullied meadows to raise the water table and restore meadow characteristics.

Action 7. Improve grazing management in sage grouse nesting habitats.

Action 8. Restore riparian habitats through grazing and water diversion management.

Objective 2. Mange for Sage Grouse numbers as outlined in each Sage Grouse Management area in the Sage Grouse Management plan by 2007.

Strategy 1. Improve the base of knowledge on the status and distribution of Idaho sage grouse and their habitats.

Strategy 2. Monitor the abundance and distribution of sage grouse.

Action 1. Identify areas of strong sage grouse populations and protect them from habitat loss.

Action 2. Identify areas of good or declining populations of sage grouse an manage habitats to restore or protect them.

Action 3. Determine the population trends of shrub-steppe birds by establishing breeding bird surveys in each Sage Grouse management area.

Action 4. Establish lek route(s).

Amphibians, Reptiles, and Invertebrates

Objective 1. Determine genetic differences and relatedness of western toad populations.

Objective 2. Provide habitat protection of wetland and riparian areas until western toad populations, abundance and distribution, and genetics have been determined.

Plants and Habitats

Objective 1. Reduce habitat modification to conserve Alkali Primrose.

Objective 2. Monitor trend in populations of Alkali Primrose.

Action 1. Reduce water diversion and flooding impacts to Alkali Primrose in Eighteenmile Creek.

Action 2. Map location of Alkali Primrose in Eighteenmile Creek and establish density-monitoring plots.

Objective 3. Maintain or increase population size of Salmon Twin Bladderpod.

Action 1. Need: Initiate a monitoring program to evaluate recovery in Williams Creek community pit.

Action 2. Conduct a complete survey of the Williams shale deposit.

Action 3. Maintain fence protecting the eastern end of the Williams Creek gravel pit.

Action 4. Work with BLM and Lemhi Co. to minimize road maintenance impacts.

Objective 4. Assess, conserve, and enhance wildlife habitats.

Strategy 1. Identify and monitor habitats needed to maintain Idaho's wildlife diversity.

Action 1. Determine quantity, distribution, and condition of dominant plant communities and major habitat elements on a basin, physiographic province(ecoregional), and statewide basis.

Action 2. Identify priority habitats of concern and their ecological relationships to native species.

Action 3. Monitor changes and trends in habitats on a basin, physiographic province (ecoregional), and statewide basis, with emphasis on priority habitats.

Strategy 2. Identify and implement habitat conservation and management actions needed to maintain Idaho's wildlife diversity.

Action 1. Identify conservation, restoration, and management needs and opportunities for priority habitats.

Action 2. Take actions to conserve, restore, enhance, or acquire important habitat areas.

Action 3. Promote land use patterns and management practices that conserve, restore, and enhance habitats needed to maintain wildlife diversity.

Action 4. Provide technical information and support to landowners, land managers, and local governmental agencies regarding habitat protection, restoration, and enhancement.

Action 5. Develop incentive and recognition programs to assist in the conservation, restoration, and enhancement of habitats on private lands.

Objective 5. Assess, conserve, and enhance populations of native species at self-sustaining levels throughout their natural geographic ranges.

Strategy 1. Species and Population Status Surveys and Monitoring.

Action 1. Maintain listings of species, populations, and distinct smaller groups that are, or could be, facing extinction or extirpation in Idaho using such categories as: endangered, threatened, and species of special concern.

Action 2. Determine the status of poorly known species and populations.

Action 3. Conduct research to address incomplete information on the taxonomic status of species.

Action 4. Maintain listings of species, populations, groups of species, or distinct smaller groups requiring special attention.
Action 5. Monitor populations of endangered, threatened, and species of special concern and populations of other species requiring special management attention.
Action 6. Develop and establish cooperative survey and monitoring protocols for priority species lacking such procedures.
Action 7. Monitor populations of common species.
Action 8. Record verified unusual sightings of rare or unusual wildlife occurrences.

Strategy 2. Identify, establish, and implement management measures to restore threatened and endangered species; preventing species of special concern from qualifying as threatened or endangered; and maintaining or enhancing other species requiring special attention.

Action 1. Conduct research to address incomplete information on species' habitat requirements, limiting factors, population demographics, and effectiveness of species conservation and management programs.
Action 2. Identify measures needed to protect, restore, maintain, or enhance populations of threatened, endangered, and species of special concern, and other species requiring special attention.
Action 3. Implement measures needed to protect, restore, maintain, or enhance populations of threatened, endangered, and species of special concern, and other species requiring special attention.
Action 4. Reintroduce native species or populations where they have been severely depleted or extirpated as may be biologically feasible and ecologically valid.
Action 5. Provide technical information and support to landowners, land managers, and local governmental agencies on species protection, restoration, and enhancement.
Action 6. Promote conservation of species populations and related ecosystems through state and local governmental agencies, landowners, land managers, and the public.

Idaho Conservation Data Center (CDC).

The CDC works with Federal, state, and private agencies and organizations to maintain high quality information on the conservation of biological diversity. CDC staff contribute to conservation planning efforts within the subbasin through dissemination and synthesis of information on the distribution and abundance of species populations and habitats. Availability of high quality information on biological diversity allows proactive conservation planning and reduces administrative delays related to fulfillment of regulatory procedural requirements.

Objective 1. Maintain high quality, accurate, and timely information on the occurrence of rare, threatened, and endangered plant and animal species.

Strategy 1. Conduct appropriate population inventory monitoring work for priority species.

Strategy 2. Maintain and develop sufficient funding to provide adequate facilities and staffing for the acquisition, maintenance, and dissemination of information on species populations.

Objective 2. Maintain high quality, accurate, and timely information on the distribution, abundance, and ecological status of plant and animal habitats, representative ecological reference areas, and plant communities.

Strategy 1. Conduct appropriate inventories of, and monitor, priority plant and animal habitats and plant communities.

Action 1. Inventory and map the current and potential distribution of ponderosa pine-dominated plant communities in Middle Salmon-Panther, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, South Fork Salmon, Lower Salmon, and Little Salmon watersheds. Inventory, map, and gather population data for ponderosa pine associated wildlife and plant species.

Action 2. Inventory and map the distribution of canyon grasslands within the Lower Salmon, Little Salmon, and Middle Salmon-Chamberlain watersheds.

Action 3. Inventory and map the distribution of sagebrush steppe within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds.

Action 4. Inventory and map the distribution of subalpine forest and woodland (subalpine fir forest, subalpine fir forest and woodland, and whitebark pine-limberpine forest and woodland plant association groups) by seral status and structural condition, within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and South Fork Salmon watersheds of the subbasin.

Action 5. In selected subalpine fir forest and woodland stands throughout the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and South Fork Salmon watersheds determine pre-European settlement fire disturbance regimes.

Action 6. Investigate fire disturbance and stand dynamic processes in whitebark pine-dominated forest and woodlands of the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, and Lower Middle Fork Salmon.

Strategy 2. Serve as an information repository for ecological data regarding the distribution, composition, and structure of vegetation within the subbasin.

Action 1. Acquire existing data sets where possible and compile metadata information according to national standards.

Strategy 3. Develop and disseminate descriptive information on high quality reference stand structure, composition, and ecological functions.

Strategy 4. Maintain and develop sufficient funding to provide adequate facilities and staffing for the acquisition, maintenance, and dissemination of information on plant and animal habitats, representative ecological reference areas, and plant communities.

Objective 3. Assist with species and ecosystem conservation management action within the subbasin.

Strategy 1. Provide recommendations for conservation site selection and management. Protect high quality, representative stands of priority plant associations and habitats.

Action 1. Inventory and prepare conservation plan for high quality, representative stands of canyon grasslands within the Lower Salmon, Little Salmon, and Middle Salmon-Chamberlain watersheds.

Action 2. Inventory and prepare conservation plan for high quality, representative stands of sagebrush steppe within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds.

Action 3. Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity for priority plant communities and for mitigation of lost wildlife habitat (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).

Strategy 2. Provide recommendations for the establishment and management of ecological reference areas.

Action 1. Monitor use of existing reference areas to assure consistency with the maintenance of ecological values.

Action 2. Identify candidate sites for the establishment of ecological reference areas based on current needs assessments. Periodically update ecological reference area needs assessments.

Action 3. Establish and maintain permanent baseline monitoring systems for priority ecosystems and species.

Strategy 3. Provide recommendations for species conservation and management. Prepare and update species conservation management plans.

5.2.3.b. Idaho Soil Conservation Commission

Goals

- *Assist 51 soil conservation districts to deliver natural resource conservation programs.*
- *Coordinate work with participants of the Idaho Conservation Partnership.*
- *Provide the Idaho State executive and legislative branches with information and education on commission goals and objectives.*
- *Fulfill responsibilities under Idaho water quality law as the state designated agency for agriculture and grazing*
- *Function as state-level entity to implement Idaho's Agricultural Pollution Abatement Plan*

Objectives

Objective 1. Provide technical and programmatic assistance to soil conservation districts for conservation implementation delivery.

Objective 2. Manage and coordinate Water Quality Program for Agriculture.

Objective 3. Participate in the implementation of the Idaho Conservation Partnership Strategic Plan.

Objective 4. Coordinate with the Office of Species Conservation.

Strategies

Strategy 1. Place and support SCC technical staff throughout Idaho in priority areas as funding allows.
Strategy 2. Sponsor and support NWPPC coordination work in the Upper Salmon Model Program and the Clearwater Focus Program.
Strategy 3. Facilitate Idaho Association of Soil Conservation District technical staff in priority areas.
Strategy 4. Coordinate with Idaho Department of Agriculture responsibilities.

5.2.3.c. Idaho Conservation Partnership Strategic Plan 2001 (NRCS, ISCC, RC&D, IASCD, IDEQ, IDA)

<u>*Goals*</u>

- *Improve water quality in Idaho State*
- *Increase quality and decrease loss of agricultural lands in Idaho State*
- *Reduce sediment production and delivery from agricultural lands in Idaho State*
- *Promote and facilitate conservation plans addressing noxious/invasive plants, riparian health, threatened/endangered species, fuel management, and vegetation health/diversity*

<u>*Objectives*</u>

Objective 1. All TMDLs will be completed for water bodies in Idaho State listed under the Clean Water Act Section 303(d) by December 2007.
Objective 2. Watershed plans will be completed and actively implemented for water bodies in Idaho State listed under the Clean Water Act Section 303(d) by 2010.
Objective 3. Erosion on all crop/grazing/forest – lands in Idaho State will be reduced to "T", the acceptable soil loss for land use criteria defined by the revised "universal soil loss equation".
Objective 4. Loss of farmland in Idaho State through land use conversion will be reduced 50%.
Objective 5. Sedimentation throughout Idaho State will meet pollution standards specified in respective TMDLs by 2010.
Objective 6. Sediment control practices will be installed on all croplands in Idaho State by 2010.
Objective 7. Conservation plans addressing these objectives will be implemented on all crop/grazing/forest – lands in Idaho State by 2010.

<u>*Strategies*</u>

Strategy 1. Seek and focus appropriate state and federal funding to achieve goals.
Strategy 2. Develop educational process for state and federal legislative entities.
Strategy 3. Incorporate the Idaho One Plan.
Strategy 4. Explore tax incentive opportunities.
Strategy 5. Encourage voluntary participation in conservation actions
Strategy 6. Facilitate Idaho State wide evaluation and assessment of conservation goals and objectives.
Strategy 7. Support local leadership infrastructures to achieve goals
Strategy 8. Gain local planning and zoning support for farmland protection.

5.2.4. Local Collaborative Groups

5.2.4.a. Soil and Water Conservation Districts

The following descriptions of existing goals, objectives, and strategies are not separated into fish and wildlife conservation/restoration categories. Each action agency described conducts work on watershed scales, emphasizes natural resource conservation, fish and wildlife protection, habitat improvement, and has Clean Water Act priorities in particular nonpoint source pollution. These groups serve, although not exclusively, private land ownership in Idaho State. Standards and specifications for agricultural Best Management Practices (BMPs) to reduce nonpoint pollution and conserve soil and water derive from the U.S. Natural Resources Conservation Service Field Office Technical Guide. Other standards and specifications derive from partnership agencies with relative expertise in the project. The following sections do not represent entire documents but have been paraphrased, except where noted, for use in this review.

Idaho Soil and Water Conservation District

(Idaho SWCD Annual Work Plan/Five Year Resource Conservation Plan, 2001)

Goals

- *Encourage and promote BMPs to reduce soil erosion, and enhance water quality*
- *Improve water quality on 303(d) listed streams*
- *Improve fish and wildlife habitat*

Objectives

Objective 1. Enhance education and information program.

Objective 2. Coordinate with NRCS and other state and federal agencies engaged in conservation.

Strategies

Strategy 1. Encourage and provide assistance for conservation planning on private lands.

Strategy 2. Encourage and provide assistance for riparian and upland BMP implementation.

Strategy 3. Design and implement road treatments in cooperation with Idaho County Road Department.

Strategy 4. Design and implement animal waste treatment plans, riparian and crop management plans, and septic system plans through the CWA Section 319 program and Div II-wide WQPA project.

Nez Perce Soil and Water Conservation District ((Nez Perce SWCD Res. Cons. Plan, 2001)

Goals

- *Develop watershed based resource plans for watersheds within the NPSWCD boundaries.*
- *Cooperate and coordinate in developing watershed plans for watersheds located within multiple conservation districts.*

- *Implement BMPs identified in the watershed plans on all land uses.*
- *Coordinate technical/financial resources for the implementation of BMPs on private lands.*
- *Reduce erosion and improve water quality and fisheries habitat on cropland, forestland, and rangeland resources.*
- *Assist landowners, communities, and tribes in meeting state, local, and federal regulations including the Clean Water Act, Endangered Species Act, and NEPA regulations.*
- *Improve the condition fisheries habitat including riparian and wetland areas.*
- *Improve grazing land and cropland productivity.*
- *Establish fish and wildlife habitat, water quality and resource condition monitoring programs.*
- *Develop and promote public awareness programs to promote good stewardship.*

<u>Objectives</u>

Objective 1. Develop one watershed based resource plan annually.

Objective 2. Conduct one meeting annually to coordinate watershed efforts and technical/financial resources for BMP implementation with local stakeholders.

Objective 3. Implement 50% of the identified BMPs to improve priority fish habitats within 10 years.

Objective 4. Reduce erosion and identified pollutants by 60% in identified priority areas within 10 years.

Objective 5. By 2010, water quality will be improved to meet TMDL standards in identified watersheds.

Objective 6. By 2010, improve riparian and wetland areas to proper functioning condition.

Objective 7. By 2015, improve rangeland condition from "fair" to "good".

Objective 8. By 2015, reduce cropland and urban erosion to "T".

Objective 9. By 2005, complete 25% of the identified animal feeding operation improvements.

Objective 10. By 2005, 50% of the streams within the District will be monitored for stream temperature.

Objective 11. By 2005, develop volunteer based stream assessment or improvement projects on 5 streams.

Objective 12. By 2005, implement water quality/fisheries habitat education program targeting the urban public.

<u>Strategies</u>

Strategy 1. Assess watershed conditions and identify priority areas for treatment.

Strategy 2. Monitor resource conditions and implement additional monitoring sites with landowners.

Strategy 3. Install BMPs to improve water quality and fisheries habitat on cropland, rangeland, forestland, and urban resources including roads and stormwater sources.

Strategy 4. Identify priority fish habitat enhancement/restoration or protection areas and implement identified BMPs.

Strategy 5. Inventory, assess and install BMPs on riparian and wetland areas.
Strategy 6. Identify priority erosion control and water quality improvement areas.
Strategy 7. Conduct on-site investigations, feasibility analysis and complete designs for identified BMPs. Inventory, plan and develop alternatives, and develop BMPs for private landowners, units of government, and local interest groups for problems identified in watershed plans.
Strategy 8. Identify and obtain commitments from volunteer groups to implement stream monitoring or improvement projects.
Strategy 9. Protect and restore freshwater habitats for key species. Restore and increase the connections between rivers and their floodplains and riparian zones.
Strategy 10. Coordinate with local conservation partners to implement public awareness/education campaign.

5.2.4.b. Upper Salmon Subbasin Watershed Project

The primary tasks of the USBWP are to: (1) identify and provide assistance with actions within the upper Salmon Subbasin that are planned or needed for salmon habitat and (2) establish procedures for implementing habitat improvement measures. Two primary goals have been established and have directed USBWP activities since its inception.

- *Goal 1. Provide for safe, timely, and unobstructed fish migration.*

Objective 1. Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.
Strategy 1. Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.
Strategy 2. Investigate (especially in tributaries) and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BOR .
Strategy 3. Investigate opportunity for securing instream flows through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.
Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.
Objective 2. Reduce the number of physical barriers hindering fish migration.
Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BOR, and Shoshone-Bannock Tribes.
Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG and BOR where feasible and migration delays can be reduced.
Strategy 3. In cooperation with the NRCS, BOR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channel.

- *Goal 2. Improve stream/riparian habitat and water quality for all life stages of fishes.*

Objective 1. Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.

Strategy 1. By 2010, implement grazing control measures in at least 70 miles critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and/or grazing management plans,

Strategy 2. Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3. In conjunction with the NRCS, IDEQ, SCC, and others implement feed lot improvements and relocations.

Strategy 4. Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5. Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6. Work cooperatively with willing irrigators to restore streamflows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7. Continue development of the IMPACT Model with the University of Idaho to determine priority sequence for the above strategies.

5.2.5. Conservation Organizations

5.2.5.a. The Nature Conservancy

TNC has identified the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, and Lemhi watersheds as being of high conservation priority and is currently seeking start-up funds for the purpose of hiring a full-time program manager, who would reside locally and would be responsible for TNC's conservation activities in the region. TNC's overall intent for this position would be to provide additional leadership, support and operating capacity to the existing habitat conservation efforts within the Upper Salmon. More specifically, this position would be focused on working with landowners and public agencies to secure the permanent protection of key private lands within the subbasin principally through the acquisition and management of conservation easements. In addition, this position would be responsible for implementing a variety of other conservation strategies, including engaging the public in education and outreach activities, building partnerships among diverse public and private interests, and developing new sources of financial capital and political support for watershed protection within the region.

5.3. Research, Monitoring, and Evaluation Activities

Collectively, there is a considerable research and monitoring effort ongoing among the agencies, Tribes, and other entities active within the Salmon Subbasin. A matrix table identifying many of the subbasin's research or monitoring programs, their geographic scopes, and the information they have generated or are developing on fish, wildlife, and habitat conditions, is given in Appendix L. Detailed descriptions of selected research, monitoring, and evaluation efforts are provided in this section of the report.

5.3.1. BPA-sponsored Efforts (activities identified by lead entity)

In addition to monitoring and evaluation efforts linked to specific conservation or restoration actions BPA has funded (e.g., those identified in Section 4.6.1), the agency has provided financial support to more than 50 research, monitoring, and/or evaluation projects related to the Salmon Subbasin's fish, wildlife or critical habitats. Detailed descriptions of 13 such efforts have been prepared by the entities leading them and are given in this section of the subbasin summary. Additional BPA-sponsored efforts are summarized in Appendix L.

Nez Perce Tribe

- *Monitoring of Listed Stock Chinook Salmon Escapement (Project No. 9703000)*. Initiated in 1997, this ongoing project is intended to use remote underwater time-lapse video technology monitor adult salmon spawner abundance and run timing in Lake Creek and the Secesh River. The project also compares spawner abundance estimates with redd count survey data on these same unsupplemented spring and summer chinook salmon spawning aggregates. This approach accurately quantifies date, time and direction of movement for escapement and run timing information without handling fish. The project demonstrated the successful application of underwater video technology to determine adult salmon spawner abundance estimates in Lake Creek. Implementation of the fish counting station allowed unimpeded upstream and downstream movement of spawning salmon and no handling of adults. The adult salmon spawner abundance estimate in Lake Creek was 52 salmon in 1998 and 67 salmon in 1999. Redd count expansion methods used to estimate spawner numbers in 1998 were 104% (PATH intensive) and 188% higher (ISS intensive) than the actual abundance estimate. In 1999, the PATH intensive redd count expansion was –18% and the ISS intensive method was +15% of the actual abundance estimate. Behaviorally, adult male salmon were observed to move upstream and downstream during the spawning season apparently looking for mates. This has important implications for operation of existing weirs in natural production areas and their potential effect on reproductive success. This technique has application for the accurate determination of listed salmon spawner abundance in tributary streams relative to recovery abundance levels suggested under the Endangered Species Act (NMFS 2000).
- *Nez Perce Tribal Hatchery Monitoring And Evaluation (Project No 9335003)*. This ongoing project was initiated in 1993 with the goal of monitoring programs associated with the Nez Perce Tribal so that operations can be adaptively managed to optimize hatchery and natural production, sustain harvest, and minimize ecological impacts. The abundance and distribution of adult fall chinook salmon are being monitored to provide data for resolving management questions and critical uncertainties relating to supplementation of fall chinook. Spawning ground surveys have documented a total of 22 fall chinook salmon redds in the lower salmon river(mouth to French Creek RM 105) between 1992 and 2000. Annual counts have ranged from 0 to 3 (Garcia et al 2000).
- *Evaluate Rebuilding the White Sturgeon Population in the Lower Snake Basin (Project No. 9700900)*. Begun in 1997, this ongoing project has a goal of rebuilding white sturgeon populations in the Snake River and its major tributaries (including the Salmon River) between Hells Canyon and Lower Granite dams, to support a sustainable subsistence harvest. The project will determine current population status, characterize the species' reproductive and early life history, and examine the habitat white sturgeon use for

spawning and rearing in the area. Information generated by this project will be used to develop an adaptive management plan for white sturgeon in the Lower Snake Basin. The plan will reassess and recommend potential mitigative actions, and 2) establish a monitoring and evaluation program. To date, the project has documented white sturgeon use of the lower 52 miles of the Salmon River as a spawning and early rearing area.

- *Salmon Supplementation Studies in Idaho Rivers (Project No. 8909802).* Initiated in 1992, this ongoing project is evaluating the utility of supplementation as a recovery/restoration strategy for spring and summer chinook salmon. Study approaches include: (1) Large-scale population production and productivity studies designed to provide Snake River basin-wide inferences; (2) Using study streams to evaluate specific supplementation programs; and (3) Small-scale studies designed to evaluate specific hypotheses. Approaches (1) and (2) measure population responses to supplementation and are long-term studies. Approach (3) is being used to evaluate specific impacts of supplementation on natural salmon, such as competition, dispersal, and behavior.

Project activities in the Salmon Subbasin have produced (1) annual chinook escapement estimates for Slate Creek and the entire Secesh River drainage (including Lake Creek; Walters et al 2001), (2) trend information on wild juvenile the entire Secesh River drainage (including Lake Creek; Walters et al 2001as well as annual snorkel-based indices of parr production in Slate Creek, Secesh River and Lake Creek . Data from the parr production work have also been incorporated into databases maintained by the IDFG general parr monitoring project.

Production/emigration and survival of juvenile chinook have been monitored in the Secesh River and Lake Creek since 1997, using emigration traps and PIT tagging techniques. Results to date show that parr and presmolt emigration to the lower SFSR is the primary early life history strategy in the system. The project is also providing trend information on the production of wild juvenile salmon in the entire Secesh River drainage (including Lake Creek; Walters et al 2001) as well as data on downstream survival and emigration timing for wild juvenile chinook moving from tributary streams to Lower Granite and McNary dams.

Shoshone-Bannock Tribes

- *Salmon River Habitat Enhancement M&E (Project No. 9405000).* The Salmon River Habitat Enhancement M&E (SRHE) project is an ongoing project initiated by the Shoshone-Bannock Tribes to provide long-term monitoring and evaluation for the major enhancement efforts undertaken by Project No. 8335900 in Bear Valley Creek (MFU), Yankee Fork Salmon River (UPS), and East Fork Salmon River (UPS) (see Section 4.6.1). Long-term monitoring of past enhancement efforts is necessary to determine the effectiveness of past projects on achieving desired goals and objectives. The overall objectives of these enhancement efforts were to reduce fine sediment inputs, improve stream channel morphology, and improve salmonid spawning and rearing habitat. Expected benefits of these efforts are long-term in nature and include improved survival at freshwater life-stages for anadromous salmonids. Sediment and habitat monitoring includes surface and subsurface fines, width/depth ratios, pool habitat (depths, frequency, and quality), streambank stability/undercuts, sinuosity, riparian condition/composition, and stream temperatures. Fisheries monitoring includes trends and distribution of chinook salmon spawning, fish composition and densities, and chinook salmon egg-to-parr survival estimates. Physical habitat monitoring in conjunction with fisheries data is used to determine changes in physical habitat quality and quantity, habitat use, egg-to-parr survival, and species composition over time. To date, the SRHE project has documented improvements in surface substrate, pool cover, and non-anadromous fish densities in Bear Valley Creek, and increased use of the off-channel rearing ponds by juvenile anadromous salmonids in the Yankee Fork Salmon River. Increased anadromous fish production is expected to result from lower levels of fine sediments in spawning gravels in East Fork Salmon River projects, although significant improvements have not been documented to date.

- *Snake River Sockeye Salmon Habitat and Limnological Research (Project No. 9107100)*. This is an ongoing project that evaluates existing and potential habitat conditions for freshwater rearing of Snake River sockeye salmon as well as survival and growth of introduced sockeye from the captive broodstock program in Pettit and Alturas lakes. Numerous physical and biological parameters are monitored in four Sawtooth Valley lakes. Intensive fish community investigations are conducted in Pettit Lake to evaluate competition/predation with juvenile sockeye. Limnological conditions are used to estimate sockeye carrying capacities for each lake. Kokanee standing stock biomass estimates are then taken into consideration to make recommendations for stocking densities for captive broodstock progeny into each lake. Stocking at densities greater than existing carrying capacities could result in a zooplankton crash that would reduce available rearing habitats and impede recovery of Snake River sockeye salmon. *Results:* Baseline physical and biological data collections began in 1992. A fertilization experiment in limnocorrals was conducted in 1993 and 1994. A test fertilization of Redfish Lake in 1995 showed an increase in primary productivity, phytoplankton, and peak zooplankton counts. The fish passage barrier on the outlet of Pettit Lake was removed in 1996. Annual monitoring of smolt migration to determine survival of stocked juveniles from Pettit and Alturas lakes began in 1996 and 1998, respectively. Nutrient enhancement of Pettit and Alturas lakes began in 1997. Decisions to add nutrients to all three lakes are made annually based on existing limnological conditions and biomass of sockeye added to individual lakes. The first sockeye from the Program returned in 1999, and 257 adults returned to the Sawtooth Valley in 2000.
- *Idaho Supplementation Studies (Project No. 8909803)*. In 1991, the Idaho Supplementation Studies project was implemented to address critical uncertainties associated with hatchery supplementation of chinook salmon populations in Idaho. Idaho Supplementation Studies is an ongoing cooperative project encompassing most anadromous production waters in the Salmon River and Clearwater River subbasins. Cooperators include the Shoshone-Bannock Tribes, Idaho Cooperative Fish and Wildlife Research Unit, Idaho Department of Fish and Game, Nez Perce Tribe, and United States Fish and Wildlife Service. The project was designed to address questions identified in the Supplementation Technical Work Group Five-Year Workplan (STWG 1988). Two goals of the project were identified: 1) assess the use of hatchery chinook salmon to increase natural populations in the Salmon and Clearwater river drainages, and 2) evaluate the genetic and ecological impacts of hatchery chinook salmon on naturally reproducing

chinook salmon populations. Four objectives to achieve these goals were developed: 1) monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapements of naturally produced fish; 2) monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation; 3) determine which supplementation strategies (brood stock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity; and 4) develop supplementation recommendations The complete study design is found in Bowles and Leitzinger (1991).

Small-scale studies addressing specific hypotheses of the mechanisms of supplementation effects (e.g., competition, dispersal, and behavior) have been completed (Peery and Bjornn 1993, 1994, 1996). Baseline genetic data have also been collected (Marshall 1992, 1994). Because supplementation brood stock development was to occur during the first five years or one generation, little evaluation of supplementation is currently possible.

Idaho Department of Fish and Game

- *Idaho Natural Production Monitoring and Evaluation* (Project No. 9107300). This is an ongoing project in place to monitor trends in spring/summer chinook salmon and steelhead trout populations in the Salmon, Clearwater and lower Snake River drainages. Project goals include establishing a long-term parr monitoring database, estimating adult escapement in key tributaries, evaluating egg-to-parr survival in streams treated with habitat improvement structures, monitoring stock-recruitment trends, and estimating smolt-to-adult survival. *Results:* Since 1984, parr density surveys have been conducted in 146 tributaries and over 1,300 sites in the Salmon and Clearwater subbasins. A total of 684 of these sites have been in the Salmon Subbasin (Figure 37). The project has quantified the benefits in parr carrying capacity observed from different habitat enhancement projects, developed Snake River and stream specific stock-recruitment relationships, and estimated smolt-to-adult survival of Snake River spring/summer chinook. A comprehensive database has been developed that includes resident fish species observed while monitoring anadromous fish. This database has been invaluable in providing distribution and densities of bull trout and westslope cutthroat trout, as well as amphibian observation data. Data from the Idaho Supplementation Studies project and regional data is being added and will provide a more complete picture of anadromous and resident fish population status in Idaho.

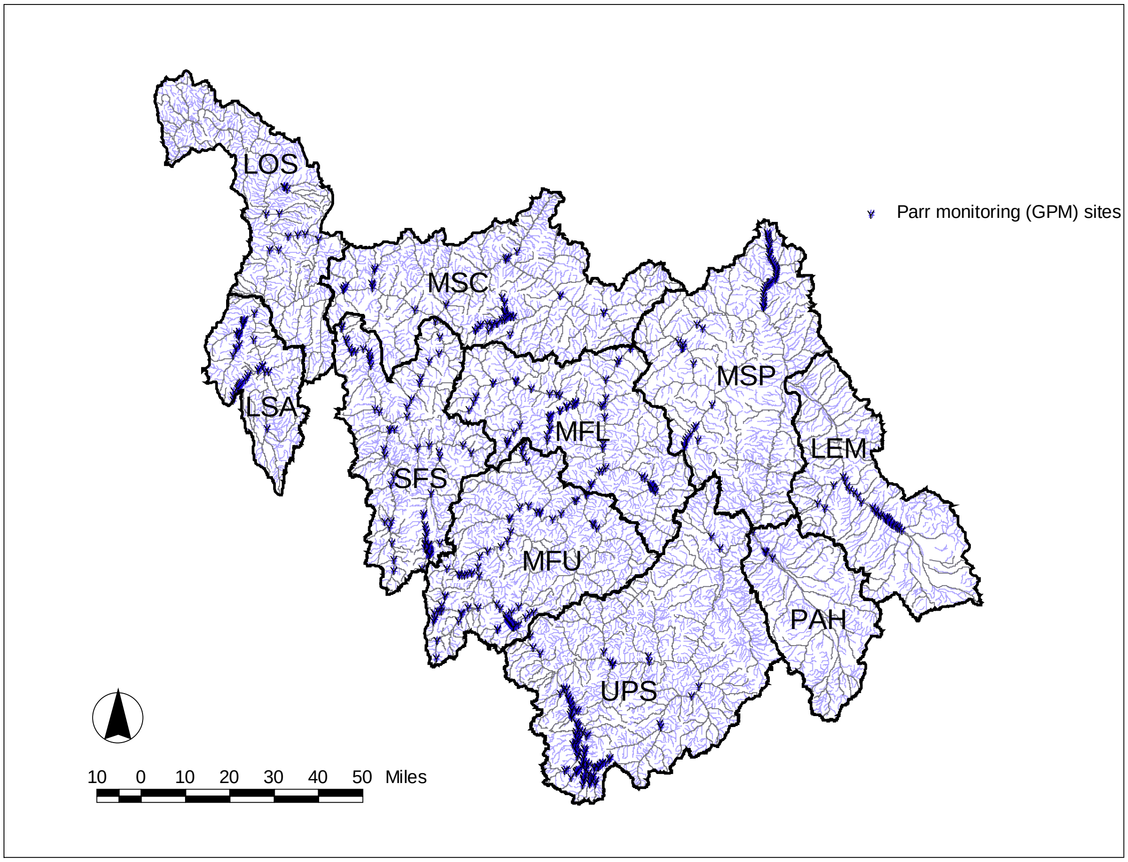


Figure 37. Snorkel locations used to monitor parr densities and percent carrying capacity for spring/summer chinook and steelhead parr in the Salmon Subbasin (source: IDFG).

- *Spring/Summer Chinook Salmon Population Viability Assessment*: Initiated in 1999 and funded through the *Idaho Natural Production Monitoring and Evaluation* project *(Project No. 199107300)*. Population viability analyses use biologically-based models combined with statistical time-series driven methodologies to quantify the extinction risks to a population. Risk of extinction was assessed for 14 core subpopulations of Snake River spring/summer chinook originating in the Selway River and the South Fork, Middle Fork, and mainstem Salmon River of Idaho. Model development and populations viability analyses are still ongoing. The models will be used to estimate population persistence for the specific stocks and to help prioritize potential population conservation intervention actions. *Results*: The results developed to date are preliminary. Only point estimates of parameter values and point estimates of extinction probabilities have been developed. Confidence intervals, from which inferences on persistence can be made, will follow. In general, extinction-time distributions varied over the populations under study. Models predicted relatively high probabilities of extinction for the populations of the Middle Fork Salmon River (Camas Creek, Loon Creek, Marsh Creek, and Sulphur Creek), and the mainstem Salmon River (Valley Creek and Yankee Fork Salmon River). A relatively high probability of persistence through the next 100 years was predicted for populations of the

South Fork Salmon River (Johnson Creek, Secesh River, and mainstem South Fork Salmon River) and the Middle Fork Salmon River (Big Creek and Bear Valley Creek).

- *Idaho Supplementation Studies (Project No 8909800)*. In 1991, the Idaho Supplementation Studies project was implemented to address critical uncertainties associated with hatchery supplementation of chinook salmon populations in Idaho. Idaho Supplementation Studies is an ongoing cooperative project encompassing most anadromous production waters in the Salmon River and Clearwater River subbasins. Cooperators include the Idaho Cooperative Fish and Wildlife Research Unit, Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribes, and United States Fish and Wildlife Service. The project was designed to address questions identified in the Supplementation Technical Work Group Five-Year Workplan (STWG 1988). Two goals of the project were identified: 1) assess the use of hatchery chinook salmon to increase natural populations in the Salmon and Clearwater river drainages, and 2) evaluate the genetic and ecological impacts of hatchery chinook salmon on naturally reproducing chinook salmon populations. Four objectives to achieve these goals were developed: 1) monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapements of naturally produced fish; 2) monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation; 3) determine which supplementation strategies (brood stock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity; and 4) develop supplementation recommendations The complete study design is found in Bowles and Leitzinger (1991).

Small-scale studies addressing specific hypotheses of the mechanisms of supplementation effects (e.g., competition, dispersal, and behavior) have been completed (Peery and Bjornn 1993, 1994, 1996). Baseline genetic data have also been collected (Marshall 1992, 1994). Because supplementation brood stock development was to occur during the first five years or one generation, little evaluation of supplementation is currently possible. Most supplementation adults did not start to return to study streams until 1997.

- *Steelhead Supplementation Study (BPA No. 9005500)*. This is an ongoing study initiated in 1992 to help determine the utility of supplementation as a potential recovery tool for steelhead, primarily in areas where the native stock was extirpated or reduced to very low abundance. After an experimental design for the study was developed (Byrne 1992), field work began in 1993. Study goals are (1) to assess the use of hatchery steelhead to restore or augment natural populations, (2) to evaluate the effects of supplementation on the survival and fitness of existing natural populations, and (3) to obtain life-history data from wild steelhead populations. Results: To date this project has estimated smolt production from hatchery adult outplants into Beaver and Frenchman creeks, PIT-tagged juvenile steelhead to obtain migration characteristics, growth rates, and smolt-to-adult survival (S.Fk. Salmon River, Pahsimeroi River, Marsh Creek), estimated the age of juvenile steelhead (SF Salmon River, Pahsimeroi River, Lick Creek, Rapid River), and monitored stream temperature in 40 streams. In 2000, the project was expanded to include a genetic analysis of Idaho's steelhead populations. We sampled 70 wild steelhead populations and the 5 hatchery stocks from Idaho. Resultant data are being analyzed and the results of the genetics work will be available in September 2001.

University of Idaho

- *Specific Enhancement Plan and Aquatic Ecosystem Review, Twelve Mile Reach of the Salmon River, Challis (Project No. 9901901)*. The objective of this study is to refine the conceptual enhancement plan for the Twelve Mile Reach of the Salmon River at Challis developed by the Custer County Watershed Group, in collaboration with the Custer County Soil and Water Conservation District, the Shoshone-Bannock and Nez Perce tribes, the Model Watershed, US Army Corps of Engineers, private landowners and other state and federal agencies.

The project evaluated the geomorphic changes of the channel during the past 70 years, and the consequences if no comprehensive management strategy is adopted. Several enhancement alternatives have been considered and a preferred strategy is being finalized collaboratively. To assess the benefits of floodplain restoration and the effects on flood risk and flood management, a hydrodynamic computer model has been used to visualize and demonstrate the various proposed alternatives. The effects of geomorphic characteristics on temperature, water quality and habitat throughout this reach are also being assessed.

- *Aquatic Ecosystem Review for the Upper Salmon Subbasin (Project No. 9906900)*. This project explores methods for prioritizing restoration projects or implementing adaptive management actions in the upper Salmon catchment. The methodology seeks to quantify benefits to fish and habitat at the local level of the restoration and also the benefits at the watershed scale. The analysis is being developed as a complement to other modeling initiatives such as EDT and fish population models. The objective is to develop a quantitative approach that can be used to prioritize restoration measures, and be used as one tool in the Subbasin Assessment process.

5.3.2. Efforts Funded by Sources Other than BPA

Entities within the subbasin have collected, and continue to collect, diverse data directed toward answering multiple questions about fish and wildlife status, aquatic and riparian system health, and terrestrial conditions. Although there is no subbasin-scale program to coordinate the large volume of work conducted by all concerned, it is clear that many questions about aquatic and terrestrial conditions within the subbasin are being answered and more might be answered through careful examination of existing information or data now being collected. This is not to suggest that there is no need for additional monitoring, but better coordination of ongoing or future data collection would allow a more efficient effort across the subbasin.

Biologists contributing to this report were able to identify more than 100 recent research, environmental monitoring, and/or evaluation activities related to the Salmon Subbasin's fish, wildlife, or critical habitats, funded by sources other than BPA. There have been an even greater number of such efforts, but time limitations prevented a full compilation of the work that has been done in the area. Descriptions of a subsample of 30 of the non-BPA funded efforts within the subbasin are given in this section of the report. Additional research, monitoring, and evaluation activities funded by sources other than BPA are summarized in Appendix L.

A small example of the geographic scope of monitoring work taking place in the subbasin without BPA support is given in Figure 38. A monitoring program being conducted by the USFS and USGS is gathering data on sediment transport at 13 stream locations scattered across 7 of the 10 major watersheds. A second collaborative monitoring effort, this one by the USGS and IDEQ, has gathered continuous water temperature data at 134 stations in the subbasin. The temperature monitoring stations have been positioned along streams within each of the 10 major watersheds in the Salmon Subbasin.

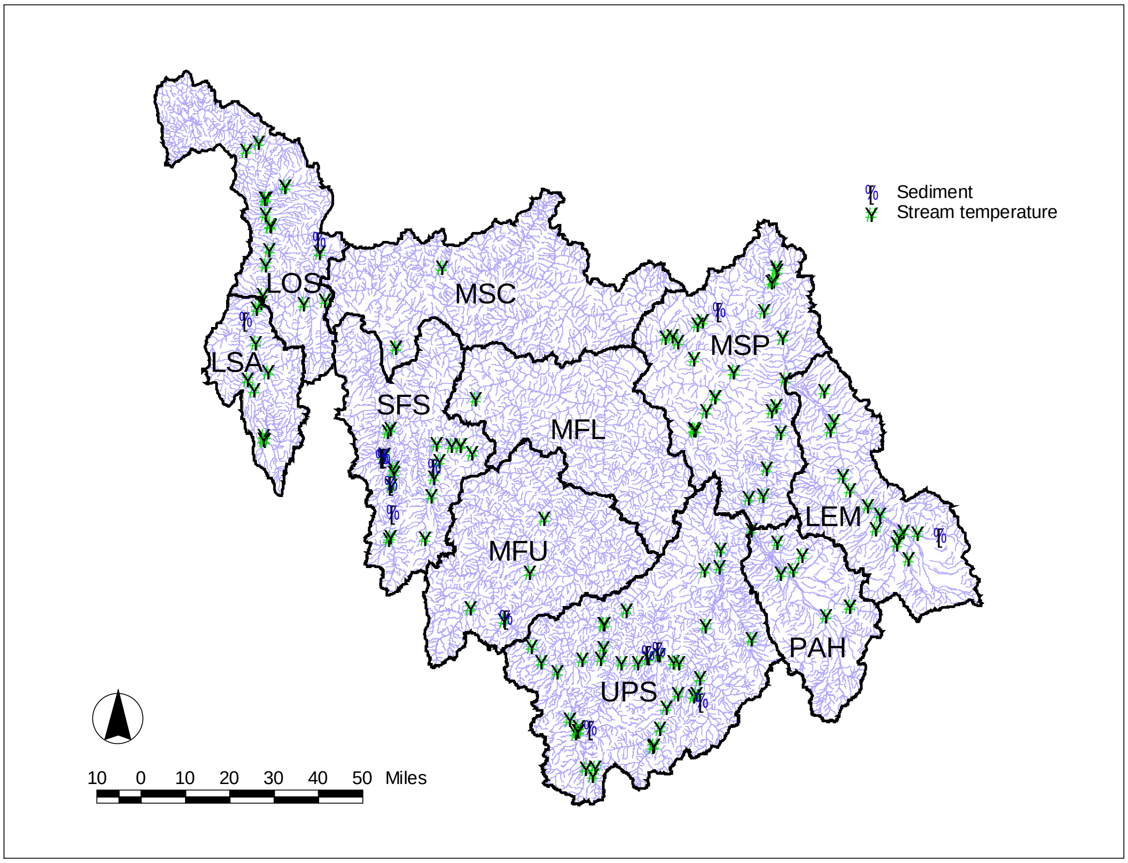


Figure 38. Stations on streams in the Salmon Subbasin at which sediment transport is being evaluated by the USFS and USGS or where water temperatures were monitored recently during a joint effort by the USGS and IDEQ (sources: USFS and USGS).

Federal Land Managers (US Forest Service and Bureau of Land Management)

• *Rocky Mountain Research Station (RMRS, Boise, Idaho)*. The Rocky Mountain Research Station has a fish research team that is part of the Aquatic and Terrestrial Ecosystems Work Unit. Current research efforts are addressing the conservation biology of aquatic vertebrates, the influences of natural and human-caused disturbance, and the development of decision support tools for forest management. Although RMRS scientists and collaborators deal with multiple aspects of aquatic communities, considerable work has and will be focused on the salmonids including chinook salmon, bull trout, cutthroat trout, interior rainbow or redband trout, and steelhead. Work occurs across a range of spatial scales but current efforts are focused largely on factors influencing or associated with the distribution and persistence of these fishes at scales ranging from stream reaches to whole river basins. Recent and ongoing research by the RMRS includes the following:

***Studies of fluvial bull trout movements and habitat use*.** Much of the existing literature on migratory bull trout has focused on adfluvial populations. RMRS is using radio telemetry and temporary weirs to describe seasonal movements and habitat use by fluvial bull trout in 2nd to 6th order streams from Rapid River to the mainstem Salmon River. In concert with the telemetry data, they are developing detailed descriptions of the habitats fish are using and the habitats available to fish. Data are addressing three stages: pre-spawning, spawning, and post spawning. More than 70 adult bull trout have been successfully tracked. Results to date illustrate that movements and the onset of spawning were strongly influenced by water temperatures. Habitats with overhead cover were important staging areas during both upstream and downstream movements. Overwintering adults displayed high site fidelity, typically remaining in the same habitat from November to March. Adult bull trout displayed home ranges exceeding 100 km and used habitats in 2nd to 6th order streams. The species wide range of seasonal habitat requirements emphasizes the need for improved understanding of spatial and temporal dynamics. Cooperators: RMRS and IDFG.

Studies of the dispersal and homing of migratory and non-migratory bull trout. Dispersal and straying rates of bull trout are poorly understood although they may have important implications for the species persistence and in recovery efforts. RMRS is attempting to describe dispersal and homing of migratory and resident bull trout. The approach has been to annually capture and PIT tag juvenile bull trout in each of two geographically separated study reaches of Rapid River. One reach supports what appears to be a resident bull trout population while the other supports extensive spawning by migratory bull trout. RMRS is measuring movements and dispersal rates of tagged fish by two methods to assess homing and straying of fish from both reaches. In addition to describing dispersal rates, this work could provide information to assess whether resident forms can refound migratory populations. Cooperators: RMRS, IDFG, Payette NF, Nez Perce NF.

***Analysis of the persistence and spatial dynamics of wild chinook salmon*.** While conservation and restoration of freshwater habitats is essential, there is growing concern that the size and spacing of habitats also needs to be considered. Effective conservation may imply maintaining or restoring a critical area and mosaic of habitat as well as habitat of certain quality. Researchers are attempting to describe factors influencing the spatial dynamics of declining populations of chinook salmon. The central hypothesis is that habitat area, quality, or context (location in relation to other populations) strongly influences the occurrence of spawning chinook salmon. If the hypothesis is true, recolonization and persistence of chinook salmon populations may also be strongly influenced by the spatial geometry of remaining habitats. The approach is to describe the annual distribution of chinook salmon redds and their relationship to potential spawning areas in the Middle Fork Salmon River. Researchers are also testing the hypothesis that large-scale geomorphic features influence the location, size, and quality of spawning patches in a predictable manner. Finally, they are collecting and archiving wild chinook salmon otoliths until microchemical techniques are refined for discriminating dispersal and life history patterns. Since 1995, annual redd counts have ranged from 20 to 661 and 99% of redds were constructed in tributaries. Redds were observed at elevations from 1140 to 2070 m, with a majority above 1900 m. The distribution of redds has deviated from a random pattern. In addition to addressing larger scale spatial questions about persistence, this research provides an estimate of the total number of redds constructed in the study area, enabling managers to estimate total adult escapement. Cooperators: RMRS, IDFG, Payette NF, Salmon-Challis NF, Sawtooth NF, UI, NPT, SBT, and NMFS.

Evaluation of historical changes in pool habitats in wilderness and non-wilderness watersheds. Information to assess temporal changes in aquatic habitats is rare and often based on anecdotal information. Data collected during a 1934-1945 Bureau of Fisheries survey and rediscovered by PNW biologists provides a unique opportunity to empirically compare current and historical habitat conditions. Importantly, the historical surveys were completed in both wilderness and non-wilderness watersheds. The approach has been to apply the identical survey methods used by the earlier crews and resurvey channel features, particularly the frequency of pools of various size and depth classes. Results to date suggest human activities in watersheds have substantially altered channel features and processes. This research is addressing the widespread need among land management agencies to evaluate cumulative effects on fish habitats and fish populations. Cooperators: RMRS, ODFW, and PNW.

Evaluation of stream sediment monitoring techniques. Approaches for monitoring conditions in salmonid spawning gravels and redds need to be refined. Through a suite of studies, researchers are characterizing spawning sites and redds, evaluating the effects of fine sediment on salmonid life stages from egg deposition to emergence, and testing monitoring approaches. They have focused on six native salmonids (including steelhead, rainbow trout, chinook salmon, and westslope cutthroat trout) across three lithologies (granitic, metasedimentary, and volcanic). Manuscripts and reports are now being prepared for the following studies: evaluation of the utility of artificial redds for monitoring incubation conditions; determination of the most sensitive substrate indices and required sample sizes for characterizing spawning substrate; development of gravel intrusion models, use of surrogates locations to predict conditions in redds; comparison of surface and subsurface techniques for characterizing substrate; and considerations for sampling dissolved oxygen in streams. Cooperators: RMRS, IDEQ, UI, LSU, ARS, USFWS, IDFG, NPS, and National Forests in Idaho and Montana.

Analysis of mark-resight surveys for salmonid redds. Aerial reconnaissance of redds is a primary technique for monitoring population trends in chinook salmon. It is assumed that redd counts represent a constant proportion of the true number of redds across time. Because a myriad of environmental factors can affect redd sightability, it is unlikely detection rates are constant. For example, there may be errors of omission and errors of inclusion. Further, a single count provides no measure of precision (i.e. no sampling variation is accounted for). Inadequately accounting for bias and precision may lead to misleading conclusions about population trends. As a result, RMRS intends to examine the applicability, efficiency, and cost-effectiveness of a modified two-sample, Lincoln-Peterson mark-resight estimator for obtaining unbiased and precise estimates of chinook salmon redds. This would provide a statistically rigorous means of monitoring salmon populations by producing a relatively unbiased estimate of redd numbers with a valid measure of precision. The approach will be to independently count and map chinook salmon redds in selected areas using aerial and ground counts. Each detected redd will be mapped and its location recorded with geographical positioning system (GPS) equipment. To avoid further observer bias, redd counts will be completed by individuals who have extensive experience (>20 years) completing chinook salmon redd surveys. Cooperators: RMRS, U of Arkansas.

Development of protocols for sampling stream dwelling salmonids. Biologists and managers need reliable methods to assess the status and distribution of stream dwelling salmonids. Behavior of fish and their specific habitat requirements, however, may make them difficult to sample and traditional sampling approaches may be biased. There is a need to compare limitations of different sampling techniques and assess the influence of both biological and physical factors on sampling efficiencies. The central hypothesis is that probabilities of detecting bull trout and other stream-dwelling salmonids are influenced by the sampling method, physical features of the sampling unit, and fish species and sizes. The approach has been to collect empirical data designed to estimate detection probabilities for salmonids in first to third order streams. Data from several sources will be used to development models of sampling efficiency and detection probability. The ultimate goal is to develop protocols for estimating the sampling effort and techniques required to achieve a desired level of accuracy in detecting the presence/absence of native salmonids. Cooperators; RMRS, U of Georgia.

Studies of spawning site selection by fluvial bull trout. Although attributes of bull trout spawning areas have been defined, there is limited understanding of why specific areas are selected for redd construction. RMRS is attempting to describe microhabitat characteristics (water depth, water velocity, substrate, temperature, proximity to cover, etc.) and local patterns of streambed scour at redd and non-redd locations. The approach is to annually map redd distributions and to collect microhabitat data in areas supporting redds. Microhabitat data is also being collected in gravel areas without redds.

Studies of fluvial bull trout movements and habitat use. A common goal of bull trout recovery efforts is the reestablishment of migratory forms. However, empirical evidence is lacking to determine if populations will reestablished after selective pressures against migration are alleviated. Researchers are attempting to monitor natural recolonization by bull trout into a formerly occupied reach of John Day Creek, a second order stream. The reach was subsequently blocked by a human caused barrier and found to be devoid of bull trout. A major debris flow then scoured the reach and removed the barrier. The approach is to sample the reach annually to determine if bull trout from downstream areas recolonize the area. Cooperators: RMRS and BLM.

Salmonid winter ecology. Despite the recognized need for winter research, the overwinter ecology of stream-dwelling salmonids remains one of the least understood aspects of their life history. Researchers have conducted a series of field studies designed to describe winter habitat requirements and behavior of trout in streams. Additional studies are being completed using laboratory aquaria. The laboratory studies were designed to test the influence of water temperature, light intensity, and cover availability on concealment of juvenile bull trout. This work could provide insights into the factors that influence detection of juvenile bull trout. Cooperators: RMRS and BLM.

USDA Forest Service – National Forests

- *South Fork Salmon River streambed sediment monitoring*. The Boise and Payette national forests have monitored temporal changes in fine streambed sediments in response to changes in management activities and to large watershed restoration programs instituted in response to severe sedimentation of important aquatic habitats (Nelson et al. 1999;USFS 1992; Jenny Fischer, BNF, personal communication; *BNF aquatics database; other restoration summaries*).
- *Fish and Fish Habitat Monitoring*. The North Fork, Yankee Fork, and Cobalt ranger districts of the Salmon-Challis NF have fish and fish habitat monitoring programs. The North Fork RD monitors fish densities in 55 drainages at least once every 3 years, the Yankee Fork RD monitors fish densities in 31 drainages at least once every 5 years, and the Cobalt RD monitors bull trout escapements and densities in three drainages each year. The USFS has conducted R1/R4 stream surveys on hundreds of miles of streams throughout the Salmon Subbasin. These surveys are designed to be repeatable over time and to accurately portray aquatic conditions in the watershed.
- *Streambed Sediment Monitoring on the Salmon-Challis NF*. This project, initiated in 1992 and fully implemented by 1995, monitors fine sediment composition in core samples taken at 147 stations on 97 different streams administered by the Salmon-Challis NF. Objectives are to determine sediment trends and relate results to fish production criteria.
- *Effectiveness Monitoring Pilot Project for Streams and Riparian Areas*. This program has been initiated to determine if key biological and physical components of aquatic and riparian communities are improved, degraded, or restored where grazing activities occur. In 1999, the USFS sampled riparian areas within 78 watersheds throughout the Salmon Subbasin for comparison.
- *Temperature Monitoring on the Salmon-Challis NF*. Extensive temperature monitoring at over 160 stations throughout the Salmon Subbasin is conducted by individual Districts and summarized annually in monitoring reports.

USDI Bureau of Land Management – District Offices

- *Fish Population Surveys*. The Salmon and Challis field offices of the BLM annually attempt to conduct fish population surveys in ten watersheds within the lands they manage in the UPS, PAH, MSP, and LEM hydrologic units, to monitor and evaluate the occurrence and population strength of native salmonids. The Salmon Field Office has also assumed fisheries monitoring for the USFS Leadore RD.

- *Riparian Condition Monitoring within the Salmon and Challis Resource Areas*. To determine the status and trend of riparian habitat in key watersheds administered by the BLM, Proper Functioning Condition (PFC) protocols have been employed for several years. Results to date, covering 607.9 miles of channel along 232 different streams, show 47% of the areas examined to be properly functioning, 47% functioning at risk with an upward or no trend, and 6% either declining or non-functional.
- *Stream Temperature Monitoring*. The Salmon and Challis Field offices deploy more than 88 continuous water temperature loggers annually to characterize baseline water temperature regimes to monitor responses due to changes in land management.

US Geological Survey

- *Continuous Stream Discharge Measurements*. The U.S. Geological Survey maintains an array of 17 stream gaging stations in the Salmon Subbasin and has collected discharge data at a total of 89 stations within the subbasin over the last 100 years; supplemental data on water temperatures were collected at several of these stations. A comprehensive summary of the 89 gaging stations is given in Appendix B.
- *Water Quality Monitoring*. Since 1990, the U.S. Geological Survey (USGS) and the Idaho Division of Environmental Quality have monitored water quality at five stations in the Salmon Subbasin as part of a statewide program that provides information on trends in surface-water quality. These stations include the Pahsimeroi River at Ellis, the Salmon River at Salmon, the Lemhi River at Lemhi, Johnson Creek at Yellow Pine, and Little Salmon River at Riggins. The stations are sampled monthly from April through September every third year for suspended sediments, nutrients, bacteria, pH, dissolved oxygen, common ions, and a variety of field parameters. Since 1996, biological samples, including qualitative and semi-quantitative macroinvertebrate inventories, and continuous temperature measurements, have been collected in addition to the monthly data on water quality constituents. Additional information on this program is available at http://idaho.usgs.gov.

Nez Perce Tribe

- *Lower Snake River Compensation Plan Hatchery Evaluations*. Since 1989, NPT evaluations of LSRCP hatcheries have been structured to monitor aspects of hatchery production performance, natural production status and performance, and interactions of hatchery and natural juveniles. The goal has been to promote genetic conservation and to contribute to the co-management of the LSRCP program.

The evaluation project has monitored adult escapements of both natural and hatchery origin chinook salmon and steelhead in several key spawning aggregates, conducted pre-release sampling of LSRCP hatchery-produced fish, monitored life stage survival of naturally and hatchery produced fish, and evaluated the genetic population structure of selected anadromous stocks.

Salmon carcass recoveries in the South Fork Salmon River (SFSR) have allowed estimates of the level of introgression of McCall Hatchery origin adults into natural production areas that include the Secesh River, Lake Creek and Johnson Creek. The percentage of hatchery-origin adults observed on the spawning grounds at Poverty Flat in the SFSR averaged 19% from 1996-2000, based on recoveries of marked carcasses. Scale pattern analysis (SPA) conducted from 1992-1995 suggests an average hatchery percentage of 40% in this same area. The percentage of hatchery origin adults observed on the spawning grounds in the 11.3 km area downstream of the adult weir on the South Fork averaged 68% from 1996-2000, and 85% by the SPA method from 1992 to 1995. Spawner abundance data from Big and Johnson creeks have been used for population trend analysis, and carcass recovery data provided on unmarked salmon in these streams were used by PATH to develop run reconstructions and to estimate spawner-to-spawner ratios. Conservation assessments have also been prepared using these same data (Kucera and Blenden 1999).

Tissue samples this project has collected from adult salmon carcasses at Poverty Flat, Stolle Meadows, Johnson Creek and the Secesh River are being used for DNA-based analyses of geographic stock structure within the SFSR. The project has also helped collect gametes from hundreds of listed adult male salmon at LSRCP hatcheries and from natural production areas. These samples have been cryo-preserved to save some of the existing genetic diversity in case of population collapses and localized extinctions.

Estimated survival of chinook salmon presmolts of McCall hatchery origin, released in the fall of 1998, was 10.1% (S.E. = 1.3%) from the SFSR to Lower Granite Dam. A similar release group in 2000 was emigrating to the ocean as this report was prepared.

Several reports summarize the results of NPT efforts to monitor and evaluate LSRCP salmon in the natural environment. These include: Kucera 1987, Cowley and Kucera 1989, Kucera and Banach 1991, Kucera et al. 1994, Kucera and Blenden 1994, 1995a, 1995b, 1996, 1998, 1999a, 1999b, and Kucera 1998.

Shoshone-Bannock Tribes

- *Streambed Sediment and Fish Habitat Monitoring*. Long-term monitoring of past enhancement efforts is necessary to determine the effectiveness of past projects on achieving desired goals and objectives. The Tribes provide monitoring of habitat enhancement projects in Bear Valley Creek, Yankee Fork Salmon River, and East Fork Salmon River designed to reduce fine sediment inputs, improve stream channel morphology, and improve salmonid spawning and rearing habitat. Expected benefits of these efforts are long-term in nature and include improved survival at freshwater life-stages for anadromous salmonids. Sediment and habitat monitoring includes surface and subsurface fines, width/depth ratios, pool habitat (depths, frequency, and quality), streambank stability/undercuts, sinuosity, riparian condition/composition, and stream temperatures. Physical habitat monitoring in conjunction with fisheries data is used to determine changes in physical habitat quality and quantity, habitat use, egg-to-parr survival, and species composition over time. Cooperating projects: Salmon River Habitat Enhancement.
- *Annual Fish Distribution and Abundance Monitoring*. The Shoshone-Bannock Tribes annually monitor trends and distribution of chinook salmon spawning in five watersheds using multiple-pass spawning ground surveys, and fish densities at over 150 sample sites in seven watersheds using snorkel techniques. Chinook salmon egg-to-parr

survival estimates are generated annually for three watersheds. Rotary screw traps are utilized on two systems to determine migration timing and survival through the hydrosystem of chinook salmon and steelhead. Results of fisheries monitoring are used to: 1) monitor long-term trends, 2) assess the effects of habitat enhancement efforts on fish production, 3) determine the best strategies for utilizing supplementation as a tool to recover chinook salmon populations, and 4) determine the best strategies for utilizing gametes and progeny of the chinook salmon captive rearing program to assist in recovery efforts. Cooperating projects: Salmon River Habitat Enhancement, Idaho Supplementation Studies.

The Tribes annually monitor trends and distributions of sockeye salmon spawning in three lakes and kokanee salmon in three streams using multiple-pass spawning ground surveys. Sockeye salmon redds are counted to document spawning success of adult sockeye stocked in the lakes. Kokanee spawning surveys are used to estimate the contribution of fry entering the lakes the following year. A rotary screw trap and juvenile weir are used on the outlets of Alturas and Pettit lakes, respectively to estimate sockeye overwinter survival and smolt emigration. A portion of sockeye salmon smolts are PIT tagged to determine migration timing and relative survival. Hydroacoustic surveys are conducted annually to estimate the *O. nerka* populations in three sockeye nursery lakes. Results of those surveys are included in estimating lake carrying capacities, and potential competition with introduced sockeye salmon juveniles. Investigations are conducted annually on diet of kokanee, bull trout, brook trout, and northern pikeminnow in Pettit and Alturas lakes. Cooperating Projects: Snake River Sockeye Salmon Habitat and Limnological Research, Research and Recovery of Snake River Sockeye Salmon (IDFG).

- *Limnological Monitoring:* The Tribes annually monitor four Sawtooth Valley lakes for a variety of biological and physical parameters. Intensive monitoring of nutrients (TP, DP, NO^3, TKN), chlorophyll, phytoplankton, and zooplankton is conducted biweekly for seven months on Redfish, Pettit, and Alturas lakes. Winter sampling is conducted monthly from January through March. The same parameters are monitored in Stanley Lake less frequently. Rotifers, virus, bacteria, and picoplankton will be added during 2001. Primary productivity is calculated four times throughout the season.

Limnological conditions are used to estimate sockeye carrying capacities for each lake. Kokanee standing stock biomass estimates are then taken into consideration to make recommendations for stocking densities for progeny of the captive broodstock program into each lake.

Idaho Department of Fish and Game

- *Annual Escapement Monitoring.* The IDFG has monitored chinook salmon returns through redd count surveys within the Salmon Subbasin since 1957. Similar redd count monitoring of steelhead trout has been conducted since 1990. Redd counts are obtained for each species annually through a combination of aerial and ground surveys in most of the major hydrologic units (watersheds within the Salmon Subbasin (Figure 39) and provide both baseline and population trend information as well as some potential for future predictions of population trends based on spawner-recruit theory.

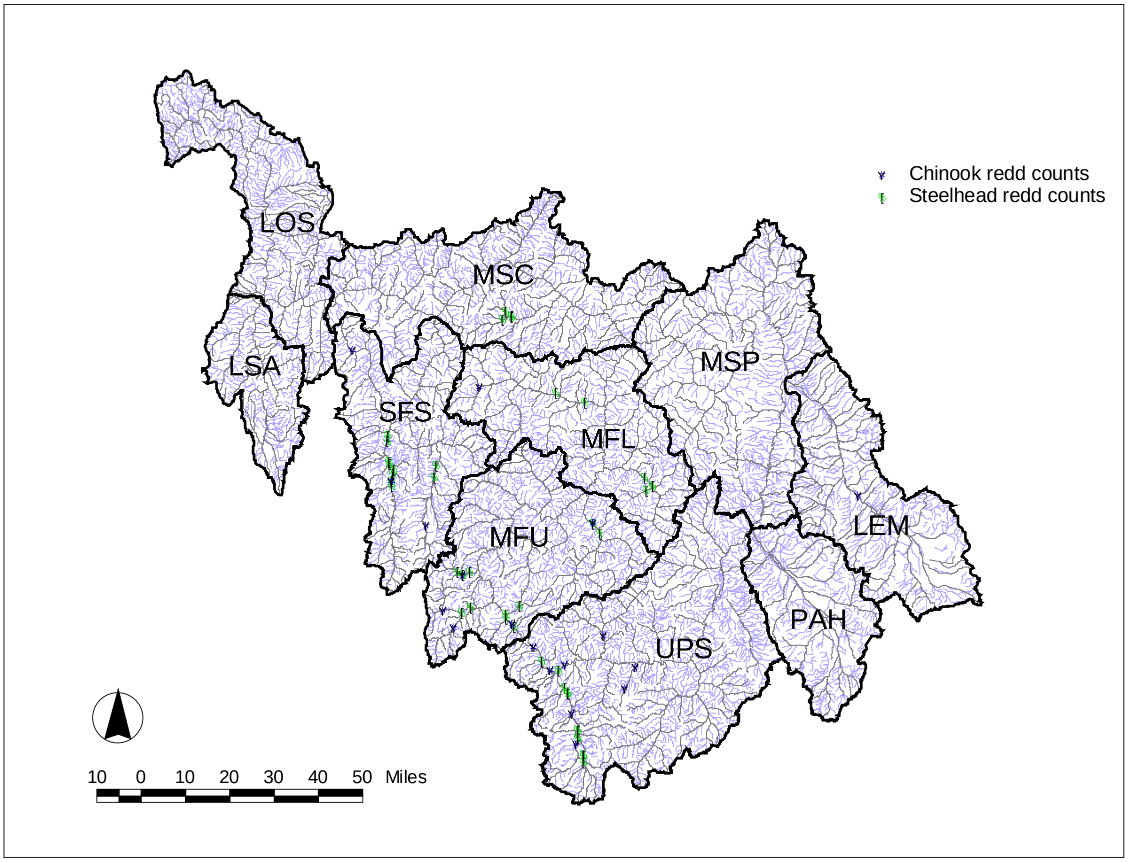


Figure 39. Survey locations used to index the escapement of spawning spring/summer chinook and summer steelhead in the Salmon Subbasin, Idaho (source: IDFG).

- *Lower Snake River Compensation Plan Hatchery Evaluations*. An extensive monitoring and evaluation program is conducted in the basin to document hatchery practices and evaluate the success of the hatchery programs at meeting LSRCP mitigation objectives and IDFG management objectives, and to monitor and evaluate the success of supplementation programs. Funding for this program is provided to IDFG by the USFWS-LSRCP. The IDFG-LSRCP hatchery monitoring and evaluation program identifies hatchery rearing and release strategies that will allow the LSRCP program to meet its mitigation requirements and improve the survival of hatchery fish while avoiding negative impacts to natural (including listed) populations. In some cases, particularly in light of ESA requirements and Idaho Supplementation Study (ISS) and Steelhead Supplementation Study (SSS) plans, hatcheries may be used to enhance naturally reproducing populations. Continuous coordination between the Hatchery Evaluation Study and IDFG's BPA-funded supplementation research project is required because these programs overlap in several areas including: juvenile outplanting, brood stock collection, and spawning (mating) strategies. Additional information on this program was included in Section 4.5.1 of this report.

Idaho Department of Environmental Quality (IDEQ)

- *<u>Beneficial Use Reconnaissance Surveys (BURP)</u>*. IDEQ has conducted extensive surveys of stream habitat, water quality, and biotic conditions during 709 site visits to streams in the Salmon Subbasin using standardized protocols that are qualitative or quantitative in nature, depending on the paramater of interest (Appendix L). Sample sites have been scattered across each major hydrologic unit (watershed) within the Salmon Subbasin (Figure 3-4), but tend to be somewhat biased toward sites of lower habitat or water quality due to a focus on identifying areas not in compliance with state water quality laws.

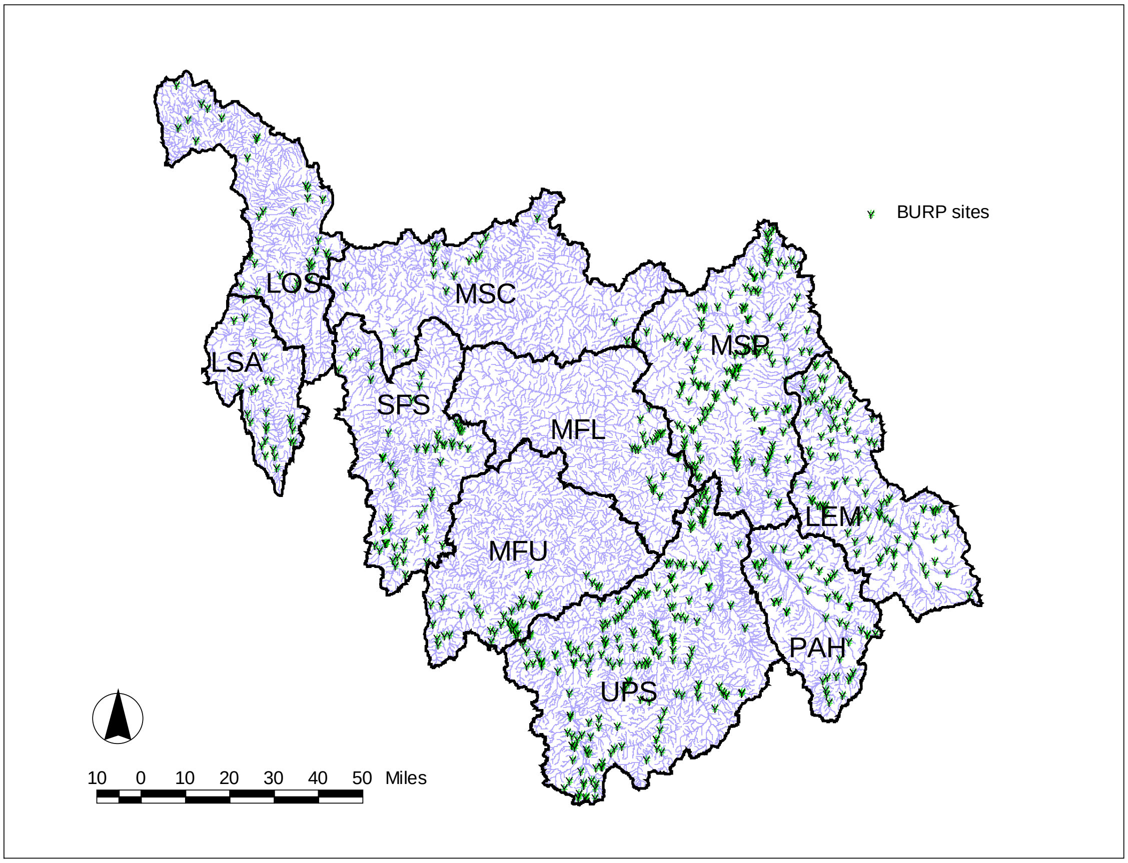


Figure 40. Beneficial Use Reconnaissance Survey (BURP) sites sampled within the Salmon Subbasin, Idaho (source: IDEQ).

Orma J. Smith Museum of Natural History

- *Fish Collection Database*. The fish collection and database at the Orma J. Smith Museum of Natural History contains over 4,500 records representing over 5000 lots of specimens collected from 1918 to the present. The collection is comprised of voucher specimens from Albertson College of Idaho, Idaho Department of Environmental Quality, U.S. Geological Survey, Idaho Department of Fish and Game, U.S. Bureau of Land Management, U.S. national forests, U.S. Forest Service Rocky Mountain Research Station, and the U.S. National Marine Fisheries Service. The curator of the collection, Donald W. Zaroban and Dr. Richard L. Wallace, Professor Emeritus of Zoology at the University of Idaho, are currently collaborating on the production of a field guide to the native fishes of Idaho. This collaboration is resulting in a combined database of Idaho specimens from the University of Idaho, the Orma J. Smith Museum, and records of Idaho specimens housed at the U.S. National Museum of Natural History and the University of Michigan Museum of Zoology.

5.4. Statement of Fish and Wildlife Needs

The following discussions and associated lists include specific immediate and/or critical needs defined collectively by fish and wildlife resource managers within the Salmon Subbasin. Needs have been defined to 1) address limiting factors to fish, wildlife and plant communities, 2) ensure that gaps in current data or knowledge are addressed, 3) enable continuation of existing programs critical to successful management of fish and wildlife resources, and 4) to guide development of new programs to facilitate or enhance fish and wildlife management.

5.4.1. Multi-scaled Ecological Research and Development of New Analytical Tools

There is a strong need for research and analytical tools that will help managers improve their ability to: 1) describe and monitor the condition of salmon and other fish populations and their habitats and 2) prioritize the use of limited conservation and restoration resources. A detailed technical discussion of the basis for this need, as well as past or ongoing research, is given in Appendix M. Researchers at the Rocky Mountain Research Station in Boise Idaho, building on knowledge and understanding developed during ICBEMP and other studies, have identified several critical and relatively unique opportunities for new research in the Salmon Subbasin that will help fill this need. These include:

1. Validation of large-scale population sampling and inventory methods
2. Development and validation of landscape models used to predict the distribution, quality, and dynamics of habitat
3. Identification of the key processes constraining evolutionary potential and the distribution of intraspecific diversity.
4. Evaluating metapopulation dynamics and key processes such as straying and dispersal.
5. Assessing patterns and effects of nonnative invasions.

6. Development of a rigorous method for prioritizing habitat restoration projects that incorporates local knowledge as well as modeling approaches to assess physical needs, biological needs, and project feasibility.
7. Evaluating non-invasive methods to study severely depressed salmonid stocks that may be sensitive to effects of scientific studies using conventional methods.
8. Assessing whether reductions in imported marine nutrients associated with low anadromous salmonid escapements actually decrease growth and survival of salmon and steelhead parr and native resident fish, particularly at low seeding densities.
9. Rigorously evaluating whether and/or how habitat enhancement activities affect egg-smolt survival, particularly at low seeding densities.

5.4.2. Fisheries/Aquatic Needs

1. Continue Lower Snake River Compensation Hatchery Monitoring and Evaluation to determine hatchery chinook and steelhead performance, natural production responses, competitive interactions, harvest management and provide for applied adaptive management.
2. Continue Nez Perce Tribal Hatchery Monitoring and Evaluation to determine hatchery chinook performance, natural production responses, competitive interactions, harvest management and provide for applied adaptive management.
3. Continue and expand investigations of interactions between hatchery and wild chinook, steelhead, and resident fish.
4. Quantify the types and extent (amount) of straying by chinook and steelhead occurring within subbasins, within the Mountain Snake Province, and within designated ESUs.
5. Investigate connectivity between populations and the role of natural and artificial barriers in population isolation.
6. Protect and restore riparian and instream habitat structure, form and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
7. Protect, restore and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.
8. Continue coordinated temperature monitoring throughout the subbasin. Identify spatial and temporal gaps, establish additional flow and temperature gauging stations and upgrade existing to provide real-time data, and expand longitudinal profiles. Fish distribution and habitat quality are highly influenced by water temperature. This parameter must be monitored in both wilderness and managed watersheds to provide baselines to evaluate population recovery and watershed restoration activities.
9. Reduce stream temperature, sediment and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species. This is the core of the objectives of the TMDL process.
10. Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.
11. Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff and wastewater effluent.
12. Continue, and enhance where necessary, conservation enforcement activities.
13. Conduct gamete preservation on all salmonids throughout the Salmon Subbasin (*Nez Perce Tribe*).

14. Implement/continue artificial propagation or supplementation programs on salmon and steelhead stocks deemed at risk (*Nez Perce Tribe*).
15. Use artificial production, i.e., egg outplants, parr releases, smolt releases, and adult outplants to reestablish salmon and steelhead runs into vacant habitat throughout the Salmon Subbasin (*Nez Perce Tribe*).

Genetic Profiles of Anadromous Fish

The establishment of genetic baselines for salmon and steelhead is a key element for identifying stock or management units within populations and conserving existing genetic resources. Also, baselines allow standard against which shifts or losses of genetic resources through various management practices (e.g. supplementation or hatchery practices) can be monitored.

1. Complete a province-wide chinook salmon genetic assessment that will provide a baseline for monitoring hatchery introgression into wild populations.
2. Continue and expand genetic profiling to define steelhead sub-populations within the subbasin to determine geographic structure, gene flow, genetic similarity and hatchery introgression into wild populations.

Summer Steelhead

1. Gather improved wild, natural, and hatchery A-run and B-run steelhead population status information including tributary specific life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, spawning areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded Idaho Supplementation Studies, Idaho Natural Production Monitoring Program, and selected Tribal efforts in the South Fork Salmon River.
2. Collect population status information for wild steelhead including adult spawner abundance, spawner to spawner ratios, spawning locations, spawning timing, juvenile abundance, and SARs in the South Fork Salmon River (*Nez Perce Tribe*).
3. Validate index survey areas for summer steelhead to ensure they provide appropriate measures of productivity.
4. Need to calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.
5. Monitor adult movement to determine if and where passage impediments exist within the basin for summer steelhead.
6. Investigate life history diversity and genetics of steelhead and relationship(s) to redband trout.
7. Evaluate the extent and impacts of hatchery straying into the subbasin to control potentially adverse genetic effects on the natural population.
8. Determine the extent of interaction between redband trout and steelhead, including overlap in distribution.
9. Investigate the distribution and abundance of redds, diversity of life history traits, and genetic composition of wild steelhead in the Middle Fork Salmon (*Nez Perce Tribe*).

10. Continue gene conservation efforts (cryopreservation) for steelhead to preserve genetic diversity within the geographic population structure (*Nez Perce Tribe*).
11. Develop conservation hatcheries with native steelhead broodstock (*Nez Perce Tribe*).

Chinook Salmon (Includes all races unless specifically noted)

1. Gather improved population status information for wild, natural and hatchery chinook salmon including life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded Idaho Supplementation Studies, Idaho Natural Production Monitoring Program, Listed Stock Escapement Monitoring project, and new projects.
2. Calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.
3. Monitor spring chinook by examining population trends and develop modeling and monitoring "tools" to determine out-of-basin impacts to Salmon subbasin chinook.
4. Determine the extent of natural production resulting from outplanted hatchery adults.
5. Define the metapopulation structure in the South Fork Salmon and Upper and Lower Middle Fork Salmon watersheds (*Nez Perce Tribe*).
6. Conduct a conservation assessment of stream-type chinook in the Upper and Lower Middle Fork Salmon watersheds (*Nez Perce Tribe*).
7. Monitor fish population parameters in relation to habitat enhancement projects (*Nez Perce Tribe*).
8. Continue evaluating reintroduction efforts for fall chinook salmon (*Nez Perce Tribe*).
9. Continue and expand the Johnson Creek Artificial Propagation Enhancement monitoring and evaluation to determine hatchery chinook performance, natural production responses, smolt-to-adult survival, competitive interactions, harvest management, and provide for applied adaptive management (*Nez Perce Tribe*).
10. Determine hatchery:natural composition of adult salmon in natural production areas (*Nez Perce Tribe*).
11. Conduct small-scale studies to determine performance and contribution of listed adult hatchery chinook salmon and their use in recovery (*Nez Perce Tribe*).
12. Continue gene conservation efforts (cryopreservation) for stream-type chinook in the subbasin (*Nez Perce Tribe*).
13. Quantify mortality rates and straying of adult chinook salmon from Lower Granite Dam to natural production areas (*Nez Perce Tribe*).

Other Native Fish Species

1. Assess the status of native species that have received little attention to date or where information is limited. Westslope cutthroat trout, bull trout, and Pacific lamprey appear to be well below historic population levels. Collect life history, distribution, abundance by life stage, genetic and homing behavior attributes.
2. Determine habitat requirements and limiting factors for Pacific lamprey production in the subbasin and assess the rehabilitation potential and process in the subbasin.
3. Monitor impacts of illegal, incidental, sport and Tribal harvest on resident native populations.

4. Investigate the existence, life history, and genetics of redband trout in the subbasin. Include populations in allopatry and sympatry with steelhead, identifying genetic and spatial segregation and overlap using current DNA-marker and GIS technology.
5. Evaluate connectivity and the degree of interchange between populations throughout the Salmon subbasin and within the province.
6. Estimate abundance and monitor known populations to establish trends and measure population response to restoration.
7. Determine the extent and magnitude of nonnative species interaction and hybridization to better define treatment options.
8. Investigate life history and distribution of white sturgeon in the mainstem Salmon River.

Exotic Fish Species

1. Determine distribution of introduced non-native species and their effects on native fish, including predation and competition. Control numbers and distribution of exotic species where feasible.

5.4.3. Wildlife / Terrestrial Needs

General

1. Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity and for mitigation of lost wildlife habitat (land purchases, land trusts, conservation easements, landowner cooperative agreements, and exchanges).
2. Implement and (where applicable) continue Integrated Pest Management programs.
3. Assist landowners with land holdings and easements.
4. Continue long-term bird monitoring.
5. Cooperate on threatened, endangered, and sensitive species recovery or conservation strategy efforts in the subbasin.
6. Acquire existing ecological data sets where possible and compile metadata according to national standards.
7. Monitor use of existing reference areas to assure consistency with the maintenance of ecological values.
8. Establish and maintain permanent baseline monitoring systems within ecological reference areas for priority ecosystems and species.
9. Identify candidate sites for the establishment of ecological reference areas based on current needs assessments. Periodically update ecological reference area needs assessments.

Ponderosa Pine Forest and Woodlands

1. Inventory and map the current and potential distribution of ponderosa pine-dominated plant communities in Middle Salmon-Panther, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, South Fork Salmon, Lower Salmon, and Little Salmon watersheds. Inventory, map, and gather population data for ponderosa pine associated wildlife and plant species.
2. Acquire lands on breaklands when opportunities arise for improved habitat protection, restoration, and connectivity for ponderosa pine plant communities and for mitigation of lost wildlife habitat for ponderosa pine associated species (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).

3. Restore mid-seral old growth ponderosa pine-dominated plant communities.
4. Create and maintain large diameter snags in ponderosa pine plant communities.
5. Develop an information and education stewardship program to foster ponderosa pine protection.

Canyon Grasslands and Sagebrush Steppe

1. Inventory and map the distribution of canyon grasslands within the Lower Salmon, Little Salmon, and Middle Salmon-Chamberlain watersheds.
2. Inventory and prepare conservation plan for high quality, representative stands of canyon grasslands within the Lower Salmon, Little Salmon, and Middle Salmon-Chamberlain watersheds.
3. Inventory and map the distribution of sagebrush steppe within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds.
4. Inventory and prepare conservation plan for high quality, representative stands of sagebrush steppe within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds.
5. Inventory, map, and gather population data for canyon grassland and sagebrush steppe associated wildlife and plant species.
6. Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity for canyon grasslands and sagebrush steppe and for mitigation of lost wildlife habitat for canyon grassland and sagebrush steppe associated species (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
7. Restore canyon grasslands and sagebrush steppe ecosystems.
8. Investigate and develop appropriate and practical restoration techniques for canyon grasslands and sagebrush steppe ecosystems.
9. Develop native plant nurseries for propagation and restoration.
10. Seed-bank native canyon grassland and sagebrush steppe perennial bunchgrass species.
11. Develop an information and education stewardship program to foster canyon grassland and sagebrush steppe protection.
12. Complete inventories to better identify, protect, and enhance existing and potential critical sage grouse habitat areas in the upper portions of the subbasin.
13. Increase public awareness of the status of sage grouse and their biology and support for their conservation.

Riparian Plant Communities

1. Inventory and map the distribution of riparian plant communities.
2. Inventory, map, and gather population data for riparian associated wildlife and plant species.
3. Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity for riparian plant communities and for mitigation of lost wildlife habitat for riparian associated species (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
4. Protect, restore, and create wetland and riparian habitat in lower elevation riparian areas.

5. Develop an information and education stewardship program to foster riparian community protection.
6. Improve the trend and condition of the subbasin riparian plant communities located in critical sage grouse habitats.
7. Reconnect historic streams to recover lost riparian plant communities and habitats.

Noxious Weeds

1. Inventory and map the distribution of noxious weeds.
2. Develop and use restoration techniques for noxious weed infested plant communities.
3. Continue control programs for noxious weeds to restore natural habitat conditions and plant communities for wildlife species.
4. Develop an information and education stewardship program for noxious weeds.
5. Develop and maintain cooperative information management protocols for the occurrence of noxious weed populations.
6. Complete inventories to better identify existing infestations and potential critical areas of spread in the Salmon River Corridor.
7. Improve the trend and condition of the subbasin riparian and upland communities located in the Salmon River Corridor through the elimination of spotted knapweed and other noxious weeds.
8. Increase public awareness of noxious weed problems and solicit their support for the conservation of native habitats.

Subalpine Forest and Woodland Stand Dynamics and Habitat Relations

1. Inventory and map the distribution of subalpine forest and woodland (subalpine fir forest, subalpine fir forest and woodland, and whitebark pine-limber pine forest and woodland plant association groups) by seral status and structural condition, within the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and South Fork Salmon watersheds of the subbasin.
2. In selected subalpine fir forest and woodland stands throughout the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and South Fork Salmon watersheds determine pre-European settlement fire disturbance regimes.
3. Investigate fire disturbance and stand dynamic processes in whitebark pine-dominated forest and woodlands of the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, and Lower Middle Fork Salmon.
4. Investigate techniques and methods to retain late successional habitats on state and private lands (land exchanges, conservation easements).
5. Develop and implement management prescriptions to restore and promote late successional habitats.
6. Develop an information and education stewardship program to foster late seral community protection.

Habitat Fragmentation

Connectivity of habitat can be critical to maintaining many wildlife populations.

1. Identify by county critical wildlife areas and plant communities.

2. Acquire critical habitats threatened by development when opportunities arise for improved habitat protection, restoration, and connectivity (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
3. Work with counties to support timely updates and resource inventories related to local land use plans to further prevent degradations of floodplains, wetlands, riparian, and other sensitive areas.
4. Reduce road densities through closures, obliteration, and reduced construction.
5. Need to support planned road closures on public land and encourage closure of other roads.
6. Improve enforcement of road closures.
7. Maintain riparian plant communities because of their connectivity value.

5.4.4. Combined Aquatic and Terrestrial Needs

The following list addresses land and water management issues, and programs needed to assess entire community trends and responses to management.

1. Continue ongoing, and establish new, monitoring and evaluation programs for fish supplementation, habitat restoration and improvement, habitat baseline conditions, water quality and water quantity improvements, conditions and trends. These M&E activities are critical to evaluating the effectiveness of projects at improving habitat, watershed health and enhancing production of target species.
2. Coordinate M&E efforts at the subbasin and provincial scale to maximize effectiveness and minimize redundancy.
3. Develop and implement improved practices for agricultural, mining, grazing, logging and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
4. Develop and maintain comprehensive and consistent subbasin databases related to both aquatic and terrestrial resources, and establish a centralized data repository. This will promote more effective resource management.
5. Investigate effects of potential loss or lack of nutrients due to declines in anadromous salmonid populations, and coordinate and evaluate nutrient enhancement alternatives.
6. Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitat (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
7. Protect existing pristine and key fish and wildlife habitats directly threatened by subdivision, recreation, or extractive resource uses.
8. Support timely updates and resource inventories related to local land use plans to further prevent degradation of floodplains, wetlands, riparian and other sensitive areas.
9. Continue to develop watershed assessments at multiple scales to facilitate integrated resource management and planning efforts.
10. Develop Federal Recovery Plans for threatened and endangered species to provide recovery guidance for state, tribal and local entities as required by law.
11. Complete road inventory and assess impacts to aquatic and terrestrial resources. Use information to facilitate transportation planning and to reduce road densities. Support planned road closures on public land and encourage closure of other roads.
12. Support timely updates and resource inventories related to local land use plans to further prevent degradation of floodplains, wetlands, riparian and other sensitive areas.

13. Continue and enhance the cooperative/shared approach in research, monitoring and evaluation between tribal, federal, state, local and private entities to facilitate restoration and enhancement measures. Protection and restoration of fish and wildlife populations and habitat will not be successful without the interest and commitment of all parties.
14. Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

Subbasin Recommendations

Projects and Budgets

Continuation of Ongoing Projects

Project: 198909800 – Idaho Supplementation Studies

Sponsor: IDFG

Short Description:

Evaluate various supplementation strategies for maintaining and rebuilding spring/summer chinook salmon populations in Idaho. Develop recommendations for using supplementation to rebuild naturally spawning populations.

Abbreviated Abstract

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 31 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large-scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook salmon have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years (three generations) of research (Bowles and Leitzinger 1991). Sampling was initiated in 1991, and implementation began in 1992. Supplementation effects are monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199005500	Steelhead Supplementation Studies	Reciprocal transfer of data/coordination
199107300	Idaho Natural Production Monitoring and Evaluation	Reciprocal transfer of data/coordination
198335000	Nez Perce Tribal Hatchery O&M	Reciprocal transfer of data/coordination
199405000	Salmon River Habitat Enhancement - O&M, M&E	Reciprocal transfer of data/coordination
199705700	Salmon River Production Program	Reciprocal transfer of data/coordination
199703000	Monitor Listed Stock Adult Chinook Salmon Escapement	Reciprocal transfer of data/coordination
199102800	Monitoring smolt Migration of Wild Snake River Spring/Summer Chinook Salmon	Reciprocal transfer of data/coordination
199604300	Johnson Creek Artificial Propagation Enhancement- O&M, M&E	Reciprocal transfer of data/coordination

Relationship to Existing Goals, Objectives and Strategies

Salmon and Clearwater Subbasin Summaries - The depressed status of Snake River spring/summer chinook salmon is clearly described in Section 4.1.1.a of the Salmon Subbasin Summary and in the Fish Status chapter of the Clearwater Subbasin Summary. ISS goals and objectives are consistent with existing plans, policies and guidelines presented in Section 5.1 of the Salmon Subbasin Summary as developed by Bonneville Power Administration (Section 5.1.1.a), the National Marine Fisheries Service (Section 5.1.1.b), the Nez Perce Tribe (Section 5.1.2.a), the Shoshone-Bannock Tribes (Section 5.1.2.b) the Idaho Department of Fish and Game (Section 5.1.3.a).

Existing Federal, State and Tribal goals, objectives and strategies identified in the Salmon and Clearwater Subbasin Summaries overlap significantly with the goals of the Idaho Supplementation Studies. The "overarching" hatchery goal of the Basinwide Salmon Recovery Strategy (Federal Caucus 2000) is to reduce genetic, ecological, and management effects of artificial production on natural populations. Through the ISS Experimental Design and brood stock strategies, this project is designed to minimize negative hatchery effects on natural populations. Specific Federal Caucus recommendations that overlap with goals of this project include: limiting the adverse effects of hatchery practices on ESA-listed populations, and using genetically appropriate broodstock to stabilize and/or bolster weak populations (Section 5.2.1).

Bonneville Power Administration (Salmon Subbasin Summary, Section 5.2.1.a) presented basinwide objectives for implementing actions under the FCRPS Biological Opinion and suggested that hatcheries can play a critical role in recovery of anadromous fish by "increasing the number of biologically-appropriate naturally spawning adults; improving fish health and fitness; and improving hatchery facilities, operation, and management and reducing potential harm to listed fish." Specific strategies developed by BPA include: reducing the potentially harmful effects of hatcheries; using safety net programs on an interim basis to avoid extinction; and using hatcheries in a variety of ways to aid recovery. The ISS Experimental Design is consistent with the goals, objectives, and strategies developed by BPA. ISS objectives and tasks specifically address the development of genetically prudent brood stocks to keep unique identities available to preserve future options.

The goal of NMFS in the Salmon Subbasin (Salmon Subbasin Summary, Section 5.2.1.b) is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye and steelhead resources. Ultimately, NMFS's goal is the achievement of self-sustaining, harvestable levels of salmon populations that no longer require the protection of the Endangered Species Act. ISS project goals and objectives are consistent with this language.

Salmon Subbasin goals, objectives and strategies developed by the Nez Perce Tribe (Section 5.2.2.a) and the Shoshone-Bannock Tribes (Section 5.2.2.b) relate directly to the Idaho Supplementation Studies. The principal Nez Perce Tribal goal; to restore anadromous fish in rivers and streams… is directly compatible with the ISS goals. Shoshone-Bannock Tribal Objective 1, Strategies 1, 2, and 3, are directly tied to ISS goals and objectives.

The Idaho Department of Fish and Game is charged with the responsibility of preserving, protecting, perpetuating, and managing the fish and wildlife resources of Idaho. This mandate is reflected as their primary goal in the Salmon Subbasin Summary (Section 5.2.3.a). Idaho's overall anadromous fisheries goal is to recover wild Snake River salmon and steelhead populations and to restore productive salmon and steelhead fisheries (Idaho Department of Fish and Game 1996, 2001). Goals and objectives of the ISS project are carried-out under these State-wide management guidelines.

Specific IDFG Fisheries Bureau goals, objectives and strategies that overlap with the ISS project include: the primary goal to provide viable fish populations for present and future use (Goal 1), the objective to maintain or restore wild populations of game fish in suitable waters (Objective 1); and to assist in recovery of rare species through the use of supplementation (Strategy 3). Anadromous Fish Management objectives and strategies that provide guiding support for this project include: the need to maintain genetic and life history diversity and integrity of naturally and hatchery-produced fish (Objective 1); the need to rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level (Objective 2); the need to use appropriate and proven supplementation techniques to restore and rebuild populations outside of wild production refugia (Objective 2, Strategy 1); the recommendation to implement hatchery intervention where necessary and prudent to provide a safety net for selected populations at risk (Objective 2, Strategy 4); and the need to balance genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction (Objective 2, Strategy 5).

The need for continued "monitoring and evaluation programs for fish supplementation" and a "cooperative/shared approach" is stated as a specific immediate or critical need in both the 2001 Salmon River Subbasin and Clearwater Subbasin summaries. ISS is a cooperative effort to monitor and evaluate supplementation strategies in Idaho. Objectives 1 and 3 directly address the issue of identifying which supplementation strategies (brood stock and release stage) if any, will be most affective in increasing natural production without adverse effects on natural productivity.

The 2001 Salmon River Subbasin and Clearwater River Subbasin summaries call for a province-wide genetic assessment of salmon as a baseline for monitoring hatchery introgression into wild populations. ISS Research Objective 2, to monitor and evaluate changes in productivity and genetic composition of target and adjacent populations following supplementation, addresses this recommendation. Adult monitoring components of ISS address interactions between hatchery and wild chinook, a need identified in the 2001 subbasin summaries.

2000 Columbia River Basin Fish and Wildlife Program – The ISS project conforms with the general vision of the Fish and Wildlife Program (Section III.A.1) and its "overarching objective to protect, mitigate and enhance the fish and wildlife of the Columbia River and its tributaries (Section III.C.1). Specifically, the Primary Artificial Production Strategy of the Fish and Wildlife Program (Section 4) addresses the need to complement habitat improvements by supplementing native fish populations with hatchery-produced fish with similar genetics and behavior to their wild counterpart. In addition, Section 4 includes language stressing the need to minimize the negative impacts of hatcheries in the recovery process. The ISS Experimental Design is aligned with this philosophy.

The 2000 Fish and Wildlife Program has adopted as two of its regional objectives for anadromous fish, the task of restoring "the wildest possible set of healthy naturally reproducing populations of salmon…by 2012" and increasing the "total adult salmon and steelhead runs above Bonneville Dam by 2025" to achieve full mitigation for losses of anadromous fish (FWP 2000, Section C.2.a.1, pg.18). Artificial production strategies are currently employed in the basin. However, the risks and benefits of supplementation on wild and naturally spawning populations are unknown. The FWP has stated in its implementation of artificial production strategies that "Artificial production must be implemented with an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties" (FWP 2000, Section 4. pg 27). The NPPC has called "for immediate efforts to gather data on wild and naturally spawning stocks, review impacts of the existing hatchery system and coordinate supplementation activities" to achieve its goal of doubling anadromous fish runs in the Columbia Basin as addressed in the Columbia Basin Fish and Wildlife program

(NPPC 1994). The overall goals of ISS are to address local and regional objectives and concerns with regard to the use of supplementation as a tool in rebuilding/reestablishing spring and summer chinook to harvestable levels in Idaho.

FCRPS Biological Opinion – (Note: For the sake of brevity, all links to Reasonable and Prudent Alternative (RPA) action items in the 2000 Federal Columbia River Power System (FCRPS) Biological Opinion are denoted below simply as "FCRPS Action ###".)

The Federal Biological Opinion includes Artificial Propagation Measures (Section 9.6.4) that address reforms to "reduce or eliminate adverse genetic, ecological, and management effects of artificial production on natural production while retaining and enhancing the potential of hatcheries to contribute to basin wide objectives for conservation and recovery." The Federal Biological Opinion recognizes that artificial production measures have "proven effective in many cases at alleviating near-term extinction risks." Many of the Actions to Reform Existing Hatcheries and Artificial Production Programs (Section 9.6.4.2) are being carried-out in the ISS project. Specifically, this project address reform measures dealing with: the management of genetic risk, the production of fish from locally adapted stocks, the use of mating protocols designed to avoid genetic divergence from the biologically appropriate population, matching production with habitat carrying capacity, and marking hatchery-produced fish to distinguish natural from hatchery fish. The Biological Opinion also reviews the need for the development of NMFS-approved Hatchery and Genetic Management Plans (HGMP). ISS activities are included in HGMPs being written for Idaho hatcheries.

FCRPS Action 174 identifies the need for "additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners". This need is addressed in ISS Research Objective 2. As we establish a baseline profile for evaluation and monitoring, we will include a genetic profile analysis for treatment and control streams.

Recommendations made in FCRPS Action 182 are to fund studies "to determine the reproductive success of hatchery fish relative to wild fish", and concerns over the genetic implications are expressed. ISS Research Objective 2, to monitor and evaluate changes in productivity and genetic composition of target and adjacent populations following supplementation, addresses this recommendation.

FCRPS Action 184 states the need to provide funding for a "hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery". ISS Research Objectives 1, 2, and 3 (Implementation Phase) are a clear attempt to provide the needed monitoring and evaluation of supplementation and in the long-term provide answers to supplementation's role in rebuilding and/or reestablishing spring chinook runs in Idaho.

Offices of the Governors. 2000. Recommendations of the Governors of Idaho, Montana, Oregon and Washington for the protection and restoration of fish in the Columbia River Basin. The Governors of the states of Idaho, Montana, Oregon and Washington urged regional recovery planners to recognize the multi-purpose aspect of hatcheries, which includes fish production for harvest, supplementation to rebuild naturally spawning populations, and captive brood stock experiments for conservation and restoration (Offices of the Governors 2000, Chapter IV, Hatchery Reforms). The Governors recommended that "the region's fish managers and tribes should jointly develop a comprehensive supplementation plan that includes aggressive monitoring and evaluation." They further recommended that the supplementation plan recognize the tribal, state and federal roles in implementation of the plan. Lastly, the Governors supported the concept of wild fish refuges and the use of these refuges as controls for evaluating conservation hatchery efforts.

The ISS project was developed and implemented cooperatively by the Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribes, and U.S. Fish and Wildlife Service. Guided by the projects Experimental Design, this project actively supplements salmon populations in areas that had on-going artificial production programs and in new areas. This project also provides very aggressive monitoring and evaluation of supplementation activities and utilizes wild fish refuges and non-supplemented streams as controls for evaluating the effects of supplementation.

Other Plans and Guidelines – Goals and objectives of the ISS project are consistent with several guidelines contained in the Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin (Brannon, et al. 1999). Objective 1 and 2 of the chinook program are actively following elements of Guidelines 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 15 of the Artificial Production Review. These guidelines address: the hatchery rearing environment; natural population parameters, habitat carrying capacity, genetic and breeding protocols, and population life history knowledge. Performance standards and indicators presented in the Artificial Production Review (NPPC 1999) presents a series of performance standards addressing both benefits and risks to populations. Many of these standards are specifically addressed in the ISS Experimental Design. The NMFS Biological Opinion on Artificial Propagation of Anadromous Salmonids in the Snake River Basin (Section 10.2) states that "The action agencies shall monitor and evaluate their respective artificial propagation programs in the Columbia River Basin." ISS is a cooperative effort to monitor and evaluate supplementation strategies in Idaho.

A major contributor in the design of the ISS project has been the Regional Assessment of Supplementation Project (RASP) "which was designed to provide a comprehensive framework for supplementation- the practice of using carefully selected stocks of hatchery fish to "reseed" streams"(FWP 1994 Section 7.3A). The ISS experiment was designed parallel to development of the RASP process, and RASP guidelines were incorporated in the design.

Review Comments

This project addresses RPAs 174, 182 and 184.

Budget

FY02	FY03	FY04
$996,726 Category: High Priority Comments:	$985,000 Category: High Priority	$990,000 Category: High Priority

Project: 198909801 – Evaluate Supplementation Studies in Idaho Rivers

Sponsor: USFWS-IFRO

Short Description:

Evaluate various supplementation strategies for maintaining and rebuilding spring/summer chinook salmon populations in Idaho. Develop recommendations for the use of supplementation to rebuild naturally spawning populations.

Abbreviated Abstract

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 31 streams throughout the Salmon and Clearwater river basins. It is working to define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook salmon have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years (three generations) of research (Bowles and Leitzinger 1991). Sampling was initiated in 1991, and implementation began in 1992. Supplementation effects are monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters. The U.S. Fish and Wildlife Service contributes to the study through investigations on Clear Creek associated with the evaluation of operations at Kooskia National Fish Hatchery, and conducts redd surveys and monitors juvenile production on Pete King Creek.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909800	ISS/ Idaho Department of Fish and	Cooperator on ISS Study

Project ID	Title	Nature of Relationship
	Game	
198909802	ISS/ Nez Perce Tribe	Cooperator on ISS Study
198909803	ISS/ Shoshone-Bannock Tribes	Cooperator on ISS Study
199107300	Idaho Natural Production Monitoring and Evaluation	Reciprocal transfer of data / coordination
19905500	Steelhead Supplementation Studies	Reciprocal transfer of data / coordination
198335003	Nez Perce Tribal Hatchery - O&M	Reciprocal transfer of data / coordination
199102800	Monitoring Smolt Migration of wild Snake River Spring/Summer Chinook Salmon	Reciprocal transfer of data / coordination
199405000	Salmon River Habitat Enhancement O&M/M&E	Reciprocal transfer of data / coordination
199604300	Johnson Creek Artificial Propagation Enhancement - O&M, M&E	Reciprocal transfer of data / coordination
199703000	Monitoring Listed Stock Adult Chinook Salmon Escapement	Reciprocal transfer of data / coordination
199705700	Salmon River Production Program	Reciprocal transfer of data / coordination

Relationship to Existing Goals, Objectives and Strategies

Note: For the sake of brevity, all links to reasonable and prudent action items in the 2000 Federal Columbia River Power System (FCRPS) Biological Opinion are denoted below simply as “FCRPS Action ###”. Relationships to both of the NPPCs 1994 and 2000 Fish and Wildlife programs (FWP) are presented since this project has consistently focused on addressing critical uncertainties and information needs expressed in the FWPs.

The 2000 Fish and Wildlife Program has adopted as two of its regional objectives for anadromous fish, the task of restoring “the wildest possible set of healthy naturally reproducing populations of salmon…by 2012” and increasing the “total adult salmon and steelhead runs above Bonneville Dam by 2025” to achieve full mitigation for losses of anadromous fish (FWP 2000, Section C.2.a.1, pg.18). Artificial production strategies are currently employed in the basin. However, the risks and benefits of supplementation on wild and naturally spawning populations are unknown. The FWP has stated in its implementation of artificial production strategies that “Artificial production must be implemented with an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties” (FWP 2000, Section 4. pg 27). The NPPC has called “for immediate efforts to gather data on wild and naturally spawning stocks, review impacts of the existing hatchery system and coordinate supplementation activities” to achieve its goal of doubling anadromous fish runs in the Columbia Basin as addressed in the Columbia Basin Fish and Wildlife program (NPPC 1994). The overall goals of ISS are to address local and regional objectives and concerns with regard to the use of supplementation as a tool in rebuilding/reestablishing spring and summer chinook to harvestable levels in Idaho. Relationships between FWP (1994, 2000), NMFS 2000 FCRPS Biological Opinion-RPAs, Clearwater and Salmon River subbasin summaries, and the ISS research objectives are demonstrated below.

The 2000 FWP Action 184 states the need to provide funding for a “hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery”. This need was also addressed in the 1994 FWP (Section 7.3B.2) stating the importance of developing “ a clear policy to guide the use of supplementation” and “implement the high priority supplementation projects including…monitoring and evaluation”. ISS Research Objectives 1, 2, and 3 (Implementation Phase) are a clear attempt to provide the needed monitoring and evaluation of supplementation and in the long-term provide answers to supplementation’s role in rebuilding and/or reestablishing spring chinook runs in Idaho.

With the current trend of declining abundance of salmon, it has become necessary to use artificial propagation and the proper use of hatchery fish to supplement wild and natural spawning populations of salmon as a rebuilding measure (FWP 1994, Section 7.0A). It is also stated in the NMFS Biological Opinion on Artificial Propagation of Anadromous Salmonids in the Snake River Basin (Section 10.2) that “The action agencies shall monitor and evaluate their respective artificial propagation programs in the Columbia River Basin.” The need for continued “monitoring and evaluation programs for fish supplementation” and a “cooperative/shared approach” is stated as a specific immediate or critical need in the 2001 Clearwater Subbasin Summary (pg.247). ISS is a cooperative effort to monitor and evaluate supplementation strategies in Idaho. Objectives 1 and 3 directly address the issue of identifying which supplementation strategies (brood stock and release stage) if any, will be most affective in increasing natural production without adverse effects on natural productivity.

Recommendations made in Action 182 (2000 FCRPS Biological Opinion) are to fund studies "to determine the reproductive success of hatchery success relative to wild fish” and concerns over the genetic implications are expressed. The FWP 1994, Section 7.1B.1 recommends a “review (of) current efforts to conserve genetic diversity within and among salmon stocks” and make recommendations on “how to achieve sustainable increases in salmon... populations”. The 2000 Clearwater Subbasin Summary calls for a province-wide genetic assessment of salmon as a baseline for monitoring hatchery introgression into wild populations (pg. 249). ISS Research Objective 2, to monitor and evaluate changes in productivity and genetic composition of target and adjacent populations following supplementation, addresses this recommendation. Adult monitoring components of the ISS address interactions between hatchery and wild chinook, a need identified in the 2000 summary (pg.249).

Action 174 identifies the need for “additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners”. A need was also identified in the 1994 FWP (Section 7.1C.3) to “collect information on wild and naturally spawning populations with the long-term objective of collecting information on the sustainability of wild and naturally spawning salmon populations”. In ISS Research Objective 2 we establish a baseline profile for evaluation and monitoring, we will include a genetic profile analysis for treatment and control streams.

The Fish and Wildlife Program (FWP 1994, Section 7.2A) states: "...regional standards and procedures for operations should be developed that are consistent with the goal of rebuilding weak wild and naturally spawning stocks". ISS Research Objectives 1 through 4 were developed to document which methods are best for supplementing existing, naturally reproducing populations of chinook salmon and reestablishing naturally producing populations in streams where they have been extirpated.

A major contributor in the design of the ISS project has been the Regional Assessment of Supplementation Project (RASP) "which was designed to provide a comprehensive framework for supplementation- the practice of using carefully selected stocks of hatchery fish to "reseed" streams"(FWP 1994 Section 7.3A). The ISS experiment was designed parallel to development of the RASP process, and RASP guidelines were incorporated in the design.

Wy-Kan-Ush-Mi Wa-Kush-Wit: Volume I: 5B–14-22; Volume II: 2-118-127. "Implement supplementation projects that have met the screening criteria of RASP (1992) and Cuenco et al (1993)", which includes the ISS project. "Establish additional programs for each of the subbasin tributary systems to monitor adult escapement and resulting smolt production, and to evaluate (by measuring the number of adults returning) the ability of managers to meet goals set by the Columbia River Management Plan."

Review Comments

This project addresses RPAs 174, 182 and 184.

Budget

FY02	FY03	FY04
$126,320 Category: High Priority Comments:	$140,000 Category: High Priority	$140,000 Category: High Priority

Project: 198909802 – Evaluate Salmon Supplementation Studies in Idaho Rivers

Sponsor: NPT

Short Description:

Evaluates hatchery supplementation as a recovery - restoration tool for spring and summer chinook salmon. Quantifies key population status and performance variables, including early-life history and smolt- to adult survival rates.

Abbreviated Abstract

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 31 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small scale studies designed to evaluate specific hypotheses. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook salmon have become extirpated. The study design called for a minimum of 15 years (three generations) of research (Bowles and Leitzinger 1991). Sampling was initiated in 1991, and implementation began in 1992. Supplementation effects are monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters. The Nez Perce Tribe is responsible for the ISS project activities on Lolo, Eldorado, Newsome, Squaw, and Papoose creeks in the Clearwater basin; and Slate Creek, Johnson Creek, Lake Creek and the Secesh River in the Salmon River basin. Key performance indices related to the Federal Columbia River Power System Biological Opinion (NMFS 2000) measured by the Nez Perce Tribe in Lake Creek and the Secesh River include: enumeration of juvenile emigration/production; early life history survival to mainstem dams; smolt-to-adult survival rates and recruit per spawner ratios; and estimates of adult abundance including natural:hatchery composition.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
19833500	Nez Perce Tribal Hatchery Monitoring and Evaluation (NPTH M&E)	NPTH M&E collects data in two treatment and one control streams required under the ISS study design. Lolo Creek, Newsome Creek, and Eldorado Creek
199604300	Johnson Creek Artificial Propagation Enhancement (JCAPE M&E) Monitoring and Evaluation	Johnson Creek Artificial Propagation Enhancement (JCAPE M&E) Monitoring and Evaluation
19970300	Listed Salmonid Escapment Monitoring (underwater video)	This project enumerates adult escapment in Lake Creek and Secesh River and provides an measure to compare redd counts and the ability to calculate fish per redd estimates.
198909800	Idaho Salmon Supplementation Studies - IDFG	IDFG is the lead cooperating agency on the ISS study.
198909801	Evaluate Salmon Supplementation in Idaho Rivers -USFWS	Cooperating agency on the ISS study.
198909802	Idaho Salmon Supplementation Studies - SBT	Cooperating agency on the ISS study.

Project ID	Title	Nature of Relationship
199005500	Steelhead Supplementation Studies in Idaho Rivers	NPT ISS study PIT tags naturally produced Steelhead for the SSS study in Lake Creek and Secesh River.
199107300	Idaho Habitat/ Natural Production Monitoring	Projects cooperatively conduct snorkeling surveys and share data.
199102800	Monitoring Smolt Migration of Wild Snake River Spring/Summer Chinook Salmon	This study PIT tags parr in Lake Creek and Secesh River. Fish are used to estimated parr to Lower Granite Survival.
199405000	Salmon River Habitat Enhancement	Cooperatively collects data and shares results
199705700	Salmon River Production Program	Cooperatively collects data shares results

Relationship to Existing Goals, Objectives and Strategies

Many of the goals, objectives, needs, strategies and action items detailed in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the ISS project. Additionally, this project is designed to provide empirical data necessary to adequately describe the biological performance in terms of abundance and performance of chinook salmon in key index areas (Secesh River and Lake Creek) to address critical uncertainties and data gaps described in the Salmon Subbasin Summary under sections 2.1, 2.2, and 3.2 (Servheen et al. 2001).

Specific needs that are addressed in the Salmon Subbasin Summary that are closely related to this proposal include:

Anadromous Fish Management

Multi-scaled Ecological Research and Development of New Analytical Tools (5.4.1)

3. Identification of the key processes constraining evolutionary potential and the distribution of intraspecific diversity. Life history data and abundance numbers and identifying fish distributions will add to the information needed to evaluate diversity of chinook salmon populations.
4. Evaluation of metapopulation dynamics and key processes such as straying and dispersal is an objective.

Fisheries/Aquatic Needs (5.4.2)

1. Continue Lower Snake River Compensation Hatchery Monitoring and Evaluation to determine hatchery chinook and steelhead performance, natural production responses, competitive interactions, harvest management and apply for adaptive management. This project will monitor hatchery stock's performance and natural stock performance. Monitor data about straying rates in the SFSR will provide information to the hatchery to examine alternative management options that may influence straying rates.

3. Continue and expand investigations of interactions between hatchery and wild chinook, steelhead, and resident fish. As explained in number 1, this proposed project would monitor straying rates.
4. Quantify the types and extent of straying by chinook. See numbers 1 and 3 above.

Genetic Profiles of Anadromous Fish

1. Complete a province-wide chinook salmon genetic assessment that will provide a baseline for monitoring hatchery introgression into wild populations.

Chinook Salmon (Includes all races unless specifically noted)

1. Gather improved population status information for wild, natural and hatchery chinook salmon including life history characteristics, smolt and adult migration patterns, adult holding areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing, and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded ISS, Idaho Natural Production Monitoring Program, Listed Stock Escapement Monitoring project, and new projects (emphasis added). Emphasis will be on SARs.
2. Calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.
4. Determine the extent of natural production resulting from outplanted hatchery adults.
5. Define the metapopulation structure of the SFSR and upper and lower MFSR watersheds. This project will examine adult characteristics that define the possible metapopulation classification of SFSR.
10. Determine hatchery and natural composition of adult salmon in natural production areas. In conjunction with NPT and IDFG ISS and JCAPE, this project will evaluate hatchery escapement in natural spawning areas.).
13. Quantify mortality rates and straying of adult chinook salmon from LGD to natural production areas. This project proposes to use PIT-tag detectors to monitor the movements of adults upstream of LGD to the natural spawning areas. Straying into other SFSR tributaries will be monitored. A time-series evaluation of the data may quantify the mortality over time.

Combined Aquatic and Terrestrial Needs (5.4.4)

11. Continue and enhance the cooperative/shared approach in research, monitoring, and evaluation between tribal, federal, state, local, and private entities to facilitate restoration and enhancement measures. Protection and restoration of fish and wildlife populations and habitat will not be successful without the interest and

commitment of all parties. The proposed project will add to all major database and public information sources (PTAGIS, Streamnet, etc.)

Note: For the sake of brevity, all links to reasonable and prudent action items in the 2000 Federal Columbia River Power System (FCRPS) Biological Opinion are denoted below simply as "FCRPS Action ###". Relationships to both of the NPPCs 1994 and 2000 Fish and Wildlife programs (FWP) are presented, since this project has consistently focused on addressing critical uncertainties and information needs expressed in the FWPs.

The 2000 Fish and Wildlife Program has adopted as two of its regional objectives for anadromous fish, the task of restoring "the wildest possible set of healthy naturally reproducing populations of salmon…by 2012" and increasing the "total adult salmon and steelhead runs above Bonneville Dam by 2025" to achieve full mitigation for losses of anadromous fish (FWP 2000, Section C.2.a.1, pg.18). Artificial production strategies are currently employed in the basin. However, the risks and benefits of supplementation on wild and naturally spawning populations are unknown. The FWP has stated in its implementation of artificial production strategies that "Artificial production must be implemented with an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties" (FWP 2000, Section 4. pg 27). The NPPC has called "for immediate efforts to gather data on wild and naturally spawning stocks, review impacts of the existing hatchery system and coordinate supplementation activities" to achieve its goal of doubling anadromous fish runs in the Columbia Basin as addressed in the Columbia Basin Fish and Wildlife program (NPPC 1994). The overall goals of ISS are to address local and regional objectives and concerns with regard to the use of supplementation as a tool in rebuilding/reestablishing spring and summer chinook to harvestable levels in Idaho.

At a basin-wide and sub-basin level, SARs of natural chinook salmon is a key uncertainty and needs to be quantified if population status monitoring is to be achieved as called for in section 9.5.6 of the 2000 FCRPS Biological Opinion (NMFS 2000). The 1995 FCRPS Biological Opinion called for the adding of life-stage specific measures as the best source to identify requirements in each life stage to meet biological requirements of the species. NMFS BIOP 9.2.2 calls for robust evaluation and comprehensive research, monitoring, and evaluation programs to evaluate population-level and life-stage specific performance standards. The 2000 FCRPS Biological Opinion recommends monitoring the population growth rate (lambda l). Other recommended high priority monitoring and evaluation measures are the development of short-term measures such as recruits per spawner (R/S) ratios and life history information such as survival. NMFS BIOP (2000) intends to use population characteristics such as abundance, genetic diversity, life history diversity, and geographic distribution to develop specific recovery goals. They also agree the recruits/spawner and smolt-to-adult returns are important to measure but covers only a part of the life cycle and information on the entire life cycle is necessary. (NMFS BIOP 9.2.2.1)

The 2000 FCRPS Biological Opinion (NMFS 2000) calls for properly designed monitoring and evaluation program as essential to resolve a wide range of uncertainties. For population status monitoring, this project will determine areas that are occupied by juvenile and spawning adult chinook salmon. Over the years, abundance data will be collected and trends and variations will be evaluated to determine the status of the population. This information should reveal any population status change over time. For environmental status monitoring, this project will determine the status of the possible effects of hatchery fish impacts that may affect the Secesh River and Lake Creek population. These impacts can be monitored for change over time. Effectiveness monitoring data will be provided to managers by providing long-term performance measures of adult and juvenile chinook salmon abundance and spatial occupation. This project will provide quality, non-inferred data for databases that represent habitat quality, which managers can use to determine the effectiveness of their management programs. 2000 FCRPS Biological Opinion calls for defining juvenile migrant survival for transported and non-transported migrants and adult returns for both groups and compare SAR's for these groups for delayed mortality. (NMFS BIOP 2000 9.6.5.3.1. In addition, research on smolt monitoring is necessary to evaluate migration timing, travel times, and relative survival data through the system. This research is necessary to satisfy elements of the RPA in sections 9.6.1 and 9.6.5.3.1 NMFS BIOP 2000 App. H).

Hierarchical Tier 1 monitoring will be provided by data from this project in the form of status of spawners, juveniles, and hatchery-origin spawners. Some habitat monitoring will be provided by this project with stream temperature data, and instream flow data. The goals of Tier 2 monitoring will be provided by this project measuring spawner and redd counts at specific sites, juvenile density and emigration estimates, counts of hatchery fish on spawning sites, counts at weirs, and age structure of spawners on sites (NMFS BIOP 2000 9.6.5.2)

FCRPS Action 9 concerns the development of Research, Monitoring, and Evaluation Plan. Performance standards are needed to develop these plans. Research, monitoring, and evaluation data collected by this project will help resolve a wide range of uncertainties for 1- and 5- year plans. Objectives of our research activities that address these uncertainties that can be resolved include: determining population's status, and assessing the effectiveness of management actions. The performance standard that can be readily achieved is the R/S ratio and SAR rarios. This project in conjunction with Project 199703000 will measure R/S ratio or SAR from the Secesh River system. This data combined with data from Johnson Creek (199604300), Upper South Fork Salmon River (198909800), and lower South Fork Salmon River (new proposed project) to constitute the SFSR basin can be evaluated to monitor experimental management changes anywhere in the FCRPS.

FCRPS Action 118 addresses indirect pre-spawning mortality of adult upstream-migrating fish. Current researchers are using large radio tags to determine mortality within the FCRPS and upstream of the facilities. The results of this research produce some questions of accuracy and impact on the adults that are radio tagged. It is the recommendation of this action that further studies be conducted to resolve the accuracy of that current research. Objectives of this project are to use PIT-tags and passive monitoring to estimate survival rates through the FCRPS and to the spawning grounds for the Secesh River system. The use of PIT-tags in juveniles will eliminate the need to use invasive methods to monitor survival in adults that may impact spawning abilities. In conjunction with installation of the adult underwater video and sonar fish counting station for abundance at the spawning grounds, R/S ratios and SARs will provide information as to whether there is significant pre-spawning mortality above the FCRPS.

Action 174 identifies the need for “additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners”. A need was also identified in the 1994 FWP (Section 7.1C.3) to “collect information on wild and naturally spawning populations with the long-term objective of collecting information on the sustainability of wild and naturally spawning salmon populations” is addressed in ISS Research Objective 2 as we establish a baseline profile for evaluation and monitoring, we will include a genetic profile analysis for treatment and control streams.

FCRPS Action 180 concerns the development of hierarchical monitoring program. Data collected by this project provides data that will assist a hierarchical monitoring program with ground-truthing database information and providing population and environmental status (including assessment of performance measures). The data collected will contribute to the Technical Recovery Team process (NMFS 2000), which includes defining areas used by adults and juveniles and status of population for Tier 1 monitoring. Objectives of this project are to define the population growth rate, estimate juvenile abundance and survival rates, and long-term monitoring to detect significant changes.

Recommendations made in Action 182 (2000 FCRPS Biological Opinion) are to fund studies "to determine the reproductive success of hatchery fish relative to wild fish” and concerns over the genetic implications are expressed. The FWP 1994, Section 7.1B.1 recommends a “review (of) current efforts to conserve genetic diversity within and among salmon stocks” and make recommendations on “how to achieve sustainable increases in salmon... populations”. The 2000 Clearwater Subbasin Summary calls for a province-wide genetic assessment of salmon as a baseline for monitoring hatchery introgression into wild populations (pg. 249). ISS Research Objective 2, to monitor and evaluate changes in productivity and genetic composition of target and adjacent populations following supplementation, addresses this recommendation. Adult monitoring components of ISS address interactions between hatchery and wild chinook, a need identified in the 2000 summary (pg.249).

FCRPS Action 184 states the need to provide funding for a “hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery”. This need was also addressed in the 1994 FWP (Section 7.3B.2) stating the importance of developing “ a clear policy to guide the use supplementation” and “implement the high priority supplementation projects including… monitoring and evaluation”. ISS Research Objectives 1, 2, and 3 (Implementation Phase) are a clear attempt to provide the needed monitoring and evaluation of supplementation and in the long-term provide answers to supplementation’s role in rebuilding and/or reestablishing spring chinook runs in Idaho.

With the current trend of declining abundance of salmon, it has become necessary to use artificial propagation and the proper use of hatchery fish to supplement wild and natural spawning populations of salmon as a rebuilding measure (FWP 1994, Section

7.0A). It is also stated in the NMFS Biological Opinion on Artificial Propagation of Anadromous Salmonids in the Snake River Basin (Section 10.2) that “The action agencies shall monitor and evaluate their respective artificial propagation programs in the Columbia River Basin.” The need for continued “monitoring and evaluation programs for fish supplementation” and a “cooperative/shared approach” is stated as a specific immediate or critical need in the 2001 Clearwater Subbasin Summary (pg.247). ISS is a cooperative effort to monitor and evaluate supplementation strategies in Idaho. Objectives 1 and 3 directly address the issue of identifying which supplementation strategies (brood stock and release stage) if any, will be most affective in increasing natural production without adverse effects on natural productivity.

The Fish and Wildlife Program (FWP 1994, Section 7.2A) states: “...regional standards and procedures for operations should be developed that are consistent with the goal of rebuilding weak wild and naturally spawning stocks”. ISS Research Objectives 1 through 4 were developed to document which methods are best for supplementing existing, naturally reproducing populations of chinook salmon and reestablishing naturally producing populations in streams where they have been extirpated.

Wy-Kan-Ush-Mi Wa-Kush-Wit: Volume I: 5B–14-22; Volume II: 2-118-127. “Implement supplementation projects that have met the screening criteria of RASP (1992) and Cuenco et al (1993)”, which includes the ISS project. “Establish additional programs for each of the subbasin tributary systems to monitor adult escapement and resulting smolt production, and to evaluate (by measuring the number of adults returning) the ability of managers to meet goals set by the Columbia River Management Plan.”

A major contributor in the design of the ISS project has been the Regional Assessment of Supplementation Project (RASP) “which was designed to provide a comprehensive framework for supplementation- the practice of using carefully selected stocks of hatchery fish to “reseed” streams”(FWP 1994 Section 7.3A). The ISS experiment was designed parallel to development of the RASP process, and RASP guidelines were incorporated in the design.

Review Comments

This project addresses RPAs 174, 182 and 184.

Budget

FY02	FY03	FY04
$676,476 Category: High Priority Comments:	$644,750 Category: High Priority	$676,988 Category: High Priority

Project: 198909803 – Salmon Supplementation Studies in Idaho- Shoshone-Bannock Tribes

Sponsor: SBT

Short Description:

Evaluate various supplementation strategies for maintaining and rebuilding spring/summer chinook populations in Idaho. Develop recommendations for the use of supplementation to rebuild naturally spawning populations.

Abbreviated Abstract

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 31 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook salmon have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years (three generations) of research (Bowles and Leitzinger 1991). Sampling was initiated in 1991, and implementation began in 1992. Supplementation effects are monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909801	Salmon Supplementation Studies in Idaho-USFWS	Cooperator under ISS Project
198909802	Salmon Supplementation Studies in Idaho- Nez Perce	Cooperator under ISS Project

Relationship to Existing Goals, Objectives and Strategies

Note: For the sake of brevity, all links to reasonable and prudent action items in the 2000 Federal Columbia River Power System (FCRPS) Biological Opinion are denoted below simply as "FCRPS Action ###". Relationships to both of the NPPCs 1994 and 2000 Fish and Wildlife programs (FWP) are presented, since this project has consistently focused on addressing critical uncertainties and information needs expressed in the FWPs.

The 2000 Fish and Wildlife Program has adopted as two of its regional objectives for anadromous fish, the task of restoring "the wildest possible set of healthy naturally reproducing populations of salmon…by 2012" and increasing the "total adult salmon and steelhead runs above Bonneville Dam by 2025" to achieve full mitigation for losses of anadromous fish (FWP 2000, Section C.2.a.1, pg.18). Artificial production strategies are currently employed in the basin. However, the risks and benefits of supplementation on wild and naturally spawning populations are unknown. The FWP has stated in its implementation of artificial production strategies that "Artificial production must be implemented with an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties" (FWP 2000, Section 4. pg 27). The NPPC has called "for immediate efforts to gather data on wild and naturally spawning stocks, review impacts of the existing hatchery system and coordinate supplementation activities" to achieve its goal of doubling anadromous fish runs in the Columbia Basin as addressed in the Columbia Basin Fish and Wildlife program (NPPC 1994). The overall goals of ISS are to address local and regional objectives and concerns with regard to the use of supplementation as a tool in rebuilding/reestablishing spring and summer chinook to harvestable levels in Idaho. Relationships between FWP (1994, 2000), NMFS 2000 FCRPS Biological Opinion-RPAs, Clearwater River and Salmon River subbasin summaries, and the ISS research objectives are demonstrated below.

FCRPS Action 184 states the need to provide funding for a "hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery". This need was also addressed in the 1994 FWP (Section 7.3B.2) stating the importance of developing " a clear policy to guide the use supplementation" and "implement the high priority supplementation projects including… monitoring and evaluation". ISS Research Objectives 1, 2, and 3 (Implementation Phase) are a clear attempt to provide the needed monitoring and evaluation of supplementation and in the long-term provide answers to supplementation's role in rebuilding and/or reestablishing spring chinook runs in Idaho.

With the current trend of declining abundance of salmon, it has become necessary to use artificial propagation and the proper use of hatchery fish to supplement wild and natural spawning populations of salmon as a rebuilding measure (FWP 1994, Section 7.0A). It is also stated in the NMFS Biological Opinion on Artificial Propagation of Anadromous Salmonids in the Snake River Basin (Section 10.2) that "The action agencies shall monitor and evaluate their respective artificial propagation programs in the Columbia River Basin." The need for continued "monitoring and evaluation programs for fish supplementation" and a "cooperative/shared approach" is stated as a specific immediate or critical need in the 2001 Clearwater Subbasin Summary (pg.247). ISS is a cooperative effort to monitor and evaluate supplementation strategies in Idaho. Objectives 1 and 3 directly address the issue of identifying which supplementation strategies (brood stock and release stage) if any, will be most affective in increasing natural production without adverse effects on natural productivity.

Recommendations made in Action 182 (2000 FCRPS Biological Opinion) are to fund studies "to determine the reproductive success of hatchery fish relative to wild fish" and concerns over the genetic implications are expressed. The FWP 1994, Section 7.1B.1 recommends a "review (of) current efforts to conserve genetic diversity within and among salmon stocks" and make recommendations on "how to achieve sustainable increases in salmon... populations". The 2000 Clearwater Subbasin Summary calls for a province-wide genetic assessment of salmon as a baseline for monitoring hatchery introgression into wild populations (pg. 249). ISS Research Objective 2, to monitor and evaluate changes in productivity and genetic composition of target and adjacent populations following supplementation, addresses this recommendation. Adult monitoring components of ISS address interactions between hatchery and wild chinook, a need identified in the 2000 summary (pg.249).

Action 174 identifies the need for "additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners". A need was also identified in the 1994 FWP (Section 7.1C.3) to "collect information on wild and naturally spawning populations with the long-term objective of collecting information on the sustainability of wild and naturally spawning salmon populations" is addressed in ISS Research Objective 2 as we establish a baseline profile for evaluation and monitoring, we will include a genetic profile analysis for treatment and control streams.

The Fish and Wildlife Program (FWP 1994, Section 7.2A) states: "...regional standards and procedures for operations should be developed that are consistent with the goal of rebuilding weak wild and naturally spawning stocks". ISS Research Objectives 1 through 4 were developed to document which methods are best for supplementing existing, naturally reproducing populations of chinook salmon and reestablishing naturally producing populations in streams where they have been extirpated.

A major contributor in the design of the ISS project has been the Regional Assessment of Supplementation Project (RASP) "which was designed to provide a comprehensive framework for supplementation- the practice of using carefully selected stocks of hatchery fish to "reseed" streams"(FWP 1994 Section 7.3A). The ISS experiment was designed parallel to development of the RASP process, and RASP guidelines were incorporated in the design.

Review Comments

This project addresses RPAs 174, 182 and 184.

Budget

FY02	FY03	FY04
$213,596 Category: High Priority Comments:	$229,322 Category: High Priority	$240,767 Category: High Priority

Project: 199102800 – Monitoring smolt migrations of wild Snake River sp/sum chinook salmon

Sponsor: NMFS

Short Description:

Collect time series information to examine migrational characteristics of wild ESA-listed Snake River spring/summer chinook salmon stocks. PIT tag wild chinook salmon parr annually; and subsequently monitor as parr/smolts at stream traps and river dams.

Abbreviated Abstract

Continue collecting and PIT tagging wild ESA-listed Snake River spring/summer chinook salmon parr from several streams annually; intercept and decode tagged parr/smolts as they pass traps in tributary streams and Snake and Columbia River dams annually. Examine and map the migrational characteristics of these wild salmon stocks both annually and historically. Continue monitoring environmental parameters within natal streams and determine how they affect wild parr and smolt movements and migrations. Continue providing real-time wild smolt timing data for making operational decisions to maximize survival of wild smolts as they migrate through the Federal Columbia River Hydropower System.

Limnological conditions are used to estimate sockeye salmon carrying capacities for each lake. Kokanee salmon standing stock biomass estimates are then taken into consideration to make recommendations for stocking densities for progeny of the captive broodstock program into each lake. Without this data, stocking at densities greater than existing carrying capacities could result in a zooplankton crash that would reduce available rearing habitats and impede recovery of Snake River sockeye salmon.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
8909800	Idaho Supplementation Studies-IDFG	Reciprocal transfer of data/coordination
8909802	Idaho Supplementation Studies-Nez Perce Tribe	Reciprocal transfer of data/coordination
8909803	Idaho Supplementation Studies-Nez Perce Tribe	Reciprocal transfer of data/coordination/do some fish tagging
8909803	Steelhead Supplementation Studies-IDFG	Reciprocal transfer of data/coordination/do some fish tagging
9202604	Life History of Sp. Chinook and Steelhead-ODFW	Reciprocal transfer of data/coordination/do some fish tagging
9207103	Environmental Monitoring in Snake River Basin	Developed environmental monitoring for 199102800
8909600	Genetic M&E Program for Salmon & Steelhead	Coordination/do some fish collection for this project
800100	Smolt Monitoring Program-	Program uses 199102800 fish

Project ID	Title	Nature of Relationship
	FPC	
9904100	Util. of nutrients by juv. chinook and steelhead	Coordination/do some fish collection for this project
830319	Development of PIT-tagging systems	Flat-plate detection and new tag developments
9107300	Idaho Nat. Prod. Monitoring and Evaluation	Reciprocal transfer of data/coordination

Relationship to Existing Goals, Objectives and Strategies

We believe that migrational characteristics of wild spring/summer chinook salmon smolts (previously tagged as summer parr) should continue to be monitored at downstream traps and dams and evaluated yearly. This information is used for real-time management decisions on FCRPS operations during the annual smolt migrations. We are now examining the run timing of wild fish stocks over several years to determine if consistent patterns are apparent and to examine possible relationships with environmental factors. Wild spring/summer chinook salmon parr are captured and PIT-tagged in their natal streams during the summer. The fish are then returned to the stream in the same area from which they were sampled. This allows exposure to all environmental factors that affect behavior and survival from that point forward and produces the most accurate timing (and estimated survival information) for these stocks as smolts during passage through the FCRPS, since all subsequent behavioral strategies are represented. Tagging fish from juvenile migrant fish trapping in natal streams cannot yield true representation of wild smolt stock timing at the dams, because (among other reasons) traps are usually operated intermittently from summer to the following spring which leads to disproportionate representation for the various life history strategies in the populations. However, these traps are very useful for monitoring annual chinook salmon escapement trends, estimating parr-to-smolt survival for some portions of the populations (such as summer and/or fall outmigrants), estimating production and monitoring emigration, and collecting valuable biological data on the stocks (particularly on parr that were tagged previously in summer).

Before 1992, fisheries managers relied on branded hatchery fish, index counts, and flow patterns for information to guide their passage decisions. A more complete approach now integrates mark information for a broad mixture of the Columbia River Basin's wild/natural and hatchery stocks. The Northwest Power Planning Council (NWPPC) has stated "... major gaps remain in understanding Columbia Basin stocks, their life patterns and survival at different points in their life cycles." Further, the 1980 Fish and Wildlife Program, Section 304(d) states that "The monitoring program will provide information on the migrational characteristics of the various stocks of salmon and steelhead within the Columbia Basin." Finally, Section 204(b) of the Program urges conservation of genetic diversity. This will only occur if wild stocks are preserved. Section 5.9A.1 of the 1994 Fish and Wildlife Program states that field monitoring of smolt movement will be used to determine the best timing for water storage releases and Section 5.8A.8 states that continued research is needed on survival of juvenile wild fish before they reach the first dam with special attention to water quantity, quality, and several other factors. Clearly, important migratory characteristics of wild fish (e.g., run timing) should continue to be considered. To this end, marking wild/natural parr with PIT tags in their natal streams during the summer of their first year of life provides the opportunity to precisely track these stocks through traps and the FCRPS during their smolt migrations the following spring.

More recently, in the 2000 FCRPS Biological Opinion, Appendix H Research Action 1193 calls for "…research to produce information on the migrational characteristics of Columbia and Snake River basin salmon and steelhead." The smolt monitoring program produces information on the migrational characteristics of the various salmon and steelhead stocks…and provides management information for implementing flow and spill measures designed to improve passage conditions in the mainstem lower Snake and Columbia Rivers." The research is necessary to satisfy elements of the Reasonable and Prudent Alternative described in Sections 9.6.1 and 9.6.5.3.1. In Section 9.6.2.1, Research Actions 149, 150, 151, and 152, address research needs for tributary habitat. In addition to our ongoing wild fish monitoring study, environmental monitoring of water quality and quantity are stated needs in tributary (natal) streams. These Actions, state that this type of information is needed for management, protection, and improvement of both riparian and upland habitat conditions. The Actions encourages cooperation between the agencies by sharing water quality and biological monitoring information, project reports and data from existing programs, and subbasin or watershed assessment products. All of our reports and additional detailed water quality information are posted on Web sites. Section 9.6.5.3.3, emphasizes the importance of monitoring and evaluation studies to measure the effectiveness of certain habitat actions in natal rearing areas. This Section also emphasizes the importance of baseline information to detect improvements over a range of life history patterns, both in upstream and downstream rearing areas. Section 9.6.5.3.5.1, (Action 188) points out the need to compare outmigration timing, health, and condition of PIT-tagged wild fish from systems such as the John Day River with PIT-tagged wild fish from the Snake River in ongoing studies to enable comparisons between the two groups in assessment of similarities and differences.

The Salmon Subbasin Summary, (May 25, 2001, page 35), Section 4.1.1.a, under Spring/summer Chinook Salmon, specifically points out the importance of project 199102800 along with other related projects in the region. It states: "Recent and ongoing research has provided managers with more specific knowledge of the Salmon Subbasin stocks. Intensive monitoring of summer parr and juvenile emigrants from nursery streams has provided insights into freshwater rearing and migration behavior (Walters et al. 2001; Achord et al. 2000; Hansen and Lockhart 2001; Nelson and Vogel 2001)". In Section 5.4.2 number 8, page 191 (Statement of Fish and Wildlife Needs), it states "Continue coordinated temperature monitoring throughout the subbasin. Identify spatial and temporal gaps, establish additional flow and temperature gauging stations and upgrade existing to provide real-time data, and expand longitudinal profiles…." Our water quality environmental monitoring systems (most located near juvenile migrant fish traps) that record hourly readings of six water quality parameters in natal rearing areas of streams, addresses this stated need. Under section 5.4.2 number 1 on page 193, "Gather improved population status information for wild, natural, and hatchery chinook salmon including life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, survival factors, smolt-to-adult survival,…." This need is obviously directly related to our wild stock monitoring study.

Numerous fish and wildlife documents have pointed out the need to characterize and monitor the migrational behavior of juvenile wild fish stocks in the Snake River basin. Our overall objective to characterize juvenile migrational behavior of wild chinook salmon stocks can best be illustrated by how the University of Washington's DART program uses our wild fish detection data. Their program uses all the historical detection data for a stock to predict migration behavior within season in real-time. As more environmental and climate data is collected, analyzed, and incorporated into regional databases, managers will be able to more accurately predict the migrational behavior and survival for each stock during their parr-to-smolt life stage.

Review Comments

Reviewers question the duration of projects of this type and its duplicative nature. In addition, the reviewers question how much this type of work should be continued. These concerns have also been expressed, in the past, by the Fish Passage Center. This project addresses RPA 190.

Budget

FY02	FY03	FY04
$ 350,000 Category: High Priority Comments:	$350,000 Category: High Priority	$350,000 Category: High Priority

Project: 199107100 – Snake River Sockeye Salmon Habitat and Limnological Research

Sponsor: Shoshone-Bannock Tribes

Short Description:

Enhance and monitor freshwater rearing habitat for juvenile Snake River sockeye. Evaluate the effects of nutrient addition and fish stocking on the lake's ecosystems and growth and survival of planted juvenile sockeye.

Abbreviated Abstract

This project assesses habitat limitations for Snake River sockeye salmon Oncorhynchus nerka, and investigates fish community dynamics (e.g. competition, predation, life histories) in sockeye salmon nursery lakes, including the relationships between resident and anadromous forms of O. nerka in current or potential Sawtooth Valley production areas. We will continue activities (e.g. lake fertilization) deemed necessary to increase or re-establish sockeye salmon production in historic nursery lakes of the Sawtooth Valley, Idaho as recommended by the Stanley Basin Sockeye Technical Oversight Committee (TOC). We will continue to assist the Idaho Department of Fish and Game (IDFG) in captive broodstock activities such as net pen deployment and assessment of sockeye salmon performance in nursery lakes through smolt emigration. Our immediate objective is to increase survival of captive broodstock progeny from the time they are stocked in the lake until they emigrate.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199107200	Redfish Lake Sockeye Salmon Captive broodstock Program	This project rears sockeye for release into the lakes. Other components include net pen operation, trawling, and juvenile migration enumeration from Redfish Lake.
199204000	Redfish Lake Captive Broodstock Rearing and Research	This project rears sockeye for release into the lakes.
199009300	Genetic Analysis of Oncorhynchus nerka	Results from this project identify origin of O. nerka found in the Sawtooth Valley lakes as well as parental origin of adults returning to the lakes. Useful comparisons to out of basin sockeye are also studied.

Relationship to Existing Goals, Objectives and Strategies

Section 7 of the FWP (1994) called for a coordination of salmon production and habitat. This project evaluates and enhances habitat for Snake River sockeye and is intimately involved with sockeye production from the captive broodstock programs (Project numbers 199107200 and 199204000). Lake fertilization and barrier removal are identified as tasks 1.3.a and 1.6.c in the Proposed Recovery Plan for Snake River Salmon (NMFS 1995) and 7.5A.1 in the FWP (1994). The Snake River Salmon Recovery Team (Bevan et al. 1994) also recommended implementing those measures in chapter 5, section 6. As noted above in 9a., all Snake River sockeye recovery efforts are coordinated through the TOC and each individual project is dependent upon the other.

The overall objective of this project is to increase sockeye populations in the Sawtooth Valley, Idaho. This objective directly addresses Section 2.2A of the FWP (1994) that states "The program preference is to support and rebuild native species in native habitats, where feasible."

This project also addresses several points in the new FWP (2000). In Basinwide Provisions under Section D. STRATEGIES it states, "Where the habitat for a target population is absent or severely diminished, but can be restored through conventional techniques and approaches, then the biological objective for that habitat will be to restore the habitat with the degree of restoration depending on the biological potential of the target population." While rearing habitat for juvenile sockeye salmon in the Sawtooth Valley is not absent, it certainly is diminished as evidenced by the paleolimnological study mentioned in the previous section. In order to increase sockeye populations we need to increase survival during their freshwater life stage. The null hypothesis, Ho = adding nutrients to sockeye rearing lakes will not affect sockeye survival, was rejected during our first year of lake fertilization. Captive broodstock progeny released in Redfish Lake during 1994, when there was no lake fertilization, had an estimated survival from time of release to outmigration of 6.7%. Sockeye released during 1995, the first year of fertilization, had an estimated survival from time of release until emigration of 15.8%. Survival increased to 23.5% after the fourth year of lake fertilization. Results from fertilization of Pettit and Alturas lakes can be found in Section e of this proposal. One must use caution when comparing survival rates because of the many confounding factors involved. Annual variations in predator abundance, competition from kokanee salmon, climatic conditions, and snowpack, all confound a simple fertilized versus non-fertilized analysis.

Within Section D.3. this project is best described by "The Primary strategy: Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives." Also in the same section it states, "This program relies heavily on protection of, and improvements to, inland habitat as the most effective means of restoring and sustaining fish and wildlife populations."

Actions undertaken by this project directly address Appendix D: Provisional Statement of Biological Objectives for environmental characteristics at the Basin level.

4. Increase energy and nutrient connections within the system to increase productivity and expand biological communities.

6. Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of population structures.

- Increase the abundance and range of existing habitats and populations.

Review Comments

This project addresses RPAs 184 and 185.

Budget

FY02	FY03	FY04
$441,369 Category: High Priority Comments:	$454,420 Category: High Priority	$474,769 Category: High Priority

Project: 199107200 – Redfish Lake Sockeye Salmon Captive Broodstock Program

Sponsor: IDFG/IOSC

Short Description:

Establish captive broodstocks of Redfish Lake sockeye salmon. Spawn captive adults to produce eggs, juveniles, and adults for reintroduction and future broodstock needs. Evaluate juvenile out-migration and adult returns by release option.

Abbreviated Abstract

Precipitous declines of Snake River sockeye salmon lead to their Federal listing as endangered in 1991 (56 FR 58619). In that same year, the Idaho Department of Fish and Game (IDFG) initiated a Captive Broodstock Program to maintain Snake River sockeye salmon and prevent species extinction. The ultimate program goal is to reestablish sockeye salmon runs to Stanley Basin waters and to provide for sport and treaty harvest opportunities. In the near-term, the program is focused on preventing further population loss, maintaining population genetic integrity, and rebuilding the population numbers.

Since the inception of the program in 1991, all returning anadromous adult sockeye salmon (16 wild fish), several hundred Redfish Lake wild out-migrants, and several residual sockeye salmon adults have been captured and used to develop captive broodstocks at the IDFG Eagle Fish Hatchery and at NMFS facilities in Washington State. Adaptively managed, the program generates hatchery-produced eggs, juveniles, and adults for supplementation to Stanley Basin waters. In addition, emphasis is placed on the annual development of genetically diverse broodstocks. Program captive broodstock techniques reflect the Region's best protocols for maintaining maximum genetic diversity, survival, and production success. Fish culture variables (e.g., broodstock mating designs, fish survival, maturation success, fecundity, egg survival to eye, and fish health) are continuously monitored and evaluated to insure maximum program success. Juvenile out-migrant monitoring (using PIT tag technology), adult return monitoring, and adult sonic telemetry studies provide information critical for the evaluation of program reintroduction strategies. Program methods and results undergo constant review through the Stanley Basin Sockeye Technical Oversight Committee, a team of technical experts assembled to review program results and to guide program direction.

Through 2000, the IDFG and NMFS hatchery programs have produced in excess of 600,000 pre-smolts, 106,000 smolts, 600 adults, and 290,000 eyed-eggs for reintroduction to Stanley Basin lakes and tributary streams. From this production, approximately 230,000 hatchery-produced, juvenile sockeye salmon have emigrated from Stanley Basin waters. In 1999, the first hatchery-produced sockeye salmon returned to the Stanley Basin. In that year, seven age 3 adults (six males and one female) returned to spawn. In 2000, the program experienced its first significant return of hatchery-produced adults. Two hundred fifty-seven sockeye salmon returned to collection facilities on Redfish Lake Creek and the upper Salmon River at the IDFG Sawtooth Fish Hatchery. The majority of year 2000 adult returns were released to the system for natural spawning.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199204000	Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research	This NMFS project complements IDFG Project 199107200 by sharing fish culture responsibility for the production of captive broodstocks and production eggs. This project serves to also reduce the risk of catastrophic loss of this valuable gene pool.

Project ID	Title	Nature of Relationship
199305600	Assessment of Captive Broodstock Technology	This NMFS project develops information needed to overcome some of the problems that limit the development of viable broodstock adults and progeny.
199107100	Snake River Sockeye Salmon Habitat and Limnological Research	This Shoshone-Bannock project evaluates nursery lake habitat conditions encountered by juvenile sockeye salmon during their freshwater rearing phase. This information is used to develop annual stocking recommendations from the captive broodstock program.
199009300	Genetic Analysis of Oncorhynchus Nerka	This University of Idaho project provides comprehensive genetics support to Project 199107200.
199700100	Captive Rearing Project for Salmon River Chinook Salmon	This IDFG project shares facility resources and personnel with Project 199107200. Project responsibilities overlap and complement each other.

Relationship to Existing Goals, Objectives and Strategies

Numbers of Snake River sockeye salmon have declined dramatically in recent years. In Idaho, only the lakes of the upper Salmon River (Stanley Basin) remain as potential sources of production. In response to a 1990 petition from the Shoshone-Bannock Tribes, NMFS declared the Redfish Lake population endangered in November, 1991 (56 FR 58619). Since 1990, only 16 wild, adult sockeye have returned to Redfish Lake. It is a virtual certainty that without the boost provided by these captive broodstocks, Redfish Lake sockeye salmon would soon be extinct.

Project Development under Past Regional Programs

Anadromous fishery managers in the basin are increasingly faced with two disparate objectives in their management programs, increasing the numbers of fish and maintaining the genetic and biological diversity of natural populations. The NPPC noted the need to balance these two needs in Section 4.1 of its 1994 Fish and Wildlife Program (NPPC 1994). The NPPC further noted that actions aimed at increasing fish numbers and conserving biological diversity are both important to maintaining a healthy ecosystem. Goals and objectives of the Redfish Lake Sockeye Salmon Captive Broodstock Program are consistent with these principles. Considerable attention and effort are placed on the importance of maintaining the genetic integrity of the Snake River sockeye salmon ESU. Reintroducing fish to the habitat is also an important component of this program.

Redfish Lake Sockeye Salmon Captive Broodstock Program goals and objectives are also consistent with guidelines and recommendations specifically addressed in the following sections of the 1994 Fish and Wildlife Program: 7.2 – the need to utilize artificial propagation to aid depleted populations; 7.4C.1 – the need for immediate intervention to protect badly damaged populations; 7.4D - the need to develop captive broodstocks as “the most cost effective means of accelerating recovery of severely depleted stocks”; 7.4E - the use of cryopreservation to “bank” critical genetic resources and to protect future options; and 7.5A.1 - the recommendation to continue captive broodstock efforts for Snake River sockeye salmon, to produce fish for reintroduction to the habitat, to develop a monitoring and evaluation program, and to develop the facility infrastructure to meet these needs.

Captive broodstock efforts are also consistent with the Recovery Goal presented in Chapter 7 of the NMFS pre-decisional Snake River Salmon Recovery Plan (Schmitten et al. 1997). In addition, sockeye recovery efforts conform to recommendations developed by Columbia Basin Fish and Wildlife Authority (CBFWA) co-managers. Specifically, the use of captive broodstock technology to increase numbers of Redfish Lake sockeye salmon is identified as one of several general strategies developed to achieve outcome-based objectives identified in the 1999 Annual Implementation Work Plan (NPPC 1999a).

Two Technical Memoranda developed by NMFS have provided information that has been used to help shape sockeye program hatchery protocols. Pacific Salmon and Artificial Propagation Under the Endangered Species Act (Hard et al. 1992) addressed hatchery practices associated with the culture of endangered species. Specifically: choice of donor stock, broodstock collection and mating, husbandry techniques, release strategies, and monitoring and evaluation programs were discussed. A Conceptual Framework for Conservation Hatchery Strategies for Pacific Salmonids (Flagg and Nash 1999) provided a framework for developing production strategies which can be applied in conservation hatcheries to produce fish with wild-like attributes. Flagg and Nash (1999) discussed broodstock sourcing, broodstock maturation and reproduction, enriched environments, growth rate modulation, rearing density, predator conditioning, release size and time, and imprinting. Strategies identified in both Technical Memoranda have helped shape the Redfish Lake Sockeye Salmon Captive Broodstock Program.

Project Significance to Current Regional Programs

Salmon Subbasin Summary - The critical status of Snake River Sockeye salmon is clearly described in Section 4.1.1.a of the Salmon Subbasin Summary (NPPC 2000a) . Section 4.5.1 identifies the Redfish Lake Sockeye Salmon Captive Broodstock Project as one of two artificial production programs in place in the Salmon Subbasin addressing recovery goals through the use of conservation hatchery practices. Program goals and objectives are also consistent with existing plans, policies and guidelines presented in Section 5.1 of the Salmon Subbasin Summary as developed by Bonneville Power Administration (Section 5.1.1.a), the National Marine Fisheries Service (Section 5.1.1.b), the Nez Perce Tribe (Section 5.1.2.a), the Shoshone-Bannock Tribes (Section 5.1.2.b) and the Idaho Department of Fish and Game (Section 5.1.3.a).

Existing Federal, State and Tribal goals, objectives and strategies identified in the Salmon Subbasin Summary (Section 5.2) overlap with the primary the principal objectives of the Redfish Lake Sockeye Salmon Captive Broodstock Program. The “overarching” hatchery goal of the Basinwide Salmon Recovery Strategy (Federal Caucus 2000) is to reduce genetic, ecological, and management effects of artificial production on natural populations. Specific recommendations that overlap with Objective 1. of captive broodstock program include: using safety net programs on an interim basis to avoid extinction while other recovery actions take place, preserving the genetic legacy of the most at-risk populations, limiting the adverse effects of hatchery practices on ESA-listed populations, and using genetically appropriate broodstocks to stabilize and/or bolster weak populations (Section 5.2.1).

Bonneville Power Administration (Section 5.2.1.a) presented basinwide objectives for implementing actions under the Federal Columbia River Power System Biological Opinion (NMFS 2000) and suggested that hatcheries can play a critical role in recovery of anadromous fish by: "increasing the number of biologically-appropriate naturally spawning adults, improving fish health and fitness, and improving hatchery facilities, operation, and management and reducing potential harm to listed fish." Specific strategies developed by BPA include: reducing the potentially harmful effects of hatcheries, using safety net programs on an interim basis to avoid extinction, and using hatcheries in a variety of ways to aid recovery. This language is consistent with Objective 1 of the Redfish Lake Sockeye Salmon Captive Broodstock Program. Objective 1., Tasks C. through N. specifically address the development of genetically prudent broodstocks and the use of cryopreservation to archive key genetic resources and to keep unique identities active in the spawning program. Objective 1., Task I. specifically addresses the production of progeny for reintroduction to the habitat. Hatchery practices reflect the Region's best protocols and undergo constant review and modification through the Stanley Basin Technical Oversight Committee process.

The goal of NMFS in the Salmon Subbasin (Section 5.2.1.b) is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye and steelhead resources. Ultimately, NMFS's goal is the achievement of self-sustaining, harvestable levels of salmon populations which no longer require the protection of the Endangered Species Act. Redfish Lake Sockeye Captive Broodstock Program goals and objectives are consistent with this language.

Salmon Subbasin goals, objectives and strategies developed by the Nez Perce Tribe (Section 5.2.2.a) and the Shoshone-Bannock Tribes (Section 5.2.2.b) relate directly to the Redfish Lake Sockeye Salmon Captive Broodstock Program. The principal Nez Perce Tribal goal; "to restore anadromous fish in rivers and streams…", is directly compatible with the primary captive broodstock program goal. Management objectives 1. through 3., Artificial Production Objectives 1. through 3., and Research Monitoring and Evaluation Objective 4. overlap considerably with Objectives 1 through 4 of this proposal. Shoshone-Bannock Tribal Objective 1., Strategies 1. and 3., are directly tied to IDFG program goals and objectives. Shoshone-Bannock Tribal activities are in place to compliment captive broodstock program work performed by cooperating BPA contractors. As mentioned in Section d. below, habitat and fisheries investigations carried out by the Shoshone-Bannock Tribes are critical components of this cooperative effort.

The Idaho Department of Fish and Game is charged with the responsibility of preserving, protecting, perpetuating, and managing the fish and wildlife resources of Idaho. This mandate is reflected as their primary goal in the Salmon Subbasin Summary (Section 5.2.3.a). Idaho's overall anadromous fisheries goal is to recover wild Snake River salmon and steelhead populations and to restore productive salmon and steelhead fisheries (IDFG

2001). Goals and objectives of the Redfish Lake Sockeye Salmon Captive Broodstock Program are carried-out under these state-wide management guidelines.

Specific IDFG anadromous fish objectives and strategies that overlap with the Redfish Lake Sockeye Salmon Captive Broodstock Program include: maintaining genetic and life history diversity and integrity of naturally and hatchery-produced fish (Objective 1.), establishing facilities for captive culture of salmon and steelhead populations likely to become extirpated in the near future (Objective 1., Strategy 4.), establishing captive populations for stocks or populations likely to become extinct in the near-term future (Objective 1., Strategy 6.), preserving genetic diversity through gamete cryopreservation (Objective 1. Strategy 7.), using appropriate and proven supplementation techniques to restore and rebuild populations (Objective 2., Strategy 1.), implementing proven hatchery intervention where necessary and ecologically prudent to provide a safety net for selected populations at risk (Objective 2., Strategy 4.), and balancing genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction (Objective 2., Strategy 5.).

2000 Columbia River Basin Fish and Wildlife Program – The Redfish Lake Sockeye Salmon Captive Broodstock Program conforms with the general vision of the Fish and Wildlife Program (Section III.A.1.) and its "overarching" objective to protect, mitigate and enhance the fish and wildlife of the Columbia River and its tributaries (Section III.C.1), NPPC 2000b). Specifically, the Primary Artificial Production Strategy of the Fish and Wildlife Program (Section 4.) addresses the need to complement habitat improvements by supplementing native fish populations with hatchery-produced fish with similar genetics and behavior to their wild counterpart. In addition, Section 4. includes language stressing the need to minimize the negative impacts of hatcheries in the recovery process. Redfish Lake Sockeye Salmon Captive Broodstock Program goals and objectives are aligned with this philosophy. Program methods receive constant review at the SBSTOC level. Cooperators strive to provide hatchery practices that meet Fish and Wildlife Program standards.

FCRPS Biological Opinion – The Federal Columbia River Power System Biological Opinion includes Artificial Propagation Measures (Section 9.6.4.) that address reforms to "reduce or eliminate adverse genetic, ecological, and management effects of artificial production on natural production while retaining and enhancing the potential of hatcheries to contribute to basinwide objectives for conservation and recovery" (NMFS 2000). The FCRPS Biological Opinion recognizes that artificial production measures have "proven effective in many cases at alleviating near-term extinction risks." Many of the Actions to Reform Existing Hatcheries and Artificial Production Programs (Section 9.6.4.2.) are being carried-out in the Redfish Lake Sockeye Salmon Captive Broodstock Program. Specifically, Objective 1., Tasks C. through N. of the captive broodstock program address reform measures dealing with: the management of genetic risk, the production of fish from locally adapted stocks, the use of mating protocols designed to avoid genetic divergence from the biologically appropriate population, matching production with habitat carrying capacity, and marking hatchery-produced fish to distinguish natural from hatchery fish. The FCRPS Biological Opinion also reviews the need for the development of NMFS-approved Hatchery and Genetic Management Plans

(HGMP). At the time of this writing, a draft HGMP covering the sockeye salmon artificial production program is in its final stages of development.

Specific Actions in the FCRPS Biological Opinion that demonstrate logical connections with the sockeye program are contained in Section 9.6.4.3. Action 175. calls for the development of safety net populations of at-risk salmon and steelhead. While ongoing, the Redfish Lake Sockeye Salmon Captive Broodstock Program serves as an "intensely intrusive" example where the entire population of anadromous adults (since 1991) was taken into captivity. Action 177. calls for BPA to begin to implement and sustain NMFS-approved, safety-net projects. This action includes the provision to fund modifications to existing facilities. This obligation will continue indefinitely, as circumstances warrant.

Other Plans and Guidelines – Goals and objectives of the Redfish Lake Sockeye Salmon Captive Broodstock Program are consistent with several guidelines contained in the Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin (Brannon, et al. 1999). Objective 1. through 4. of the captive broodstock program are actively following elements of Guidelines 1., 4., 5., 8., 10., 11., 12., 13., 14., and 15. of the Artificial Production Review. These guidelines address: the hatchery rearing environment, natural population parameters, habitat carrying capacity, genetic and breeding protocols, germ plasm repositories, and population life history knowledge. Performance standards and indicators presented in The Final Draft Artificial Production Review (NPPC 1999b) cover a series of issues addressing both benefits and risks to populations. Many of these standards are addressed by objectives identified in the Redfish Lake Sockeye Salmon Captive Broodstock Program. These relationships will be identified in the final HGMP for captive broodstock program activities.

The Governors of the states of Idaho, Montana, Oregon and Washington urged regional recovery planners to recognize the multi-purpose aspect of hatcheries, which includes fish production for harvest, supplementation to rebuild naturally spawning populations, and captive brood stock experiments for conservation and restoration (Offices of the Governors 2000, Chapter IV, Hatchery Reforms). The Governors recommended, "all hatcheries in the Columbia River Basin be reviewed within three years to determine the facilities' specific purposes and potential future uses in support of fish recovery and harvest." The Redfish Lake Sockeye Salmon Captive broodstock program is directly involved with the use of existing and emerging conservation hatchery technologies to develop captive broodstocks for conservation and restoration purposes.

Relationships described above are substantive in nature and address core guidelines, goals, objectives and strategies identified in the various planning documents. Techniques and products developed in the Redfish Lake Sockeye Salmon Captive Broodstock Program are critical components of the overall conceptual framework being developed in the Region.

Review Comments

This project is considered a BASE project by NMFS since it contributed to the baseline survival of sockeye salmon during the generation of the Biological Opinion. Some managers believe the project goals/target could be firmer.

Budget

FY02	FY03	FY04
$853,229 Category: High Priority Comments:	$1,312,821 Category: High Priority	$878,470 Category: High Priority

Project: 199107300 – Idaho Natural Production Monitoring and Evaluation

Sponsor: IDFG/IOSC

Short Description:

Identifies limiting factors and recommends methods to improve adult-to-smolt and smolt-to-adult survival of chinook salmon and steelhead. Provides long-term monitoring data to determine the effectiveness of recovery actions and population status.

Abbreviated Abstract

The Idaho Natural Production Monitoring and Evaluation Project (INPMEP) is an ongoing project in place to monitor trends in spring/summer chinook salmon and steelhead trout populations in the Salmon, Clearwater and lower Snake River drainages. This project has three major components including long-term general monitoring programs, evaluating habitat enhancement projects, and estimating life-cycle survival. The general monitoring programs provide historical as well as up to date information on juvenile salmon and steelhead populations. Specifically, the general parr-monitoring database contains 17 years of parr density and carrying capacity estimates from over 150 tributaries in the Mountain Snake Province. Adult escapement is monitored by completing redd count surveys for steelhead trout and chinook salmon. The second component of this project has been to evaluate habitat improvement projects initiated in the 1980's in over 20 key spawning and rearing tributaries. Benefits from the habitat projects were intensively monitored for about 10 years. During that period, the maximum benefits of the habitat enhancement projects could not be determined because seeding levels were below carrying capacity. Improved escapement in 2001 provides a unique opportunity to compare treatment and control sections during a period (2002) when densities may approach parr carrying capacity. We expect to focus on those comparisons during the 2002 field season. The third component of the INPMEP is evaluating overall life-cycle survival for aggregate Snake River spring and summer chinook salmon and steelhead trout. The survival work includes the freshwater stage (smolts per female) as well as the combined migration and ocean stages (smolt-to-adult survival). The survival analysis provides a method for determining if freshwater survival or migration and ocean survival are most limiting to the recovery of Snake River salmon stocks, and a baseline from which to evaluate future responses to management actions.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909800	Evaluate Salmon Supplementation In Idaho Rivers (ISS)	Contributes to the general parr monitoring database
199005500	Steelhead Supplementation Studies in Idaho	Contributes to the general parr monitoring database

Relationship to Existing Goals, Objectives and Strategies

The FWP, Salmon and Clearwater Subbasin summaries, NMFS 2000 biological opinion on the operation of the Columbia River power system, and the IDFG 2000 fisheries management plan identify monitoring and evaluation projects as important to recovery of Snake River salmon and steelhead populations. Specifically, RPA 180 of the NMFS biological opinion calls for the development of hierarchical basinwide monitoring programs. In 1994, the INPEMP established a priority sampling design that provides annual density and carrying capacity estimates of juvenile salmon and steelhead in 50 of the most important (core) streams in the Salmon and Clearwater subbasins. The high priority systems were identified in the IDFG anadromous plan (IDFG 1992). The FWP (FWP 7.1.C) described the need to establish a similar priority system for M&E projects. Other applicable RPAs include 185 and 189. Those actions describe the need to evaluate and monitor SARs.

The NMFS biological opinion describes the need to determine areas occupied by juvenile and spawning salmon and monitor their trends through time (Section 9.6.5). Redd counts and the GPM activities completed by INPEMP address those needs. The INPEMP also fills a compliance-monitoring role by acting as an accounting system for downstream mitigation projects (section 9.6). If downstream measures improve SARs, those benefits will be measured in the parr and adults escapement trends provided by the INPMEP. The recently completed Clearwater and Salmon subbasin summaries reported that the INPMEP was the mechanism in place to meet several critical M&E needs (i.e., smolt-to-adult survival estimates, adult spawner abundance, juvenile abundance and distribution, spawning success, and stock replacement analysis (SSS-5.4.1, CSS-248-250 pp.).

Review Comments

This project addresses RPAs 180 and 190.

Budget

FY02	FY03	FY04
$831,000 Category: High Priority Comments:	$969,000 Category: High Priority	$945,000 Category: High Priority

Project: 199202603 – Upper Salmon Basin Watershed Project Administration/Implementation Support

Sponsor: ISCC/IOSC

Short Description:

Provide local coordination and guidance for implementation of on-the-ground projects that improve and enhance anadromous and resident fish habitat.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project Administration/Support serves as the coordinating entity for fish habitat protection and improvement activities. The project is coordinated through the Idaho Soil Conservation Commission with the Custer and Lemhi Soil and Water Conservation Districts providing leadership for habitat actions on private lands. The program centers around a local advisory committee representing private, state, federal, tribal, and local land managers and other interests, with a technical team assisting with prioritizing on-the-ground projects. The project encompasses the area from the mouth of the Middle Fork to its headwaters in the Stanley Basin. This includes the hydrologic units of the Upper Salmon, Pahsimeroi, Middle Salmon/Panther, and Lemhi Watersheds. The USBWP program is being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 02 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, Project No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, Project No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199401700	Idaho Model Watershed Habitat Project	RPA Action # 149, 150, 151, 152, 153, 154 - Habitat protection, restoration, and complexity on Lemhi, Pahsimeroi, and East Fork Watersheds.
199306200	Upper Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Upper Salmon River Diversion Consolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon Watersheds.
199401500	Idaho Fish Screening Improvement (Idaho Dept. of Fish and Game)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.
199901900	Restore Salmon River Challis, Idaho Area	RPA Action # 149, 150, 151, 152, 153, 154 - Restore natural river morphology and function in Upper Salmon River Watershed.

Project ID	Title	Nature of Relationship
200105200	Hawley Creek	RPA Action # 149, 150, 151, 152, 153, 154 - Increase tributary flows to the Lemhi River Watershed.
200105100	Little Morgan Creek	RPA Action # 149, 150, 151, 152, 153, 154 - Increase tributary flows to the Pahsimeroi River Watershed.
	East Fork Easement	RPA Action # 149, 150, 151, 152, 153 - Restore natural function of flood plain in East Fork Salmon River Watershed.
199405000	Salmon River Habitat O&M	RPA Action # 149, 150, 152 - Monitoring and evaluation

Relationship to Existing Goals, Objectives and Strategies

This proposal funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.
RECOMMENDATIONS OF THE GOVERNORS OF IDAHO, MONTANA, OREGON AND WASHINGTON FOR THE PROTECTION AND RESTORATION OF FISH IN THE COLUMBIA RIVER BASIN, JULY, 2000

Partnerships

- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

Water for Fish

- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.
- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this
- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

Local Recovery Plans

- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

Fish Passage

- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.

- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.
- Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

The USBWP addresses the above recommendations through coordination of multiple entities, technical, financial, educational resources, and jurisdictional responsibilities for the protection, restoration, and complexity of fish habitat. Habitat projects coordinated through the USBWP respond directly to flow issues through work with irrigation districts, BOR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems. Fish passage will be enhanced through these projects through liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

SALMON SUBASIN SUMMARY (DRAFT) MAY 25, 2001.
Listed below are the summary goals, objectives, and strategies addressed by this project.

Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1. Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.

Strategy 1. Assist the Idaho Fish Screen Program and BoR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2. Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3. Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2. Reduce the number of physical barriers hindering fish migration.

Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3. In cooperation with the NRCS, BoR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for al life stages of fishes.

Objective 1. Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.

Strategy 1. By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2. Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3. In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.

Strategy 4. Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5. Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6. Work cooperatively with willing irrigators to restore stream flows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7. Continue development of the IMPACT Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The goals and objectives from the Salmon Subbasin Summary will be implemented by means of the foregoing strategies through the coordination efforts of the Upper Salmon Basin Watershed Project. The purpose of the project is to ensure that all activities for the protection and enhancement of salmon production within each subbasin are coordinated on a comprehensive watershed basis.

2000 COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM
Objectives for biological performance

Anadromous fish losses

- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005. Obtain the information necessary to begin restoring the characteristics of healthy lamprey populations.
- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.
- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

The Upper Salmon Basin Watershed Project addresses the above objectives through coordination of multiple entities, technical, financial, educational resources, and jurisdictional responsibilities for the protection, restoration, and complexity of fish habitat.

Resident fish losses

- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.
- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.
- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Watershed actions for the protection, restoration, and complexity of fish habitat enhance ecosystems and ecosystem function which are beneficial to resident and anadromous fish. These actions are coordinated by the Upper Salmon Basin Watershed Project to ensure consistency in prioritization and application of habitat projects.

Wildlife losses

- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.
- Maintain existing and created habitat values.

Watershed actions for the protection, restoration, and complexity of fish habitat enhance ecosystems and ecosystem functions beneficial to wildlife species. These actions are coordinated by the Upper Salmon Basin Watershed Project to ensure consistency in prioritization and application of habitat projects.

Habitat Strategies

Primary strategy: Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

- Build from strength
- Restore ecosystems, not just single species
- Use native species wherever feasible

Habitat projects coordinated through the Upper Salmon Basin Watershed Project focus on protection of existing high quality habitat, restoration of ecosystems which support multi-species, and revegetation practices which emphasize use of native plant species.

2000 FCRPS BIOLOGICAL OPINION, DECEMBER 21, 2000.

Action 149a: BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. The Lemhi subbasin is included within these priority subbasins.

Action 149b: The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.

Action 149c: BPA addresses passage, screening, and flow problems where they are not the responsibility of others.

Action 149d: BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.

Action 150: In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.

Action 151: BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.

Action 152: The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:

Action 152a: Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.

Action 152b: Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.

Action 152c: Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.

Action 152d: Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.

Action 152e: Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).

Action 152f: Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Action 153: BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.

Action 154a: BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.

Action 154b: The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.

All of the above actions in the upper Salmon basin will be coordinated through the Upper Salmon Basin Watershed Project.

- Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals
- Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.
- Flow – Work with irrigation districts, BOR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.
- Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.
- Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BOR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This coordination is especially important as most fish spawning and rearing habitat is on private land.
- Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.
- Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.
- Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.
- TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.
- Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.
- Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.
- Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality

Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

- Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.
- River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

This project addresses RPAs 152 and 154. The reviewers are curious how the administrative costs in this proposal tie in with the significant administrative costs included in project numbers 28036, 28037, 28038, 28039, and 28040. Watershed assessments have been requested for the past several years. Are those assessments being completed?

Budget

FY02	FY03	FY04
$285,364 Category: High Priority Comments:	$290,000 Category: High Priority	$295,000 Category: High Priority

Project: 199204000 – Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research

Sponsor: NMFS

Short Description:

Provide a safety net captive broodstock program for Redfish Lake sockeye salmon. Provide prespawning adults, eyed eggs, and smolts to aid recovery of this ESA-listed endangered species in Idaho

Abbreviated Abstract

The National Marine Fisheries Service (NMFS), in partnership with Idaho Department of Fish and Game (IDFG) has been maintaining US Endangered Species Act (ESA) listed Snake River sockeye salmon (Oncorhynchus nerka) from Redfish Lake, Idaho, in a captive broodstock program since 1992. Captive broodstocks are a form of artificial propagation where fish are cultured in captivity for most or all of their life cycle. These programs provide a safety net to prevent populations from going extinct. Captive broodstock programs generate much higher egg-to-spawner survival (usually > 50%) than occurs in nature (usually < 1.0 %). This higher survival of captive broodstock salmon enables them to produce many more adults, eyed eggs, fry, and smolts per generation than wild fish.

This larger number of progeny per generation is being used by the program to "jumpstart" the restoration of ESA-listed endangered Redfish Lake sockeye salmon.

In the Salmon Subbasin Summary (SSS), federal, state, and tribal agencies repeatedly call for artificial production programs, like the Redfish Lake sockeye salmon captive broodstock program, to meet goals and objectives (for confirmation see SSS, Section 5.2). The use of artificial production programs (e.g., captive broodstocks) for salmon stocks deemed at risk of extinction is also identified as Fisheries Needs number 14 and 15 in the SSS summary. The continuation of current programs, such as the Redfish Lake sockeye salmon captive broodstock program, is also a required reasonable and prudent action (item 177) in the NMFS 2000 FCRPS Biological Opinion. In addition, the implementation and refinement of captive broodstocks for the recovery of Snake River sockeye salmon have been identified as priorities in the 1994 NWPPC Columbia Basin Fish and Wildlife Program (7.4A.1-3), are part of the overarching and regional objectives of the 2000 NWPPC Columbia Basin Fish and Wildlife Program, and are priorities described in the NMFS proposed Recovery Plan for Snake River salmon.

The original sources of NMFS captive broodstocks are juvenile and adult fish captured, held, and spawned by the Idaho Department of Fish and Game (IDFG). The fish are reared to adulthood in fresh well water, or from smolt to adult in a pumped, filtered, and UV-sterilized seawater system. NMFS has spawned Redfish Lake sockeye salmon captive broodstock yearly since 1994. Fry to adult survival has ranged from 14-84% and currently averages over 50%. Eyed-egg viability has averaged about 60%. The NMFS captive broodstock program has produced over 840,000 viable eggs for use in recovery efforts.

Since 1994, captive broodstock progeny have been returned to Idaho as prespawning adults, eyed eggs, fry, and smolts for release in recovery efforts. These releases helped produce the return of 7 and 257 anadromous sockeye salmon to the Salmon River Basin lakes in 1999 and 2000, respectively. The 2000 return alone was 16 times greater than the number of naturally produced adults (n = 16) returning to the lakes in the decade of the 1990’s. Over the next funding cycle, NMFS proposes to continue these same captive broodstock efforts that have helped prevent Redfish Lake sockeye salmon from becoming extinct.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199107200	Redfish Lake sockeye captive broodstock program	Idaho Department of Fish and Game is also maintaining captive broodstocks for Snake River sockeye salmon to avoid catastrophic loss of the gene pool and for rebuilding efforts.
199107100	Snake River sockeye salmon habitat	The Shoshone-Bannock Tribe of Idaho is conducting habitat and limnological research for rebuilding efforts for Snake River sockeye salmon.
199009300	Genetic analysis of	The Univeristy of Idaho has been conducting

Project ID	Title	Nature of Relationship
	Oncorhynchus nerka (ESA)	genetic analyses of Snake River sockeye salmon.
199305600	Assessment of captive broodstock technology	Refinement of captive broodstock technology is necessary to maximize potential of captive broodstock recovery programs for ESA-listed stocks of Pacific salmon in the Columbia River Basin.

Relationship to Existing Goals, Objectives and Strategies

The use of captive broodstock fish to restore anadromous runs of Snake River sockeye salmon is an action required to reach many of the objectives of the Salmon Subbasin Summary (SSS) and the 2000 NWPPC Columbia Basin Fish and Wildlife Program. In addition, safety net captive broodstocks are among the Reasonable and Prudent Alternative (RPA) actions called for in the 2000 NMFS Biological Opinion, and are an ESA mandated item in the NMFS Recovery Plan for Snake River Salmon (Schmitten et al. 1995, 4.1a and 4.1b).

Artificial production programs, such as the captive broodstocks for salmon stocks deemed at risk of extinction, are identified as a Fisheries Need under items 14 and 15 of Section 5.4.2 of the SSS. The need for propagation programs such as captive broodstock safety nets are also referred to in many other areas of the SSS. Following is a list derived from the SSS (Section 5.2) demonstrating common goals and objectives shared by federal, state, and tribal agencies that relate to the Redfish Lake sockeye salmon captive broodstock program.

1. BPA

- Objective 1 - Avoid jeopardy and assist in meeting recovery standards for Columbia Basin Salmon…that are affected by the FCRPS.
- Hatchery Strategy 2 - Use a safety net program on an interim basis to avoid extincition while other recovery actions take place for sturgeon and anadromous fish.
- Hatchery Strategy 3 - Use hatcheries in a variety of ways and places to aid recovery.

2. NMFS

- The goal of NMFS in the Salmon subbasin is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye, and steelhead resources.

3. Tribes

- Goal 1 - Restore anadromous fish in rivers and streams at levels to support the historical, cultural, and economic practices of the tribes.
- Management Objective 15 - Develop conservation hatcheries for supplementation of ESA listed fish populations.
- Artificial Production Objective 2 - Prevent further decline of salmon, steelhead and other species stocks through the use of artificial propagation.
- Artificial Production Objective 3 - Begin to reestablish runs of salmon, steelhead, and other species that are no longer present in the Salmon subbasin.

4. State of Idaho, General

- Goal 1 - Preserve, protect, perpetuate, and manage Idaho's 5000+ fish and wildlife species as steward of public resources.
- Objective 1 - Minimize the number of Idaho species identified as threatened or endangered under the provisions of the Endangered Species Act of 1973, as amended.

5. State of Idaho, Fisheries Bureau

- Goal 2 - To preserve Idaho's rare fishes to allow for future management options.
- Strategy 3 - Assist in recovery of rare species through captive rearing projects, supplementation, and protection.

6. State, Statewide Fisheries Management

- Idaho's overall goal is to restore and maintain wild native populations and habitats of resident and anadromous fish to preserve genetic integrity, ensure species and population viability, and provide sport fishing and aesthetic benefits.
- Objective 4 - Maintain genetic integrity of wild native stocks of fish and naturally managed fish when using hatchery supplementation.

7. State of Idaho, Anadromous Fisheries Management

- Idaho's overall anadromous fisheries goal is to recover wild Snake River salmon and steelhead populations and restore productive salmon and steelhead fisheries.
- Objective 1 - Maintain genetic and life history diversity and integrity of both naturally- and hatchery-produced fish.
- Strategy 4 - Establish facilities for captive culture of salmon and steelhead populations likely to become extirpated in the near-term future.
- Strategy 6 - Establish captive populations for stocks or populations likely to become extinct in the near-term future.
- Objective 2 - Rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level.
- Strategy 1 - Use appropriate and proven supplementation techniques to restore and rebuild populations outside of wild production refugia.
- Strategy 4 - Implement proven hatchery intervention where necessary and ecologically prudent to provide a safety net for selected populations at risk.

The Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research Project (199294000) not only meets the SSS goals, objectives, and needs, but is specifically identified as an ongoing BPA-funded conservation action (Section 4.6.1).

The Project's primary objective of recovering sockeye salmon runs in the Snake River directly meets the NWPPC 2000 Fish and Wildlife program's overarching objective of "recovery of fish and wildlife affected by the development and operation of the hydrosystem that are listed under the Endangered Species Act". The captive broodstock project's restoration efforts are a critical activity for attaining the NWPPC 2000 Fish and

Wildlife Program regional objectives of: 1) “Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005…”, 2) “Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012, and 3) “Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and nontribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.”

The NWPPC 2000 Fish and Wildlife Program’s primary artificial production strategy of using artificial production “under the proper conditions, to 1) complement habitat improvements by supplementing native fish populations up to the sustainable carrying capacity of the habitat with fish that are as similar as possible, in genetics and behavior, to wild native fish, …” also calls for restoration activities like those conducted in the Redfish Lake Captive Broodstock Rearing and Research Project. In addition to conforming with the current Program, the project is part of the priority guidelines for implementation and refinement of captive broodstocks for the recovery of Snake River sockeye salmon identified in the earlier 1994 NWPPC Columbia Basin Fish and Wildlife Program (CBFWP 1994, 7.5A.1-3).

The Redfish Lake project was initially designed to fulfill the needs of the NMFS proposed Recovery Plan for Snake River salmon (Schmitten et al. 1995, 4.1a and 4.1c). Currently, maintenance of an ESA-listed captive broodstock that can be used to restore anadromous sockeye salmon to the Snake River is a NMFS identified safety net program meeting the needs of RPA action item 177 identified in Section 9.6.4.3 of the 2000 NMFS FCRPS Biological Opinion.

In summary, the recovery of Snake River sockeye salmon has been a major goal of federal, state, and tribal agencies since their listing as endangered under the ESA. For restoration to occur in a timely fashion, the full reproductive potential of the remaining population must be harnessed to produce large numbers of juveniles in the shortest period of time. Captive broodstock technology not only provides the only safety net for this population segment, but is also the only reasonable avenue to restore the population within our lifetime. The Redfish Lake Captive Broodstock Rearing and Research program should continue to produce hundreds of adults and hundreds of thousands of eggs each year for supplementation releases into historic habitats. Thus, barring environmental or other catastrophes, this project should help stabilize runs of anadromous of sockeye salmon to the Snake River Basin.

Review Comments

This project is considered a BASE project by NMFS since it contributed to the baseline survival of sockeye salmon during the generation of the Biological Opinion. The NMFS is currently under a lease that has contract language that allows for the lease to be terminated with a 90 day notice, language that subsequently gives the owner flexibility for purposes of selling the property. Presently, the owner of the property is actively marketing the property as "for sale." The property, which has been identified as desirable for development, is located in Kitsap County, one of the fastest growing counties in the Washington. The

NMFS conducted a survey of other existing facilities throughout western Washington and identified this site as the most acceptable based on issues such as water availability, water quality, etc. The market analysis by NMFS indicated that the property is worth $850,000 for a lease purpose. Presently, there are no other hatcheries that could provide the facilities required to raise this particular group of fish.

Budget

FY02	FY03	FY04
$1,600,000 Category: High Priority Comments:	$780,000 Category: High Priority	$811,200 Category: High Priority

Project: 199401500 – Idaho Fish Screen Improvement

Sponsor: IDFG and IOSC

Short Description:

Enhance passage of juvenile and adult fish in Idaho's anadromous fish corridors by consolidation and elimination of irrigation diversions. Minimize adverse fish impacts of irrigation diversion dams by screening pump intakes and canals.

Abbreviated Abstract

Fish screens and fish friendly diversion dams save fish. Bonneville Power Authority grants in company with Congressional Mitchell Act grants and cost sharing with irrigators/landowners and other agencies has and continues to improve fish passage in Idaho tributary streams to the Columbia River. More than one hundred and fifty-four(154) of 194 old fish screens have been upgraded to meet current NMFS criteria. Thirteen (13) surface irrigation canals have been eliminated by conversions to wells or taken out of use. Thirty-seven (37) canals were consolidated into 15 canals. One hundred and fifty-nine (159)pump intakes have been screened, six (6) infiltration systems installed to eliminate need for diversion dams, headgates and conventional fish screens. Nineteen (19) fences have been built around fish screens to exclude people and animals. Fifty seven (57) headgates were improved and fourteen (14) fish friendly diversions have replaced gravel push-up, hay bales, tin, and mattress irrigation diversion dams.

Consolidation and/or elimination of numerous diversions is the best solution to increasing tributary survival of migrating fish. Reconnecting streams previously captured by irrigation canals opens up many miles of spawning and rearing habitat. Most of these tributaries have excellent habitat, are unpolluted and are essentially unchanged from their original, pre-agricultural quality. Five tributaries are in the process of being reconnected to the Salmon corridor. Elimination or modification of gravel push-up diversions to fish friendly diversions saves fish, improves streambed stability and improves chemical, physical, thermal and biological characteristics of Idaho waterways. Lockable, controllable headgates are cost shared with irrigators and provide a means of taking only the desired water volume and can be turned off when water is not needed.

Idaho is approximately 75% complete with the screening effort of known diversions in anadromous waters. Consistent funding could assist completing the known work by 2005. Evaluations of fish screens, reconnected stream projects and sites needing attention are on-going using a combination of in-kind and combined private, state, and federal funding sources.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/ Implementation Support	Coordination and prioritization of screening and habitat improvement activities (RPA Actions #149, 150, 151, 152, 153, and 154)
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds
199600700	Consolidations	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon watersheds

Relationship to Existing Goals, Objectives and Strategies

The screen program in Idaho and other Columbia River states has been recognized as a positive value to protecting both anadromous and resident fish. In 1956, Gebhards found an annual loss of one (1) million smolts to 250 diversions in 500 miles of the Salmon River drainage. The Snake River system historically produced over half of the spring/summer chinook for the Columbia River system. As recently as the late 1960's, the Snake River supported wild runs exceeding 120,000 adult spring/summer chinook salmon and summer steelhead. These runs supported popular fisheries and generated significant financial and recreational benefits to local and regional communities (unpublished IDFG report, 1998).

Corley (1961) estimated 279,000 smolts were saved by 84 fish screens on the Lemhi River. Munther (1973) found 3,200 chinook juveniles diverted into one unscreened ditch in the Sawtooth valley. Kiefer (1994) researched one Salmon River diversion (S-28) and found 68% of the down river migrants were funneled into this ditch. Present on-going studies reveal some wing dams take all migrants, others on outside meanders divert most of the downstream migrants. The losses of game fish are not restricted to anadromous species. Clothier (1954) and Spindler (1955) emphasized the loss of resident fish in Montana years ago.

Idaho's fish screen program has gone beyond screening fish. It endeavors to find ways to keep fish out of irrigation ditches. It recognized the importance of reconnecting streams to provide access for migration, spawning and rearing of all fish species. This project strives to keep fish out of irrigation ditches first, then screen the ditch as a secondary measure.

This project addresses needs identified in Section 5.4- Fish and Wildlife Needs of the Salmon Subbasin Summary. Specific needs addressed by this project are:

- development of a rigorous method for prioritizing habitat restoration projects that incorporates local knowledge as well as modeling approaches to asses physical needs, biological needs, and project feasibility,
- protect and restore riparian and instream habitat structure, for, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish, and
- protect, restore and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.

Review Comments

A new position has been established/filled to develop and implement an M&E program. In addition, an element of the program will be to construct and maintain fences around the screening facilities. This program is essential to the continued protection/management of protected species/populations. This projects addresses RPAs 149 and 500.

Budget

FY02	FY03	FY04
$1,000,000 Category: High Priority Comments:	$1,048,550 Category: High Priority	$1,099,500 Category: High Priority

Project: 199405000 – Salmon River Habitat Enhancement M & E

Sponsor: SBT

Short Description:

Maintain habitat improvements and evaluate benefits; monitor salmonid populations and habitat parameters; coordinate land and water stewardship activities; coordinate planning, implementation, monitoring, and evaluation of new improvements and protections

Abbreviated Abstract

The Salmon River Habitat Enhancement (SRHE) project was initiated by the Shoshone-Bannock Tribes in 1984 to improve chinook salmon and steelhead runs in traditional Tribal fishing areas. The overall goal of the SRHE project is to increase adult escapement back to the Salmon River by improving egg-to-parr survival of chinook salmon and steelhead, primarily through habitat improvements. The project has sponsored major habitat enhancements in three Salmon subbasin systems: 1) Bear Valley Creek (Middle Fork Salmon River), 2) Yankee Fork Salmon River, and 3) East Fork Salmon River. While improving anadromous salmonid spawning and rearing habitat, the project enhancements also benefit resident fish and wildlife species by decreasing fine sediment inputs and enhancing riparian habitat. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best alternative was chosen for each system. Expected outcomes of this project are increased survival during freshwater

life-stages of anadromous salmonids due to improvements in spawning, incubation, rearing, and riparian habitats; increased juvenile numbers should result in an increase in adult returns if out-of-basin survival can be improved. Benefits from this project are masked by low smolt-to-adult survival rates mainly due to low survival in the Snake River corridor. Ultimately, only the recovery of chinook salmon and steelhead will determine if all efforts have achieved their goals. Our on-going monitoring and evaluation includes: 1) Redd counts to estimate adult escapement, 2) Snorkel surveys to estimate juvenile production, and 3) Habitat parameter measures to determine changes in habitat quality and quantity. Revegetation efforts are also on-going in Big Boulder Creek and Herd Creek. Project personnel also provide Tribal representation on various technical work groups in the Salmon River subbasin.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909803	Salmon Supplementation Studies in Idaho Rivers (ISS)	Coordinate work to avoid duplication of effort, share personnel and equipment when necessary during the field season, share data.
199401700	Idaho Model Watershed Habitat Projects	Provide representation on Technical Team and Advisory Group.

Relationship to Existing Goals, Objectives and Strategies

As the 1994 Columbia River Basin Fish and Wildlife Program has been the guidance for the Salmon River Habitat Enhancement M&E (SRHE) Project for the last seven years, and the 2000 Fish and Wildlife Program is incomplete for specific project guidance until province and subbasin level planning is completed, discussion of how the SRHE project addresses the 1994 program is still relevant. The 1994 Fish and Wildlife Program recognizes that improvements in habitat quality are needed to increase the productivity of many stocks of chinook salmon (NPPC 1994). Salmon River chinook salmon stocks are in jeopardy of going extinct in the near future unless survival through the migration corridor on the Snake and Columbia Rivers can be improved, as well as improvements in habitat quality and quantity in the Salmon River subbasin itself. The SRHE Project has been working since 1984 to improve habitat in critical areas for the recovery of chinook salmon and steelhead and to monitor the results of those improvements. The enhancements initiated by this project strive to provide healthy stream and riparian communities. A healthy, functioning stream and riparian community will provide numerous benefits to fish and wildlife and water quality, as well as to other users of the resource. By improving habitat conditions to ensure compatibility with the biological needs of salmon, steelhead, and other fish and wildlife species, this project directly addresses the habitat goal of the 1994 Fish and Wildlife Program (NPPC 1994).

This project also directly addresses several measures of the Fish and Wildlife Program (NPPC 1994). Measure 7.6A.1 calls for coordination of human activities on a comprehensive watershed management basis, and through the project's involvement with the various technical and basin advisory groups for the Salmon River Basin, the Tribes are working to ensure that this happens. Measure 7.6A.2 calls for improved productivity of salmon and steelhead habitat critical to the recovery of weak stocks, and through our work in all systems, reducing fine sediment inputs into the system should improve egg-to-parr production. Also, by providing additional rearing habitat and access to previously blocked habitat, potential smolt production is increased in the Yankee Fork Salmon River and in Big Boulder Creek. All streams in our affected project areas have been designated critical habitat for the recovery of endangered chinook salmon (57 FR 14653), and the project is working to improve habitat productivity in these areas by providing healthy, functioning stream and riparian communities.

Measure 7.6B.1 states the need to improve and maintain coordination of land and water activities to protect and improve the productivity of salmon and steelhead stocks. Through the project's involvement with changes to allotment management plans, oversight on mining operations, efforts to improve fish passage including screening of irrigation diversions and diversion consolidations, participation in regional committees which share information on habitat enhancement and supplementation, and participation with technical and basin advisory groups working in the Salmon River Basin, this project is directly addressing this measure. Measure 7.6B.3 gives priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowners. The projects on Herd Creek and the Yankee Fork Salmon River are both on private land, and cooperative agreements and/or easements have been obtained for both projects. Measure 7.6B.4 calls for giving priority to actions that maximize the desired result per dollar spent, and to actions that have a high probability of succeeding at a reasonable cost. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best biological and cost-effective alternative was chosen for each system (J.M. Montgomery 1985; BNI 1987; EA 1988). Measure 7.6B.6 encourages involvement with volunteers and educational institutions in cooperative habitat enhancement projects. The Tribes' Salmon Corps, a volunteer service-oriented organization, has been actively involved with past enhancement efforts with this project, and will be utilized further as opportunities arise.

Measure 7.6C.5 calls for federal land and water management agencies, states, tribes, and private landowners to take all steps necessary to comply with the habitat objectives. By providing healthy, functioning stream and riparian communities at our project sites, this project has improved and will continue to improve sediment regimes, bank stability, water quality, large woody debris, large pool frequency, riparian vegetation, stream morphology, and riparian communities.

Section 7.7 calls for cooperative habitat protection and improvement with private landowners, and by working with the model watershed technical and advisory groups, this project has been actively seeking and implementing improvements on private lands in the Salmon River Basin.

Measure 7.8C.1 states to ensure that all mining activities comply with state water quality standards. This measure is addressed by the project's oversight on mining activities in the Salmon River Basin. Measure 7.8D.1 charges parties to identify and protect riparian and underwater lands associated with perennial and intermittent streams and to initiate actions to increase shade, vegetation, standing and down large and small woody debris when water quality objectives are not being met. By implementing major enhancement projects in the three systems (Bear Valley Creek, Yankee Fork Salmon River, East Fork Salmon River), the project has taken, and will continue to take action to ensure water quality and habitat objectives are met in the Salmon River Basin.

As stated in Section 9.b. above, the overall goal of the Shoshone-Bannock Tribes and the SRHE Project is the recovery of chinook salmon and steelhead in the Columbia River Basin, focusing primarily on the Salmon River Basin. In accordance with 1994 and 2000 Columbia River Basin Fish and Wildlife Program goals and objectives, this project continues to protect and improve habitat conditions in the Salmon River Basin, thus benefiting the biological needs of salmon, steelhead, bull trout, and other fish and wildlife species. The SRHE Project addresses the vision of the 2000 Fish and Wildlife Program by protecting and restoring natural ecological functions and habitats within the Salmon River subbasin. The SRHE Project also evaluates effects of previous habitat management on the ecosystem through detailed monitoring and evaluation of past project enhancement efforts. The SRHE Project has taken into account ecological habitat-forming processes prior to project implementation, as called for in the 2000 Fish and Wildlife Program Scientific Principle #4. The Project realizes that habitat-forming processes can occur over long periods of time, so monitoring of past enhancement efforts is necessary to evaluate the long-term benefits of those efforts.

The SRHE Project addresses several fish and wildlife needs in the Salmon River subbasin, which are identified in the draft Salmon Subbasin Summary (Huntington 2001). Salmon Subbasin Summary Section 5.4.2 Fisheries Aquatic Needs #6, 7, 8, and 9 are all addressed by the SRHE Project. Need #6 calls for the protection and restoration of riparian and instream habitat structure, form, and function to provide suitable holding, spawning, and rearing areas for anadromous and resident fish. Previous project enhancement efforts in Bear Valley Creek, Herd Creek, Big Boulder Creek have directly addressed this need (see Section 9.b. for detailed project discussion). Need #7 calls for the protection, restoration, and creation of riparian, wetland, and floodplain areas within the subbasin and establish connectivity. Previous project enhancement efforts in Bear Valley Creek, Herd Creek, Big Boulder Creek, and the Yankee Fork Salmon River have directly addressed this need (see Section 9.b.). Need #8 calls for continued coordinated temperature monitoring throughout the subbasin. The SRHE Project annually coordinates the placement of over 15 thermographs in the Salmon River subbasin with other management entities in the subbasin. Need #9 calls for reduction of stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species. Previous project efforts in Bear Valley Creek, Herd Creek, and Big Boulder Creek have directly addressed this need (see Section b.).

The SRHE Project also addresses Salmon Subbasin Summary Section 5.4.2 chinook salmon needs # 1 and 7. Need #1 calls for gathering of improved population status information for wild, natural, and hatchery chinook salmon including life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing and percentage, spawning success, and spawner to spawner ratios. Through detailed annual spawning ground surveys and snorkel sampling, the SRHE Project addresses this need in Bear Valley Creek, Yankee Fork Salmon River, Herd Creek, and Big Boulder Creek. Need #7 calls for monitoring of fish population parameters in relation to habitat enhancement projects. Although directly relating changes in fish population characteristics to habitat enhancement efforts is a difficult undertaking due to other confounding factors, the SRHE Project has documented increased densities of non-anadromous salmonids in Bear Valley Creek following enhancement efforts, and has documented extremely high use of off-channel habitat made available in the Yankee Fork Salmon River (see Section 9.h. for details). The SRHE Project continues to monitor fish population changes in relation to project habitat enhancement efforts in Bear Valley Creek, Yankee Fork Salmon River, Herd Creek, and Big Boulder Creek.

The SRHE Project addresses Salmon Subbasin Summary Section 5.4.4 combined aquatic and terrestrial needs #1, 2, 3, and 13. Need #1 calls for continued ongoing and establishment of new monitoring and evaluation programs for fish supplementation, habitat restoration and improvement, habitat baseline conditions, water quality and water quantity improvements, conditions, and trends. The SRHE Project will continue to provide detailed fish, aquatic habitat, and riparian monitoring in Bear Valley Creek, Yankee Fork Salmon River, Herd Creek and Big Boulder Creek as well as other systems as the need arises. Need #2 calls for coordinated M&E efforts at the subbasin and provincial scale to maximize effectiveness and minimize redundancy. The SRHE Project participates annually in the upper Salmon River basin interagency coordination meeting to address this need. Need #3 calls for the development and implementation of improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function. The SRHE Project provides Tribal representation on numerous technical work groups within the Salmon River basin which all attempt to address this need. Need #13 calls for continuing and enhancing the cooperative/shared approach in research, monitoring, and evaluation between tribal, federal, state, local, and private entities to facilitate restoration and enhancement measures. Project personnel actively work with all of the above mentioned entities to monitor, evaluate, and adaptively manage ongoing projects, implement new projects, and share new ideas/concepts concerning resource management and protection.

Review Comments

This project addresses RPAs 150, 152 and 183.

Budget

FY02	FY03	FY04
$249,500 Category: High Priority Comments:	$260,000 Category: High Priority	$245,500 Category: High Priority

Project: 199604300 – Johnson Creek Artificial Propagation Enhancement Project

Sponsor: NPT

Short Description:

Enhance and monitor a weak but recoverable stock of native summer chinook salmon in Johnson Creek. Construct facilities for adult collection and holding, juvenile rearing and smolt acclimation.

Abbreviated Abstract

This project is a small-scale supplementation initiative designed to increase the survival of a weak but recoverable spawning aggregate of summer chinook salmon. The goal of this project is to prevent the extirpation of the ESA listed Johnson Creek summer chinook and begin their recovery through supplementation. We intend to achieve this goal by rearing up to 300,000 chinook salmon smolts with acclimated releases back into Johnson Creek. Supplementation under this project is planned for a minimum of 5 full salmon generations or 25 years.

Low capital facilities will be designed and constructed for holding adults, acclimating juveniles, and expansion of an existing fish hatchery. These facilities will be used to produce smolts and/or other approaches as necessary to insure the survival of this population.

We will continue to monitor and evaluate the supplementation program by comparing smolt to adult survival rates and recruit per spawner ratios of natural and supplemented fish. This program will evaluate the benefits and drawbacks of acclimated releases of juvenile chinook salmon smolts. This program, initiated prior to the first releases of supplemented fish, has been collecting baseline life-history characteristic information, to examine survival of the wild fish in Johnson Creek and any potential effects that the supplementation program may have on the wild population.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909800	Idaho Salmon Supplementation (IDFG)	Long term supplementation evaluation. Will utilize 199604300 production and evaluation data in the system-wide evaluation.
198909802	Salmon Supplementation Studies in Idaho (NPT)	Long term supplementation evaluation. Will utilize 199604300 production and evaluation data in the system-wide evaluation.
199703800	Salmonid Gamete Preservation (NPT)	Long Term Gamete Preservation.
199703000	Monitoring of Listed Stock Chinook Salmon Escapement	This project collects data on adult abundance and migration timing of chinook salmon. We compare adult abundance techniques to quantify techniques.
	IDFG McCall Fish Hatchery	Working cooperatively with project to expand facility to accommodate Johnson Creek juveniles for supplementation program.

Project ID	Title	Nature of Relationship
199005500	Steelhead Supplementation in Idaho Rivers	Johnson Creek project provides life history data through a PIT tag marking project.
199701501	Imnaha Smolt and Adult Monitoring Program	Imnaha basin project used for efforts in testing new methods and technologies for SAR and R/S estimates.
	Comparative Survival Rate	Johnson Creek fish will be used to develop a long-term index of transport survival rate (SAR) to in-river survival rate (SAR) for Snake River hatchery and wild/natural spring and summer chinook smolts.
	Lower Snake River Compensation Plan Hatchery Evaluations	This project will provide a better estimate of straying of SFSR fish into Johnson Creek and JC fish straying in the SFSR.
19910300	Spring/Summer Chinook Salmon Population Viability Assessment	Johnson Creek data used for evaluating extinction risks to populations and uses abundance data generated by research projects in SFSR and other Salmon River streams.
199107300	Idaho Natural Production Monitoring and Evaluation	Johnson Creek data supplement program to monitor trends in chinook salmon and steelhead trout populations in the Salmon River.
	University of Idaho	Project utilizes known Johnson Creek fish for radio tag studies. Johnson Creek project uses the radios for weir impedance studies.

Relationship to Existing Goals, Objectives and Strategies

The Johnson Creek Artificial Propagation Enhancement (JCAPE) project is part of a cooperative project between NPT, IDFG, and USFWS (LSRCP program) and is one of the high priority Tribal supplementation projects that has been around since the Early Implementation Plan (EIP) process through the Bonneville Power Administration. It has received a high priority ranking through CBFWA and has been reviewed and recommended through the U.S. v Oregon Production Advisory Committee process. NMFS has deemed the project as critical to recovery of ESA-listed salmon (Stelle 1996, 1999). Additionally, this program has undergone intense scrutiny and review through the NMFS ESA Section 10 Application process and an Independent Scientific Review through the NPPC 3-Step Process.

Brood stock needs for the JCAPE project were derived from the minimum number of spawners needed to maintain an effective population size for Johnson Creek. This brood stock number is 232 adults, which would produce approximately 300,000 supplementation smolts for release back into Johnson Creek (PRRG 2000).

Activities associated with the JCAPE have been authorized under ESA Section 10 and Section 7 Permits and Biological Opinions. These documents include ESA Section 10 Permit No. 1147, Permit No. 1164, FWS Section 7 Biological Opinion 501.1100,1-4-98-F4 (bull trout), ESA Section 10 Applications (Lothrop 1998, 2000), NMFS Section 10 Biological Opinion (1998).

Supplementation occurring under the JCAPE project is completely integrated with the Lower Snake River Compensation Plan (LSRCP) Program. The McCall Fish Hatchery is the central facility for incubation and rearing of summer chinook salmon smolts that will be acclimated and released in the satellite facilities described in this proposal.

NMFS (1995) suggests revising rearing and breeding techniques to improve the quality of smolts, and manipulating water temperatures and diets to emulate natural growth. Studies conducted at their Manchester Lab (Maynard et al. 1996) suggests that decreasing rearing densities, using acclimation ponds and voluntary release strategies, and incorporating shade, substrate, cover, and structure in rearing containers can increase post-release survival by making fish more like their wild counterparts. The JCAPE project, a NATURE's concept supplementation program, is designed to preserve and recover chinook salmon in Johnson Creek.

Review Comments

This project is considered a BASE project by NMFS.

Budget

FY02	FY03	FY04
$4,410,100 Category: High Priority Comments:	$1,136,750 Category: High Priority	$1,193,838 Category: High Priority

Project: 199700100 – Captive Rearing Project for Salmon River Chinook Salmon

Sponsor: IDFG and IOSC

Short Description:

Develop captive rearing techniques for chinook salmon and evaluate the success and utility of captive rearing for maintaining stock structure and conservation levels of adult spawners in three drainages.

Abbreviated Abstract

Anadromous fishery managers in the Snake River basin are increasingly faced with two disparate objectives in their programs, increasing the number of spawning adults and maintaining the diversity of natural populations. Managers discussed possible means of achieving these goals by protecting small populations at high risk of extinction, and it was agreed that a form of captive culture might be appropriate for some stocks. In response, the IDFG initiated the Captive Rearing Project for Salmon River Chinook Salmon. The strategy of captive rearing is to prevent cohort collapse by providing captive-reared adult spawners to the natural environment, which, in turn, maintain the continuum of generation-to-generation smolt production. Captive rearing also strives to maintain the genetic identity of the local population by utilizing naturally spawned individuals in the project. However, captive rearing is a short-term approach to species preservation. It does little to repair the underlying problems that have resulted in the decline of Pacific salmonids over the past decades, but the benefits of this program will be realized by maintaining locally adapted populations until these issues have been resolved.

The goal of this project is to develop and test captive rearing techniques. Project activities are divided into two parts: hatchery propagation and spawning performance monitoring and evaluation. The success of the project depends on developing culture techniques to produce fish with the proper behavioral, morphological, and physiological characteristics to successfully interact with and breed with wild individuals. Field monitoring is used to document behavioral interactions, spawn timing, success of redds spawned by captive-reared individuals, and to determine if changes in culture technique result in the desired changes in reproductive behavior or performance.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199606700	Manchester Spring Chinook Broodstock Project	This NMFS project complements IDFG Project 199700100 by sharing fish culture responsibility (seawater) for captive chinook salmon. This project serves to also reduce the risk of catastrophic loss.
199305600	Assessment of Captive Brood Stock Techniques	This NMFS project develops information needed to overcome some of the problems that limit the development of viable broodstock adults and progeny.
198909600	Genetic Monitoring and Evaluation of Snake River Salmon and Steelhead	This NMFS project provides genetic analysis of brood stock and wild chinook salmon.
199105500	NATURES	This NMFS project develops and evaluates fish culture techniques. Topics that have direct bearing on the IDFG captive chinook proposal include exercise training and live food training in captive populations.
199009300	Genetic Analysis of Oncorhynchus Nerka - modified to include chinook salmon	This University of Idaho project provides comprehensive genetics support to Project 199700100.
199107200	Redfish Lake Sockeye Salmon Captive Brood Stock Program	This IDFG project shares facility resources and personnel with Project 199700100. Project responsibilities overlap and complement eachother.

Project ID	Title	Nature of Relationship
199705700	Salmon River Production Program	This Shoshone-Bannock Tribes project assists the IDFG captive chinook project with the out planting of eggs from hatchery spawning investigations. The SBT provides additional assistance with adult out plants and juvenile production assessments.
200001900	Tucannon River Spring Chinook Captive Broodstock Program	This WDFW project develops captive broodstock techniques that are relevant to the IDFG captive chinook program.
199604400	Grande Ronde Basin Spring Chinook Captive Broodstock Program	This ODFW program provides complimentary information from captive broodstock efforts inplace to maintain and rebuild three stocks of spring chinook salmon in the Grande Ronde River basin of Oregon.

Relationship to Existing Goals, Objectives and Strategies

Salmon Subbasin Summary - The depressed status of Snake River spring/summer chinook salmon is clearly described in Section 4.1.1.a. of the Salmon Subbasin Summary (NPPC 2000a). Section 4.5.1 identifies the Captive Rearing Project for Salmon River Chinook Salmon as one of two artificial production programs in place in the Salmon Subbasin addressing recovery goals through the use of conservation hatchery practices. Program goals and objectives are also consistent with existing plans, policies and guidelines presented in Section 5.1. of the Subbasin Summary as developed by Bonneville Power Administration (Section 5.1.1.a.), the National Marine Fisheries Service (Section 5.1.1.b.), the Nez Perce Tribe (Section 5.1.2.a.), the Shoshone-Bannock Tribes (Section 5.1.2.b.) and the Idaho Department of Fish and Game (Section 5.1.3.a.).

Existing Federal, State and Tribal goals, objectives and strategies identified in the Subbasin Summary (Section 5.2.) overlap significantly with the primary objectives of the Captive Rearing Project for Salmon River Chinook Salmon. The "overarching" hatchery goal of the Basinwide Salmon Recovery Strategy (Federal Caucus 2000) is to reduce genetic, ecological, and management effects of artificial production on natural populations. By selecting the captive rearing approach to hatchery intervention, this program is designed to minimize negative hatchery effects on natural populations. Specific Federal Caucus recommendations that overlap with Objective 1. of this program include: using safety net programs on an interim basis to avoid extinction while other recovery actions take place, preserving the genetic legacy of the most at-risk populations, limiting the adverse effects of hatchery practices on ESA-listed populations, and using genetically appropriate broodstock to stabilize and/or bolster weak populations (Section 5.2.1.).

Bonneville Power Administration (Section 5.2.1.a.) presented basinwide objectives for implementing actions under the FCRPS Biological Opinion and suggested that hatcheries can play a critical role in recovery of anadromous fish by "increasing the number of biologically-appropriate naturally spawning adults; improving fish health and fitness; and improving hatchery facilities, operation, and management and reducing potential harm to listed fish." Specific strategies developed by BPA include: reducing the potentially harmful effects of hatcheries; using safety net programs on an interim basis to avoid extinction; and using hatcheries in a variety of ways to aid recovery. Objective 1. and 2. of the Captive Rearing Project for Salmon River Chinook Salmon overlap significantly with the goals, objectives, and strategies developed by BPA. Chinook captive rearing program objectives and tasks specifically address the development of genetically prudent broodstocks and the use of cryopreservation to archive key genetic resources and to keep unique identities available to preserve future options. Objective 1., Task D. specifically address the production of adult chinook salmon for reintroduction to the habitat. Hatchery practices reflect the region's best protocols and undergo constant review and modification through the Chinook Salmon Captive Propagation Technical Oversight Committee (CSCPTOC) process.

The goal of NMFS in the Salmon Subbasin (Section 5.2.1.b.) is to achieve the recovery of Snake River spring/summer and fall chinook, sockeye and steelhead resources. Ultimately, NMFS's goal is the achievement of self-sustaining, harvestable levels of salmon populations that no longer require the protection of the Endangered Species Act. Chinook captive rearing program goals and objectives are consistent with this language.

Salmon Subbasin goals, objectives and strategies developed by the Nez Perce Tribe (Section 5.2.2.a.) and the Shoshone-Bannock Tribes (Section 5.2.2.b.) relate directly to the Captive Rearing Project for Salmon River Chinook Salmon. The principal Nez Perce Tribal goal: "to restore anadromous fish in rivers and streams…", is directly compatible with the primary chinook captive rearing program goal. Nez Perce Tribal management Objectives 1. through 3., 14., and 15.; Artificial Production Objectives 1. through 3.; and Research Monitoring and Evaluation Objective 4. overlap considerably with Objectives 1., 2., and 3. of this proposal. Shoshone-Bannock Tribal Objective 1., Strategies .1 and 3., are directly tied to IDFG chinook captive rearing program goals and objectives.

The Idaho Department of Fish and Game is charged with the responsibility of preserving, protecting, perpetuating, and managing the fish and wildlife resources of Idaho. This mandate is reflected as their primary goal in the Salmon Subbasin Summary (Section 5.2.3.a.). Idaho's overall anadromous fisheries goal is to recover wild Snake River salmon and steelhead populations and to restore productive salmon and steelhead fisheries (Idaho Department of Fish and Game 1996, 2001). Goals and objectives of Captive Rearing Project for Salmon River Chinook Salmon are carried-out under these state-wide management guidelines.

Specific IDFG Fisheries Bureau goals, objectives and strategies that overlap with the Captive Rearing Project for Salmon River Chinook Salmon include: the primary goal to provide viable fish populations for present and future use (Goal 1.), the objective to maintain or restore wild populations of game fish in suitable waters (Objective 1.); and to assist in recovery of rare species through the use of captive rearing projects (Strategy 3.). Anadromous Fish Management objectives and strategies that provide guiding support for this program include: the need to maintain genetic and life history diversity and integrity of naturally and hatchery-produced fish (Objective 1.); the need to establish facilities for captive culture of salmon likely to become extirpated (Objective 1., Strategies 4. and 6.); the need to preserve genetic diversity through gamete cryopreservation (Objective 1., Strategy 7); the need to rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level (Objective 2.); the recommendation to implement hatchery intervention where necessary and prudent to provide a safety net for selected populations at risk (Objective 2., Strategy 4.); and the need to balance genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction (Objective 2., Strategy 5.).

2000 Columbia River Basin Fish and Wildlife Program – The Captive Rearing Project for Salmon River Chinook Salmon conforms with the general vision of the Fish and Wildlife Program (Section III.A.1.) and its “overarching" objective to protect, mitigate and enhance the fish and wildlife of the Columbia River and its tributaries (Section III.C.1.; NPPC 2000b). Specifically, the Primary Artificial Production Strategy of the Fish and Wildlife Program (Section 4.) addresses the need to complement habitat improvements by supplementing native fish populations with hatchery-produced fish with similar genetics and behavior to their wild counterpart. In addition, Section 4. includes language stressing the need to minimize the negative impacts of hatcheries in the recovery process. Chinook captive rearing program goals and objectives are aligned with this philosophy. Program methods receive constant review at CSCPTOC level and constantly strive to provide hatchery practices that meet Fish and Wildlife Program standards.

2000 FCRPS Biological Opinion – The Federal Columbia River Power System Biological Opinion (NMFS 2000) includes Artificial Propagation Measures (Section 9.6.4.) that address reforms to “reduce or eliminate adverse genetic, ecological, and management effects of artificial production on natural production while retaining and enhancing the potential of hatcheries to contribute to basinwide objectives for conservation and recovery.” The Biological Opinion recognizes that artificial production measures have “proven effective in many cases at alleviating near-term extinction risks.” Many of the Actions to Reform Existing Hatcheries and Artificial Production Programs (Section 9.6.4.2.) are being carried-out in the Captive Rearing Project for Salmon River Chinook Salmon. Specifically, Objective 1. and 2. of the chinook captive rearing program address reform measures dealing with: the management of genetic risk, the production of fish from locally adapted stocks, the use of mating protocols designed to avoid genetic divergence from the biologically appropriate population, matching production with habitat carrying capacity, and marking hatchery-produced fish to distinguish natural from hatchery fish. The Biological Opinion also reviews the need for the development of NMFS-approved Hatchery and Genetic Management Plans (HGMP). At the time of this writing, a draft is in its final stages of development.

Specific Actions in the Biological Opinion that demonstrate logical connections with the chinook captive rearing program are identified in Section 9.6.4.3. Actions 170, 173, 174, 175, 177, 182, and 184 are all addressed by objectives identified in the Captive Rearing Project for Salmon River Chinook Salmon. Actions 170 and 173 call for the design and funding of capital modifications to implement reforms identified in HGMP's. Action 174 identifies the need for "additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners". This need is addressed in research conducted by the Captive Rearing Project for Salmon River Chinook Salmon under Objective 2. Actions 175 and 177 call for the development and funding of safety net populations of at-risk salmon and steelhead. Target populations specifically addressed by the IDFG Captive Rearing Project for Salmon River Chinook Salmon are specifically referenced in the Biological Opinion. Recommendations made in Action 182 are to fund studies "to determine the reproductive success of hatchery fish relative to wild fish", and concerns over the genetic implications are expressed. The Captive Rearing Project for Salmon River Chinook Salmon is actively involved with research designed to address this question. Objective 2. of the captive rearing project includes research directed at determining the reproductive success of pre-spawn adults released for natural spawning and of captive-reared adults retained in the hatchery. In addition, the IDFG and NMFS have initiated maturation physiology research to address questions related to reproductive timing and success. Action 184 states the need to provide funding for a "hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery". The Captive Rearing Project for Salmon River Chinook Salmon is making a clear attempt to provide the needed monitoring and evaluation of conservation hatchery techniques and of behavioral patterns and spawning success in pre-spawn adults produced by the program.

Offices of the Governors. 2000. Recommendations of the governors of Idaho, Montana, Oregon and Washington for the protection and restoration of fish in the Columbia River Basin. The Governors of the states of Idaho, Montana, Oregon and Washington urged regional recovery planners to recognize the multi-purpose aspect of hatcheries, which includes fish production for harvest, supplementation to rebuild naturally spawning populations, and captive brood stock experiments for conservation and restoration (Offices of the Governors 2000, Chapter IV, Hatchery Reforms). The Governors recommended, "all hatcheries in the Columbia River Basin be reviewed within three years to determine the facilities' specific purposes and potential future uses in support of fish recovery and harvest." They further recommended that the supplementation plan recognize the tribal, state and federal roles in implementation of the plan. Lastly, the Governors supported the concept of wild fish refuges and the use of these refuges as controls for evaluating conservation hatchery efforts.

This project focuses on identifying facility needs and developing rearing protocols for the captive culture of chinook salmon. Information generated by this project would be used to retrofit existing hatcheries or build new facilities for the purpose of chinook salmon captive culture to satisfy conservation and recovery objectives. The IDFG recognizes the importance of and manages the fish resources in wild production refuges. This project is involved in IDFG efforts to assess population viability in all production areas and prioritizing areas for potential intervention with captive culture strategies.

Other Plans and Guidelines – Goals and objectives of the Captive Rearing Project for Salmon River Chinook Salmon are consistent with several guidelines contained in the Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin (Brannon, et al. 1999). Objective 1. and 2. of the chinook captive rearing program are actively following elements of Guidelines 1., 4., 5., 8., 10., 11., 12., 13., 14., and 15. of the Artificial Production Review. These guidelines address: the hatchery rearing environment, natural population parameters, habitat carrying capacity, genetic and breeding protocols, germ plasm repositories, and population life history knowledge. Performance standards and indicators presented in The Final Draft Artificial Production Review (NPPC 1999) presents a series of performance standards addressing both benefits and risks to populations. Many of these standards are addressed by specific chinook captive rearing program objectives. These relationships will be identified in the final HGMP for chinook captive rearing program hatchery activities.

Relationships described above are substantive in nature and address core guidelines, goals, objectives and strategies identified in the various planning documents. Techniques and products developed in the Captive Rearing Project for Salmon River Chinook Salmon are critical components of the overall conceptual framework being developed in the region.

Review Comments

The results from this work will significantly benefit the target populations. This project has had significant peer review and is guided by a technical oversight committee. This project is considered a BASE project by NMFS in regards to the 2000 Biological Opinion. This project should eventually be tied into the Safety Net Artificial Production Program (SNAPP) process.

Budget

FY02	FY03	FY04
$750,482 Category: High Priority Comments:	$1,800,000 Category: High Priority	$1,500,000 Category: High Priority

Project: 199703000 – Chinook Salmon Adult Abundance Monitoring

Sponsor: NPT/PNNL

Short Description:

Implement state-of-the-art technologies to accurately quantify chinook salmon spawner abundance in the Secesh River, Lake and Marsh creeks. Adult abundance data would allow a measure of recovery threshold abundance of a listed species (NMFS 2000).

Abbreviated Abstract

Snake River spring and summer chinook salmon (Oncorhynchus tshawytscha) have declined to dangerously low levels and are listed as threatened under the Endangered Species Act (ESA). The National Marine Fisheries Service (NMFS), in the 2000 Biological Opinion, has proposed a list of potential recovery actions and a metric for measuring recovery actions for listed Evolutionary Significant Units (ESU) in the Snake River basin. The ability to measure an abundance metric is the basis for assessing whether listed spring and summer chinook salmon populations meet recovery thresholds and are a candidate for delisting under the ESA or further conservation actions. For listed Snake River chinook salmon, recovery efforts and recovery status are to be measured in terms of the abundance of spawning adults for each ESU. However, quantitative abundance data for listed Snake River ESU's generally does not exist. Currently there is no project, plan, or method that would allow for a quantitative measure of listed ESU spawner abundance.

Current redd count data represent an index of relative abundance only, and provides no direct quantitative measure of spawner abundance. Expansions of redd counts to spawner numbers are influenced by measurement error and uncertainty of assumptions regarding estimates of fish per redd, relative numbers in surveyed and unsurveyed areas, prespawning mortality rates, age composition, and hatchery fish contribution (Beamesderfer et al. 1998). Furthermore, current redd count methods will not be able to determine when or if an ESU reaches a desired recovery threshold.

We propose to use new and existing technologies that can provide accurate spawner abundance information that can be used in future long-term monitoring projects. In addition, we will integrate the identified technology into site-specific final engineering design and implement it for adult salmon abundance determination in the Secesh River and Lake and Marsh creeks.

The Secesh River is an unsupplemented stream in the South Fork Salmon River in Idaho. Lake Creek is an unsupplemented tributary to the Secesh River. Both are control systems for the Idaho Salmon Supplementation Studies (ISS). Marsh Creek is located in the headwaters of the Middle Fork of the Salmon River and is unsupplemented with the exception of one release of 22,000 Rapid River fry into Cape Horn Creek by University of Idaho researchers in 1975.

This approach is a critical first step towards initiating accurate and precise quantification of adult spawner abundances as required under the NMFS 2000 Biological Opinion. Salmon populations and investment of Fish and Wildlife Program funds in salmon recovery projects in the region are placed at risk by an inability to quantify adult salmon abundance in tributary streams to evaluate project effectiveness and ESA recovery alternatives. Salmon managers and the Northwest Power Planning Council need to understand with certainty if recovery thresholds are being met and if recovery alternatives (if any) build population size of critically depressed stocks.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
198909800	Idaho Salmon Supplementation Study - IDFG Secesh River	Uses adult abundance to develop fish per redd numbers, Marsh Creek-Comparison of wild to hatchery populations.
198909801	Idaho Salmon Supplementation Study - USFWS	Uses adult abundance to develop fish per redd numbers, -comparison of wild to hatchery populations.
198909802	Idaho Salmon Supplementation Study - NPT	Uses adult abundance to develop fish per redd numbers, Secesh River and Lake Creek-Comparison of wild to hatchery populations.

Project ID	Title	Nature of Relationship
198909803	Idaho Salmon Supplementation Study - SHOBAN	Uses adult abundance to develop fish per redd numbers, -comparison of wild to hatchery populations.
	Proposed-Evaluation of adult chinook salmon returns, South Fork Salmon River, Idaho	Will compare adult abundance to PIT tags returns at the same site, build index for PIT tag detections, SAR R/S, Adult to adult ratios, expansion of ratios into non-monitored streams with PIT tag detections
199810804	Streamnet	Provide abundance for data base
	Johnson Creek-monitoring and evaluation	
199701501	Chinook salmon and steelhead smolt survival and smolt to adult return rate quantification - Imnaha River	Determines emigrant survival and SAR return rates for chinook salmon and steelhead.
	Proposed-chinook abundance monitoring, Minam River	Determines abundance for another ESU

Relationship to Existing Goals, Objectives and Strategies

In light of the continuous and unabated decline of Columbia River salmon populations, the Independent Science Group (ISG) called for a rigorous monitoring program combined with an adaptive management approach to salmon recovery (Williams et al.1998). Nehlsen et al. (1991) also recommend the development of long term monitoring programs that track the status of at-risk populations. However, current methods such as redd counts are not always sufficient for accurate spawner abundance determination (Dunham et al. 2001). Redd counts and carcass surveys when combined with unknown variables add immeasurable errors, preventing full confidence in spawner escapement estimates. Expansion of redd counts to spawner numbers are also influenced by the uncertainty of assumptions regarding estimates of fish per redd, relative numbers in surveyed and unsurveyed areas, redd superimposition and prespawning mortality rates (Beamesderfer et al. 1997). Weirs and picket fences also have their limitations in streams with highly variable hydrographs (Clay 1995). The primary function of most permanent and temporary weirs is for hatchery broodstock collection purposes and many are not sited downstream of the entire spatial distribution of salmon spawning habitat. While adult broodstock collection weirs can obtain a minimum spawner abundance estimate, they are not capable of enumerating fish that migrate during high water periods, or adults that spawn downstream of the weir location. They also require the physical trapping and handling of both target and non-target species and at times may impede migration (Clay 1995). Weirs impede fish movements if they do not allow for both, upstream and downstream movement. Better methods and techniques are required. We plan to develop those technologies and methodologies that can be used to accurately determine salmon spawner abundance in the Secesh River and Lake and Marsh creeks.

This project would be a cooperative effort among state, federal and Tribal agencies and independent scientists that would complement ongoing research and management activities. Project activities would actively seek collaboration and coordination with other agencies to establish standardized monitoring efforts that are comparable between streams and that provide regional information application. Adult salmon abundance monitoring would be closely coordinated with National Marine Fisheries service for ESA recovery metrics.

This project proposes technologies that utilize demonstrated, measurable and quantitative methods that will result in clear benefits to salmon abundance monitoring. Hydroacoustics is an effective monitoring tool when applied under the appropriate circumstances. This technology is currently used to enumerate and describe temporal and spatial movement patterns of many anadromous populations in lotic systems (Daum and Osborne 1998; Ransom et al. 1999). Resistivity counters are another "hands off" technology that has a proven record of accurately counting upstream migrating salmonids (Aprahamian et al. 1996, McCubbing et al. 2000). Electronic counters are employed extensively in riverine systems by fishery biologists in other countries.

The importance of implementing these identified technologies for the collection of accurate spawner abundance information in determining population status and recovery thresholds of Ecological Significant Units (ESU) is clear (NMFS 2000). The Biological Opinion for operation of the federal hydropower system (NMFS 2000) recommended that accurate assessment of spawner escapement of listed ESU's are required for determining the viability, recovery status, and delisting of ESU's under ESA. The NMFS Biological Opinion defined the degree to which species-level biological requirements must be met:

"At the species level, NMFS considers that the biological requirements for survival, with an adequate potential for recovery, are met when there is a high likelihood that the species' population will remain above critical escapement thresholds over a sufficiently long period of time. Additionally, the species must have a moderate to high likelihood that its population will achieve its recovery level within an adequate period of time. The particular thresholds, recovery levels, and time periods must be selected depending upon the characteristics and circumstances of each salmon species under consultation (NMFS 2000)."

The objectives of this proposal are consistent with and recommended by action plans identified in the Biological Opinion, Fish and Wildlife Program, Salmon River Subbasin Summary, Wy-Kan-Ush-Me-Wa-Kush-Wit (Spirit of the Salmon) (Columbia River Inter-Tribal Fish Commission 1995) and the Validation Monitoring Panel (Botkin et al. 2000). The development and implementation of these technologies to determine salmon spawner abundance would aid the Nez Perce Tribe and other co-managers carry out their responsibilities identified in the Kan-Ush-Me-Wa-Kush-Wit (Spirit of the Salmon), Biological Opinion (NMFS 2000), Fish and Wildlife Program and the Salmon River Subbasin Summary

Co-managers, such as the Nez Perce Tribe, are expected to develop monitoring plans to help resolve a wide range of uncertainties including the population status of the listed spawning aggregates. The recovery metric for Marsh Creek is the likelihood that the

8-year geometric mean abundance of natural spawners will be equal to or greater than the interim proposed recovery abundance levels (Marsh Creek 426) specified in the Biological Opinion (NMFS 2000). While the Secesh River is not listed as an index stream in the Biological Opinion (NMFS 2000), it is the only unsupplemented stream in the South Fork Salmon River and should be given ESU status and a recovery metric determined. Long term data sets of spawning ground surveys are available, as well as juvenile emigration information and video based adult spawner abundance. NMFS recommended characterizing populations by abundance/productivity, diversity (viability), spatial structure, and habitat capacity, most of which rely on some quantitative measure of adult abundance rather than a relative index (NMFS 2000). Furthermore, adult abundance is a necessary component of the NMFS proposed short-term measures of stock performance that focuses on life history stages (NMFS 2000). Once the technologies have been shown to accurately determine salmon spawner abundance on these streams, a long-term monitoring project can be implemented on these and other ESU populations.

Goals of the proposed project are consistent with the Biological Opinion Reasonable and Prudent Actions (RPAs). Many of the monitoring activities designated in Actions 179, 180, 193 and 1 and 9 of the Biological Opinion will be executed in part through the objectives of this proposal.

Action 179 in the NMFS Biological Opinion (2000) call for defining populations based on biological criteria and evaluating population viability in accordance with NMFS' viable salmonid population (VSP) approach. This project will continue to focus on assessing accurate chinook salmon population abundance and data necessary to estimate the population growth rate. Long-term data sets that provide accurate information to determine population growth rates, trends and viability are a necessity.

Action 180 in the NMFS Biological Opinion (2000) calls for Population Status Monitoring. This proposed project which was developed under the Tier 2 level of population monitoring will define population growth rates, detect changes in those growth rates or relative abundance in reasonable time. And, in cooperation with BPA project 198909802 (ISS), will estimate juvenile freshwater abundance and survival rates, and identify association between population status or stage-specific survival and environmental attributes.

Action 193 directs action agencies to investigate state-of-the-art, novel fish detection and tagging techniques for use in long-term research, monitoring, and evaluation efforts. The NMFS efforts to develop short-term measures of stock performance that can serve as proxies for standard metrics, such as recruits per spawner, SAR, etc will be aided by accurate adult population abundance data. Video, hydroacoustic, resistivity and electronic technologies are all used and accepted in other parts of the world, but have seen limited application in the Columbia River basin. These technologies will allow managers to move toward decisions based on accurate, scientifically based, quantifiable data. As these technologies become accepted and more widely used in the Columbia River basin, abundance data will be more comparable within and between subbasins. Long-term data sets will provide information to calculate accurate values for Lambda (l).

Action 1 requires 1 and 5-year plans to evaluate performance standards in the Biological Opinion. Action 9 requires the development of 1 and 5-year research, monitoring and evaluation plans to determine the effectiveness of the actions of reasonable and prudent actions. Accurate spawner abundance is of utmost importance to both of these Actions by providing data rather than a relative index to determine if short term-trends might be evident. Short-term measures of stock performance that can serve as proxies for standard metrics, such as recruits per spawner and smolt-to-adult return will aid short term projections and evaluations.

The intended goals of the Fish and Wildlife Program (Northwest Power Planning Council 2000) are furthered with the initiation of this project. The Fish and Wildlife Program (FWP) calls for monitoring techniques that are biologically quantifiable and fill measurable data gaps. Monitoring projects must use techniques that are appropriate for evaluating outcomes in the stated biological objectives. Proposals must also plan for the dissemination of collected data, proven technology and project results (Northwest Power Planning Council 2000). These technologies will provide a quantifiable abundance rather than a relative index. Therefore, the development of techniques for salmon abundance monitoring as described in this proposal falls within the conceptual framework and strategy established in the FWP.

Wy-Kan-Ush-Me-Wa-Kush-Wit (Spirit of the salmon) provides guidance to "Establish and monitor escapement checkpoints at mainstem dams and in index subbasins. ….Methods to be used include video counting at hydropower dams and at key locations in tributaries…. The least intrusive method should be used to collect the necessary information…. Establish additional monitoring programs for each of the subbasin tributary systems to monitor adult escapement and resulting smolt production, and to evaluate (by measuring the number of adults returning) the ability of managers to meet goals set by the Columbia River Fish Management Plan (CRFMP)."

TheValidation Monitoring Panel (Botkin et al. 2000) provided a science-based analysis for monitoring of salmon for conservation plans. The panel identified the need for adult salmon abundance information in relation to conservation and restoration plans. They also reviewed methods for determining adult escapement. The authors highlighted video, hydroacoustics, electronic counters and resistivity counters because these technologies offer a non-intrusive method of counting fish while not altering fish migration and behavior. The advantages of these technologies also include the ability to count fish in turbid and high flow conditions.

The Basinwide Recovery Strategy provides an outline of the data required to develop and assess recovery plans for listed salmonids. The main monitoring and evaluation goal stated in the Basinwide Recovery Strategy is to identify trends in abundance and productivity in populations of listed salmonids. A second critical goal is establishing quantitative mechanistic links between factors that can be manipulated and population responses. Critical uncertainties and data needs listed in the Basinwide Recovery Strategy are very similar to those called for in the Viable Salmonid Populations (VSP). The assessment of population status should involve assessing population abundance, population growth rate, population structure, and diversity (VSP).

This project has a clear relationship to specific objectives in the Salmon River Subbasin Summary. The research, monitoring and evaluation goal of the federal government is to identify trends in abundance and productivity in populations of listed anadromous salmonids. Accurate long-term abundance data sets will provide the most reliable means of determining population status (i.e. abundance, trend, distribution, and variation). This project is relevant to the following objectives and strategies:

Objective 1 **Conduct population status monitoring to determine juvenile and adult distribution, population status and trends.**

Objective 2 **Monitor the status of environmental attributes potentially affecting salmonid populations, their trends, and associations with salmonid population status.**

Objective 3 **Monitor the effectiveness of intended management actions o aquatic systems, and the response of salmonid populations to these actions.**

Objective 5

Strategy 2. Conduct Tier 2 monitoring to obtain detailed population assessment and assessments of relationships between environmental characteristics and salmonid population trends.

Strategy 3. Conduct Tier 3 monitoring to establish mechanistic links between management actions and fish population responses.

This project would provide accurate data to National Marine Fisheries Service to aid in their efforts to determine trends in the abundance of the Marsh Creek and Secesh River populations within 25 years. Supplementation efforts are being implemented on an increasing number of streams. Unsupplemented, or control streams, will be a valuable tool to National Marine Fisheries Service and other agencies as they attempt to separate the effects of oceanic and environmental changes within their study designs. As unsupplemented systems, these streams would be controls to base results of the natural river option should that occur.

Monitoring of chinook salmon abundance would aid the Nez Perce Tribe in determining if their goals to “Restore anadromous fish in rivers and streams at levels to support the historical, cultural, and economic practices of the tribes.” and “Reclaim anadromous and resident fish resource and the environment on which the resource depends for future generations.” were successful. The project would also allow the Tribe to determine if the status of their management objectives 1, 3 and 6 were successful (“Restore and recover historically present fish species”, “ Manage salmon and steelhead for long-term population persistence.” “Implement effective monitoring and evaluation of supplementation and habitat enhancement programs of project-specific and reference stream (control) locations.”). This project would specifically fulfill the requirements of Nez Perce Tribe research monitoring and evaluation objectives.

Objective 5 **Conduct conservation evaluation of Middle Fork Salmon River chinook salmon spawning aggregates.**

Strategy 2 Assess status of spring and summer chinook salmon in tributary streams of the Middle Fork of the salmon River.

Objective 6 **Accurately determine adult chinook salmon spawner abundance and spawner migration timing into the Secesh River and Lake creek on an annual basis.**

Strategy 1 Coordinate the listed stock escapement monitoring project with state and federal management agencies in the Snake River basin.

Strategy 2 Coordinate the escapement monitoring evaluation study with the National Martine Fisheries Service.

Strategy 3 Monitor the abundance and timing of migration of adult chinook salmon into the Secesh River and Lake Creek drainages.

Strategy 4 Transfer the technology through annual project reports.

Idaho's statewide fisheries management objective 1 would be able to use accurate abundance data from the Secesh River, Lake and Marsh creeks to give priority consideration in management decisions affecting wild native populations of resident and anadromous fish species. This project can also provide accurate population data to Idaho Department of Fish and Games's anadromous fish management Objectives and Strategies.

Objective 1 **Maintain genetic and life history diversity and integrity of both naturally-and hatchery-produced fish.**

Strategy 1 Prepare genetic management and conservation plans for salmon and steelhead populations using known genetic diversity and genetic structure data.

Action 3 Monitor hatchery chinook salmon introgression into wild populations.

Action 4 Quantify the types and extent (amount) of straying occurring in within subbasins, within the Mountain Snake Province and within designated ESUs.

Strategy 2 Maintain and establish wild production refugia for salmon and steelhead populations.

Action 1 Assess complete distribution of wild salmon and steelhead spawning and rearing.

Action 2 Take steps to assure salmon and steelhead in refugia areas are protected.

Strategy 5 Monitor appropriate population parameters to assess population status, trends and persistence.

Although not specified in the proposal, this project has the video potential to provide data concerning bull trout movements and hatchery straying.

Within the Statement of Fish and Wildlife Needs, Section 5.4.1 states that "There is a strong need for research and analytical tools that will help managers improve their ability to: 1) describe and monitor the condition of salmon and other fish populations and their habitats……"

The needs of chinook salmon include 1) "Gather improved population status information for wild, natural and hatchery chinook salmon including …., juvenile and adult migration patterns,…adult spawner abundance, distribution, timing and parentage, spawning success, and spawner to spawner ratios." …. "Mechanism is through continued and expanded Idaho Salmon Supplementation Studies, Idaho Natural Production Monitoring Program, Listed Stock Escapement Monitoring project, and new projects". 3) Monitor spring chinook by examining population trends…."

Appendix M points out that "New research in the Salmon Subbasin could be particularly important in five areas: 1) validation of large-scale population sampling and inventory methods." Rocky Mountain Research Station "work on several salmonid species in the region suggests both (redd counts and estimates of fish abundance) may be seriously biased and imprecise,"…. Technologies being developed in this project avoid the reliance on redd count expansion methods while providing accurate spawner abundance estimates. Hydroacoustics, in particular, can be adapted to provide population estimates for larger populations (e.g. Middle Fork and South Fork Salmon River).

"A strong argument can also be made for research in the Salmon Subbasin that focuses strongly on those issues most relevant to recovering listed stocks of fish and that avoids placing additional risks of mortality on these fish. Relevant issues might include the following:

The intrusiveness of sampling and associated potential risks to severely depressed stocks….. Under current extremely low escapement levels, the risk of additional mortality from handling needs to be closely scrutinized." The passive, non-invasive technologies proposed in this project adhere to this principle.

"Life stage survival studies." The approach suggested included enumerating adults, marking recruits from those adults, and monitoring life stage survival until the adults return. This project provides the adult enumeration without handling, and the ongoing Idaho Salmon Supplementation Studies on the Secesh River and Lake Creek marks recruits and monitors their life stage survival.

Review Comments

This project addresses RPAs 180 and 193.

Budget

FY02	FY03	FY04
$1,033,000 Category: High Priority Comments:	$914,000 Category: High Priority	$772,000 Category: High Priority

Project: 199703800 – Preserve Salmonid Gametes and Establish a Regional Salmonid Germplasm Repository

Sponsor: NPT

Short Description:

Preserve Salmonid Gametes through cryogenic techniques to maintain genetic diversity in populations with low levels of abundance and at high risk of extirpation. Establish a Regional Salmonid Germplasm Repository for populations listed under the ESA.

Abbreviated Abstract

Numerous chinook salmon and steelhead populations within the Columbia River Basin are at the point of extinction and are listed under the Endangered Species Act (ESA). More evolutionary significant units are quickly approaching this point. Without immediate intervention, the genetic diversity contained within these fish populations will be lost (NMFS 2000a). The Nez Perce Tribe (Tribe) strives to ensure the biodiversity of the existing male salmonid population by maintaining a germplasm repository. Our approach is to sample and cryopreserve male gametes thereby preserving salmonid genetic diversity within the major subbasins in the Snake River basin. Established in 1992 as a cooperative effort between the Nez Perce Tribe, University of Idaho, and Washington State University, the sperm bank of Snake River chinook salmon and steelhead has grown into the largest fish germplasm repository in the United States. Because the Snake River sperm bank can no longer accommodate additional populations, this present program must be expanded and upgraded to meet its objectives. Using the experience gained in the development of the Snake River sperm bank, the objective of this proposal is to immediately establish a Regional Salmonid Germplasm Repository and cryopreserve ESA-listed chinook salmon, steelhead, bull trout and other rare salmonids in the Columbia River basin. This facility will have state-of-the-art technology, laboratory, instruments and the capability of evaluating, cryopreserving, storing fish sperm and maintaining the inventory of samples from a large number of populations in an efficient and secure manner. The development of a comprehensive fish germplasm repository for populations at risk can provide a tangible and quantitative solution to potential loss of biodiversity. Monitoring and evaluation will involve fertility trials to test the viability of the cryopreserved sperm. Genetic analysis is completed each year on fish in storage.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199604300	Johnson Creek Artificial Propagation Enhancement Project	Cryopreserve semen from Johnson Creek fish for future artifical propagation options
199800770	Lostine River Monitoring and Evaluation Project	Cryopreserve semen from Lostine River fish for future artifical propagation options
	Nez Perce Tribe Lower Snake River Compensation Plan Hatchery Evaluation	Cryopreserve semen from salmonids at LSRCP hatcheries for future artifical propagation options
199801001	Grande Ronde Captive Brood O&M/M&E	Coordination
199800702	Grande Ronde Spring	Coordination

Project ID	Title	Nature of Relationship
	Chinook Captive Broodstock Project	
19980077	Grande Ronde Supplementation - Lostine River Monitoring and Evaluation Project	Cryopreserve semen from Lostine River salmonids for future artifical propagation options
14666	Steelhead supplementation in Idaho	Coordination and cryopreserved semen from Fish Creek steelhead for future artificial propagation options
9107200	Redfish Lake Sockeye Salmon Captive Broodstock Program	Storing cryopreserved semen from endangered sockeye salmon in project tanks
198806400	Kootenai River white sturgeon studies and conservation aquaculture	Storing cryopreserved semen from endangered white sturgeon in project tanks

Relationship to Existing Goals, Objectives and Strategies

Pacific salmon have now been extirpated from nearly 40 percent of their historical habitat in the Pacific Northwest. Nearly half of the remaining populations are at risk of extinction (Levin and Schiewe 2001). The rationale for preserving gametes of listed salmonid stocks is to serve as insurance for ongoing conservation projects. The rationale for genetically analyzing archived milt is to determine the genotypes of our cryopreserved samples so the technology is used to maximize available genetic diversity within a population, minimize drift by increasing the effective population size and maintaining "population identity" (Powell personal communication 1998).

The genetic analysis monitoring and evaluation portion of the project is relevant to the provincial knowledge of population structure of chinook salmon, steelhead and other salmonids studied. Indeed, population structure of Columbia and Snake River salmonids have been studied and applied to existing populations using the preliminary results of this project's analysis (Brannon et al. 2000). These results could realize cost savings and facilitate coordination among the comanagers, regulators and the public.

There is a need for novel research programs, such as this proposed gene banking effort, that arise out of the failures of previous attempts to manage, control, or prevent environmental degradation or to enhance restoration (Underwood 1995).

The NMFS Biological Opinion (2000b) identified the following actions relevant to this proposal:

Action 175: Implementation of high priority, safety-net actions can begin with the brood year 2002. The regional germplasm repository was approved by CBFWA under the "A" list of projects to be funded under BiOP (2000b).

Action 177: Implement and sustain NMFS-approved safety-net programs = regional germplasm repository was approved by CBFWS as an "A" fund under BiOP.

Action 178: Fund for the planning and implementation of additional safety-net programs. Emergency actions, which may endanger a population, need immediate intervention.

Action 184: Determine whether hatchery reforms reduce the risk of extinction and whether hatcheries contribute to recovery.

Salmon and steelhead in the Snake River and upper Columbia River are particularly depressed, needing safety-net programs designed to intervene with artificial production techniques to prevent extinction. Designed only to prevent extirpation, cryopreservation of male salmonid gametes is not intended to be a permanent project, and does not serve as a substitute for addressing the factors of decline (NMFS 2000b, p. 9-158). Intervention will occur, in this case meaning collecting male gametes, before a population declines to the point that highly intrusive techniques (like captive broodstock programs) are necessary (NMFS 2000b, p. 9-159). There is a danger that wild populations may be too depleted to obtain individuals for captive broodstock programs (Carroll et al. 1996).

NMFS Research Program. NMFS Northwest Fisheries Science Center is one of five NMFS research centers and is responsible for providing scientific and technical support for the management, conservation, and development of the Pacific Northwest region's anadromous and marine fishery resources. The Conservation Biology Division uses appropriate genetic and quantitative methods to characterize components of biodiversity in living marine resources and identifies factors that pose risks to these components (Salmon Subbasin Summary 2001). The Salmonid Gamete Preservation project coordinates with this division of the Science Center, conferring on preserving listed salmonid genetic diversity.

Subbasin summaries. It is generally accepted that hydropower development on the lower Snake River and Columbia River are the primary cause of decline and continued suppression of Snake River salmon and steelhead (IDFG 1998, CBFWA 1991, NWPPC 1992, NMFS 1995, NRC 1996), resulting in low yearly effective population sizes (Nb), increasing genetic and demographic risks (i.e. potential extinctions) of local populations (Salmon subbasin summary draft 2001).

The Salmon Subbasin Summary (2001) under Existing Goals, Objectives, and Strategies (3.2) and the Nez Perce Tribe's Research Monitoring and Evaluation (3.2.2.a.) cites:

> "Objective 4. Preserve the genetic diversity of salmonid populations at high risk of extirpation through application of cryogenic techniques.
> Objective 5. Maintain or restore wild native populations of bull trout, westslope cutthroat trout and resident rainbow trout to ensure species viability."

The Salmon Subbasin Summary (2001) under Existing Goals, Objectives, and Strategies (3.2) under the Idaho Department of Fish and Game's (3.2.3.a.)Anadromous Fish Management cites:

"Objective 1. Maintain genetic and life history diversity and integrity of both naturally-and hatchery-produced fish.
Objective 2. Rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level."

The Salmon Subbasin Summary (2001) under Existing Goals, Objectives, and Strategies (3.2) under the Idaho Department of Fish and Game's (3.2.3.a.) Resident Fish Management cites:

"Objective 2. Maintain genetic integrity of wild native stocks of fish and naturally managed fish when using hatchery supplementation."

A single goal has been identified for supplementation research on steelhead in the Salmon Subbasin. This is to assess how or if artificial propagation can be used to rebuild natural populations of steelhead to self-sustaining and harvestable numbers without an adverse impact on the existing natural populations.

The Clearwater Subbasin Summary (2001) under Existing Goals, Objectives, and Strategies for the Nez Perce Tribe Department of Fisheries Resources Management vision cites:

"Goals: Conserve, restore and recover native anadromous and resident fish populations.
Strategy: Preserve the genetic diversity of salmonid populations at high risk of extirpation through the application of cryogenic techniques."

The Clearwater Subbasin Summary (2001) under Existing Goals, Objectives, and Strategies under the Idaho Department of Fish and Game's Fisheries Management Plan for 2001-2006 (IDFG 2001) cites:

"Goal 2. To preserve Idaho's rare fishes to allow for future management options.
Objective 2.1 Maintain or restore wild populations of game fish in suitable waters.
Strategy 2.1.3. Assist in recovery of rare species through captive rearing projects, supplementation, and protection."

The Idaho Department of Fish and Game's anadromous fisheries management goals for the Clearwater subbasin include (Clearwater subbasin summary 2001):

"Goal 1. Maintain genetic and life history diversity and integrity of both naturally- and hatchery-produced fish."

The Salmon Subbasin Summary (2001) section about "Statement of Fish and Wildlife Needs" states: The establishment of genetic baselines for salmon and steelhead is a key element for identifying stock or management units within populations and conserving existing genetic resources. Also, baselines allow standard against which shifts or losses of genetic resources through various management practices (e.g. supplementation or hatchery practices) can be monitored. Specifically, fish and wildlife needs include continuing gene conservation efforts (cryopreservation) for steelhead to preserve genetic diversity within the geographic population structure and continue gene conservation efforts (cryopreservation) for stream-type chinook in the subbasin.

The Clearwater Subbasin Summary (2001) section about "Statement of Fish and Wildlife Needs" states: under genetic conservation:

"1. Continue gene conservation efforts (cryopreservation) for fall chinook salmon and steelhead in the subbasin.

2. Develop gene conservation efforts (cryopreservation) to preserve genetic diversity within the geographic population structure for bull trout and cutthroat trout.
3. Develop conservation hatcheries with native steelhead broodstock."

WY-KAN-USH-MI WA-KISH-WIT Spirit of the Salmon. The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warms Springs and Yakima Tribes states the major problem impacting fish resources continue to be passage at mainstem dams and flows below Hells Canyon Dam. Problems noted in the Clearwater systems include logging, road building, grazing, mining, irrigation, grazing and stream channelization. High sedimentation is clearly the biggest problem in the Salmon River subbasin due to the highly erodible terrain (CRITFC 2001).

Source populations for all supplementations for all supplementation efforts will be chosen to best match the characteristics of the natural population (CRITFC 1995). The source population gametes chosen from select spawning aggregates are currently being cryoconserved for future options.

Columbia Basin Fish and Wildlife Authority. The Salmonid Gamete Preservation project has previously received a relatively high project ranking through the Columbia Basin Fish and Wildlife Authority. The Columbia Basin Fish and Wildlife Authority and a "funding" recommendation by the Independent Science Review Panel under the NMFS BiOp rated a high priority proposal for a regional germplasm repository as a high priority.

Snake River Salmon Recovery Plan. The utilization of cryobiology is a well-recognized methodology in the establishment of genome resource banks of rare and endangered organisms. Additional justification for this proposed project is based on the following Snake River Salmon Recovery Plan (NMFS 1994); IV.A The Snake River Salmon Recovery Plan; IV.A The recovery goal.....is to restore these distinct populations (and their genetic and demographic subunits). IV.A..5 Objectives Supporting the Recovery Goal - Judiciously use hatchery production… but exercise caution to avoid introductions which can degrade the genomes of natural stocks. a. Supplement the weakened natural stock with hatchery-propagated fish, but only of the same genetic lineage. IV.C.6. The following principles have influenced Team evaluations and decisions.... and should also serve as guidelines.... a.) Biological Diversity- The biological diversity of the listed species must be maintained, and particular attention must be paid to the array of genomes.... 2) some 38 separate breeding subpopulations.

The National Marine Fisheries Service's Salmon Recovery Plan states that captive broodstock and supplementation programs should be initiated and/or continued for populations identified as being at imminent risk of extinction, facing severe inbreeding depression, or facing demographic risks. The plan further states that the conservation of local populations or stocks of Pacific salmon and the preservation of their genetic resources is an important goal.

Scientific Review Team. In the Review of Salmonid Artificial Production in the Columbia River Basin (Scientific Review Team, ISAB 1998), several recommendations are relevant to this proposed project:

> "Recommendation 7. Hatchery programs should use large breeding populations to minimize inbreeding effects and maintain what genetic diversity is present within the population."
> Recommendation 15. Germplasm repositories be developed to preserve genetic diversity for application in future recovery and restoration projects in the Basin, and to maintain a gene bank to reinforce diversity among small, inbred natural populations."
> Recommendation 16. The "genetic status of all natural populations of anadromous… salmonids needs to be understood…"

It is critical, therefore, to launch an immediate program to preserve germplasm by collecting and cryopreserving milt from all naturally spawning populations that can be reached. The technology is available and presently being employed with some ESA listed salmonid stocks (the current salmonid gamete preservation project). This effort needs to be expanded, and given higher priority. Germplasm should be collected for each population on more than one broodyear to develop as complete a repository as possible. The availability of germplasm for future use in maintenance of diversity or restoration of extirpated runs will be invaluable in the long-term ecological framework of the managed river"(Scientific Review Team, ISAB 1998).

Northwest Power Planning Council Fish and Wildlife Program (1994/2000): The NWPPC system-wide goal in the 1994 Columbia River Basin Fish and Wildlife Program is a healthy Columbia Basin: "one that supports both human settlement and the long-term sustainability of native fish and wildlife species in native habitats where possible, while recognizing that where impacts have irrevocably changed the ecosystem, we must protect and enhance the ecosystem that remains" (NWPPC 1994). The overall vision in the NWPPC's 2000 Draft Columbia Basin Fish and Wildlife Program (NWPPC 2000) is "a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife, mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem and providing the benefits from fish and wildlife valued by the people of the region."

Several Northwest Power Planning Council (NWPPC) program measures in the Columbia River Basin Fish and Wildlife Program (NWPPC 2000) direct the implementation of the Salmonid Gamete Preservation Program:

- Measure 7.4E states "cryopreservation (preservation of fish gametes by freezing) has the potential of allowing banking of genetic stocks for future use, especially when the population is severely depleted and its habitat has been damaged or destroyed".
- Measure 7.4E.2 directs Federal and State agencies to fund needed research and demonstrations of cryopreservation identified in the coordinated habitat and production process.
- Measure 7.4D addresses captive brood stocks. Captive brood stock program have the potential to rapidly increase adult fish numbers, while retaining genetic diversity of severely depleted wild or naturally spawning stocks of salmon.
- Measure 7.4D.2 directs National Marine Fisheries service and Bonneville Power Administration to fund captive brood stock demonstration projects funded under the coordinated habitat and production process.

- Measure 7.2D.2 Also fund tests of new techniques at Columbia River basin artificial propagation facilities.

The 2000 Columbia River Basin Fish and Wildlife Program's 6th Scientific Principles is biological diversity allows ecosystems to persist in the face of environmental variation. Habitat strategies include "Use native species whenever feasible. Where a species native to that particular habitat cannot be restored, then another species native to the Columbia River Basin should be used."

State Agency. In the Oregon Department of Fish and Wildlife's Native Fish Conservation Approach, the Conceptual Framework (draft 2001) recognizes cryopreservation as one of the seven general categories for the conservation roles of hatcheries.

Review Comments

Academic, management, and regulatory agencies have discussed and conferred the merits of a regional program such as what is proposed in this work. This project addresses RPA 177. The significant increase in budget is due to capital construction of a regional germ plasm repository facility.

Budget

FY02	FY03	FY04
$1,279,000 Category: High Priority Comments:	$2,094,000 Category: High Priority	$1,010,000 Category: High Priority

Project: 199901900 – Holistic Restoration of the Twelvemile Reach of the Salmon River near Challis, Idaho

Sponsor: OSC / Custer SWCD

Short Description:

Work holistically to restore the channelized Salmon River corridor to a natural meandering form in balance with watershed processes that will restore geomorphic diversity, reduce bank erosion, lower summer temperatures and improve critical fish habitat.

Abbreviated Abstract

Recent geomorphic studies have shown that the cumulative effect of piecemeal bank protection, diking and poor vegetation management during the past century has resulted in a straightening of over 14 miles of river near Challis. This effect has worsened braiding tendencies in the reach, resulting in an unstable channel, increased bank erosion, a high width-to-depth ratio at low flows, and elevated temperatures (over 78oF has been observed). The channel incision has reduced connectivity with the floodplain and associated wetlands. NRCS and IDFG have worked with a County Watershed Advisory Group (WAG) to build a collaborative effort, with cost share funding from NRCS, IDFG, Thompson Creek Mine, USFWS, USFS, BLM, BOR, Army Corps of Engineers, and

NMFS. Private landowners also cost-share by conserving land within the corridor, committing to future maintenance and assisting in construction activities. The primary goal of the project is anadromous fish habitat enhancement, but the WAG also plan for enhancement of habitat for resident fish and wildlife, water quality, and management of fine sediments. Locally, this reach of the Salmon river at Challis is referred to as the "twelve-mile reach".

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/ Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Consolidations	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon Watersheds.
199401500	Idaho Fish Screen Improvements (Idaho Dept. of Fish and Game)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.

Relationship to Existing Goals, Objectives and Strategies

SALMON SUBASIN SUMMARY (DRAFT) MAY 25, 2001.
Listed below are the summary goals, objectives, and strategies addressed by this project.

Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1 **Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.**

Strategy 1 Assist the Idaho Fish Screen Program and BoR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2 Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3 Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4 By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2 Reduce the number of physical barriers hindering fish migration.

Strategy 1 Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2 Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3 In cooperation with the NRCS, BoR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for al life stages of fishes.

Objective 1 Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.

Strategy 1 By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2 Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3 In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.

Strategy 4 Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5 Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6 Work cooperatively with willing irrigators to restore streamflows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7 Continue development of the IMPACT model in the Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The goals and objectives from the Salmon Subbasin Summary will be implemented by means of the foregoing strategies through the coordination efforts of this Salmon River (Challis) Watershed Project. The purpose of the project is to ensure that all human activities affecting salmon production within this ecologically important reach are coordinated on a comprehensive watershed basis.

2000 COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM
Objectives for biological performance

Anadromous fish losses

- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005. Obtain the information necessary to begin restoring the characteristics of healthy lamprey populations.
- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.
- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

This proposed project will restore the natural physical processes throughout the Salmon River at Challis, which will restore fish habitat in a sustainable manner, restore connectivity with side channels and floodplain and lower temperatures.

Resident fish losses

- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.
- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.
- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Watershed actions for the protection, restoration, and complexity of fish habitat enhance ecosystems and ecosystem function which are beneficial to resident and anadromous fish.

Wildlife losses

- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.
- Maintain existing and created habitat values.

Watershed actions for the protection, restoration, and complexity of fish habitat enhance ecosystems and ecosystem functions beneficial to wildlife species.

Habitat Strategies

Primary strategy: Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

- Build from strength
- Restore ecosystems, not just single species
- Use native species wherever feasible

Habitat projects coordinated Salmon River restoration project at Challis focus on protection of existing high quality habitat, restoration of ecosystems which support multi-species, and revegetation practices which emphasize use of native plant species.

2000 FCRPS BIOLOGICAL OPINION, DECEMBER 21, 2000.

Action 149b:	The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.
Action 149c:	BPA addresses passage, screening, and flow problems where they are not the responsibility of others.
Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 151:	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152 b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).
Action 152f:	Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Action 153:	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.
Action 154a:	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.
Action 154b:	The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.
Action 183:	Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

This project will contribute to all of the above actions in the upper Salmon basin. The project will be under the guidance of the Upper Salmon Basin Watershed Project, the Custer Soil and Water Conservation District and the Idaho Governor's Office of Species Conservation.

- Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.
- Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This coordination is especially important as most fish spawning and rearing habitat is on private land.
- Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.
- Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.
- Assessments and plans – Provide information in the development of subbasin assessment and plans in Upper Salmon River Basin – particularly related to temperature modeling through the mainstem Salmon River..
- Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; US Army Corps of Engineers, Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and

Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

- Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection.
- River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

RECOMMENDATIONS OF THE GOVERNORS OF IDAHO, MONTANA, OREGON AND WASHINGTON FOR THE PROTECTION AND RESTORATION OF FISH IN THE COLUMBIA RIVER BASIN
July, 2000
Partnerships

- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

Water for Fish

- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.
- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this
- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

Local Recovery Plans

- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

Fish Passage

- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.
- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.

- Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

The project addresses the Governor's recommendations by:

- Partnerships between the local landowners, federal agencies, state agencies and the local Soil and Water Conservation District
- This is a local recovery plan – conceived and developed in the Challis-Salmon region.
- The project will improve habitat and water quality

This project has identified the instabilities in the Twelve-Mile reach, that include channel degradation, braiding and high width-depth ratios. Temperatures through this reach have reached 79oF in recent years. Channel instability has resulted in extensive bank erosion, loss of land, riprapping of channel banks and levees. This project attempts to take a holistic view to improve habitat, reduce temperatures, restore floodplain function and reduce fine sediments from bank erosion.

Review Comments

Addresses RPA 149 and 152. Similar to the ISRP's review, the CBFWA reviewed Proposals 28036, 28037, 28038, 28039, 28040 and 199901900 as a collection of proposals. These budgets are a significant portion of the total Salmon subbasin budget and need additional scrutiny. The reviewers and project sponsors are in agreement with the ISRP regarding the need for the development of a well-defined watershed assessment; however the managers expressed concern that landowner support could be lost if additional planning efforts were required during the next couple of years at the expense of implementation. Recognizing that nearly 90% of the spawning activities occur on private lands, the managers realize landowner participation is essential to the management and conservation of the resources. As a result, the managers have spent over a decade developing working relationships with private landowners through extensive planning processes. Based on their working relationships with the landowners, the managers indicated that requiring the development of assessments prior to implementing actions that have already been discussed/planned with the landowners will result in the loss of public support and subsequently the inability to manage the areas that have been identified as critical through a decade of planning. Although the proposals have new project numbers they are ongoing projects (i.e., 199401700, 199306200 19960700). The BPA COTR, who was present during the review, indicates that these proposals are not characterized by a change of scope, however there was significant disagreement with this statement. Although the tasks are considered a high priority, there is concern among CBFWA reviewers about the size of the proposed budgets and the ability to implement actions at the proposed rate. In each proposal the same writing contractor and the University of Idaho is identified. Are the U of I employees separate individuals for each project? Baseline M&E (i.e., juvenile counts and redd counts since 1998 and physical data collection since 1985) data is being collected through IDFG activities Detailed M&E plans have not been developed to date but will be developed as the project moves forward. Data collected to date show that rearing populations are higher then elsewhere and that by opening the side-channels the population will greatly benefit. The sponsor understands a watershed assessment is important and indicated that other agencies are working towards performing the activity. Considering the magnitude of implementation proposed, the sponsor should seek CREP implementation funding as cost share as has been done by similar SWCD proposals in the Columbia Plateau Province. See comments for Project 28036.

Budget

FY02	FY03	FY04
$1,844,000 Category: High Priority Comments:	$1,784,000 Category: High Priority	$1,784,000 Category: High Priority

Project: 199902000 – Analyze the Persistence and Spatial Dynamics of Snake River Chinook Salmon

Sponsor: RMRS

Short Description:

Results will advance current understanding of the relationship between the distribution, pattern, and persistence of chinook salmon and landscape patterns. **Note: the most appropriate RPA for this project is RME Action 180.

Abbreviated Abstract

We propose continuation of research funded by BPA since 1999 to describe factors influencing the spatial distribution and persistence of wild chinook salmon (Oncorhynchus tshawytscha). A multitude of regional program documents emphasize the need for long-term monitoring and analysis of the spatial structure of Snake River chinook salmon. Emerging conservation theory suggests that recolonization and persistence of widely ranging species may be strongly influenced by the spatial geometry of remaining habitats. The relevance of these concepts to the persistence of declining stocks of salmon is unknown. If patterns in the distribution and spatial structure of salmon populations are important to their persistence in stochastic environments, effective conservation may imply maintaining or restoring a critical amount or mosaic of habitat as well as smaller scale habitat characteristics. As our central hypothesis, we propose that habitat area, quality, or context (relative location) influences the occurrence of spawning chinook salmon. We are testing this hypothesis by describing the distribution of chinook salmon redds and spawning habitats within the Middle Fork Salmon River drainage. Our results will advance current understanding of the relationship between landscape characteristics and the distribution, pattern, and persistence of chinook salmon. Such information could be key for development of conservation and restoration strategies. While this research focuses on larger scale spatial questions about persistence, it simultaneously has provided information useful for intensively monitoring an ESA listed chinook salmon stock. Our annual estimates of wild chinook salmon redds enable managers to estimate total annual redd numbers in order to monitor stock status and evaluate the influences of various mitigation and restoration efforts. Six years of data have already been gathered since inception of the project in 1995. The project will require additional years to follow a complete generation or more of spawning fish in order to complete the analysis of spatial structure.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
89098000	Idaho supplementation studies	Collaborative, information sharing
199107300	Idaho natural production monitoring and evaluation	Collaborative, information sharing
0	Lower Snake River compensation plan hatchery evaluations	Collaborative, information sharing
199405000	Salmon River enhancement M&E	Collaborative, information sharing

Relationship to Existing Goals, Objectives and Strategies

This research addresses three critical needs identified in Regional Program documents. 1.) the need for long-term information to assess trends in wild chinook salmon populations; 2) the need for evaluation of broad scale population sampling and inventory methods; and 3) the need for analysis of the spatial structure of wild chinook salmon populations.

Long-term trend information

The Power Planning Council's Fish and Wildlife Program (NWPPC 2000), the Salmon Subbasin summary (Servheen et al. 2001), the National Marine Fisheries Service Biological Opinion (NMFS 2000), and IDFG (2001) all emphasize the need for long-term monitoring and acquisition of life history information for chinook salmon. These and other Regional Program documents emphasize the need for efforts to gather data on wild and naturally occurring spawning stocks. The Biological Opinion (NMFS 2000) also notes that a comprehensive monitoring and evaluation program will be required to meet RPA (reasonable and prudent alternatives). Our research objectives are very consistent with guidelines outlined by NMFS (2001) that call for "critical monitoring/evaluation components" which will be integral to measuring recovery performance standards. The Columbia Basin Fish and Wildlife Authority (CBFWA) notes that a primary function of species monitoring and evaluation components is to measure progress toward achieving conservation and recovery objectives (NWPPC 2000). Since the project inception in 1995, this research has provided information critical to intensively monitoring an ESA listed chinook salmon stock. Our annual estimates of wild chinook salmon redds enable managers to estimate total annual redd numbers in order to monitor stock status and evaluate the influences of various mitigation and restoration efforts.

Broad scale sampling

The recent Salmon Subbasin summary, specifically calls for research to provide validation of broad scale population sampling and inventory methods (Serhveen et al. 2001). The Biological Opinion (NMFS 2000) calls for monitoring population status by assessing population abundance, trends, distribution, and variation. Prior to this project, chinook salmon were inventoried only in "index" areas of the MFSR drainage. This research represents the first comprehensive survey of spawning areas and redds in the basin and provides key information on overall distribution of redds and spawning fish. Further, the data enables a comparison of population trends between "index" areas and the complete inventories.

Spatial structure

The Biological Opinion (NMFS 2000) and the Salmon Subbasin summary (Serhveen et al. 2001) both call for an analysis of the spatial structure of wild chinook salmon populations. The CBFWA similarly notes that monitoring programs need to be expanded as necessary to reduce critical uncertainties (NWPPC 2000). As noted above, in response to declining populations, ESA requirements, and regional monitoring efforts, agencies have adopted policies that attempt to conserve and restore remaining chinook salmon populations. Considerable effort has been applied to conserve or restore the quality of habitats considered necessary for chinook salmon to complete their complex life cycle. Although recolonization and persistence of chinook salmon may be strongly influenced by the spatial geometry of remaining habitats, the relevance of these concepts to the persistence of declining stocks of salmon remains unknown. Yet, little effort has been directed toward evaluating whether patterns in the distribution and spatial structure of salmon populations are important to their persistence in stochastic environments. This research directly addresses those stated research priorities and management needs.

In addition to providing long-term and broad scale information to monitor an ESA listed salmon population, our results will simultaneously advance current understanding of the relationship between landscape characteristics and the distribution, pattern, and persistence of chinook salmon. Such information could be key for development of conservation and restoration strategies. At a broad scale, emerging strategies to conserve and restore critical habitats and viable populations will be based on this and associated research.

Review Comments

This project addresses RPA 180. During this past year, this project has been funded at 1/2 the required budget (i.e., $50,000 of the needed/approved $100,000). The sponsors indicated is they only receive $50,000/year in the upcoming years the funding level will be insufficient to allow them to continue the proposed work in the original proposal. Reviewers suggest that the Project meets critical needs for long-term monitoring, indexing, acquisition of life history information, and analysis of the spatial structure of a wild chinook salmon population. The reviewers identified simulates between Objective 4 and work proposed in proposal 28035. Sponsors of Project 199902000 recognized that the existing tasks (i.e., strategies to achieve the task) were inadequate to meet Objective 4. Although completing the existing tasks under Objective 4 would produce useful preliminary information, the analysis would be incomplete and difficult to defend in the physical sciences community. As a result, Objective 4 was refined into a Proposal 28035. The refined approach for addressing Objective 4 examines the physical controls of basin hydrology and sediment supply on spawning habitat availability at watershed scales. The extensive spawning habitat data available for the Middle Fork Salmon River through Project # 199902000 provides an excellent test site for the physical model. The model is robust, however, and once validated can be applied to any river basin. The model could have immediate use for identifying critical habitats and examining scenarios for best management practices for maintaining or optimizing spawning habitat. Moreover, the model would provide a physically-based, defensible method for assessing spawning habitat and prioritizing management actions at watershed scales.

Per the reviewers request, the following tasks from Proposal 28035 should be considered for funding through Objective 4 of 199902000:

Objective 4 Relate the location, size, and quality of spawning patches to basin geomorphic features.

Task a. Compile databases to describe basin landscape features.

Task b. Develop models to predict patch distribution and empirically validate models.

Subtask b.1. Predict grain size and the spatial distribution of suitable spawning habitat as a function of channel hydraulics and boundary shear stress.

Subtask b.1.1. Determine baneful flow depth and channel slope at watershed scales.

Subtask b.1.2. Determine grain sizes suitable for chinook spawning.

Subtask b.2. Modify predictions of grain size and spawning habitat availability to account for channel type and consequent hydraulic roughness.

Subtask b.2.1. Predict and field verify channel type, hydraulic roughness, and consequent modification of surface grain size.

Subtask b.3. Quantify the effects of sediment supply on surface grain size and spawning habitat availability.

Subtask b.3.1. Identify sources and magnitudes of sediment supply.

Subtask b.3.2. Model the long-term effects on spawning habitat availability due to sediment input and routing through the channel network.

Subtask b.4. Validate predictions of grain size and spawning habitat availability.

The cost savings resulting from the merger of these two Projects would total $30,841 ($18,636 for Project # 28035 and $11,845 for Project # 199902000). If this project is not fully funded, Objective 4 is the lowest priority task.

Budget

FY02	FY03	FY04
$215,194 Category: High Priority Comments:	$215,194 Category: High Priority	$215,194 Category: High Priority

New Projects

Project: 28001– Evaluate Factors Influencing Bias and Precision of Chinook Salmon Redd Counts

Sponsor: RMRS

Short Description:

Results will assess redd count bias and precision and will have important implications for improving chinook salmon redd surveys across the Snake River basin. **Note: the most appropriate RPA for this project is RME Action 180.

Abbreviated Abstract

The ability to detect trends in fish populations depends upon obtaining reliable estimates of abundance in an efficient manner. Simply relying on a relative count that has not been adjusted for undetected individuals, may lead to misleading conclusions about population trends, spatial distribution, and habitat associations because of the unknown magnitude of the sampling bias. Redd counts in index areas are commonly used to monitor annual trends in chinook salmon (Oncorhynchus tshawytscha) populations where total adult escapements are unknown. The assumption is that uncorrected redd counts represent a constant proportion of true numbers of redds across time, which is unlikely given the myriad of environmental and other factors affecting redd sightability or redd distribution. Further, an index count provides a single number with no measure of precision, i.e., it does not include sampling variation. Despite the widespread use of redd counts to calculate measures of population performance, little is known regarding the accuracy of chinook salmon redd counts or the factors that decrease precision and introduce bias. Therefore, we propose new research to evaluate factors influencing bias and precision of chinook salmon redd counts. We will determine the true number of redds within a series of study reaches; apply the true counts to determine the accuracy of aerial and ground-based redd counts; measure environmental and habitat factors and model which variables most influence redd sightability; assess inter- and intra- year sources of variation in redd counts; quantify inter-observer variation in ground-based surveys; compare accuracy of single versus multiple pass counts; and evaluate and compare the effectiveness of a modified two-sample, Lincoln-Petersen mark-resight estimator and Huggins mark-resight estimator (including covariates) for obtaining unbiased and precise abundance estimates of redds. Results from this proposed research will have important implications for improving chinook salmon redd surveys conducted across the Snake River basin.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199902000	Analyze the persistence and spatial dynamics of Snake River chinook salmon	Integrated, the new project will depend on data collected during the existing project.
89098000	Idaho supplementation studies	Collaborative, information sharing
199107300	Idaho natural production monitoring and evaluation	Collaborative, information sharing
	Lower Snake River	Collaborative, information sharing

Project ID	Title	Nature of Relationship
	Compensation Plan hatchery evaluations	
199405000	Salmon River enhancement M&E	Collaborative, information sharing

Relationship to Existing Goals, Objectives and Strategies

The Fish and Wildlife Program (NWPPC 1994) has previously issued calls for "efforts to gather data on wild and naturally occurring spawning stocks…" Additionally, IDFG (2001) and the National Marine Fisheries Service (NMFS) have noted the importance of the acquisition of long-term monitoring and life history information for wild stocks (NMFS 2000b). The Biological Opinion (NMFS 2000b) calls for a comprehensive monitoring and evaluation program to assess current status and the effectiveness of restoration actions. Our objectives in this proposal are very consistent with guidelines outlined by NMFS (2001) that call for "critical monitoring/evaluation components" which will be integral to measuring recovery performance standards. The Columbia Basin Fish and Wildlife Authority (CBFWA) notes that a primary function of species monitoring and evaluation components is to measure progress toward achieving conservation and recovery objectives (NWPPC 2000). In response to these regional monitoring priorities, part of the response by management agencies has been to continue existing redd counts and to implement additional redd counts in order to monitor trends in chinook salmon populations. Further, agencies have proposed stock assessments using estimates of extinction risk based on population trend data developed from index sites. Yet, little effort has been directed toward validation of redd counting approaches to ensure that such data are reliable.

This project seeks to enhance monitoring efforts focused on Snake River chinook salmon populations by evaluating and attempting to improve current methodologies used for enumerating redds. Population monitoring efforts are only as good as the data they are based upon; valid, precise, and cost-efficient sampling methods are vital to our ability to detect a population trend. However, current methodologies for counting redds lack a firm statistical foundation and an adequate measure of precision. The research we propose seeks to address this need in a more rigorous fashion. Importantly, this research also addresses research priorities identified in several Regional Program Documents. The recent Salmon Subbasin summary, specifically calls for research to provide validation of broadscale population sampling and inventory methods (Serhveen et al. 2001). The Biological Opinion (NMFS 2000b) calls for monitoring population status by assessing population abundance, trends, distribution, and variation. Except in cases where weirs make adult escapement estimates feasible, redd counts will be the primary approach for population status monitoring. Action 180 specifically calls for funding at Tier 1 and Tier 2 levels to develop protocols for the data to be collected during population status monitoring (NMFS 2000b). The CBFWA similarly notes that monitoring programs need to be expanded as necessary to reduce critical uncertainties (NWPPC 2000). Finally, by quantifying the bias and precision of redd counts, this project could also assist other projects in developing better estimates of adult escapements that are extrapolated from redd surveys—one of IDFG's explicit objectives for the MFSR (IDFG 2001).). This project would also assist research efforts that are attempting to quantify habitat relationships and identify factors for population decline. The insights derived from this research could have important applications for improving redd counts currently conducted by other entities across the Snake River basin. In addition, promising methods might be applicable to other anadromous and resident salmonids.

Review Comments

RPA 180 - Over 50% of the redd counts in the Middle Fork of the Salmon River are conducted via air. This ongoing research is allowing for the estimation of the precision that is associated with aerial and ground counts. The ability to identify the factors that could be influencing the precision of the counts is essential due to the fact that an aerial approach to counting redds is the only feasible method to count redds in the Middle Fork. The managers have identified this research as essential for future management activities.

Budget

FY02	FY03	FY04
$198,738 Category: High Priority Comments:	$208,675 Category: High Priority	$219,109 Category: High Priority

Project: 28002– Fluvial Bull Trout Migration and Life History Investigations in the upper Salmon River Subbasin

Sponsor: SBT

Short Description:

Identify the distribution and status of fluvial bull trout populations. Identify seasonal habitat use and migration patterns of fluvial bull trout. Determine bull trout presence/absence, densities, population status, and spawning times.

Abbreviated Abstract

Current efforts to conserve and restore bull trout Salvelinus confluentus in the Northwest, including Idaho, are restricted by knowledge of their status and needs. Of the 567 subwatersheds in the central Idaho mountains where bull trout are currently present, in approximately 30% of those subwatersheds (n = 167), the population status of bull trout is unknown (Rieman et al. 1997). Also, of the 1,147 potential historical subwatersheds in the central Idaho mountains, Rieman et al. (1997) found that approximately 20% (n = 220) of those were listed as unknown or not classified for bull trout presence/absence. Currently, little or no information exists concerning the distribution, migration timing, and migration distances for fluvial bull trout in the upper Salmon River subbasin. Without such basic information regarding presence/absence and population status, conservation and recovery of ESA-listed Columbia River Basin bull trout is difficult at best. The proposed project will identify the distribution and status of fluvial bull trout in the upper Salmon River subbasin, identify seasonal habitat use and migration patterns of fluvial bull trout, and determine bull trout presence/absence, densities, population status, and spawning times in the upper Salmon River subbasin. Priorities for sampling will be determined following the input from agency biologists working in the subbasin, although initial sampling will focus on subwatersheds in the basin where fluvial and resident life history forms of bull trout are known to exist. Results from the project will be made available on an on-going basis to fish and land managers in the basin and through publication in peer-reviewed literature. The project will fill existing data gaps concerning bull trout distribution and status in the upper Salmon River subbasin.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199405000	Salmon River Habitat Enhancement M&E	Assist in collection of field data and telemetry.
198909803	Salmon Supplementation Studies in Idaho Rivers	Assist in collection of field data and telemetry.
199107100	Snake River Sockey Salmon Habitat	Assist in collection of field data and telemetry.

Relationship to Existing Goals, Objectives and Strategies

The goals and objectives of this project are consistent with the vision, objectives, and strategies identified in the 2000 Columbia River Basin Fish and Wildlife Program. The vision of the 2000 Fish and Wildlife Program of an ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife is consistent with this project. By gaining valuable information on fluvial and resident bull trout populations in the upper Salmon River subbasin, results of the project will aid in future recovery efforts for ESA-listed Columbia River Basin bull trout. The proposed project is also consistent with several strategies in the 2000 Fish and Wildlife Program including identifying and resolving key uncertainties for the program. As was discussed in detail above, data on bull trout in the upper Salmon River subbasin and throughout the region are currently inadequate concerning bull trout population status. This project will directly resolve critical uncertainties for bull trout population status in the upper Salmon River subbasin.

This project directly addresses several needs identified in the draft Salmon Subbasin Summary. Needs #1, 5, and 6 identified for other native species (other than chinook salmon and steelhead) include (from Huntington 2001):

1. Assess the status of native species that have received little attention to date or where information is limited. Westslope cutthroat trout, bull trout, and Pacific lamprey appear to be well below historic population levels. Collect life history, distribution, abundance by life stage, genetic, and homing behavior attributes.

5. Evaluate connectivity and the degree of interchange between populations throughout the Salmon subbasin and within the province.

6. Estimate abundance and monitor known populations to establish trends and measure population response to restoration.

This project will address Need #1 by assessing the status of bull trout in the upper Salmon River subbasin and collecting life history, distribution, abundance by life stage, and homing behavior attributes. The project will address Need #5 by investigating the extent that fluvial bull trout move between watersheds, and thus the connectivity and degree of interchange between populations. The project will address Need #6 by monitoring known bull trout strongholds and establishing trend or index count areas in addition to investigating those areas where bull trout status is largely unknown.

The project will also address combined aquatic and terrestrial Need # 13 which calls for the continuation and enhancement of the cooperative/shared approach in research, monitoring and evaluation between tribal, federal, state, local, and private entities to facilitate restoration and enhancement measures. The proposed project will address this need by involving all of the above mentioned entities directly in project planning and implementation.

Review Comments

This proposal addresses data gaps in bull trout distribution and life history in the upper Salmon River Subbasin. The RFC suggests this information is needed for the development of recovery actions for the Salmon River Bull Trout Recovery Unit; however, the geographical scope of this project appears too large for the proposed approach, and the 50 fish radio tagging sample seems too small for the size of the subbasin.

The RFC suggests a more systematic approach would lend itself well to project success. The project could be strengthened by concentrating on one major drainage at a time. Each of the 3 drainages (Yankee Fork, Mainstem, and East Fork) should receive about 50 tagged fish and 2-3 years sampling effort. It appears the proponents need to include more specific information on telemetry equipment to be used, and details such as transmitter life, size, frequencies and costs. There may be remote tracking sites currently available in the subbasin that could be utilized for this project, and if so, the project efficiency could be greatly improved by utilizing them. If there are no remote sites currently in place, it would be wise to establish some. The use of data loggers would also narrow the focus of equipment manufacturers and save time and money in data collection. Specific plans for radio-tracking are lacking in the proposal. Some additional plans need to be prepared in regards to tracking methods, frequency, and approach.

"The USFWS feels if the proposal can meet the above concerns and those raised by the ISRP, there are elements of the project that warrant funding."

Budget

FY02	FY03	FY04
$163,440 Category: Recommended Action Comments:	$143,000 Category: Recommended Action	$145,000 Category: Recommended Action

Project: 28003– Characterize and Assess Wildlife-Habitat Types and Structural Conditions for Subbasins within the Mountain Snake Province

Sponsor: NHI

Short Description:

Fine-scale wildlife habitat assessment for the Mountain Snake Province will provide critical baseline data for planning and monitoring efforts that is called for in the 2 subbasin summaries and is consistent with the NWPPC 's Subbasin Planning process.

Abbreviated Abstract

As ecological assessments of the Columbia River Basin step down in geographic scale to the sub-basin level, the need for fine-scale wildlife habitat depiction and assessment rises markedly. The Northwest Habitat Institute, working with the Northwest Power Planning Council's Framework Process for Subbasin Planning, developed 32 wildlife-habitat types and an associated wildlife-habitat relationships data set to depict the current conditions of the Columbia River Basin. We are proposing that the same mapping methodology and wildlife-habitat types be reviewed and mapped at a finer level of resolution (4 ha minimum mapping unit, (mmu) (10 acres)) for all sub-basins within the Mountain Snake Province. The Mountain Snake Province covers about 15,000,000 acres in the Columbia Basin. Current Landsat Thematic Mapper imagery will form the basis for map analysis and interpretation. Supporting this finer level of mapping will help resource managers, scientists, and policy makers make better decisions, predictions, plans, and models for the Mountain Snake Province. This is because these new wildlife-habitat maps will depict not only the composition of the habitat but also give a user and idea of the current structural condition(s) of the habitat. And, the local resource managers in both the Clearwater and Salmon subbasin plans call for mapping wildlife-habitat(s) because "existing… information are inadequate…. to protect species or to evaluate progress toward goals stated.." [Clearwater Subbasin Summary, p.251]. Also, specific local resource mangers goals and objectives support a need for mapping, for example in the Clearwater Subbasin Summary: IDFG's Goal #1, Objective 1.1, Strategy 1.1.1 and 1.1.3 (p.206); Nez Perce Tribe's Goal #7, Objective 5, 6, & 7, Strategies 4, 7, 19, 20, 21, & 22 (p. 213-215); Nez Perce National Forest Goal #1 (p. 217); USFWS's Goal #1 (p.221); Clearwater National Forest's Goal #1 (p. 223) ;IDFG's (wildlife) Goals #1 & 14, Strategies 2, 3, 4, 5, & 6 (p. 224-225); Nez Perce National Forest's (wildlife) Goals # 1, 3, & 6 (p. 226) ; and Clearwater Policy Advisory Committee's Goals # 1 (p. 229). Also, in the Salmon Subbasin Summary example are: IDFG's Goal #1, Strategy 1, (Terrestrial Habitats and Wildlife) Objectives 3 & 6, (Migratory Birds) Objective 2, 4, 5, (Plants and Habitats) Objective 4 (p.153, 160, 161, 165); Idaho Conservation Data Center Objective 2 (p. 167); and Nez Perce Soil and Water Conservation District Goal # 1, Objective 1 (p.170-171). In addition, most all sub-basin plans call for assessing or identifying wildlife-habitat(s) for conservation purposes, like protection or enhancement e.g. Draft Clearwater Subbasin Summary, Statement of Wildlife/Terrestrial Needs (p. 251-253) and Draft Salmon Subbasin Summary, Statement of Wildlife/Terrestrial Needs (p. 194-196) and Combined Aquatic and Terrestrial Needs (p.197). To be successful with conservation actions, strategies, habitat restoration and mitigation projects having the ability to predict species

associations, map wildlife-habitat types and structural conditions and putting that information into context with existing landscapes, will allow for a more comprehensive assessment of individual sub-basins and successful design

Our proposal plans to: (1) map the wildlife-habitat types at a refined resolution (4 ha mmu), (2) map the wildlife habitat structural conditions (4 ha mmu), (3) validating the mapping effort by field visits, and (4) assess the current conditions for wildlife using the wildlife-habitat relationships data set in conjunction with the wildlife-habitat types and structural conditions mapping information. The subbasin maps and assessment results will be post on the web, as well as written up in a report format so that the findings are available to wide audience and potential users.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
2000742	Establishing Baseline Key Ecological Functions of Fish & Wildlife for Sub-Basin Planning	An ecoprovince fine-scale habitat map would depict with greater accuracy areas where key ecological functions are increasing or decreasing. Baseline key ecological functions are an important omponent of NWPPC's Subbasin Planning Process.
21005	Characterize and Assess Wildlife-Habitat Types and Stuctural Conditions for Sub-Basins within the Columbia Gorge Ecoprovince	This project is for refined mapping at a sub-basin level and when completed will give a fine scale ecoprovince map. This ecoprovince map can then be compared with the Mountain Snake map when it is done and eventually can build into a basin perspective
21006	Characterize and Assess Wildlife-Habitat Types and Stuctural Conditions for Sub-Basins within the Inter Mountain Ecoprovince	This project is for refined mapping at a sub-basin level and when completed will give a fine scale ecoprovince map. This ecoprovince map can then be compared with the Mountain Snake map when it is done and eventually can build into a basin perspective
24007	Characterize and Assess Wildlife-Habitat Types and Stuctural Conditions for Sub-Basins within the Mountain Columbia Ecoprovince	This project is for refined mapping at a sub-basin level and when completed will give a fine scale ecoprovince map. This ecoprovince map can then be compared with the Mountain Snake map when it is done and eventually can build into a basin perspective
25098	Characterize and Assess Wildlife-Habitat Types and Stuctural Conditions for Sub-Basins within the Columbia Plateau Ecoprovince	This project is for refined mapping at a sub-basin level and when completed will give a fine scale ecoprovince map. This ecoprovince map can then be compared with the Mountain Snake map when it is done and eventually can build into a basin perspective

Relationship to Existing Goals, Objectives and Strategies

A key principle that is identified from the Northwest Power Act is that in developing the Columbia River Basin Fish and Wildlife Program, the council must deal with the Columbia River and its tributaries as a system and use the best scientific knowledge available (in 2000 Fish and Wildlife Program, Key Principles, Technical Appendix 2). Further, the draft Scientific Foundation for the Fish and Wildlife Program (NWPPC 2000) lists 8 principles that describe the relationship between species and their ecosystems. Principle 3 states, biological systems operate on various spatial and time scales that can be organized hierarchically. The definition of hierarchy usually depends on the question asked (Levin 1992). But, the Council has elected to address the hierarchy question by defining the various levels of regional planning which are: basin or Columbia River Bio-physical region, Province, sub-basin, 6th order HUC, and site specific areas. Each of these levels of planning varies in amounts of area that are considered. For example, basin level typically addresses 100,000s of square miles, provinces- 1,000s of square miles, sub-basins, -100s of square miles, 6th HUC – 10s of square miles, and specific sites – 1 to10 square miles. Also, at each level there are different features that are described.

Next, the Northwest Power Planning Council on October 19, 2000 adopted a Program that relies on multi-species sub-basin assessments and planning, including adoption of the Multi-species Framework process. A part of the Framework process is a basin-wide depiction of wildlife-habitats for current and normative (historic) conditions. By moving a portion of the Framework to a spatial depictions, allows resource mangers and the public to see findings and outcomes illustrated across the landscape, and for the initial case it was the basin. A primary reason, we think this is a valuable tool is because maps allow diverse and complicate data to be display in a common format, they can focus a discussion, and they are readily understood. We believe that there is a regional need for these maps and they are based on the Council direction to a) acknowledging the Columbia River Basin as a system and to use the best available science when making a decision(s), b) understanding that biological systems operate on various spatial scales that can be organized hierarchically, and c) adopting the Multi-species Framework process that includes map development and addressing questions at various hierarchical levels, like at the sub-basins or 6th HUC. Our proposal also addresses the coordination aspects of the Northwest Power Planning Council's Fish and Wildlife Program [see section 3.3]. In that, it builds towards a coordinated set of information that is deemed as "essential" for this program.

Local resource managers listed within each Subbasin Summary Report, which was written for each subbasin in the Mountain Snake Province, their conservation objectives and needs for fish and wildlife. And, the local resource managers in both the Clearwater and Salmon subbasin plans call for mapping wildlife-habitat(s) because "existing… information are inadequate…. to protect species or to evaluate progress toward goals stated.." [Clearwater Subbasin Summary, p.251]. Also, specific local resource mangers goals and objectives support a need for mapping, for example in the Clearwater Subbasin Summary: IDFG's Goal #1, Objective 1.1, Strategy 1.1.1 and 1.1.3 (p.206); Nez Perce Tribe's Goal #7, Objective 5, 6, & 7, Strategies 4, 7, 19, 20, 21, & 22 (p. 213-215); Nez

Perce National Forest Goal #1 (p. 217); USFWS's Goal #1 (p.221); Clearwater National Forest's Goal #1 (p. 223) ;IDFG's (wildlife) Goals #1 & 14, Strategies 2, 3, 4, 5, & 6 (p. 224-225); Nez Perce National Forest's (wildlife) Goals # 1, 3, & 6 (p. 226) ; and Clearwater Policy Advisory Committee's Goals # 1 (p. 229). Also, in the Salmon Subbasin Summary example are: IDFG's Goal #1, Strategy 1, (Terrestrial Habitats and Wildlife) Objectives 3 & 6, (Migratory Birds) Objective 2, 4, 5, (Plants and Habitats) Objective 4 (p.153, 160, 161, 165); Idaho Conservation Data Center Objective 2 (p. 167); and Nez Perce Soil and Water Conservation District Goal # 1, Objective 1 (p.170-171). In addition, most all sub-basin plans call for assessing or identifying wildlife-habitat(s) for conservation purposes, like protection or enhancement e.g. Draft Clearwater Subbasin Summary, Statement of Wildlife/Terrestrial Needs (p. 251-253) and Draft Salmon Subbasin Summary, Statement of Wildlife/Terrestrial Needs (p. 194-196) and Combined Aquatic and Terrestrial Needs (p.197). To be successful with conservation actions, strategies, habitat restoration and mitigation projects having the ability to predict species associations, map wildlife-habitat types and structural conditions and putting that information into context with existing landscapes, will allow for a more comprehensive assessment of individual sub-basins and successful design. Several examples of products that could be developed for a sub-basin using the wildlife habitat maps are: current ecological condition, individual wildlife species distributions, rare, unique or priority habitats, land use/land cover patterns, juxtaposition of specific habitats of interest, habitat of specific species that perform 1 or several key ecological functions, habitats that lie within urban growth boundaries.

Review Comments

This activity is currently being funded under the Ecosystem Diagnosis and Treatment project at NWPPC. The need for expansion of this project to produce finer resolution within each province should be determined through the EDT assessment process. If that process determines that finer resolution is necessary for regional planning, then funding for expansion should be provided through the NWPPC subbasin assessment effort.

Budget

FY02	FY03	FY04
$375,935 Category: Recommended Action Comments:	$363,854 Category: Recommended Action	$378,408 Category: Recommended Action

Project: 28005 – Assessment of spring/summer chinook salmon habitat within the Salmon River Subbasin.

Sponsor: FS, BLM, USGS, USU

Short Description:

Evaluate and compare attributes of streams utilizied and not utilized by chinook salmon within the subbasin. Evaluated habitat characteristics would describe low gradient stream segments which foster chinook salmon production.

Abbreviated Abstract

Habitat data will be collected throughout watersheds and subwatersheds within the Salmon River Subbasin that are currently both occupied and unoccupied by chinook salmon. These data will be used to establish stream habitat characteristics that sustain chinook populations within the Salmon River Basin and the Columbia River Basin. The objective of this project would be a model that discriminates habitat occupied and unoccupied by chinook salmon at the subwatershed (e.g., within drainages of the Lemhi River Basin), watersheds (e.g., Lemhi River Basin vs. Johnson Creek watershed), and subbasins (Salmon River Subbasin vs. Clearwater Subbasin) scale.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
19960200	Comparative survival rate study of hatchery pit tagged chinook and comparative survival oversight	We will use generated data to determine the relationship between habitat and chinook numbers/presence
8712702	Comparative Survival Rate Study	We will use generated data to determine the relationship between habitat and chinook numbers/presence
26019	South Fork Clearwater, Selway, and Salmon River Basins monitoring and evaluation of spring/summer chinook salmon outplant program.	We will use generated data to determine the relationship between habitat and chinook numbers/presence
9102800	Monitoring smolt migration of wild Snake River spring/summer chinook salmon	We will use generated data to determine the relationship between habitat and chinook numbers/presence
9107300	Idaho natural production monitoring and evaluation program	We will use generated data to determine the relationship between habitat and chinook numbers/presence
8909800	Idaho supplementation study	We will use generated data to determine the relationship between habitat and chinook numbers/presence
8909802	Idaho supplementation study	We will use generated data to determine the relationship between habitat and chinook numbers/presence
8909803	Salmon supplementation studies in Idaho Rivers -- Sho-Ban tribes	We will use generated data to determine the relationship between habitat and chinook numbers/presence

Relationship to Existing Goals, Objectives and Strategies

In 1998 an interagency group representing the Forest Service (FS), Bureau of Land Management (BLM), National Marine Fisheries Service (NMFS), Fish and Wildlife Service (FWS), and Environmental Protection Agency (EPA) began developing a long-term aquatic and riparian effectiveness monitoring program for FS and BLM lands within the Upper Columbia River Basin. The goal is to ensure effectiveness of standards identified in earlier consultation efforts related to land management activities conducted by federal agencies (NMFS 1998). The goal of this effort is to insure FS and BLM land management standards are effective at protecting stream habitats of listed species.

This monitoring project fits within the three overarching objectives from the Basinwide Recovery Strategy (RPA 9.6.2) and the direction for environmental status monitoring, effectiveness monitoring, and quality of regional databases sub-sections of RPA 9.6.5.

This is the only Basin-wide program that uses standardized methods and sampling design to collect aquatic habitat data that evaluates whether mitigation measures effectively protects stream habitat. Information on macroinvertebrates, riparian vegetation, and quantified descriptors of land management activities are collected within each sub-watershed. The program is managed by the Fish and Aquatic Ecology Unit of the Forest Service, has sampled approximately 400 sites throughout the Basin, and will sample 300 sites annually in the future – regardless of additional funding through the BPA.

The current program provides a basin-wide assessment of habitat conditions but does not specifically describe the relationships between habitat conditions and the spawning and rearing success of any specific fish species. This proposal will allow us to describe habitat conditions at the reach, sub-watershed, watershed, and sub-basin scale for streams that are either utilized or not utilized by chinook salmon. Existing information on spawning, survival, growth, and escapement will be combined with the habitat data to determine which habitat conditions result in the highest productivity. The strength of this proposal is that it incorporates existing region-wide habitat assessment procedures with population level information collected by numerous state and federal agencies, tribes, and academia. Results will be relevant to chinook salmon at a variety of spatial scales ranging from the reach to sub-basin, and to a lesser extent for steelhead and bull trout.

The primary significance of this project within the Snake River spring/summer chinook salmon ESU it that it may serve as a canary. Reach scale metrics are not likely to change within the time-scale of interest for the BIOP (5-10 years). In addition, variance associated with l will make it difficult to state with certainty if it exceeds or falls below 1. Stream habitat attributes (especially macroinvertebrates – see Hawkins et al. 2000), however, will give a good indication of the current conditions of riparian and upland environment.

The BIOP hypothesized that current condition of stream habitat is degraded. By collecting the data within this proposal and comparing it to data previously collected in minimally disturbed sites within the subbasin, we can test this hypothesis. To insure proper allocation of resources used in the restoration of chinook salmon populations within this ESU, a test of this hypothesis seems a necessary step.

At the subbasin scale this project will meet a need listed within the Salmon Subbasin Summary (Draft, May 25). In the section 5.4.1 of this document, a stated need is the “Development and validation of landscape models used to predict distribution, quality, and dynamics of habitat.” This effort will not only ensure models of this type are constructed for the Salmon River Subbasin, but that model development is connected among other subbasins within the Columbia River Basin.

Review Comments

Although this proposal has been identified as a pilot project by the sponsor, select components are presently implemented through a USFS project that exists in the upper Columbia Basin. In addition, the sponsor indicated that the USFS spends $500,000/year collecting such data. Although the USFS has been in communication with the IDFG, the USFS has not discussed the proposed work with the SBT due in part to the fact that the proposed work will be performed on federal lands. Due to the innovative nature of the project the reviewers recommend that the project sponsor submit the proposal for consideration in the Innovative Project process.

Budget

FY02	FY03	FY04
$115,750 Category: Recommended Action Comments:	$ N/A Category:	$ N/A Category:

Project: 28006– Tag and evaluate PIT-tag retention in sub-yearling chinook salmon

Sponsor: Biomark, Inc.

Short Description:

We propose to PIT tag 12,000 sub-yearling chinook salmon as part of an IDFG NATURES study being conducted in 2002. Additionally, we will determine the rate of PIT-tag shedding in sub-yearling salmonids from 24 hours post-tagging to 30 days post-tagging.

Abbreviated Abstract

This project has two objectives. First, to PIT-tag 12,000 juvenile chinook salmon *Oncorhynchus tshawytscha* for an Idaho Department of Fish and Game (IDFG) NATURES (Natural Rearing System) study being conducted at Sawtooth Fish Hatchery, near Stanley, Idaho. The second objective is to evaluate PIT-tag retention in sub-yearling salmon for 30 days post-tagging. While PIT tags are ubiquitous in studies of salmonid movement and survival through Columbia and Snake River hydroelectric projects, little research has been conducted on tag retention since the technology was developed in the 1980s. This research typically possesses one of two shortcomings: the study was conducted on a small number of fish, or the study lacks a long-term temporal component. There is a particular lack of information pertaining to sub-yearling fish, which may display increased shedding due to their small size at the time of tagging. Biomark will tag 12,000 sub-yearling chinook salmon in June or July, 2002. Following tagging, all shed tags will be collected in 24-hour intervals for 7 days post-tagging and at 72-hour intervals for 8-30 days post-tagging. As part of an agreement with the IDFG, Biomark will provide them with the PIT-tag data files in order to evaluate the downstream movement of these fish through hydroelectric projects after release. Data analysis will consist of determining how the shedding rate decreases over time, comparing fish size to probability of shedding using logistic regression, and preparation of the tag-retention findings into a manuscript for submission to a peer-reviewed journal.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
9705700	Salmon River Production Program, Shoshone-Bannock tribe.	Project funded to examine supplementation programs, strategies, and potential problems associated with supplementation.
8909803	Idaho Supplementation Studies, Shoshone-Bannock tribe.	Funded to evaluate "critical uncertainties" associated with supplementation. Delayed shedding of PIT-tags may be one of these uncertainties.
8909802	Supplementation Studies in Idaho Rivers, Nez Perce tribe.	Funds a variety of large- and small-scale programs associated with supplementation.
8909800	Idaho Supplementation Studies, IDFG.	Identical objectives and strategies as in No. 8909803.

Relationship to Existing Goals, Objectives and Strategies

The majority of our funding request will be used to tag the 12,000 sub-yearling chinook salmon at Sawtooth Fish Hatchery. The passage and survival data generated using these tagged fish will be analyzed by Idaho Department of Fish and Game (IDFG) personnel. While Biomark is not participating directly in this analysis, budgetary and personnel limitations within the IDFG will preclude large-scale PIT tagging of these fish prior to release.

According to the Salmon River sub-basin summary for the Mountain Snake Province, a goal of the Fisheries Bureau of the IDFG is “to preserve Idaho’s rare fishes to allow for future management options” (see Section 5.2.3a). One of the strategies associated with this goal is to use supplementation as part of a program to aid in the recovery of rare anadromous fishes. Further review of the sub-basin summary reveals a number of instances where supplementation is listed as a major tool in anadromous fish management. An objective of anadromous fish management by the IDFG is to "rebuild naturally reproducing populations of anadromous fish to utilize existing and potential habitat at an optimal level." The first strategy associated with this objective is to "use appropriate and proven supplementation techniques." There are two objectives of supplementation research by the IDFG: (1) "monitor and evaluate the effects of supplementation on pre-smolt and smolt numbers…" and (2) "determine which supplementation strategies provided the quickest and highest response in natural production…[of salmon]." These sorts of objectives and strategies are not restricted to the IDFG. Review of the sub-basin summary reveals similar recommendations for the Nez-Perce and Shoshone-Bannock tribes in the Mountain Snake province.

The natural-rearing study being conducted in 2002 is part of the supplementation research being done by the IDFG. In order to properly assess the efficacy of natural-rearing methods a sufficient number of fish will have to be PIT-tagged so their downstream movement and passage through hydroelectric projects can be monitored and evaluated. Through a collaborative effort with Biomark, NATURES methods will be evaluated using juvenile fish that will be PIT-tagged through funding by the Bonneville Power Administration. Ancillary to the natural-rearing study, Biomark will conduct a large-scale, long-term PIT-tag retention study on sub-yearling chinook salmon.

The rationale for conducting a tag-retention study like the one we propose is that no previous work has combined a large number of fish (approximately 12,000 sub-yearlings) and a long-term (30 days post-tagging) temporal component. These data are needed considering one of the objectives of IDFG supplementation research, as stated in the Salmon River sub-basin summary, is to expand knowledge pertaining to PIT-tagged pre-smolt, or sub-yearling chinook salmon.

In addition to its relationship with the goals, objectives, and management and research strategies in the Salmon River sub-basin, this research will potentially provide data germane to two RPA actions described in the December 12, 2000 FCRPS Biological Opinion. Action 174 describes a system-wide, comprehensive marking plan for the Columbia River watershed. PIT-tags will be a major component of the comprehensive marking plan and this tag-retention research could contribute insight into methodologies necessary to minimize pre-release sources of error when monitoring the out-migration of juvenile anadromous fishes.

Action 185 states that "…fish marking and recapturing programs aimed at defining juvenile migrant survival…" will be funded and expanded. This tag retention research is aimed at identifying "critical uncertainties" related to passage and survival estimates through hydropower projects. By identifying a time, post-tagging, when shedding becomes negligible, future passage and survival studies can be designed to account for delayed sheds and improve the accuracy and precision of survival estimates.

Review Comments

Thousands of fish of this size are tagged and released on a yearly basis; however, the managers have not expressed a concern regarding tag retention during this time period. Some reviewers suggest that research similar to what is being proposed may have already been performed by the agencies or tribes. Addresses RPA 174.

Budget

FY02	FY03	FY04
$82,044 Category: Recommended Action Comments:	$ N/A Category:	$ N/A Category:

Project: 28007– Causes and effects of nonnative trout invasions in the Salmon and Clearwater River subbasins

Sponsor: RMRS

Short Description:

Provide a better understanding of nonnative trout invasions and their effects on native salmonids. Deliver models and information for evaluating management alternatives. RPA 152 will be most significantly enhanced by this work.

Abbreviated Abstract

Nonnative trout invasions are widespread in the Columbia River basin, yet their implications for fishery management are poorly understood. In many, but not all cases, it is believed that nonnative trout can have adverse impacts on native salmonids. These impacts can result from ecological (e.g., competition, predation) or genetic (e.g., hybridization) interactions, or both. Efforts to manage other factors related to salmonid productivity (e.g., harvest, hatcheries, habitat, hydropower) must explicitly consider the issue of nonnative trout invasions. For example, many wilderness areas support large, relatively pristine habitats with minimal harvest, or influences from hydropower operations. However, these habitats may support large populations nonnative trout (e.g., brook trout, nonnative rainbow, or cutthroat trout). Management options for dealing with nonnative trout are limited and controversial. Furthermore, there is little understanding of larger-scale patterns that could be used to support a more strategic approach to managing nonnative trout.

We propose to study nonnative trout invasions and their potential ecological and genetic impacts on native salmonids in the Salmon and Clearwater River subbasins to provide better information for managing nonnative trout invasions. We will consider ecological impacts by looking at multi-scale (e.g., subbasins, subwatersheds, reaches) patterns in the distribution of native salmonids and nonnative trout. Our goal is to produce a series of models to predict nonnative trout distributions and their ecological impacts on native salmonids. Patterns of interspecific hybridization between two key species pairs, brook/bull and cutthroat/rainbow trout will also be described and analyzed in relation to local habitat and landscape characteristics to identify areas where hybridization is likely to be a problem. This work could be directly assimilated into fisheries management efforts. Finally, we will conduct a more focused study on the genetics of brook trout invasions to

better understand how this species actually disperses through streams to colonize new habitats.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
N/A		

Relationship to Existing Goals, Objectives and Strategies

Current management of nonnative trout invasions is fraught with controversy. Many popular recreational fisheries target nonnative trout, yet nonnative trout can have devastating impacts on native species in some cases. Furthermore, approaches to controlling nonnative species can be extremely controversial. Management actions focused on nonnative trout invasions and their impacts span a range of possibilities, including no action, direct and indirect control, or a mixture of the latter two strategies. The choice to adopt any approach should be informed by an assessment of threats posed by nonnatives, and potential benefits and impacts of management on native species.

The primary management objective is to remove the effects of nonnative trout on native salmonid populations, thereby enhancing the latter. However, management to control nonnatives may also have unintended adverse impacts on native species. Clearly, managers face very difficult choices in weighing the cost and benefits of the range of available alternatives for controlling nonnative trout invasions. Here, we provide a brief background on specific alternatives, and the need to develop a strategic approach to prioritizing management activities. Our proposed research is focused on deriving information to support more effective and strategic management decisions.

Review Comments

Reviewers suggest that benefits from this project will persist over the long-term only if the results/recommendations can be applied in a management scenario. Presently, there is little collaboration with the management agencies (i.e., this research was not sought by the managers). The managers acknowledge that the proposal is well written; however, the proposed work appears innovative and should be submitted for funding through the Innovative Project process. Project addresses RPAs 152 and 183.

The project is designed to investigate the ecological and genetic impacts of nonnative trout invasions at various spatial scales in the Salmon and Clearwater River subbasins. The multi-spatial scale approach by the sponsors could provide comprehensive information on the dynamics of trout invasions.

The RFC agrees with the broad-scale modeling approach (i.e., data collection and analysis) of Phase 1 of the study and strongly encourage the sponsor to coordinate in a more deliberate fashion with other agencies and ongoing efforts in the North Fork Clearwater. In addition, the RFC suggests the sponsor should use available genetics information throughout the major study basins to reduce costs in Phase 3 of the study.

The RFC indicated that much of the data that would be collected as described within Table 1, Phase 1 and 2a (occurrence of non-natives and natives in watersheds and habitat/landscape characteristics) has been collected for the Clearwater National Forest. The RFC expressed concern relative to whether this project addresses the important issue. The RFC acknowledges that the science appears sound, but are unsure whether the results will have management implications? The most significant possibility of a project like this would be to develop models to help prioritize management alternatives (e.g., habitat restoration) that would benefit native species while not benefiting exotic species. The goals and objectives as stated in the proposal do not address this issue. The proposal should be rewritten to address management implications, and submitted through the innovative process. The RFC questions whether the BPA is the appropriate source of funding for the proposed work.

Budget

FY02	FY03	FY04
$64,900 Category: Recommended Action Comments:	$303,000 Category: Recommended Action	$309,000 Category: Recommended Action

Project: 28008– Riparian Conservation Easement Purchase of Scarrow Property on Lake Creek a Tributary to the Secesh River, Idaho.

Sponsor: IDFG and IOSC

Short Description:

Acquisition of sensitive riparian area to protect water quality above wild summer chinook spawning grounds.

Abbreviated Abstract

We propose to purchase a riparian Conservation Easement on a private inholding on Lake Creek a headwater tributary to the Secesh River, Idaho. The property lies about three miles upstream of wild summer chinook spawning grounds on Lake Creek. The landowner has a timber sale proposed along with homesite development. The landowner is interested in a Conservation Easement in lieu of some timber and mining development along Lake Creek. We propose to purchase an easement on approximately a 12-acre riparian section of the property to protect the critical summer chinook spawning grounds downstream.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
9802300	Burgdorf Conservation Easement	Protect water quality for wild summer chinook spawning grounds

Relationship to Existing Goals, Objectives and Strategies

The Secesh River Summer Chinook population is one of the few remaining pure stocks in the Snake River basin. Although the Scarrow parcel is not known to be spawning or rearing area for the summer Chinook its close proximity to the spawning area makes it worth providing reasonable protection. This property is one of the few lands in the drainage not in federal ownership. The Lake Creek Chinook spawning area is all protected either by federal ownership or by the Burgdorf Conservation Easement. The NMFS 2000 FCRPS Biological Opinion RPA Action 150 relates directly to this project with the protection of sensitive non-federal lands at risk.

Review Comments

This proposal addresses RPA 150. The reviewers identified this proposal as important because it would provide for the purchase of the last piece of private land in the watershed. Water quality parameters are expected to improve significantly through cost effective actions that would result due to the purchase.

Budget

FY02	FY03	FY04
$68,500 Category: High Priority Comments:	$ Category:	$ Category:

Project: 28009 – Smolt Condition and Adult Returns: An Indirect Method of Assessing the Potential Mitigation Benefits of Nutrient Enhancement Projects

Sponsor: IDFG and IOSC

Short Description:

Proposes the development of a standard weight equation for chinook salmon and steelhead trout smolts. The equation will provide a method to determine if the condition of Snake River smolts is poor due to the lack of marine-driven nutrients.

Abbreviated Abstract

Nutrient enhancement of freshwater spawning and rearing habitats is receiving increased attention as a possible recovery tool for endangered Snake River chinook salmon and steelhead trout populations. This project proposes to develop a standard weight equation for chinook and steelhead smolts leaving their natal rearing habitat. The equations can be used to evaluate the relative condition of Snake River smolts and compare them to other regions. Secondly, we suggest that smolt-to-adult return rates (SAR) should vary with existing nutrient gradients and associated smolt condition. The hypothesis that we propose to test is that relative weights (a measure of fish condition) should explain a significant proportion of the variation in SAR of Snake River chinook salmon and steelhead trout. That accretion parallels the major assumption of stream fertilization projects (i.e., increased nutrients will improve growth, survival, and ultimately contribute to recovery of Snake River chinook salmon and steelhead stocks). The addition of this work compliments ongoing nutrient proposals and adds to them by providing managers with a simple tool to measure the potential benefits of stream fertilization projects.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Fish Passage Center Data - PTAGIS	The analysis will use data from PTTAGIS

Relationship to Existing Goals, Objectives and Strategies

Salmon Subbasin Summary

Page 191 of the Salmon subbasin summary identifies a critical and relatively unique research need of "assessing whether reduction in imported marine nutrients associated with low anadromous salmonid escapements actually decrease growth and survival of salmon and steelhead parr and native resident fish particularly at low seeding densities."

Clearwater Subbasin Summary

Page 247 need # 6. "Investigate effects of potential loss or lack of nutrients due to declines in anadromous salmonid populations, and coordinate and evaluate nutrient enhancement alternatives."

NPPC Fish and Wildlife Program

Sections of the plan with applicability include: 7.0A, 7.0C.4, 7.1A1

NMFS Biological Opinion

Sections of the biological opinion with applicability include: 5.2.1, 5.2.2,9.1.3, and 9.6.2

Review Comments

Although the reviewers expressed concern regarding a lack of reference (in the proposal) as to how the results from this work would be transferred, the sponsors indicated that it was an oversight. The sponsors acknowledged that cooperation from the states, federal agencies, and tribes will be required to collect the required data. As a result, dissemination of the information to the cooperators as well as the rest of the Columbia River Basin will be expected. Project addresses RPA 190.

Budget

FY02	FY03	FY04
$44,600 Category: Recommended Action Comments:	$ Category:	$ Category:

Project: 28010 – Nez Perce Salmon River Terrestrial

Sponsor: NPT

Short Description:

Protect, enhance, and restore native canyon grassland, and associated riparian habitats within the Lower Salmon and Little Salmon River Watersheds, along with high elevation wet meadows which are the headwaters and water storage systems for the same.

Abbreviated Abstract

This project is designed to protect, enhance, and restore native canyon grasslands, forested uplands, shrub-lands, and associated riparian/wetlands found within the Lower Salmon (LOS) and Little Salmon (LSA) watersheds. Early project implementation will focus on the collection of all relevant GIS data, which will be used to track the limiting factors affecting both fish and terrestrial resources and where these limiting factors manifest themselves on the ground. Attempts will be made to fill data gaps as time and funding allow. Once information is available, a prioritization process will be designed to address balancing issues of high priority, at risk habitats, availability of willing sellers, and cost benefit of land acquisition, easements and habitat restoration activities. Restoration plans will be developed for each new acquisition. Site-specific management plans will be written to maintain these high levels of terrestrial and fisheries benefits and to manage the property as part of a functioning ecosystem not in isolation from its neighbors. Where it is appropriate, neighboring landowners will be closely consulted in order to coordinate management activities and to assist them in best management practices through cooperative projects and cost share funding of activities such a weed control. A monitoring and evaluation plan will be developed to document the outcome of management activities and allow a feedback loop for adjusting management direction. This project will benefit target wildlife species (mule deer, chukar, California quail, yellow warbler, song sparrow, beaver, black-capped chickadee, downy woodpecker, blue grouse, and western meadowlark) as well as listed steelhead, spring and summer Chinook, bull trout and cutthroat that inhabit portions of the project area.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
19920570	Dworshak Wild. Mit.Trust-IDFG's Craig Mt. Project	The sw portion of the IDFG - Craig Mtn. project falls into the Lower Salmon River watershed.

Relationship to Existing Goals, Objectives and Strategies

The Nez Perce Salmon River Terrestrial Project (NPSRTP) addresses several strategies and goals outlined in the NPPC's 2000 Program. It contributes to the vision of "…a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife…" (NPPC, 2000; 12). It also supports the assumption that "This is a habitat-based program, rebuilding healthy, naturally producing fish and wildlife populations by protecting, mitigating, and restoring habitat and the biological systems within them…" (NPPC, 2000; 13). It helps achieve the following biological objectives: "Recovery of fish and wildlife affected by the development and operation of the hydrosystem…; Develop and implement habitat acquisition and enhancement projects…; Coordinate mitigation activities throughout the basin…; Maintain existing and created habitat values; and Monitor and evaluate habitat and species responses to mitigation actions." (NPPC, 2000; 20-21). Finally, it supports the habitat strategy to "Restore ecosystems, not just single species." (NPPC, 2000; 27). Habitat protection and restoration within the Lower Salmon and Little Salmon watersheds also falls within the policy of regional decision-makers to develop plans that "…focus on restoring habitats within degraded watersheds as an alternative to breaching lower Snake River dams as a restoration measure for anadromous salmonids…" as stated in the Salmon Subbasin Summary (Huntington, 2001, p.1). It is also stated in Action 150 of the RPA Actions for the Columbia Plateau from 2000 FCRPS Biological opinion December 21, 2000 that "…BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded …"

Review Comments

The sponsors have identified several properties that could be purchased. The funding of this proposal would allow for the immediate implementation of habitat work following the purchase. The NPT and IDFG will coordinate at the technical and policy level throughout the life of the project. When funding this project, project number 28018 funding should be considered. The Wildlife Committee rated the project as having significant wildlife benefits using the criteria of permanence, size, connectivity to other habitat, and juxtaposition to public lands.

Budget

FY02	FY03	FY04
$2,801,996 Category: High Priority Comments:	$2,955,486 Category: High Priority	$3,069,260 Category: High Priority

Project: 28011 – Incidental Mortality in Selective Sport Fisheries

Sponsor: IDFG and IOSC

Short Description:

Conduct literature review and scoping for a contemporary study of incidental mortality rates in selective sport fisheries.

Abbreviated Abstract

Estimates of mortality rates resulting from selective sport fisheries, where non-targeted fish are released, are diverse depending on fishing method, gear type, hooking location, fish size and condition, study design and environmental conditions. Many results are qualified by abnormal monitoring conditions, additional mortality related to holding fish, short-term observations, and lack of true controls. Studies involving inland fisheries for anadromous species are limited in number and their application to other systems is often questionable.

This proposal is for the development of a research program to discern the fate of adult salmon and steelhead caught-and-released in Idaho sport fisheries.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Idaho Natural Monitoring & Evaluation	Additional information on spawning escapements
	Steelhead Supplementation Studies	Additional information on spawning escapements
	Idaho Supplementation Studies	Additional information on spawning escapements
	Lower Snake River Compensation Program	Additional information on spawning escapements

Relationship to Existing Goals, Objectives and Strategies

Incidental mortality estimates are needed to quantify annual losses of non-target salmon and steelhead in sport fisheries directed at hatchery fish. The region, including states, tribes, and the federal government want to know the extent to which selective fisheries protect ESA listed or other non-target stocks while allowing legitimate harvest of more abundant hatchery runs. Early work in the Snake River basin led to the conclusion anadromous adults could be released in selective fisheries with acceptable impacts (Pettit 1977).

Estimates of incidental mortality rates associated with sport fishing are called for in the Biological Opinion on the Federal Columbia River hydroelectric system, RPA Action 167 (NMFS 2000) and in the Four Governors' Plan (Offices of the Governors 2000). The proposal for 2002 is to develop a comprehensive study plan to provide the information to meet these requirements.

Review Comments

Addresses RPA 167. The reviewers believe this proposal should be submitted for review through the Systemwide/Mainstem Province review due to systemwide implications.

Budget

FY02	FY03	FY04
$200,000 Category: Recommended Action Comments:	$200,000 Category: Recommended Action	$300,000 Category: Recommended Action

Project: 28012 – Four-Step Planning to Identify Safety-Net Projects for Idaho Steelhead

Sponsor: IDFG and IOSC

Short Description:

This proposal addresses RPA 175. Planning process identified by NMFS to prioritize populations and determine strategies to alleviate near-term extinction risk.

Abbreviated Abstract

In their recent Federal Columbia River Power System (FCRPS) Biological Opinion (December 21, 2000), the National Marine Fisheries Service (NMFS) described that numerous salmon and steelhead populations in the upper Columbia and upper Snake river basins are in such bad condition that extinction may be imminent in the near term, before long-term actions are taken to remedy limiting factors. It is documented that most of the long-term decline of Snake River stocks is due predominately to poor survival associated with the FCRPS. Although mitigation and recovery efforts should be focused on direct alleviation of key limiting factors, concurrent recovery efforts in areas such as habitat and artificial production have been recognized as necessary to meet regional goals.

NMFS acknowledged substantial uncertainty regarding the potential long-term benefits of artificial production as a recovery tool. However, NMFS hypothesized that for certain populations, intervention with artificial production measures to alleviate near-term extinction risk, generally referred to as “safety-net” programs, may have enough potential benefit to outweigh the risks of such intervention yet this tool is still considered relatively unproven. To investigate the risk and benefit of possible intervention with artificial production, a four-step planning process is described in the FCRPS Biological Opinion, Section 9.6.4.3 and Reasonable and Prudent Alternative (RPA) Action 175, to determine safety-net projects. NMFS also proposed candidate populations in this section of the FCRPS Biological Opinion to undergo the planning process to determine if intervention with artificial production is warranted. NMFS provided no biological rationale for their proposed candidate populations.

This project would initiate the four-step process identified by NMFS for A-run and B-run steelhead in the Salmon and Clearwater subbasins: 1) Synthesize existing population/genetic information and conduct an extinction risk analysis to identify populations that are candidates for intervention, including the populations noted in RPA Action 175 – Lemhi River, main Salmon River tributaries, East Fork Salmon River, lower Salmon River, upper Lochsa River and South Fork Salmon River; 2) Develop artificial production intervention options leading to a proposed strategy and assess whether other action would produce protection of similar benefit with less risk; 3) Conduct a benefit-risk analysis of the proposed strategy to determine whether intervention is warranted; 4) Develop a Hatchery Genetic and Management Plan (HGMP), if intervention with artificial production is warranted, to guide implementation.

NMFS seems to assume that artificial intervention is a foregone conclusion to address extinction risk yet they have provided a planning format that can utilize extinction risk and benefit risk analyses in a broader context to consider other alternatives. This project will approach the four-step process with consideration that intervention may be one of a mix of potential options for intervention.

Several of the tributaries identified by NMFS in RPA action 175 already have ongoing artificial production actions which are not designed as safety-net projects to reduce extinction risk. These actions may confound safety-net planning. The four-step planning process will consider effects of ongoing artificial production actions in the assessment of extinction risk. Planning will be coordinated with the relevant tribal and federal fishery managers and existing artificial production programs.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	RPA Action 175	Implementation of RPA
199005500	IDFG Steelhead Supplementation Studies in Idaho Rivers	Will provide data needed for planning
199107300	IDFG Natural Production Monitoring	Will provide data needed for planning
199700100	IDFG Captive Rearing Project for Salmon River Chinook Salmon	Will provide methodology needed for planning
199705700	Shoshone-Bannock Tribes Salmon River Production Program	Will provide data needed for planning
199703800	Nez Perce Tribe Preserve Salmonid Gametes Program	Will provide data and methodology needed for planning
	Lower Snake River Compensation Program	Will provide data and methodology needed for planning, will coordinate with planning
	U.S. v Oregon	Planning proposal will provide information aiding development of a new Columbia River Fishery Management Plan

Relationship to Existing Goals, Objectives and Strategies

This proposal implements RPA Action 175 (Section 9.6.4.3 in the 2000 FCRPS Biological Opinion, December 21, 2000).

This planning proposal supports objectives/strategies identified in the draft Salmon and Clearwater Subbasin Summaries (Cichosz et al. 2001, Huntington et al. 2001). In the summaries, state and tribal fishery managers generally identified implementation of emergency actions that address imminent risk to salmon and steelhead populations as an objective. (Examples - See Nez Perce Tribe Management Objective 14, p. 147, Salmon Subbasin Summary; IDFG Fisheries Bureau Goal 2, Strategy 3, p. 154; IDFG Anadromous Fish Management Objectives 1 and 2, page 157 in the Salmon Subbasin Summary).

The IDFG is charged with the responsibility of preserving, protecting, perpetuating and managing the fish and wildlife resources of Idaho. This mandate is reflected as their primary goal in the Salmon and Clearwater Subbasin Summaries. Idaho's overall anadromous fisheries goal is to recover naturally reproducing, native Snake River salmon and steelhead populations and to restore productive fisheries. This proposal is consistent with Idaho statewide management guidelines (IDFG 1992, 2001). Key anadromous fish management objectives and strategies that provide guiding support for this proposal include: 1) the need to maintain genetic and life history diversity and integrity of naturally and hatchery-produced fish, 2) the recommendation to implement hatchery intervention where necessary and prudent to provide a safety-net for selected populations at risk, 3) the need to balance genetic and demographic risks of unproven hatchery intervention strategies with risk of extinction, and 4) the need to maintain a mix of production strategies, including purely natural, across the landscape.

The proposal is consistent with the Northwest Power Planning Council (NWPPC) Fish and Wildlife Program Vision and planning assumptions for the Columbia River Basin (NWPPC 2000). Where feasible, protecting and restoring the natural ecological functions, habitat, and biological diversity of the Columbia River Basin is defined as a key aspect of the program vision. Planning assumptions for the Fish and Wildlife Program include implementation of artificial production and other non-natural interventions that are consistent with the central effort to protect and restore habitat and avoid adverse impacts to native fish and wildlife species. Another key assumption is to include restoration of the widest possible set of healthy naturally reproducing populations by 2012.

Specific Federal Caucus recommendations that overlap with this proposal include: 1) using safety net programs on an interim basis to avoid extinction while other recovery actions take place, 2) preserving the genetic legacy of the most at-risk populations, 3) limiting adverse effects of hatchery practices on ESA-listed populations and 4) using genetically appropriate broodstock to stabilize and/or bolster weak populations.

This project would also provide important analyses and strategy development for the U.S. v Oregon parties' effort to develop a new Columbia River Fishery Management Plan.

Review Comments

Addresses RPA 175. There is a current effort to combine all 4-step process proposals into one unified effort to ensure that overlap and redundancy are avoided. Refer to Safety Net Artificial Production Program proposal.

Budget

FY02	FY03	FY04
$ Category: Withdrawn, defer to SNAPP proposal Comments:	$ Category: Withdrawn, defer to SNAPP proposal	$ Category: Withdrawn, defer to SNAPP proposal

Project: 28014 – Bull trout population assessment and life history characteristics in association with habitat quality and land use: template for recovery planning.

Sponsor: USGS

Short Description:

Assess bull trout population density, abundance and life history characteristics for core areas of the Imnaha Subbasin and evaluate relationships to habitat quality and land use based on field evaluations and mark/recapture techniques.

Abbreviated Abstract

The goal of this project is to understand and document population abundance and rates of population change for threatened bull trout (*Salvelinus confluentus*) in the Salmon River (Little Salmon) Subbasin, and to relate population and life history characteristics to habitat quality and land use. The data and conservation assessment tools provided by this project will be used in bull trout recovery planning and will provide a template for research, monitoring, and evaluation programs for bull trout populations throughout this as well as other provinces. We propose to do a comprehensive population assessment for all life stages of bull trout in combination with detailed habitat assessments for the streams identified. This assessment will provide information on densities, population abundance and structure, movement, and habitat quality. Basic population abundance and density information is crucial for determining population status, for monitoring population size and trends, and to evaluate opportunities for, and the effectiveness of, management activities aimed at bull trout recovery. Based on established and cost effective mark and recapture techniques, the Pradel-type mark/recapture analysis we have proposed provides a simple response variable, lambda, which can be used to evaluate how each sub-population is responding to current habitat conditions or would likely respond to future habitat improvements. We will develop a simple population life-cycle model based on bull trout abundance data and life history characteristics combined with information on habitat quality and land use patterns. Within each of the proposed watersheds, we have identified core areas (streams), which demonstrate a range of habitat quality as well as different management types (e.g., private vs. USFS). Further, the USFS Effectiveness Monitoring program annually provides detailed stream habitat assessments for different land use management types for watersheds throughout the Columbia Basin, which may ultimately be used for evaluating the effect of habitat quality on bull trout survival in additional areas.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199405400	Characterize the Migratory Patterns, Structure, Abundance, and Status of Bull Trout Populations from Subbasins in the Columbia Plateau	complimentary
	IDFG General Parr Monitoring	provides information for
	NWPPC Ecosystem Diagnostics and Treatment (EDT)	project data can be use to validate EDT model

Relationship to Existing Goals, Objectives and Strategies

USFWS Recovery Planning

The goals of this project are directed towards fulfilling USFWS needs for bull trout recovery planning. The USFWS goal is to describe courses of actions necessary for the ultimate delisting of a species and ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed across the species' native range (Lohr et al. 1999). To meet this overall goal, USFWS has identified several objectives which require the type of information provided by this project: 1) maintain current distribution of bull trout within core areas in all recovery units and restore distribution where needed to encompass the essential elements for bull trout to persist, 2) maintain stable or increasing trends in abundance of bull trout in all recovery units, and 3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies. Further, the USFWS recovery planning document (Lohr et al. 1999) embraces the idea of core areas. Conserving respective core areas and their habitats within recovery units is intended to preserve genotypic and phenotypic diversity and allow bull trout access to diverse habitats. The continued survival and recovery of individual core area populations is thought to be critical to the persistence of recovery units and their role in overall recovery of the Columbia distinct population segment. Our proposed project will provide critical information about bull trout population abundance, trends, relationships to habitat, and potential for improving survival through habitat protection or restoration that will allow USFWS to describe the necessary courses of action and evaluate proposed management actions.

Subbasin Plan

The goals of this project will help managers evaluate threats to listed salmon and trout from potential habitat degradation as identified in the Salmon River Subbasin Plan (Plan) and the Lower Snake River Subbasin, Snake River Subbasin, Lower Salmon River Subbasin, and Little Salmon River Subbasin Bull Trout Problem Assessment, *Prepared for the State of Idaho* (CBBTTAT 1998). Further, the State of Idaho classified the following tributaries as 'Stream Segments of Concern': Little Salmon River, Boulder Creek, Hazard Creek, and Hard Creek. Mandatory site specific Best Management Practices (SSBMPs), developed by local working committees for some these watersheds, minimize impacts that may result from timber management. Although the 'Stream Segments of Concern' program local working committees no longer exist (passage of Senate Bill 1284 -BAG and WAG process), the developed SSBMPs are still in effect today.

In relation to the proposed project, these assessments suggest that efforts for conservation and restoration within the Little Salmon drainage should include: 1) continued maintenance and protection of high quality bull trout habitat at the watershed level for Rapid River; 2) continued or increased fish population inventory and monitoring efforts for Rapid River, Boulder Creek, Hazard/Hard Creek, and Little Salmon River; 3) active restoration of degraded bull trout spawning and early rearing habitat, with a subbasin emphasis on the Boulder Creek watershed, and 10) barrier removal. They also suggest that active restoration efforts at the subbasin level should include improvements to water quality (i.e. temperature and sediment) and flood event impacts to mainstem Little Salmon River.

More specifically, they highlight that it is important to continue monitoring, or start active monitoring, in known bull trout streams and that these efforts should include bull trout population trends and redd surveys. They also highlight bull trout distribution and movement studies as important. Priority streams for intensive bull trout surveys and monitoring include the Little Salmon River: Rapid River, and Boulder Creek, the streams identified for study in this proposal. In regard to identifying core habitat areas, they suggest that “areas of degraded spawning and early rearing habitat that have high inherent potential should be identified and actively restored. Areas adjacent to existing high quality habitat and populations should be prioritized, along with degraded areas that are occupied by bull trout”(CBBTTAT 1998).

In addition, these goals should also provide a benefit to listed salmon and steelhead populations in this basin. The Subbasin Plan identifies the following relevant data gaps or research needs:

1. Seasonal habitat use, juvenile rearing potential, and smolt yield for mainstem Salmon and major tributary mainstems. Continuation of physical habitat evaluation to determine benefits of habitat improvements.
7. Effects of sedimentation on seasonal habitat capacities and survival rates.
8. Migration timing and survival for smolts in mainstem and tributaries. Determination of where and why major losses of smolts occur prior to Lower Granite Dam.

The goals of this proposed project are directly applicable to the efforts identified in the Subbasin Plan. The potential for increasing fish survival from habitat changes needs to be identified, and core areas need to be protected. Further, evaluation needs to occur when habitat changes are implemented, in order to evaluate the effectiveness of management actions and aide in future bull trout planning for this subbasin as well as other areas.

Habitat Component

Stream habitat surveys are currently being used by state and federal conservation agencies (Bain et al. 1999) to address legal mandates. Consultation protocols for aquatic species protected under the Endangered Species Act include documentation of the stream habitat characteristics (NMFS 1996). There are also attempts to utilize aquatic habitat metrics as thresholds in meeting the mandates of the Clean Water Act, and physical attributes of stream are being used as management standards in federal land management plans. These habitat data need to be explicitly related back to fish survival and recovery.

Review Comments

This proposal was not reviewed. Per the ISRP's request, the sponsors have resubmitted the proposal for review in just one subbasin (i.e., Imnaha Subbasin in the Blue Mountain Province (Proposal 27017)).

Budget

FY02	FY03	FY04
$ Category: Withdrawn Comments:	$ Category: Withdrawn	$ Category: Withdrawn

Project: 28015 – Benefit/Risk Analysis to Promote Long-Term Persistence of Chinook Salmon in the Middle Fork Salmon River

Sponsor: NPT

Short Description:

Assess relative benefits and risks associated with current population status, genetics and potential for management actions and implement appropriate action to insure long-term persistence of chinook salmon in the Middle Fork Salmon River subbasin.

Abbreviated Abstract

Snake River spring and summer chinook salmon (*Oncorhynchus tshawytscha*) have declined to dangerously low levels and are listed as threatened under the Endangered Species Act (ESA). The population trend of salmon spawning aggregates in the Middle Fork Salmon River genetic refuge is in significant decline and salmon are at low levels of abundance and subsequent high demographic risk. Three of the seven index stocks used in the National Marine Fisheries Service (NMFS) Draft Cumulative Risk Initiative (CRI; NMFS-NOAA July 17, 2000) occur in tributaries of the Middle Fork Salmon River which states:

> "*The seven Snake River spring/summer chinook salmon index stocks are experiencing a decreasing trend in population change. This trend appears to have worsened in the most recent years for which we have complete data (1990-1994). Without additional intervention, the long-term prognosis for these stocks is clearly extremely poor.*"

The NMFS, in the 2000 Draft Biological Opinion, has proposed a list of potential recovery actions to create artificial propagation safety-net programs for stocks that are critically depressed and essential to recovery. Included in this safety-net program is a required action to complete risk/benefit assessments and Hatchery Genetic Management Plan's (NMFS 2000). Completion of a benefit/risk analysis (B/RA) is mandatory for evaluation and timely implementation of the best management actions to promote long-term persistence of chinook salmon in the Middle Salmon River. This B/RA is intended to serve four distinct purposes: 1) establishing the necessity of a management action and description of the goals of the program; 2) comparison of the range of management actions that could achieve the goals; 3) an assessment of the potential risks and benefits of the management actions that could achieve the goals; and 4) identification of critical uncertainties to be addressed by research elements of the Research, Monitoring and Evaluation Plan.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199703800	Preserve Listed Salmonid Stocks Gametes	Cryopreserved samples in the Middle Fork Salmon River subbasin may be used to promote genetic diversity.
198335000	Nez Perce Tribal Hatchery	Project has a Benefit Risk Assessment that has been developed by the Nez Perce Tribe
199604300	Johnson Creek Artificial Propagation Enhancement Project	Project has a Benefit Risk Assessment that has been developed by the Nez Perce Tribe

Relationship to Existing Goals, Objectives and Strategies

This proposal has measurable, quantitative biological objectives and will result in clear benefits to spring and summer chinook salmon survival. This project also has near term measurable benefits to ESA listed species. Completion of this BR/A for Middle Fork Salmon River Chinook Salmon will establish a management action that achieves the most benefit (increased survival) with the least amount of risk through a science-based and peer reviewed/supported process. Although this proposal is for planning, by making the assumption that the resulting preferred management action is implemented in a timely manner the short-term risk of extirpation of the ESA listed species would be reduced as a direct outcome of this proposal.

The 2000 FCRPS Biological Opinion (NMFS 2000) recommends an action to complete risk/benefit assessments and Hatchery Genetic Management Plan's for 12 specific stocks at very low level of abundance as well as for other stocks that are determined to be critically depressed and essential to recovery. Although the tributary streams of the Middle Fork Salmon River are not directly listed as requiring safety net actions, the stock status of chinook salmon in these tributaries is similar or below those listed. In addition, the current management approach to maintain each spawning aggregate as a separate and unique brood source would seem to imply that the genetic information exhibited by Middle Fork Salmon River chinook salmon (if not within every spawning aggregate in the subbasin) would be essential for recovery.

The 2000 FCRPS Biological Opinion (NMFS 2000) Paragraph 9.5.3.2.2 states that "enough new data shall be provided to allow NMFS to apply the performance standards provided in section 9.2.2.1, including the abundance, productivity trends, species diversity (genetic and life history diversity, and population distribution for each listed ESU." Data collected by this project will be specifically to examine current abundance and trends, and to analyze all genetic information and samples to date in the MFSR.

The 2000 FCRPS Biological Opinion (NMFS 2000) Action 175 concerns the development of Artificial Propagation Safety-net programs. A four step process will generally be applied to an individual population being considered for a safety-net project, starting with an extinction risk analysis; second, intervention options will be developed and a proposed strategy outlined; third, a benefit-risk analysis for the proposed strategy will be conducted to determine whether intervention is warranted; and fourth, an HGMP will be developed to guide implementation of the safety-net project. This benefit-risk analysis is the first step in this four step process outlined by NMFS.

The 2000 FCRPS Biological Opinion (NMFS 2000) Action 179 concerns defining populations based on biological criteria and assessing population viability. Biologically based populations must be defined to establish recovery goals (NMFS 2000). To define the MFSR population, objectives of this project includes collection and analysis of all genetic information to date and to do additional analysis on archived scale samples and male gamete samples. This data will be used by Action Agencies and NMFS to develop recovery strategies for listed salmon ESUs in the MFSR.

The Northwest Power Planning Council (NPPC) 2000 Fish and Wildlife Program has an objective to halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005. In linking biological objectives with strategies, the NPPC Program states that "if the potential for restoring the natural production of the habitat is low, or the biological potential of the target population is low because of survival problems elsewhere in its life cycle, the area may become a candidate for certain types of artificial production." As mentioned earlier, the MFSR habitat conditions are nearly pristine mostly in designated wilderness areas thus narrowing the list of potential management actions. Under Artificial Production Strategies the NPPC Program recommends that in "wild salmon refuges" no artificial production should be used but recognizes that "when fish runs fall to extremely low levels, artificial production may be the only way to keep enough of that population alive in the short term so that it has a chance of recovering in the long term."

Review Comments

The Middle Fork Chinook population is regarded by the managers as depressed. In 2000, IDFG initiated a process to use a population viability model developed by the University of Idaho (UI). The UI model was not referenced in the proposal. The IDFG suggests that some of the proposed work has been performed by the IDFG. There is a current effort to combine all Four-Step process proposals (the Four-Step process is mandated in the BiOp) into one unified effort to ensure that overlap and redundancy are avoided.

Defer to the consolidated SNAPP proposal, in which the unique tasks from this proposal have been maintained. If the consolidated SNAPP proposal does not received funding, this proposal should be considered as a stand alone proposal for funding, as it was the only “original RPA 175/SNAPP type proposals” specifically addressing chinook salmon. The IDFG PVA analysis was not coordinated with NPT and was not available at time of proposal submittal.

Budget

FY02	FY03	FY04
$ Category: Withdrawn, defer to SNAPP proposal Comments:	$ Category: Withdrawn, defer to SNAPP proposal	$ Category:

Project: 28016 – Restoration of the Yankee Fork Salmon River

Sponsor: SWCD, OSC

Short Description:

Restore the natural river channel characteristics, floodplain function, sediment regime, and aquatic habitat within the dredged reach of the Yankee Fork. Reconnect the remaining quality habitat, thereby increasing the biological integrity of the basin.

Abbreviated Abstract

A 6 mile reach of the Yankee Fork Salmon River has been severely altered by dredge mining that has disrupted geomorphic processes within the basin and fragmented the remaining quality salmonid habitat in a once productive and important subbasin of the upper Salmon River. The dredged reach has been straightened, simplified, and isolated from its floodplain and is no longer capable of supporting a naturally functioning riverine ecosystem. The channel is wide, shallow, and planar, lacking the complex pool-riffle morphology, undercut banks, riparian shading, and diversity of aquatic habitat that is seen in adjoining, less disturbed reaches. A multi-year restoration plan is proposed to reclaim the historic aquatic habitat within the dredged reach and to reconnect the remaining quality habitat, thereby increasing the biological integrity of the basin. We propose a comprehensive, multi-disciplinary, and multi-agency plan that includes 1) pre-restoration study and design, 2) phased restoration and monitoring, allowing iterative improvement of methods, 3) long-term physical and biological monitoring, and 4) dispersal of gained knowledge through a variety of outlets. Several factors make restoration of this site particularly compelling: 1) it is an historically productive habitat for Snake River chinook that are now listed as threatened; 2) the dredged reach presents several threats to chinook viability with the basin (discussed further below); 3) the current channel is incapable of reworking the dredge piles that confine it and requires active intervention to restore this ecosystem; and 4) significant data collection and analyses have already been conducted in the basin, providing an unprecedented knowledge base for restoration activities.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199405000	Salmon River Habitat Enhancement M&E	Samples mainstem and Yankee Fork annually to determine juvenile abundance, and adult escapement. Will provide baseline and monitoring data for our proposed work, and off-channel ponds will be integrated into our project. (RPA #150, 152)
198909803	Salmon supplementation study in Idaho Rivers	Sampling of the control reach within the study area. Will provide baseline and monitoring data for our proposed work. (RPA #150, 152).

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/ Implementation Support	Administrative and public outreach functions associated with habitat restoration planning and work (RPA #149, 150, 152, and 154) as described in this proposal.

Relationship to Existing Goals, Objectives and Strategies

The Salmon Subbasin Summary identifies the dredge mine portion of the Yankee Fork Salmon River as a major limiting factor in Section 4.4.1.a. In addition, the Yankee Fork has been designated by the SBT, IDFG, USFS, Idaho Soil Commission, and County agencies and Community leadership groups as a priority watershed for restoration and enhancement projects for fish and wildlife habitat.

SALMON SUBBASIN SUMMARY (DRAFT) MAY 25, 2001

The Yankee Fork Restoration Project addresses several fish and wildlife Needs identified in the draft Salmon Subbasin Summary. Salmon Subbasin Summary Section 5.4.2 Fisheries Aquatic Needs #6, 7, and 9 are all addressed by the Yankee Fork Restoration Project. Need #6 calls for the protection and restoration of riparian and instream habitat structure, form, and function to provide suitable holding, spawning, and rearing areas for anadromous and resident fish. Need #7 calls for the protection, restoration, and creation of riparian, wetland, and floodplain areas within the Subbasin and establish connectivity. Previous project enhancement efforts in the Yankee Fork Salmon River and Big Boulder Creek have directly addressed this need (see Section d.) Need #9 calls for reduction of stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species. Restoration efforts in the Yankee Fork Salmon River will directly address these needs.

The Yankee Fork Restoration Project also addresses Salmon Subbasin Summary Section 5.4.4 combined aquatic and terrestrial Needs #1, 2, and 13. Need #1 calls for monitoring and evaluation of programs for fish supplementation, habitat restoration and improvement, habitat baseline conditions, water quality and water quantity improvements, conditions, and trends. Our Project involves extensive data collection concerning current and historic conditions that will be used to develop restoration design options and will also serve as a baseline for monitoring efforts throughout all phases of the project. The Project also includes a comprehensive monitoring plan to evaluate both short- and long-term success of the project and to provide information for improving and fine-tuning the Project restoration activities during their phased implementation. Need #2 calls for coordinated M&E efforts at the Subbasin and provincial scale to maximize effectiveness and minimize redundancy. The Yankee Fork Restoration Project will participate annually in the upper Salmon River basin interagency coordination meeting to address this need. Need #13 calls for continued and enhanced cooperation between State, Federal, Tribal, local and private entities in research, monitoring and evaluation to facilitate restoration and enhancement measures. This project addresses the need by having all above mentioned entities as partners in restoration.

2000 COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM
The Yankee Fork Restoration Project addresses the mission of the 2000 Fish and Wildlife Program by protecting and restoring natural ecological functions and habitats within the Salmon River Subbasin. The Yankee Fork Restoration Project will take into account ecological habitat- forming processes prior to project implementation, as called for in the 2000 Fish and Wildlife Program Scientific Principle #4. The Project realizes that habitat-forming processes can occur over long periods of time, so monitoring of enhancement efforts will be necessary to evaluate the long-term benefits of those efforts. In accordance with 1994 and 2000 Columbia River Basin Fish and Wildlife Program goals and objectives, this project will protect and improve habitat conditions in the Salmon River Basin, thus benefiting the biological needs of salmon, steelhead, bull trout, and other fish and wildlife species.

Although the 1994 Fish and Wildlife Program has been replaced with the 2000 Fish and Wildlife Program, the following items from the 1994 document are still applicable to the project and listed below as follows:

- Measure 7.6A.2 calls for improved productivity of salmon and steelhead habitat critical to the recovery of weak stocks. The Yankee Fork has been designated as critical habitat (57 FR 14653), and the stock at this time is extremely depressed (Fig. 3) and on the verge of extinction. This project will improve habitat productivity by providing a healthy, functioning stream and riparian community that reconnects remaining quality habitat within the YF basin.
- Measure 7.6B.3 gives priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowners. This project will use a Subbasin Assessment to guide project activities and will occur on private land for which conservation easements are being negotiated by the USFS.
- Measure 7.6B.6 encourages involvement with volunteers and educational institutions in cooperative habitat enhancement projects. This project will involve the Shoshone-Bannock High School through their streamside incubator project on the Yankee Fork, and also the Challis High School through their Living Stream Classroom Project.
- Measure 7.8A.2 charges federal land managers to initiate actions needed for recovery when the habitat objectives are not being met. The USFS conducted a pilot watershed analysis to identify critical issues within the basin and provide baseline information for restoration activities (Overton et al. 1999; discussed further in Section 9f of this proposal).
- Measure 7.8D.1 charges parties to identify and protect riparian and underwater lands associated with perennial and intermittent streams and to initiate actions to increase shade, vegetation, standing and down large woody and small woody debris when water quality objectives are not being met. The affected six-mile area of the Yankee Fork Salmon River has no functional floodplain, and is currently listed by the State of Idaho as being a water quality limited segment. Our proposed project seeks to rectify these deficiencies by restoring the dredged reach and creating a naturally-functioning riverine ecosystem.

2000 FCRPS BIOLOGICAL OPINION, DECEMBER 21, 2000.

The following RPA's are of relevance to the Yankee Fork Project:

Action 149a:	BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years.
Action 149d:	BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.
Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152 b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).
Action 152f:	Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).
Action 153:	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.
Action 154a:	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.
Action 154b:	The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.

The Yankee Fork Restoration Project addresses these issues by being a collaborative, interagency, and interdisciplinary effort that seeks to improve a variety of physical and biological conditions within a critical habitat area largely located on private land. The rehabilitation of this habitat will supplement other restoration and management activities planned for the Upper Salmon Subbasin.

Review Comments

Although IDFG identified the Yankee Fork as a major source of sedimentation to the mainstem Salmon River, reviewers question the benefit/cost issue. The reviewers suggest that the proposed work appears expensive and are concerned about the ability to achieve proposed goals in a timely manner. The work proposed is high priority, there are some concerns about the cost of implementation.

Budget

FY02	FY03	FY04
$799,785 Category: High Priority Comments:	$1,226,860 Category: High Priority	$1,186,860 Category: High Priority

Project: 28018 – Lower Salmon River Tributary Protection and Enhancement

Sponsor: IDFG

Short Description:

Protect and enhance important aquatic and terrestrial habitats in Salmon River tributaries.

Abbreviated Abstract

Protect and enhance aquatic and terrestrial habitats in key tributaries to the Lower Salmon River, through acquisition of conservation easements, fee-title, land trades, or long term agreements. Implement habitat improvement and conservation measures. Specific project area includes tributaries to the Salmon River, from French Creek near Riggins to the confluence of the Salmon River with the Snake River. First year activities will include the development of a landscape level plan for the project area, including a prioritized list of actions. Restoration actions will improve water quality, enhance riparian and native grassland habitats, and benefit steelhead trout, chinook salmon, bull trout, redband trout, westslope cutthroat trout, bighorn sheep, mountain quail, and a variety of other native fish and wildlife species.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
92205700	Craig Mountain Wildlife Mitigation Project	Implementation of proposed project will complement on-going wildlife mitigation/restoration activities on Craig Mountain.

Project ID	Title	Nature of Relationship
9107300	Idaho Natural Production Monitoring and Evaluations	Ongoing project to monitor trends in spring/summer chinook salmon and steelhead trout populations in the Salmon, Clearwater and lower Snake river drainages. Has quantified the benefits in parr carrying capacity observed from habitat enhancement projects.

Relationship to Existing Goals, Objectives and Strategies

The Northwest Power Planning Council's 2000 Fish and Wildlife Program calls for maintenance and restoration of healthy ecosystems and watersheds to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.

- Protection and enhancement of Lower Salmon River tributaries addresses several reasonable and prudent actions listed in the FCRPS Biological Opinion.
- The FCRPS concluded that off-site mitigation in tributaries is necessary to continue to operate the hydropower system.
- High water temperatures have been linked to stress and disease. Reducing water temperatures in tributaries can influence water temperatures in main migratory corridor and provide cooler water sanctuaries for migrating juvenile fish (RPA141).
- Project implementation will increase tributary water flow, and comply with water quality standards and watershed health (RPA 149).
- Project implementation will provide protection and restoration of non-Federal habitat that is severely degraded (RPA 150).
- Project implementation will provide opportunities to fund long-term protection of riparian buffers in concert with existing federal programs (RPA 153).
- Habitat acquisition and easements are high priority and will emphasize protection of critical habitat under the Restoration of Bighorn Sheep Hells Canyon Initiative (BLM 1997).

Review Comments

This project addresses RPA 154. This proposal is linked to project 28010. Reviewers identified this proposed work to be a high priority if managers and stakeholders agree as to which easements should be purchased or are in agreement relative to the section of the plan that tentatively identifies properties that could be purchased. When funding this project, project 28010 funding levels should be considered. The development of the restoration plan should be a priority for this project. The Wildlife Committee rated the project as having significant wildlife benefits using the criteria of permanence, size, connectivity to other habitat, and juxtaposition to public lands.

Budget

FY02	FY03	FY04
$101,000 Category: High Priority Comments:	$406,000 Category: High Priority	$541,000 Category: High Priority

Project: 28019 – Improve Stream Habitat by Reducing Discharge from Animal Feeding Operations

Sponsor: ISDA / IOSC

Short Description:

Enhance tributary and main stem fish habitat and water quality by reducing direct discharge and run-off from Animal Feeding Operations by supporting on-farm improvement with cost-share funding and technical assistance.

Abbreviated Abstract

The Idaho State Department of Agriculture (ISDA) has begun implementing the Beef Cattle Environmental Control Act, which became effective July 1, 2000. This new program will address discharge problems from all Beef Cattle Animal Feeding Operations (Beef CAFO) in the entire state of Idaho. This proposal insures identification and immediate cleanup of all critical Animal Feeding Operations (AFO) problems in anadromous fish habitat areas within the Salmon subbasin. This first year will provide immediate results by reducing discharge from the most significant livestock sources that are not regulated under the Beef CAFO program, as well as establish an information base to insure there are effective, ongoing AFO-related processes in this critical anadromous and resident fish subbasin.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199401170	Idaho Model Watershed Project	RPA Action # 149, 150, 151, 152, 153, 154 - Habitat protection, restoration, and complexity in Salmon subbasin watersheds.

Relationship to Existing Goals, Objectives and Strategies

The proposal results in clear benefits to species survival: The Columbia River Basin Fish and Wildlife Program recognizes that improvements in habitat quality are needed to increase the productivity of many stocks of Chinook salmon (NPPC 1994). This project will have clear goals for eliminating discharge by preventing runoff from AFOs and restricting livestock from streams and rivers in winter feeding areas, thereby providing immediate improvements in the quality of water and habitat.

*The proposal has immediate benefits to ESA-listed species***:** Confined Animal feeding operations have been clearly identified as one of the contributors to lower water quality along streams where there are discharges and these operations are regulated under the Beef CAFO program. This proposal allows the identification of problem areas and operations along streams in the Salmon subbasin that are not regulated, then promotes collaboration among various governmental agencies while working with landowners to effect change. The immediate benefits are in both the on-the-ground activities that will improve water quality and habitat as well as monitoring efforts to ensure improvements.

*The proposal will improve conditions in a 303d water-quality limited stream***:** The ISDA will also work with producers and develop site-specific plans that will immediate improvement to the water quality in impaired streams. The criteria will be to focus on individual operations that: (a) are located on impaired streams, (b) have the greatest potential to discharge, (c) have impacted water quality, (d) obtain the greatest return for the financial assistance granted. Waters in the state must be protected for existing uses, which include Salmonid Spawning and Cold Water Biota.

The proposal addresses habitat enforcement and results in protection of fish or wildlife habitat (including anadromous species): There will be numerous positive results for salmon, steelhead and bull trout from this project. The cost-share application guidelines will direct landowners to design projects with the objective of improving water quality and fish habitat. Evaluation of project applications will result in a project ranking and selection of the best of those, which will have a measurable reduction in the impact to surface waters and habitat in the subbasin. Finally, on-the-ground improvement will be made through implementation of the projects with long-term compliance inspections by ISDA.

Share the cost of the action with other entities as part of a collaborative effort: The ISDA will work with landowners and state and federal agencies with direct and matching fund efforts for cost sharing in order to assist producers in the development of site-specific plans that will bring the operations into compliance with water quality laws and regulations. The criteria will be to focus individual operations that: (a) are located on impaired streams, (b) have the greatest potential to discharge, (c) have impacted water quality, (d) will work with landowners, other state and federal agencies to fund development of site specific plans that will benefit water quality and fish habitat.

Recommended by an action plan of a science based assessment: The FWP, Salmon and Clearwater Subbasin summaries, NMFS 2000 biological opinion on the operation of the power system, and the IDFG 2000 fisheries management plan identify monitoring and evaluation projects as important to recovery of salmon and steelhead populations.

The ISDA and other cooperating agencies will conduct science-based assessments of facilities in order to determine if they are contributing to water quality degradation and then, assist landowner in developing and implementing a mitigation action plan. The ISDA's inspectors and Technical Service Bureau will conduct follow-up compliance inspections to ensure the site-specific plans are implemented. The assistance includes technical and nutrient management assistance, compliance activities, and cost share funding for implementation of site-specific plans.

Actions approved by a tribal and or state governmental authority: The Idaho Legislature and Governor, as exemplified by passage of the Beef Cattle Environmental Control Act of 2000, has given high priority to this effort. The high priority focus on this project by the ISDA has been amplified through collaborative commitment from tribal, state and federal agencies.

The Governors of the states of Idaho, Montana, Oregon and Washington have listed such actions as priorities in their Recommendations of the Governors of Idaho, Montana, Oregon and Washington for the Protection and Restoration of Fish in the Columbia River Basin (2000). In their recommendations, the Governors called for improved water quality (in compliance with state water quality standards), and local recovery plans to improve degraded habitat.

Collect or identify data appropriate for measuring biological outcomes identified with objectives: These individual landowner action plans within the overall project will produce measurable water quality and habitat improvements. Monitoring of all water quality and habitat improvement activities will be ongoing throughout this particular project implementation process and continue as additional landowners are added to the database. Water quality data collection will be coordinated with IDEQ to be used in their Beneficial Use Reconnaissance Project.

Review Comments

Sponsors suggest that the proposed work will provide the tool needed to reach the private landowners, a tool that is currently absent. Based on experience elsewhere in Idaho, the sponsors indicated that $10,000-20,000/feedlot would be required to implement the prescribed corrective measures; however, the sponsors are unsure of the number of unregulated feed lots that would require corrective measures in the Salmon River subbasin and thus are unable to calculate the reduction of inputs that will occur until the cattle operations are identified. Based on conversations with the owners of the cattle operations, the sponsors anticipate the ability to address approximately 80% of the unregulated sites. Because the number of feedlots that may need corrective measures is unknown, the reviewers expressed concern whether the requested amount would be enough to correct all the identified operations. The sponsors indicated that they were unsure if the requested amount would be sufficient but also suggested that the funding request may exceed their needs. The sponsors indicated that there are no out-year costs associated with the proposed work since landowners and other programs are responsible for maintenance costs. Reviewers questioned why a needs assessment was not proposed as the first step for this proposed project. The sponsors suggested that implementing an assessment process could disturb the synergy that exists among the existing regulatory programs. The sponsors further stated that the Governor of Idaho has asked what actions could be taken relative to livestock that would immediately benefit fish and wildlife. The sponsors indicted that the fencing of unregulated feedlots is considered the best solution to addressing livestock induced problems. Although monitoring was not identified in the proposal, monitoring activities will be performed through other ongoing programs. The reviewers suggest there this a lack of coordination and believe the prioritization process could be enhanced through coordination with the state and tribes. The managers acknowledge that if the right operations are selected the tagged species will significantly benefit from the activity. Until the reviewers can be assured the work occurs in areas that the managers have identified as key areas, the reviewers are unable to recommend the proposal as a high priority. The reviewers suggest that through the TMDL process there is EPA money for this type of activity. Furthermore, reviewers question the benefit/cost issue and subsequently believe the proposed work appears expensive and are concerned about the ability to achieve the proposed goals in a timely manner.

Budget

FY02	FY03	FY04
$2,026,000 Category: Recommended Action Comments:	$ Category:	$ Category:

Sponsor: USFWS-LSRCP

Project: 28026 – Develop HGMP's for LSRCP Programs to address artificial production reforms identified in the FCRPS Biological Opinion and other regional processes.

Assess LSRCP Programs to identify needed artificial production reform measures, coordinate proposed reforms among co-managers, select and define potential reforms, and develop funding implementation.

Abbreviated Abstract

NMFS' hydro biological opinion included an RPA action requirement for the BPA to provide resources to develop HGMP's to help guide hatchery reform actions in the Columbia River Basin. A coordinated approach is needed to facilitate the application of artificial production program reforms to address mitigation, tribal trust, Endangered Species Act, and other legally mandated responsibilities for listed anadromous salmonid populations in the Snake and Columbia River basins. The Hatchery Genetic Management Plan (HGMP) format was developed by the regional Federal agencies, states, and Tribes to provide a standardized format for required information needed to meet these responsibilities. The Lower Snake River Compensation Plan (LSRCP) Office proposes to develop HGMP's for each of its artificial production programs by the end of 2003. The plans will include a clear statement of the purpose and goals of the individual programs and their relationship to existing harvest, habitat, and hydrosystem goals. The plans will include comprehensive operational, facility, and monitoring and evaluation (M&E) details to appropriately describe the programs. The plans will evolve over time as the ongoing regional processes and information from M&E are completed to be responsive to decisions made in those forums. The proposal would provide one FTE for each of the LSRCP co-managers (Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Shoshone Bannock Tribe, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) to form a working group to assess existing LSRCP

programs, develop appropriate strategies to facilitate needed reforms, coordinate those proposed reforms with ongoing regional processes, develop HGMP's, and develop proposals for funding for agreed to reform measures. The work group will operate under the supervision of a core team of LSRCP co-managers. The proposed project is high priority based on the level of emphasis that NMFS, NWPPC Fish and Wildlife Program, and the FWS have placed on development of HGMP's to meet ongoing regional processes.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	RPA Action 170	Will identify capital modifications identified as necessary in the HGMP planning process for LSRCP anadromous fish programs.
	RPA Action 173	Will identify LSRCP reforms in the HGMP planning process for implementation.
	RPA Action 174	Will coordinate LSRCP marking strategies in regional process.
	RPA Action 175	Will coordinate development of safety-net projects affecting LSRCP programs.
	RPA Action 176	Will coordinate development of HGMP's for Grande Ronde and Tucannon river spring/summer Chinook safety-net programs.
	RPA Action 177	Will coordinate implementation of approved safety-net programs affecting LSRCP programs.
	RPA Action 178	Will coordinate development of new safety-net projects affecting LSRCP programs.
	RPA Action 179	Will coordinate LSRCP involvement in recovery planning.
	RPA Action 180	Will coordinate LSRCP involvement in regional monitoring program.
	RPA Action 182	Will coordinate LSRCP involvement in identifying appropriate populations for research.
	RPA Action 183	Will coordinate LSRCP involvement in identifying appropriate monitoring.
	RPA Action 184	Will coordinate LSRCP involvement in assessing reform measures.
	NMFS Art. Prop. Biop	Will coordinate development of LSRCP HGMP's which meet requirements for NMFS Artificial Propagation Biological Opinion.
	FWS LSRCP bull trout Biop	Will coordinate development of LSRCP HGMP's which meet requirements for FWS bull trout Biological Opinion.
	NWPPC's Sub basin Planning	Will coordinate development of HGMP's for LSRCP programs in the Columbia Plateau, Blue Mountain, and Mountain Snake Provinces which meet

Project ID	Title	Nature of Relationship
		objectives developed in sub basin planning.
	ESA Recovery Planning	Will coordinate development of HGMP's for LSRCP programs which meet requirements of Recovery Plans developed for listed species.
	US v Oregon CRFMP	Will coordinate development of HGMP's for LSRCP programs which meet the agreements negotiated in the CRFMP.

Relationship to Existing Goals, Objectives and Strategies

The 2000 Federal Columbia River Power System (FCRPS) Biological Opinion (NMFS 2000) identified a number of actions under artificial propagation measures to reform existing hatcheries and artificial propagation programs in the Columbia River Basin in order to capture off-site mitigation credit. The stated goal of the reforms was to reduce or eliminate adverse genetic, ecological, and management effects of artificial production on natural production while retaining and enhancing the potential of hatcheries to contribute to basinwide objectives for conservation and recovery. The goal also includes providing fishery benefits to achieve mitigation and trust responsibilities with an increased emphasis on conservation and recovery.

Many of the actions to reform existing hatcheries and artificial production programs identified in the Biological Opinion will require substantial and costly changes to meet the fundamental premise of the approach identified in the Basinwide Recovery Strategy, that artificial production programs can be operated consistent with the goals of the Endangered Species Act while meeting fishery mitigation objectives. The extent to which the reforms can be identified, implemented, and their benefits determined will lead to a consistent approach throughout the Columbia River Basin.

Efforts to implement reforms will require a systematic review of existing program objectives and facilities requirements to determine which reform measures may be appropriate for each individual program. Implementation of reforms must be consistent with basinwide strategies being developed under existing regional processes (i.e. ESA recovery planning, *US v Oregon CRFMP renegotiations,* NWPPC subbasin planning and APR, etc.) to assure a better integration of hatchery, harvest, habitat, and hydrosystem objectives and strategies.

Products of this proposed project will provide a description of the application of identified reforms for specific artificial production programs in completed HGMP's. The plans will include a clear statement of the purpose and goals of the individual programs and its relationship to harvest, habitat, and hydrosystem goals. The plans will include comprehensive operational, facility, and monitoring and evaluation (M&E) details to appropriately describe the programs. A menu of potential hatchery reforms measures will be identified that could be used to help guide future implementation of projects that could qualify for off-site mitigation credit in the hydo biological opinion. The plans will evolve over time as the ongoing regional processes and information from M&E are completed to respond to new analyses and decisions made in those forums.

Review Comments

Development of the HGMP's (for the LSRCP program) are directed specifically to address hatchery reforms identified in the FCRPS BiOp (RPA 169). These reform measures are identified as reform measures that go beyond existing (or non-existing since they have not completed their hatchery production Biop.) NMFS jeopardy criteria (related to hatchery production programs) to obtain additional (off-site mitigation) benefits to get the hydrosystem out of jeopardy. The HGMP was chosen by NMFS, NWPPC, and Federal Caucus as the format for addressing those reforms. These reform actions (unless developed in the normal LSRCP process and fundable under our existing budget) are now mandated to the hydrosystem action agencies (not the LSRCP program). The proposal outlines a coordinated approach to 1) assess our existing programs, 2) identify potential reform measures, 3) coordinate those measures with the other ongoing regional processes (ESA, US v Oregon, NWPPC, etc. along with our tribal trust and compensation responsibilities), and 4) develop HGMP's for agreed upon reform measures. Presently, funding does not exist in the LSRCP budget to accomplish this task (and it is not a LSRCP funding responsibility). This proposal would provide all of the LSRCP co-managers the staff to accomplish the above objectives within the processes we are legally mandated to participate in to address off-site mitigation. Existing LSRCP programs are not legally mandated to develop HGMP's.

Budget

FY02	FY03	FY04
$856,292 Category: High Priority Comments:	$899,107 Category: High Priority	$ Category:

Project: 28030 – Salmon River Native Resident Fish Assessment

Sponsor: IDFG and IOSC

Short Description:

Investigate population status and trends, life histories, habitat needs, limiting factors, and threats to persistence of all resident native fishes in the Salmon River Subbasin. Emphasis of work will be on salmonid fishes.

Abbreviated Abstract

The Salmon River Subbasin supports 21 species of native resident fish. Information on long-term trends in resident fish distribution and status throughout the Salmon River drainage have mostly been obtained incidental to efforts focused on monitoring juvenile anadromous salmonids. Over the past 20 years both cursory and comprehensive population and habitat assessments have been conducted by state and federal agencies on specific streams, often associated with immediate land management activities. Surveys are rarely repeated over time, thus improving or degrading trends on a sub-watershed scale have not been tracked. These assessments have largely been restricted to public lands. Distribution and abundance information on non-salmonid native fishes have been inconsistently, and only qualitatively collected.

The goal of this project is to provide a comprehensive baseline for evaluating future land and species management actions relative to effects on native fishes and their habitats. This project will: 1) complete our knowledge base of current status of all native resident fishes at the 6th HUC watershed level across all land ownerships, 2) provide recommendations for the design of long-term monitoring of those populations, and 3) coordinate the development and maintenance of a Salmon Subbasin database usable by all agencies and tribes.

Indirectly, the completion of this assessment will assist with development of future research on critical management issues in specific watersheds or with individual species.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199005500	Steelhead Supplementation Studies in Idaho Rivers	Resident fish information collected incidental to project tasks will be incorporated into assessment and database
199107300	Idaho Natural Production Monitoring and Evaluation Project	Resident fish information collected incidental to project tasks will be incorporated into assessment and database
198909800	Idaho Supplementation Studies	Resident fish information collected incidental to project tasks will be incorporated into assessment and database
199405000	Salmon River Enhancement Monitoring and Evaluation	Resident fish information collected incidental to project tasks will be incorporated into assessment and database
98002	Snake River Native Salmonid Assessment	Project design will be used as a template for this project

Relationship to Existing Goals, Objectives and Strategies

More than 17,000 miles of rivers and streams are in the Salmon Subbasin which likely support native resident fish, including bull trout, westslope cutthroat trout and redband trout (CBFWA 2001a). A thorough assessment of bull trout distribution and status is imperative to development of the recovery plan being developed by USFWS (Lohr et al. 2000). Likewise, a thorough understanding of the status of other native species is necessary to conserve populations and avoid adverse impacts that could lead to federal listing decisions. Assessment of the status of these species is listed as a “fish and wildlife need” in the Salmon Subbasin Summary (CBFWA 2001a, Section 5.4.2.).

Eighty-nine water bodies within the Salmon Subbasin are classified as impaired under the guidelines of Section 303(d) of the Clean Water Act (US EPA and IDEQ 1998). Water quality determinations, and subsequent establishment of Total Maximum Daily Loads (TMDLs) of pollutants that are tolerable to maintain beneficial uses, rely on accurate and complete aquatic fauna information. In a large percentage of the streams, the ecological integrity of fish communities may have been affected by hydropower system induced declines in anadromous fish and the nutrient cycling /forage function they provide.

A complete spatial database will provide federal, state, local, and private land managers information necessary to direct conservation and habitat restoration actions where most needed. An active database will enable managers to measure population and habitat responses to such actions. Coordination of monitoring and evaluation efforts and maintenance of common databases is central to several "needs" listed in the Salmon Subbasin Summary (CBFWA 2001a, Section 5.4).

This project is directly relevant to two Reasonable and Prudent Alternative Actions developed in the NMFS 2000 FCRPS Biological Opinion:

Action 154: BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.

Action 198: The Action agencies, in coordination with NMFS, USFWS, and other Federal agencies, NWPPC, states, and Tribes, shall develop a common data management system for fish populations, water quality, and habitat data.

Review Comments

Objective 1 (plan) is recommended as high priority and the implementation phase should be funded pending the completion/review and coordination of all management groups in the proposed study area.

Budget

FY02	FY03	FY04
$250,000 Category: High Priority (Obj 1). Recommended Action (all else) Comments:	$200,000 Category:	$200,000 Category:

Project: 28034 – Chinook Salmon Smolt Survival and Smolt to Adult Return Rate Quantification, South Fork Salmon River, Idaho

Sponsor: NPT

Short Description:

Monitor smolt production and adult escapement in the South Fork Salmon River with PIT-tag detections to provide SARs and R/S ratios as performance measures.

Abbreviated Abstract

Historically, the average annual salmon run in the Columbia River above Bonneville Dam was 5 - 11 million fish (CRIFTC 1996). In 1995 it was requested that Snake River spring/summer chinook salmon be listed as threatened under authority of the Endangered Species Act (ESA) (NMFS 1995). The South Fork Salmon River drainage in Idaho was probably the most important summer chinook salmon spawning stream in the Columbia Basin (Mallet 1974). Numerous studies have investigated factors that contribute to the decline of spring/summer chinook in the SFSR. These studies include passage problems associated with the Snake River and Columbia River dams, harvest levels, hatchery competition, and habitat degradation. There exists a need to develop performance standards to measure responses of adjustments that are employed to correct these problems. The Reasonable and Prudent Alternative (RPA) of the 2000 Federal Columbia River Power System (FCRPS) Biological Opinion (NMFS 2000) lists two performance standards: standards related to ESU status and standards used to evaluate how effective management actions produce an expected biological response. NMFS (2000) indicates that assessment of survival and recovery will be based on estimates of life stage survival and annual population growth rate (lambda λ) and measures of productivity that include recruit per spawner (R/S) and smolt-to-adult returns (SARs). The NMFS considers the status of component populations as an indicator of the status for the entire ESU. The NMFS Biological Opinion 2000, Action 179, calls for defining populations based on biological criteria and evaluating population viability in accordance with NMFS' Viable Salmonid Population (VSP) approach. The VSP defines population performance measures in terms of four key parameters: abundance, population growth rate, spatial structure, and diversity. Additionally, the VSP relates performance and risks at the population scale with risks affecting the persistence of the entire ESU (McElhany et al 2000). This project proposes to conduct monitoring of the production, migration, and survival of spring/summer chinook salmon smolts and adults in the South Fork Salmon River (SFSR) basin. The portion of the SFSR basin to be studied includes Johnson Creek, Secesh River, and the upper SFSR. By utilizing new and existing research efforts in the SFSR basin, quality smolt-to-adult return rates (SAR) and recruit-per-spawner (R/S) ratios will be generated for all individual spawning aggregates in the SFSR and for the SFSR basin population as a whole. These performance indicators will define diversity, measure spatial structure, monitor straying of natural and hatchery fish, and monitor short- and long-term changes of abundance and survival in tributary populations and the sub-basin population. In addition, the performance indicators will evaluate progress toward recovery of Snake River spring/summer chinook salmon in the SFSR basin.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
8909800	Idaho Salmon Supplementation, IDFG	Provide data and analysis for cooperative statewide program
8909801	Idaho Salmon Supplementation, USFWS	Provide data and analysis for cooperative statewide program
8909802	Idaho Salmon Supplementation, NPT	Provide data and analysis for cooperative statewide program

Project ID	Title	Nature of Relationship
8909803	Idaho Salmon supplementation, SBT	Provide data and analysis for cooperative statewide program
9604300	JCAPE M&E	Use JCAPE data for ISS project stream
9703000	Monitor Listed Stock	Cooperate with project to use video facilities
9701500	Imnaha Smolt and Adult Monitoring	Cooperate to develop equipment and methodology for SAR
9107300	Idaho Natural Production Monitoring and Eval	Data from PIT-tagged steelhead will be shared with this project
9103000	Chinook Salmon Viability Assessment	Results from the proposed project will be used as input
8712702	Comparative Survival Rate	Provide additional PIT-tags and SARs to be evaluated
9703800	Preserve Salmonid Gametes	Provide manpower for in field collection and time for collections
	McCall Fish Hatchery LSRCP Evaluations	Provide input on hatchery stray rates
	NPT, LSRCP Hatchery Evaluations	Provide input on hatchery stray rates
	University of Idaho	Provide recovery at natal streams of radio tags and spawning
	IDFG Salmonid Winter Ecology	Winter movement rates on PIT-tagged fish
	IDFG Annual Escapement Monitoring	Data to develop adults/redd indexes
	RPA Action 9	Provide measures of performance standards that are used to plan
	RPA Action 20	PIT-tag detections are used to set MOP and gate depth criteria
	RPA Action 47	Performance measures are used to assess delayed mortality
	RPA Action 107	Performance measures of adults after they pass the FCRPS
	RPA Action 118	Evaluates upstream performance of adults after passage
	RPA Action 169	Monitor impacts of hatchery fish on natural populations
	RPA Action 179	Define population on a biological basis for recovery goals
	RPA Action 180	Provides a monitoring site with accurate data collection
	RPA Action 185	Provides a performance measure to evaluate juvenile passage

Project ID	Title	Nature of Relationship
	RPA Action 188	Provides a performance measure of upstream for comparison
	RPA Action 189	Provides performance measure to monitor passage histories
	RPA Action 193	Develops new technology to monitor adult movements

Relationship to Existing Goals, Objectives and Strategies

Columbia River Basin Fish and Wildlife Program

This study will provide information as directed by the Columbia River Basin Fish and Wildlife Program (CRBFWP). The 2000 CRBFWP directs that significant attention to rebuilding healthy, natural producing fish populations by protecting and restoring habitats and the biological systems within them (NPCC 2000). The 2000 CRBFWP has three primary strategies: (1) identify and resolve key uncertainties for the program; (2) monitor, evaluate, and apply results, and; (3) make information from this program readily available. In light of the continuous and unabated decline of Columbia River salmon populations, the Independent Science Group (ISG) has called for a rigorous monitoring program combined with an adaptive management approach to salmon recovery (Williams et al. 1999).

Any proposed recovery efforts for Snake River spring/summer chinook salmon require knowledge of specific life history strategies, critical habitat for spawning and rearing, and downstream and upstream migration data. This information will provide data to describe responses of populations to habitat conditions in terms of productivity and life history diversity (biological performance) as well as description of the environmental conditions or changes that will achieve the desired population characteristics (environmental characteristics). Biological objectives should be empirically measurable and based on explicit scientific rationale and should become increasingly quantitative and measurable at smaller levels (i.e. basin, province, sub-basin, etc.) (NPPC 2000). Information from this project will provide quality data that can be better utilized to provide the basis for improved monitoring techniques as requested in the Columbia River Basin Fish and Wildlife Program (NPPC 2000).

2000 FCRPS Biological Opinion

The objectives of this proposal are specifically related to the action plans identified in the 2000 FCRPS Biological Opinion (NMFS 2000). Co-managers, such as the Nez Perce Tribe, are expected to develop monitoring techniques to help resolve a wide range of uncertainties. At a basin-wide and subbasin level, SARs of natural chinook salmon is a key uncertainty and needs to be quantified if population status monitoring is to be achieved as called for in section 9.5.6 of the 2000 FCRPS Biological Opinion (NMFS 2000). The 1995 FCRPS Biological Opinion (NMFS 1995) called for the adding of life-stage specific measures as the best source to identify requirements in each life stage to meet biological requirements of the species. Section 9.2.2 (NMFS 2000) calls for robust evaluation and comprehensive research, monitoring, and evaluation programs to evaluate population-level and life-stage specific performance standards. The 2000 FCRPS Biological Opinion

(NMFS 2000) recommends monitoring the population growth rate (lambda λ). Other recommended high priority monitoring and evaluation measures are the development of short-term measures such as recruits per spawner (R/S) ratios and life history information such as survival. The 2000 FCRPS Biological Opinion (NMFS 2000) intends to use population characteristics such as abundance, genetic diversity, life history diversity, and geographic distribution to develop specific recovery goals. They also agree the recruits/spawner and smolt-to-adult returns are important to measure but covers only a part of the life cycle and information on the entire life cycle is necessary (Section 9.2.2.1, NMFS 2000).

As required by the 2000 FCRPS Biological Opinion (NMFS 2000), a properly designed monitoring and evaluation program is essential to resolve a wide range of uncertainties. For population status monitoring, this project will determine areas that are occupied by juvenile and spawning adult chinook salmon. Over the years, abundance data will be collected and trends and variations will be evaluated to determine the status of the population. This information should reveal any population status change over time. Effectiveness monitoring data will be provided to managers by providing long-term performance measures of adult and juvenile chinook salmon abundance and spatial occupation. This project will provide quality, non-inferred data for databases that represent habitat quality, which managers can use to determine the effectiveness of their management programs. 2000 FCRPS Biological Opinion (NMFS 2000) calls for defining juvenile migrant survival for transported and non-transported migrants and adult returns for both groups and compare SAR's for these groups for delayed mortality (Section 9.6.5.3.1. In addition, research on smolt monitoring is necessary to evaluate migration timing, travel times, and relative survival data through the system. This research is necessary to satisfy elements of the RPA in sections 9.6.1 and 9.6.5.3.1 App. H, NMFS 2000).

Hierarchical Tier 1 monitoring will be provided by data from this project in the form of status of spawners, juveniles, and hatchery-origin spawners. Some habitat monitoring will be provided by this project with stream temperature data, and instream flow data. The goals of Tier 2 monitoring will be provided by this project measuring spawner and redd counts at specific sites, juvenile density and emigration estimates, counts of hatchery fish on spawning sites, counts at weirs, and age structure of spawners on sites (Section 9.6.5.2, NMFS 2000). As recommended by NMFS (2000), fates of individual fish as a function of their history will be tracked by use of PIT-tags.

The Reasonable and Prudent Alternative (RPA) of the 2000 FCRPS Biological Opinion (NMFS 2000) lists two performance standards: standards related to ESU status and standards used to evaluate how effective management actions produce an expected biological response. NMFS (2000) indicates that assessment of survival and recovery will be based on estimates of life stage survival and annual population growth rate (lambda λ) and measures of productivity that include recruit per spawner (R/S) and smolt-to-adult returns (SARs). A primary objective of this project is to provide lambda, R/S, and SARs. Other parameters that will be examined by this project and that are listed by NMFS as characteristics of a salmon population that must be examined are abundance, genetic diversity, life history diversity, and geographic distribution. Objectives of this project include collection and analysis of data for all of these characteristics.

Data collected by this project are specific to implementation and progress reports. Paragraph 9.5.3.2.2 of the 2000 FCRPS Biological Opinion (NMFS 2000) specifically states that "enough new data shall be provided to allow NMFS to apply the performance standards provided in section 9.2.2.1, including the abundance, productivity trends, species diversity (genetic and life history diversity, and population distribution for each listed ESU." This same data can be used by management agencies to evaluate the effectiveness of off-site mitigation actions (NMFS 2000, section 9.5.2.3.4).

CBFWA (1990) as cited in NMFS (2000) acknowledges that there are multiple ESUs within the Snake River basin. However, available data do not clearly demonstrate their existence or define their boundaries. Information from this project will help define ESUs in a more finite manner. The 2000 FCRPS BIOP addresses this question but uses very general aspects to differentiate between races. Additionally, the 2000 FCRPS BIOP states that there is mixed evidence as to whether supplementation and stock transfers have altered genetic make up of indigenous populations. Little information has been generated about the impacts of large releases on natural stocks. This project will monitor straying of natural and hatchery releases and may answer questions associated with hatchery influences on natural populations. NMFS uses a broad range of assumptions about the relative effectiveness of hatchery fish for estimation of the median population growth rates (lambda) and the risk of absolute extinction of chinook salmon index stocks (NMFS 2000). Data from this project will help reduce the uncertainties associated with these assumptions.

NMFS developed guidelines for basin level, multi-species recovery planning for the foundation of species-specific recovery plans (NMFS 2000). These guidelines are contained in The Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy (Basin Recovery Strategy - BRS). NMFS (2000) lists the BRS recovery and threshold abundance levels for index stocks (Table C-4). These abundance levels are used as reference points for comparisons with observed escapements (NMFS 2000). The abundance of Poverty Flat index stock can be estimated with data collected by this project and the existing McCall Fish Hatchery weir and redd survey data. These data provide information about index levels that meet the guidelines established within the BRS.

One step NMFS uses for application to apply the ESA Section 7(a)(2) standards developed in the 1995 FCRPS Biological Opinion for Pacific salmon is to define the biological requirements and current status of each listed species. This project will add considerable biological information about the adult life history stage for a sub-basin and its tributaries. NMFS (2000) establishes a recovery abundance level of Snake River spring/summer chinook salmon for index stocks in Johnson Creek and Poverty Flats. Data generated from this project can be used as a long-term monitor to determine whether or not that recovery abundance level is being attained.

Specific actions related to this proposed project that are listed in the RPA:

Action 9: This action concerns the development of Research, Monitoring, and Evaluation Plan. Performance standards are needed to develop these plans. Monitoring data collected by this project will help resolve a wide range of uncertainties for 1- and 5- year plans. Objectives of our research activities that address these uncertainties that can be resolved include: monitoring population's status, monitoring causal relationships between habitat (or other) attributes and population response, and monitoring the effectiveness of management actions. The performance standard that can be readily achieved is the R/S ratio or SAR. This project will measure R/S ratios or SARs from the SFSR and its tributaries. Since the historical production of Snake River summer chinook salmon has occurred mainly in the SFSR, it is important to measure and monitor the R/S ratios or SARs for this sub-basin in a long-term program that can be evaluated to monitor experimental management changes anywhere in the FCRPS and Salmon River basin from the SFSR downstream.

Action 20: This action calls for the Corps of Engineers to operate the Lower Snake River reservoirs within 1 foot of MOP for the majority of the time that juvenile migrants are present. An objective of this project is to use PIT-tag data to determine survival of smolts through the Lower Snake River hydro facilities. This information is critical to establishing dates for implementing MOP conditions to be friendlier for juvenile fish. Since chinook salmon in Secesh River are considered to be wild stocks, it is critical that these fish be afforded maximum consideration to be passed quickly through the FCRPS. The PIT-tag detections of returning adult migrants can be used in lieu of radio tagging to monitor changes in gate depth criteria at each dam to ensure best passage conditions for adults.

Action 47: This action addresses delayed mortality (D). In conjunction with Action185, data from this project can be used by the Action Agencies to evaluate delayed mortality of transported versus non-transported fish. This project proposes to PIT-tag enough fish to get statistically significant numbers of returning adults to provide a performance measure with R/S ratios or SARs to compare in-river, transported, and undetected juveniles through the FCRPS. This data will be available to other researchers to evaluate delayed mortality (D).

Action 107: This action concerns adult passage and evaluation of survival through the hydro system. It includes assessment of survival of adult salmonids migrating upstream and factors contributing to unaccounted losses. This includes measures that are objectives of this project which include: evaluation of survival rates through the system (SAR Lower Granite Dam to Lower Granite Dam), reproductive success (smolt abundance), and straying into non-natal streams. If reduced reproductive success occurs, it will be reflected by an increased adults/smolt ratio and reduced smolt production. Major objectives of this project are to monitor smolt production and escapement abundance. R/S ratios and SARs at the natal stream and SARs at LGD will be monitored over the long-term to determine if significant mortality exists upstream of the facilities. Pit-tagged hatchery fish straying into monitored tributaries of the SFSR will be detected. In addition, non-PIT-tagged hatchery fish that stray into Secesh River will be accounted for in conjunction with the Nez Perce Video Monitoring project (Number 1997-030-00) and in Johnson Creek by the JCAPE M&E project (Number 96-043-00).

Action 118: This action addresses indirect pre-spawning mortality of adult upstream-migrating fish. Current researchers are using large radio tags to determine mortality within the FCRPS and upstream of the facilities. The results of this research produce some questions of their accuracy and the impact on the adults that are radio tagged. It is the recommendation of this action that further studies be conducted to resolve the accuracy of the current research. Objectives of this project are to use PIT-tags and passive monitoring to estimate survival rates through the FCRPS and to the spawning grounds for streams in the SFSR. The use of PIT-tags in juveniles will eliminate the need to use additional invasive methods to monitor survival in adults that may impact spawning abilities. In conjunction with passive video monitoring for abundance at the spawning grounds, R/S ratios and SARs will provide information as to whether there is significant pre-spawning mortality above the FCRPS.

Action 169: This action concerns hatchery reforms and development of hatchery and genetic management plans (HGMP). A hatchery exists on the upper portion of SFSR. The JCAPE O&M division will operate a hatchery operation on Johnson Creek. A major objective of this project is to monitor the impacts hatchery releases have on wild/natural fish in the remainder of the SFSR. Data from this project will help with the assessment of hatchery reforms for the SFSR McCall Hatchery and Johnson Creek JCAPE O&M programs to assist with writing their HGMPs. In particular, straying rates of hatchery adults into the wild population of Secesh River will be monitored by this project and Nez Perce Tribe ISS project (Number 89-098-02). Straying rates into the natural populations of Johnson Creek will be monitored by Nez Perce Tribe JCAPE M&E project (Number 96-043-00). IDFG management personnel monitor straying rates at Poverty Flats and Stolle Meadows. Releases of fish into the SFSR by the McCall Fish Hatchery will be monitored by this project to determine if there is a relationship between number released and SARs. This needs to be monitored for potential impacts on wild/natural fish in SFSR.

Action 179: This action concerns defining populations based on biological criteria and assessing population viability. Biologically based populations must be defined to establish recovery goals (NMFS 2000). To define the SFSR population, objectives of this proposal include monitoring and reporting environmental and habitat characteristics, life history traits, demographic information, estimates of straying or migration, and geographic distribution. This data may be used by Action Agencies and NMFS to develop recovery goals for listed salmon ESUs.

Action 180: This action concerns the development of hierarchical monitoring program. Data collected by this project provides knowledge that will assist a hierarchical monitoring program with ground-truthing database information and a population and environmental status (including assessment of performance measures). The number of sites to be monitored will be determined with a power analysis. The data collected will contribute to the Technical Recovery Team process (NMFS 2000), which includes defining areas used by adults and status of populations for Tier 1 monitoring. Objectives of this project are to define the population growth rate, estimate smolt abundance and survival rates, and long-term monitoring to detect significant changes.

Action 185: This action concerns juvenile monitoring and evaluation in the FCRPS. This RPA Action is in conjunction with Action 47, which requires an evaluation by the Action Agencies of delayed mortality of transported versus non-transported fish. This project proposes to PIT-tag enough fish to get statistically significant numbers of returning adults to provide a performance measure with R/S or SARs to assist the CSS project compare in-river, transported, and undetected juveniles through the FCRPS. This data will be provided to other researchers to evaluate delayed mortality (D). This project proposes to PIT-tag enough fish to support the necessary detections at the FCRPS. In conjunction with the Nez Perce Tribe JCAPE M&E project (Number 9604300), the Nez Perce Tribe ISS project on Secesh River (Number 89-098-02), and the IDFG ISS project on the SFSR (Number 89-09-800), wild/natural fish will be marked with PIT-tags to monitor passage through the hydro facilities.

Action 188: This action addresses the need for studies of PIT-tagged fish from the lower Columbia River streams. Information from our proposed project in an upriver drainage will add to the PTAGIS and Streamnet databanks so other researchers or managers can make comparisons with any downriver research project. This will enable comparison of similarities and differences between various experimental management actions that may occur throughout the FCRPS.

Action 189: This action calls for studies relating to the passage histories of fish through the guidance systems in the hydro system. In conjunction with the Nez Perce Tribe JCAPE M&E project (Number 9604300), the Nez Perce Tribe ISS project on Secesh River (Number 89-098-02), and the IDFG ISS project on the SFSR (Number 89-09-800), wild/natural fish will be marked with PIT-tags to monitor passage through the hydro facilities and collect data on adult escapement returning through the hydro facilities. One of the primary objectives of this project is to measure smolt survival and SARs and R/S ratio of adults at LGD and to the natal streams. SARs have been used to monitor the variation in the passage histories. Managers can use these SAR or R/S data to monitor impacts from experimental management of the hydro system that may impact passage. Managers can use information about adult mortality upstream of the hydro facilities to determine effectiveness of land and water management activities. Inclusion of the data generated by this project in the PTAGIS database will allow spatial and temporal basin-wide research and analysis comparisons to occur in the future.

Action 193: This action calls for the investigation of state-of-the-art, novel fish detection techniques in long-term research projects, monitoring programs, and evaluations of program results. An objective of this project is to use advanced PIT-tag detection technology in the natal streams to detect adult escapement in less than optimal conditions. Destron-Fearing has made advances with the detection range and configuration of detection equipment. In streams where the Nez Perce

Tribe Video Monitoring project (Number 1997-030-00) is active, new detectors will be used in conjunction with existing temporary in-stream structures to monitor adults. In other locations, temporary detection structures will be used year-round for adult and juvenile detections (Figure 2, Figure 3). Data from detections will be at the natal stream and R/S ratios or SARs can be calculated for that particular stock or will be combined with other sub-basin tributaries in an aggregate for sub-basin R/S ratios or SARs. R/S ratios and SARs can be used to monitor experimental management of the hydro facilities and to determine mortality upstream of the hydro facilities.

Salmon Subbasin Summary

This project incorporates all the measurement objective metrics that are necessary at the basin, watershed, and reach levels. At the basin level, to measure total fish population, inter-annual variability, or spatial distribution across the basin, metrics include adult counts at the river mouth and extensive redd or spawner counts (Botkin et al. 2000). At the watershed level, to measure the effects of management actions or population responses in treated versus untreated watersheds, metrics this project will measure include redd or spawner counts and smolt production and survival (Botkin et al. 2000). At the reach level, to measure the effects of site-specific management prescriptions or season utilization of different reach types, metrics this project will measure include life history stage specific survival (Botkin et al. 2000). All of these measures will address the needs listed in the Salmon Subbasin Summary (Servheen et al. 2001).

This project is designed to provide empirical data necessary to adequately describe the biological performance in terms of abundance and performance of chinook salmon in key (index) areas to address critical uncertainties and data gaps described in the Salmon Subbasin Summary under sections 4.1.1a, 4.2, 4.4.4a, and 4.5 (Servheen et al. 2001). Further direction is given within the Salmon Subbasin Summary to halt declining trends in salmon populations above Bonneville Dam, restore healthy naturally reproducing populations of salmon in each relevant province, and to increase total salmon runs above Bonneville Dam. Any proposed recovery efforts for Snake River spring/summer chinook salmon require knowledge of specific life history strategies, critical habitat for spawning and rearing, downstream emigration, and upstream migration. This information will provide data to describe responses of populations to habitat conditions in terms of productivity and life history diversity (biological performance) as well as description of the environmental conditions or changes that will achieve the desired population characteristics (environmental characteristics). Biological objectives should be empirically measurable and based on explicit scientific rationale and should become increasingly quantitative and measurable at smaller levels (i.e. basin, province, sub-basin, etc.) (NPPC 2000). Redd counts and estimates of fish abundance are the primary measures used to derive measures of stock performance (Servheen et al. 2001). To measure specific stock performance, this project will measure SARs and R/S ratios directly rather than make estimates. Information from this project will provide quality data that can be better utilized to provide the basis for improved monitoring techniques as requested in the CRBFWP (NPPC 2000, NMFS 2000).

Specific needs that are addressed in the *Salmon Sub-basin Summary* that are closely related to this proposal include:

Multi-scaled Ecological Research and Development of New Analytical Tools (5.4.1)

5.4.1.3. Identification of the key processes constraining evolutionary potential and the distribution of intraspecific diversity. This project will provide life history data and abundance numbers and identify fish distributions to add to the information needed to evaluate diversity of SFSR populations.

5.4.1.4. Evaluation of metapopulation dynamics and key processes such as straying and dispersal is an objective. Data from this project will be subjected to Population Viability Analysis with the STOCHMVP (relatively new concepts and program) program to determine if the SFSR is a metapopulation and the probability of persistence that it has (Dennis et al. 1991, Garton 2001).

5.4.1.7. Evaluating non-invasive methods to study severely depressed salmonid stocks that may be sensitive to effects of scientific studies using conventional methods. Expanded antennae transceiver (manufactured by Destron-Fearing) technology will be tested so that minimal invasive means have to be used to collect data from depressed stocks.

Fisheries/Aquatic Needs (5.4.2)

5.4.2.1. Continue Lower Snake River Compensation Hatchery Monitoring and Evaluation to determine hatchery chinook and steelhead performance, natural production responses, competitive interactions, harvest management and apply for adaptive management. This project will monitor hatchery stock's performance and natural stock performance in the same sub-basin. Monitor data about straying rates in the SFSR will provide information to the hatchery to examine alternative management options that may influence straying rates.

5.4.2.3. Continue and expand investigations of interactions between hatchery and wild chinook, steelhead, and resident fish. As explained in number 1, this proposed project would monitor straying rates.

5.4.2.4. Quantify the types and extent of straying by chinook. See numbers 1 and 3 above.

5.4.2.13. Conduct gamete preservation on all salmonids throughout the Salmon Subbasin. This project proposes to assist the gamete project with location of suitable sample areas and predictions of peak spawning to time collections.

Chinook Salmon (Includes all races unless specifically noted)

1. Gather improved population status information for wild, natural and hatchery chinook salmon including life history characteristics, smolt and adult migration patterns, adult holding areas, survival factors, smolt-to-adult survival, adult

spawner abundance, distribution, timing, and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded ISS, Idaho Natural Production Monitoring Program, Listed Stock Escapement Monitoring project, and new projects (emphasis added). This management need is the strength of this proposed project. The emphasis of this proposed project will focus on SARs and R/S ratios.

5. Define the metapopulation structure of the SFSR and upper and lower MFSR watersheds. This project will examine adult characteristics that define the possible metapopulation classification of SFSR.

10. Determine hatchery and natural composition of adult salmon in natural production areas. In conjunction with NPT and IDFG ISS and JCAPE, this project will evaluate hatchery escapement in natural spawning areas.

13. Quantify mortality rates and straying of adult chinook salmon from LGD to natural production areas. This project proposes to use PIT-tag detectors to monitor the movements of adults upstream of LGD to the natural spawning areas. Straying into other SFSR tributaries will be monitored. A time-series evaluation of the data may quantify the mortality over time.

Combined Aquatic and Terrestrial Needs (5.4.4)

13. Continue and enhance the cooperative/shared approach in research, monitoring, and evaluation between tribal, federal, state, local, and private entities to facilitate restoration and enhancement measures. Protection and restoration of fish and wildlife populations and habitat will not be successful without the interest and commitment of all parties. The proposed project will add to all major database and public information sources (PTAGIS, Streamnet, etc.). Additionally, presentations about the project are a major objective of the project.

14. Better educate the public on issues and policies important to natural resources restoration, protection, and enhancement to encourage meaningful public participation. To educate the public and facilitate more participation, this project will assemble and present information to groups within the public domain.

Federal Land Management Agencies
Most of the lands along the SFSR are managed by Federal Agencies. The U.S. Forest (USFS) is the primary land manager. Under the auspices of the Government Performance and Results Act and Chief Financial Officer's Act, the USFS prepared the USDA Forest Service Strategic Plan (USFS 2000). This plan provides the direction for the future that the USFS will follow to attain two of its four primary goals: address ecosystem health and scientific and technical assistance. The Natural Resources Agenda (NRA) is a current strategy that the USFS follows and is focused watershed health and restoration, sustainable forest management, the national forest road system, and recreation (USFS 2000). In addition, the Land and Resources Management Planning (LRMP) rule is another current effort by the USFS that requires the USFS to consider the relationships of possible actions

to the goals and objectives of the Forest Service Strategic Plan. The LRMP has three key elements as its major focus: (1) collaboration with interested and affected parties, (2) science-based assessments and planning, and (3) ecological, social, and economic sustainability (USFS 2000). The Salmon Subbasin Plan details the habitat reclamation and other land management practices the USFS has undertaken to improve the habitat occupied by salmon along the SFSR (Servheen et al. 2001). This proposed project will work cooperatively with the USFS to provide salmon performance measures to evaluate the USFS's degree of attaining the goals and objectives required in their management plans.

Additionally, the objectives proposed by this project are designed to answer land use practices, adult salmon passage, and stock identification questions addressed in the Tribal Recovery Plan (CRITFC 1995). Recommended short-term actions to evaluate impacts of tributary land use practices on fisheries include smolt production and production per spawning pair. Recommended actions for adult salmon passage include more accurate and precise counting methods during the entire upstream migration of listed species. Collection and evaluation of data on escapement, age composition, and smolt production may provide a measure that can be monitored to identify any differences between stocks that occupy the different tributaries in the SFSR. The number of returning adults will be used to evaluate the ability of managers to meet stock specific goals set by the Columbia River Fish Management Plan (CRFMP) (CRITFC 1995).

Review Comments

This project addresses RPA 180.

Budget

FY02	FY03	FY04
$660,000 Category: High Priority Comments:	$600,000 Category: High Priority	$630,000 Category: High Priority

Project: 28035 – Geomorphic Controls on Watershed-Scale Availability of Chinook Salmon Spawning Habitat in the Salmon River

Sponsor: UI, RMRS

Short Description:

Quantify geomorphic controls on watershed-scale availability of sediment sizes suitable for chinook spawning.

Abbreviated Abstract

Healthy spawning habitats are critical to the persistence of endangered salmon populations and the locations of these habitats may be an important factor imparting spatial structure to populations across a landscape. Although a variety of environmental factors influence the production of quality spawning habitat, a primary control is the size of bed material that an adult salmonid can move to excavate a redd. We propose to quantify geomorphic controls on watershed-scale availability of sediment sizes suitable for chinook spawning in the Middle Fork Salmon River (MFSR). Digital elevation models will be coupled with theoretical equations of channel competence to predict grain size as a function of channel hydraulics and boundary shear stress; thereby allowing rapid identification of channel reaches with suitable chinook salmon spawning habitat. The effects of channel type on hydraulic roughness and shear stress will be overlain on these initial predictions. Finally, modification of grain size by sediment supply (volume and size) will be examined through 1) field studies that identify sources and magnitudes of sediment supply (e.g., tributary inputs, post-fire debris flows, spatial variation in parent lithology), and 2) theoretical modeling of stochastic sediment inputs and sediment routing through the drainage basin. Initial field studies will provide essential input parameters, and model predictions will be tested against existing surveys of chinook spawning habitat (Thurow 2000). The MFSR was chosen as a study site because of availability of data to test the model, and because of its relatively pristine condition that serves as crucial habitat for federally listed chinook salmon. The ability to predict the locations of potential spawning habitat across broad geographic areas has applications for: 1) remotely estimating the distribution and amount of available spawning habitat within a watershed, 2) focusing conservation and restoration efforts on critical habitats, and 3) providing insight to the spatial structure of populations within and among streams.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
9902000	Analyze the persistence and spatial dynamics of Snake River chinook salmon	Collaborative, information sharing

Relationship to Existing Goals, Objectives and Strategies

The importance of productive, well-connected, and fully functional habitats is a common theme throughout the goal statements of the Columbia Basin Fish and Wildlife Program (CBFWP, 2000). This priority is evidenced in two of the provisional biological objectives outlined in the CBFWP. The first objective states that CBFWP will "Protect the areas and ecological functions that are at present relatively productive for fish and wildlife populations to provide a base for expansion of healthy populations as we rehabilitate degraded habitats in other areas." The second objective states that CBFWP will "Protect and restore freshwater habitat for all life history stages of the key species." The CBFWP also outlines a specific habitat strategy with a goal to "Identify the current conditions and biological potential of the habitat, and then protect or restore it to the extent described in the biological objective."

A similar focus on the importance of habitat is contained in the biological opinion issued by the National Marine Fisheries Service (NMFS) in 2000 (FCRPS Biological Opinion), which specifically recommends habitat protection measures in two reasonable and prudent actions relevant for the Mountain Snake Province.

Action 150: In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.

Action 153: BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BPA and NMFS will develop by June 1, 2001.

In providing guidance for research priorities, NMFS underscored a habitat-based approach to recovery by suggesting priority be given to proposals that "protect and restore land and water habitat in ways that permanently address underlying ecosystem processes, reconnect isolated habitats or improve connections between habitats."

An assumption inherent to all habitat-based initiatives is that key areas can be accurately and objectively identified in a timely fashion. At present, however, systematic frameworks do not exist for the identification of these areas and restoration efforts are typically based on subjective identifications and assessments of habitat potential. The research we propose would provide a means to objectively identify critical spawning habitats for chinook salmon. Further, the ability to quantify model inputs using a geographic information system (GIS) ensures that the approach can be rapidly applied to broad geographic areas. As a result, spawning areas with high restoration or conservation priority could be identified across large watersheds and targeted for conservation efforts.

At a local level, our proposed work addresses a research need identified in the recent draft of the Salmon Subbasin Summary, which is to develop and validate habitat models at broader scales than have been traditionally considered (pg. 190, Serhveen et al. 2001). A better understanding of the broadscale geomorphic controls on spawning habitat availability is crucial for assessing current ecosystem conditions and predicting likely response to natural and anthropogenic disturbances. This information is also relevant for developing defensible watershed analyses, designing and implementing habitat restoration and maintenance projects, and providing insight to the function and structure of salmonid populations.

Review Comments

This project should be incorporated into project number 199902000. See the comments for project 199902000.

Budget

FY02	FY03	FY04
$ Category: Do not fund as stand alone project. See project 199902000. Comments:	$ Category: Do not fund as stand alone project. See project 199902000.	$ Category: Do not fund as stand alone project. See project 199902000.

Project: 28036 – Holistic Restoration of Critical Habitat on Non-federal Lands in the Pahsimeroi Watershed, Idaho

Sponsor: Custer SWCD / OSC

Short Description:

Collaborative effort to implement projects on non-federal lands that are effective at improving habitat conditions (and survival rates) for native anadromous and resident salmonids in the Pahsimeroi watershed, Idaho.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project (USBWP) is by far the largest collaborative effort to restore salmon habitat on non-federal lands in the Salmon Subbasin or elsewhere in Idaho. The Project is a multi-stakeholder effort covering four hydrologic units that include the Lemhi, Upper Salmon, Pahsimeroi, and Middle-Salmon Panther watersheds. Efforts on the Project are coordinated through the Idaho Soil Conservation Commission, with the Lemhi and Custer Soil and Water Conservation Districts doing most of the direct work with private landowners. The USBWP, with a multi-agency technical team providing guidance, has implemented a diversity of important habitat restoration projects in areas where such activities had previously been quite limited.

The USBWP program is now being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 2002 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

The project described in this proposal covers the planning, design, construction, project implementation, O&M, and M&E activities the USBWP anticipates in the Pahsimeroi watershed during FY 2002 and into the near future. Because of the way in which collaborative groups such as the USBWP operate, the scope of this proposal is an expert generated "best-estimate" of the mix of analyses and projects that will be implemented over the next several years. The proposal represents a serious effort by the USBWP to upgrade planning and M&E efforts that have in the past been limited by staffing constraints.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/ Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.

Project ID	Title	Nature of Relationship
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Upper Salmon River Diversion Consolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon Watersheds.
199401500	Idaho Fish Screen Improvements (Idaho Dept. of Fish and Game)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.
200105100	Little Morgan Creek	RPA Action # 149, 150, 151, 153 - Increase tributary flows and connectivity with the mainstem Pahsimeroi River.
199107300	Idaho Natural Production M&E	RPA Action # 182 - Annual monitoring of salmonid abundance at established stations.
198909803	Idaho Supplementation Studies (IDFG, ShoBan Tribes, UI, USFWS)	Relationship to be developed.
199906300	Aquatic Ecosystem Review for the Upper Salmon Subbasin (UI/ERG)	RPA Action # 152, 154 - Environmental evaluations and analyses supporting selected USBWP restoration work.
199905500	Steelhead Supplementation Study (IDFG)	Relationship to be developed.

Relationship to Existing Goals, Objectives and Strategies

Holistic Restoration of Critical Habitat on Non-federal Lands in the Pahsimeroi Watershed, Idaho will be an important component of salmon and ecological restoration efforts in the Columbia River Basin because it will achieve on-the-ground habitat improvements in areas critical to the persistence of ESA-listed anadromous salmonids. The importance of these areas was described earlier in Section “b”. Given the ways in which the USBWP intends to revise its operations in the Pahsimeroi watershed, the project will also incorporate more rigorous project planning, monitoring, evaluation, and adaptive management that will help assure that its restoration actions become increasingly effective at achieving important biological objectives through time.

Continuation of this project will address many fish and wildlife needs identified in the recently completed Salmon Subbasin Summary (Servheen et al. 2001), and will be entirely consistent with regional programs. Needs, goals, objectives, and strategies addressed by the project are identified below.

Multiple fish and wildlife needs identified in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the proposed project:

- Protect and restore riparian and instream habitat structure, form, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
- Protect, restore, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.
- Reduce stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.
- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.
- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff, and wastewater effluent.
- Monitor and evaluate habitat restoration and improvement activities, habitat baseline conditions, water quality and water quantity improvements, conditions and trends.
- Contribute to a coordinated, collaborative M&E effort in the Salmon Subbasin, to maximize effectiveness and minimize redundancy.
- Develop and implement improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
- Develop and maintain comprehensive and consistent subbasin databases related to both aquatic and terrestrial resources, and establish a centralized data repository.
- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitats (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
- Protect key fish and wildlife habitats directly threatened by subdivision, recreation, or extractive resource uses.
- Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

The proposed project is consistent with USBWP goals, objectives, and strategies identified in the Salmon Subbasin Summary (Servheen et al. 2001):

- Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1 Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.

Strategy 1 Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2 Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3 Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4 By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2 **Reduce the number of physical barriers hindering fish migration.**

Strategy 1 Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2 Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3 In cooperation with the NRCS, BOR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for all life stages of fishes.

Objective 1 **Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.**

Strategy 1 By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2 Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3 In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.

Strategy 4 Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5 Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6 Work cooperatively with willing irrigators to restore stream flows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7 Continue development of the IMPACT Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The proposed project is consistent with the following July 2000 recommendations of the Governors of Idaho, Montana, Oregon, and Washington, for the protection and restoration of fish in the Columbia River Basin:

- *Partnerships*

-- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

- *Water for Fish*

-- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.

-- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this

-- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

• *Local Recovery Plans*

-- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

• *Fish Passage*

-- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.

-- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.

-- Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

The USBWP addresses the above recommendations through coordination of multiple entities, technical, financial, educational resources, and jurisdictional responsibilities for the protection, restoration, and complexity of fish habitat. Habitat projects coordinated through the USBWP respond directly to flow issues through work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems. Fish passage will be enhanced through these projects through liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

The proposed project will contribute to meeting the vision of the 2000 Columbia River Basin Fish and Wildlife Program:

• *Objectives for biological performance*

Anadromous fish losses

-- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005.

-- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.

-- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

The USBWP contributes to regional efforts to meet these these objectives by implementing habitat improvement projects on nonfederal land that are coordinated with the multiple entities that have jurisdictional responsibilities for the protection, restoration, and complexity of critical fish habitat.

Resident fish losses

-- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.

-- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.

-- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Actions that the USBWP implements with stakeholders on nonfederal land help protect and restore ecosystems and ecosystem functions that are beneficial to resident and anadromous fish.

Wildlife losses

-- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.

-- Maintain existing and created habitat values.

Actions the USBWP implements on nonfederal land help protect and restore ecological values that are important to native species of wildlife.

Habitat Strategies

Primary strategy

-- Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

Supporting strategies

-- Build from strength

-- Restore ecosystems, not just single species

-- Use native species wherever feasible

Habitat projects implemented by the USBWP focus on protecting high quality habitat, restoring poorly functioning components of ecosystems that support multiple species, and restoring native riparian vegetation.

The proposed project supports the December 2000 FCRPS Biological Opinion:

Action 149a:	BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. The Lemhi watershed is included within these priority subbasins and is identified for immediate action.
Action 149b:	The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.
Action 149c:	BPA addresses passage, screening, and flow problems where they are not the responsibility of others.
Action 149d:	BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.
Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 151:	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152 b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).

Action 152f: Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Action 153: BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.

Action 154a: BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.

Action 154b: The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.

Action 183: Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

All of the above actions in the Pahsimeroi watershed will be done directly by, or in association with, the USBWP:

Fish Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

Fish Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.

Flow – Work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.

Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.

Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This work is especially important as most fish spawning and rearing habitat is on private land.

Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.

Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.

Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.

TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.

Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.

Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.

Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.

River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

Addresses RPA 149, 150 and 154. Similar to the ISRP's review, the CBFWA reviewed Proposals 28036, 28037, 28038, 28039, 28040 and 199901900 as a collection of proposals. Except for proposal 28039, all the proposed work would protect and enhance spawning habitat. Proposal 28039 would protect a migration corridor that is also characterized by the presence of rearing habitat, habitat types that do not exist in the other watersheds. The reviewers and project sponsors are in agreement with the ISRP regarding the development of a well-defined watershed assessment; however IDFG expressed concern that landowner support could be lost if additional planning efforts were required during the next couple of years at the expense of implementation. Recognizing that nearly 90% of the spawning activities occur on private lands, IDFG realizes landowner participation is essential to the management and conservation of the resources. As a result, managers have spent over a decade developing working relationships with private landowners through extensive planning processes. Based on their working relationships with the landowners, the managers indicated that requiring the development of assessments prior to implementing actions that have already been discussed/planned with the landowners will result in the loss of public support and subsequently the inability to manage the areas that have been identified as critical through a decade of planning. Although the proposals have new project numbers they are ongoing projects (i.e., 199401700, 199306200, 19960700). The BPA COTR, who was present during the review, indicates that these proposals are not characterized by a change of scope. Although the tasks are considered a high priority, there is concern among CBFWA reviewers about the size of the proposed budgets and the ability to implement actions at the proposed rate. In each proposal, a professor, graduate student and writing contractor are identified. Are these separate individuals for each project? Could cost savings be achieved through coordination of these projects during funding? The budget for the implementation phase should be refined, as appropriate, based on the results of the assessment. The budget needs reconciling in terms of cost of assessments and scheduling of implementation tasks.

Budget

FY02	FY03	FY04
$2,606,341 Category: High Priority Comments:	$2,623,700 Category: High Priority	$2,696,000 Category: High Priority

Project: 28037 – Holistic Restoration of Critical Habitat on Non-federal Lands in the Lemhi Watershed, Idaho

Sponsor: Lehmi SWCD / OSC

Short Description:

Collaborative effort to implement projects on non-federal lands that are effective at improving habitat conditions (and survival rates) for native anadromous and resident salmonids in the Lemhi watershed, Idaho.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project (USBWP) is by far the largest collaborative effort to restore salmon habitat on non-federal lands in the Salmon Subbasin or elsewhere in Idaho. The Project is a multi-stakeholder effort covering four hydrologic units that include the Lemhi, Upper Salmon, Pahsimeroi, and Middle-Salmon Panther watersheds. Efforts on the Project are coordinated through the Idaho Soil Conservation Commission, with the Lemhi and Custer Soil and Water Conservation Districts doing most of the direct work with private landowners. The USBWP, with a multi-agency technical team providing guidance, has implemented a diversity of important habitat restoration projects in areas where such activities had previously been quite limited.

The USBWP program is now being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 2002 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

The project described in this proposal covers the planning, design, construction, project implementation, O&M, and M&E activities the USBWP anticipates in the Lemhi watershed during FY 2002 and into the near future. Because of the way in which collaborative groups such as the USBWP operate, the scope of this proposal is an expert generated “best-estimate” of the mix of analyses and projects that will be implemented over the next several years. The proposal represents a serious effort by the USBWP to upgrade planning and M&E efforts that have in the past been limited by staffing constraints.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Upper Salmon River DiversionConsolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon watersheds.
199401500	Idaho Fish Screen Improvements (IDFG)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.
199107300	Idaho Natural Prouction M&E (IDFG)	RPA Action # 182 - Annual monitoring of salmonid abundance at established stations.
198909803	Idaho Supplementation Studies (IDFG, ShoBan Tribes, UI, USFWS)	Relationship to be developed.
199906300	Aquatic Ecosystem Review for the Upper Salmon Subbasin (UI/ERG)	RPA Action # 152, 154 - Environmental evaluations and analyses supporting selected USBWP restoration work.

Project ID	Title	Nature of Relationship
199705700	Salmon River Production Program (ShoBan Tribes)	Relationship to be developed.
200105200	Hawley Creek	RPA Action # 149, 150, 151, 152, 153, 154 - Increase tributary flows to the Lemhi River.

Relationship to Existing Goals, Objectives and Strategies

Holistic Restoration of Critical Habitat on Non-federal Lands in the Lemhi Watershed, Idaho will be an important component of salmon and ecological restoration efforts in the Columbia River Basin because it will achieve on-the-ground habitat improvements in areas critical to the persistence of ESA-listed anadromous salmonids. The importance of these areas was described earlier in Section "b" and reflected in recent federal identification of salmon habitat on non-federal lands in the Lemhi watershed as a high-priority for immediate funding of restoration actions. Given the ways in which the USBWP intends to revise its operations in the Lemhi watershed, the project will also incorporate more rigorous project planning, monitoring, evaluation, and adaptive management that will help assure that its restoration actions become increasingly effective at achieving important biological objectives through time.

Continuation of this project will address many fish and wildlife needs identified in the recently completed Salmon Subbasin Summary (Servheen et al. 2001), and will be entirely consistent with regional programs. Needs, goals, objectives, and strategies addressed by the project are identified below.

Multiple fish and wildlife needs identified in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the proposed project:

- Protect and restore riparian and instream habitat structure, form, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
- Protect, restore, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.
- Reduce stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.
- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.
- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff, and wastewater effluent.
- Monitor and evaluate habitat restoration and improvement activities, habitat baseline conditions, water quality and water quantity improvements, conditions and trends.
- Contribute to a coordinated, collaborative M&E effort in the Salmon Subbasin, to maximize effectiveness and minimize redundancy.
- Develop and implement improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
- Develop and maintain comprehensive and consistent subbasin databases related to both aquatic and terrestrial resources, and establish a centralized data repository.

- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitats (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
- Protect key fish and wildlife habitats directly threatened by subdivision, recreation, or extractive resource uses.
- Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

The proposed project is consistent with USBWP goals, objectives, and strategies identified in the Salmon Subbasin Summary (Servheen et al. 2001):

Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1. Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.

Strategy 1. Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2. Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3. Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2. Reduce the number of physical barriers hindering fish migration.

Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3. In cooperation with the NRCS, BOR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for all life stages of fishes.

Objective 1. Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.

Strategy 1. By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2.	Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.
Strategy 3.	In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.
Strategy 4.	Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.
Strategy 5.	Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.
Strategy 6.	Work cooperatively with willing irrigators to restore stream flows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.
Strategy 7.	Continue development of the IMPACT Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The proposed project is consistent with the following July 2000 recommendations of the Governors of Idaho, Montana, Oregon, and Washington, for the protection and restoration of fish in the Columbia River Basin:

- *Partnerships*

-- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

- *Water for Fish*

-- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.

-- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this

-- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

- *Local Recovery Plans*

-- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

- *Fish Passage*

-- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.

-- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.
--Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

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The proposed project will contribute to meeting the vision of the 2000 Columbia River Basin Fish and Wildlife Program:

- *Objectives for biological performance*

Anadromous fish losses

-- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005.

-- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.

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The USBWP contributes to regional efforts to meet these these objectives by implementing habitat improvement projects on nonfederal land that are coordinated with the multiple entities that have jurisdictional responsibilities for the protection, restoration, and complexity of critical fish habitat.

Resident fish losses

-- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.

-- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.

-- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

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-- Maintain existing and created habitat values.

Actions the USBWP implements on nonfederal land help protect and restore ecological values that are important to native species of wildlife.

Habitat Strategies

Primary strategy

-- Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

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-- Build from strength

-- Restore ecosystems, not just single species

-- Use native species wherever feasible

Habitat projects implemented by the USBWP focus on protecting high quality habitat, restoring poorly functioning components of ecosystems that support multiple species, and restoring native riparian vegetation.

The proposed project supports the December 2000 FCRPS Biological Opinion:

Action 149a: BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. The Lemhi watershed is included within these priority subbasins and is identified for immediate action.

Action 149b:	The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.
Action 149c:	BPA addresses passage, screening, and flow problems where they are not the responsibility of others.
Action 149d:	BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.
Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 151:	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152 b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).
Action 152f:	Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).
Action 153:	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.
Action 154a:	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.

Action 154b: The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.

Action 183: Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

All of the above actions in the Lemhi watershed will be done directly by, or in association with, the USBWP:

Fish Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

Fish Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.

Flow – Work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.

Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.

Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This work is especially important as most fish spawning and rearing habitat is on private land.

Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.

Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.

Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.

TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.

Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.

Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.

Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.

River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

Addresses RPA 149, 150, and 154. See comments for Project Number 28036.

Budget

FY02	FY03	FY04
$3,238,682 Category: High Priority Comments:	$3,257,000 Category: High Priority	$3,343,500 Category: High Priority

Project: – 28038 - Holistic Restoration of Critical Habitat on Non-federal Lands, East Fork Salmon Watershed, Idaho

Sponsor: Custer SWCD / OSC

Short Description:

Collaborative effort to implement projects on non-federal lands that are effective at improving habitat conditions (and survival rates) for native anadromous and resident salmonids in the East Fork Salmon watershed, Idaho.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project (USBWP) is by far the largest collaborative effort to restore salmon habitat on non-federal lands in the Salmon Subbasin or elsewhere in Idaho. The Project is a multi-stakeholder effort covering four hydrologic units that include the Lemhi, Upper Salmon, Pahsimeroi, and Middle-Salmon Panther watersheds.

Efforts on the Project are coordinated through the Idaho Soil Conservation Commission, with the Lemhi and Custer Soil and Water Conservation Districts doing most of the direct work with private landowners. The USBWP, with a multi-agency technical team providing guidance, has implemented a diversity of important habitat restoration projects in areas where such activities had previously been quite limited.

The USBWP program is now being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 2002 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

The project described in this proposal covers the planning, design, construction, project implementation, O&M, and M&E activities the USBWP anticipates in the East Fork Salmon watershed during FY 2002 and into the near future. Because of the way in which collaborative groups such as the USBWP operate, the scope of this proposal is an expert generated "best-estimate" of the mix of analyses and projects that will be implemented over the next several years. The proposal represents a serious effort by the USBWP to upgrade planning and M&E efforts that have in the past been limited by staffing constraints.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/ Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Upper Salmon River Diversion Consolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon Watersheds.
199401500	Idaho Fish Screen Improvements (Idaho Dept. of Fish and Game)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.

Project ID	Title	Nature of Relationship
199405000	Salmon River Habitat Improvement and M&E	RPA Action # 149, 150, 152, 183 - Habitat improvement and associated monitoring.
	East Fork Jr. Baker Easement	RPA Action # 149, 150, 151, 153 - Restore natural floodplain function along the East Fork Salmon River
199107300	Idaho Natural Production M&E	RPA Action # 182 - Annual monitoring of salmonid abundance at established stations.
198909803	Idaho Supplementation Studies (IDFG, ShoBan Tribes, UI, USFWS)	Relationship to be developed.
199906300	Aquatic Ecosystem Review for the Upper Salmon Subbasin (UI/ERG)	RPA Action # 152, 154 - Environmental evaluations and analyses supporting selected USBWP restoration work.
199705700	Salmon River Production Program (ShoBan Tribes)	Relationship to be developed.

Relationship to Existing Goals, Objectives and Strategies

Holistic Restoration of Critical Habitat on Non-federal Lands in the East Fork Watershed, Idaho will be an important component of salmon and ecological restoration efforts in the Columbia River Basin because it will achieve on-the-ground habitat improvements in areas critical to the persistence of ESA-listed anadromous salmonids. The importance of these areas was described earlier in Section "b" and reflected in recent federal identification of salmon habitat on non-federal lands in the East Fork watershed (part of the Upper Salmon watershed) as a high-priority for near-term funding of restoration actions. Given the ways in which the USBWP intends to revise its operations in the East Fork watershed, the project will also incorporate more rigorous project planning, monitoring, evaluation, and adaptive management that will help assure that its restoration actions become increasingly effective at achieving important biological objectives through time.

Continuation of this project will address many fish and wildlife needs identified in the recently completed Salmon Subbasin Summary (Servheen et al. 2001), and will be entirely consistent with regional programs. Needs, goals, objectives, and strategies addressed by the project are identified below.

Multiple fish and wildlife needs identified in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the proposed project:

- Protect and restore riparian and instream habitat structure, form, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
- Protect, restore, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.
- Reduce stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.
- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.

- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff, and wastewater effluent.
- Monitor and evaluate habitat restoration and improvement activities, habitat baseline conditions, water quality and water quantity improvements, conditions and trends.
- Contribute to a coordinated, collaborative M&E effort in the Salmon Subbasin, to maximize effectiveness and minimize redundancy.
- Develop and implement improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
- Develop and maintain comprehensive and consistent subbasin databases related to both aquatic and terrestrial resources, and establish a centralized data repository.
- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitats (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
- Protect key fish and wildlife habitats directly threatened by subdivision, recreation, or extractive resource uses.
- Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

The proposed project is consistent with USBWP goals, objectives, and strategies identified in the Salmon Subbasin Summary (Servheen et al. 2001):

Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1. Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.

Strategy 1. Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2. Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3. Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2. Reduce the number of physical barriers hindering fish migration.

Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3. In cooperation with the NRCS, BOR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for all life stages of fishes.

Objective 1. Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.

Strategy 1. By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2. Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3. In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.

Strategy 4. Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5. Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6. Work cooperatively with willing irrigators to restore stream flows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7. Continue development of the IMPACT Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The proposed project is consistent with the following July 2000 recommendations of the Governors of Idaho, Montana, Oregon, and Washington, for the protection and restoration of fish in the Columbia River Basin:

- *Partnerships*

-- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

- *Water for Fish*

-- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.

-- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this

-- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

- *Local Recovery Plans*

-- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

- *Fish Passage*

-- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.

-- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.

-- Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

The USBWP addresses the above recommendations through coordination of multiple entities, technical, financial, educational resources, and jurisdictional responsibilities for the protection, restoration, and complexity of fish habitat. Habitat projects coordinated through the USBWP respond directly to flow issues through work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems. Fish passage will be enhanced through these projects through liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

The proposed project will contribute to meeting the vision of the 2000 Columbia River Basin Fish and Wildlife Program:

- *Objectives for biological performance*

  Anadromous fish losses

-- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005.

-- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.

-- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

The USBWP contributes to regional efforts to meet these these objectives by implementing habitat improvement projects on nonfederal land that are coordinated with the multiple entities that have jurisdictional responsibilities for the protection, restoration, and complexity of critical fish habitat.

Resident fish losses

-- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.

-- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.

-- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Actions that the USBWP implements with stakeholders on nonfederal land help protect and restore ecosystems and ecosystem functions that are beneficial to resident and anadromous fish.

Wildlife losses

-- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.

-- Maintain existing and created habitat values.

Actions the USBWP implements on nonfederal land help protect and restore ecological values that are important to native species of wildlife.

Habitat Strategies

Primary strategy

-- Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

Supporting strategies

-- Build from strength

-- Restore ecosystems, not just single species

-- Use native species wherever feasible

Habitat projects implemented by the USBWP focus on protecting high quality habitat, restoring poorly functioning components of ecosystems that support multiple species, and restoring native riparian vegetation.

The proposed project supports the December 2000 FCRPS Biological Opinion:

Action 149a:	BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. The Lemhi watershed is included within these priority subbasins and is identified for immediate action.
Action 149b:	The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.
Action 149c:	BPA addresses passage, screening, and flow problems where they are not the responsibility of others.
Action 149d:	BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.
Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 151:	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152 b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).
Action 152f:	Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Action 153:	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.
Action 154a:	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.
Action 154b:	The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.
Action 183:	Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

All of the above actions in the East Fork watershed will be done directly by, or in association with, the USBWP:

Fish Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

Fish Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.

Flow – Work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.

Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.

Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This work is especially important as most fish spawning and rearing habitat is on private land.

Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.

Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.

Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.

TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.

Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.

Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.

Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.

River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

Addresses RPA 149, 150, and 154. See comments for Project Number 28036.

Budget

FY02	FY03	FY04
$2,606,084 Category: High Priority Comments:	$2,604,300 Category: High Priority	$2,667,600 Category: High Priority

Project: 28039 – Holistic Restoration of Habitat on Non-federal Lands, Middle Salmon-Panther Watershed, Idaho

Sponsor: Lehmi SWCD / OSC

Short Description:

Collaborative effort to implement projects on non-federal lands that are effective at improving habitat conditions (and survival rates) for native anadromous and resident salmonids in the Middle Salmon-Panther watershed, Idaho.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project (USBWP) is by far the largest collaborative effort to restore salmon habitat on non-federal lands in the Salmon Subbasin or elsewhere in Idaho. The Project is a multi-stakeholder effort covering four hydrologic units that include the Lemhi, Upper Salmon, Pahsimeroi, and Middle-Salmon Panther watersheds. Efforts on the Project are coordinated through the Idaho Soil Conservation Commission, with the Lemhi and Custer Soil and Water Conservation Districts doing most of the direct work with private landowners. The USBWP, with a multi-agency technical team providing guidance, has implemented a diversity of important habitat restoration projects in areas where such activities had previously been quite limited.

The USBWP program is now being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 2002 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

The project described in this proposal covers the planning, design, construction, project implementation, O&M, and M&E activities the USBWP anticipates in the Middle Salmon-Panther watershed during FY 2002 and into the near future. Because of the way in which collaborative groups such as the USBWP operate, the scope of this proposal is an expert generated “best-estimate” of the mix of analyses and projects that will be implemented over the next several years. The proposal represents a serious effort by the USBWP to upgrade planning and M&E efforts that have in the past been limited by staffing constraints.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.

Project ID	Title	Nature of Relationship
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork Watersheds.
199600700	Upper Salmon River Diversion Consolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon Watersheds.
199401500	Idaho Fish Screen Improvements (IDFG)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversion improvements on Lemhi, Pahsimeroi, East Fork and Upper Salmon Watersheds.
199107300	Idaho Natural Production M&E (IDFG)	RPA Action # 182 - Annual monitoring of salmonid abundance at established stations.
198909803	Idaho Supplementation Studies (IDFG, ShoBan Tribes, UI, USFWS)	Relationship to be developed.
199906300	Aquatic Ecosystem Review for the Upper Salmon Subbasin (UI/ERG)	RPA Action # 152, 154 - Environmental evaluations and analyses supporting selected USBWP restoration work.

Relationship to Existing Goals, Objectives and Strategies

Holistic Restoration of Critical Habitat on Non-federal Lands in the Middle Salmon-Panther Watershed, Idaho will be an important component of salmon and ecological restoration efforts in the Columbia River Basin because it will achieve on-the-ground habitat improvements in areas critical to the persistence of ESA-listed anadromous salmonids. The importance of these areas was described earlier in Section "b". Given the ways in which the USBWP intends to revise its operations in the Middle Salmon-Panther watershed, the project will also incorporate more rigorous project planning, monitoring, evaluation, and adaptive management that will help assure that its restoration actions become increasingly effective at achieving important biological objectives through time.

Continuation of this project will address many fish and wildlife needs identified in the recently completed Salmon Subbasin Summary (Servheen et al. 2001), and will be entirely consistent with regional programs. Needs, goals, objectives, and strategies addressed by the project are identified below.

Multiple fish and wildlife needs identified in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the proposed project:

- Protect and restore riparian and instream habitat structure, form, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
- Protect, restore, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.

- Reduce stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.
- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.
- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff, and wastewater effluent.
- Monitor and evaluate habitat restoration and improvement activities, habitat baseline conditions, water quality and water quantity improvements, conditions and trends.
- Contribute to a coordinated, collaborative M&E effort in the Salmon Subbasin, to maximize effectiveness and minimize redundancy.
- Develop and implement improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
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Objective 1. Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.

Strategy 1. Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2. Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

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Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2. Reduce the number of physical barriers hindering fish migration.

Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

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-- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

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-- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this

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The USBWP contributes to regional efforts to meet these these objectives by implementing habitat improvement projects on nonfederal land that are coordinated with the multiple entities that have jurisdictional responsibilities for the protection, restoration, and complexity of critical fish habitat.

Resident fish losses

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-- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.

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Actions that the USBWP implements with stakeholders on nonfederal land help protect and restore ecosystems and ecosystem functions that are beneficial to resident and anadromous fish.

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Actions the USBWP implements on nonfederal land help protect and restore ecological values that are important to native species of wildlife.

Habitat Strategies

Primary strategy

-- Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

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Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.

Action 152d: Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.

Action 152e: Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).

Action 152f: Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Action 153: BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.

Action 154a: BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.

Action 154b: The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.

Action 183: Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

All of the above actions in the Middle Salmon-Panther watershed will be done directly by, or in association with, the USBWP:

Fish Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

Fish Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.

Flow – Work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.

Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.

Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This work is especially important as most fish spawning and rearing habitat is on private land.

Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.

Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.

Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.

TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.

Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.

Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.

Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.

River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

Addresses RPA 149, 150, and 154. See comments for Project Number 28036.

Budget

FY02	FY03	FY04
$1,863,326 Category: High Priority Comments:	$1,881,500 Category: High Priority	$1,943,700 Category: High Priority

Project: 28040 – Holistic Restoration of Critical Habitat on Non-federal Lands, Upper Salmon Watershed, Idaho

Sponsor: Custer SWCD / OSC

Short Description:

Collaborative effort to implement projects on non-federal lands that are effective at improving habitat conditions (and survival rates) for native anadromous and resident salmonids in the Upper Salmon watershed, Idaho.

Abbreviated Abstract

The Upper Salmon Basin Watershed Project (USBWP) is by far the largest collaborative effort to restore salmon habitat on non-federal lands in the Salmon Subbasin or elsewhere in Idaho. The Project is a multi-stakeholder effort covering four hydrologic units that include the Lemhi, Upper Salmon, Pahsimeroi, and Middle-Salmon Panther watersheds. Efforts on the Project are coordinated through the Idaho Soil Conservation Commission, with the Lemhi and Custer Soil and Water Conservation Districts doing most of the direct work with private landowners. The USBWP, with a multi-agency technical team providing guidance, has implemented a diversity of important habitat restoration projects in areas where such activities had previously been quite limited.

The USBWP program is now being reconfigured on a geographic basis in order to address past ISRP comments and new federal agency plans. In FY 2002 the USBWP will be restructured consistent with a geographic approach for project selection, planning, implementation, and monitoring. The following ongoing projects will be restructured into this approach:

- Idaho Upper Salmon Basin Watershed Habitat Projects, No. 199401700
- Salmon River Anadromous Fish Passage Enhancement, No. 199306200
- Upper Salmon River Diversion Consolidation Project, No. 199600700

The project described in this proposal covers the planning, design, construction, project implementation, O&M, and M&E activities the USBWP anticipates in the Upper Salmon watershed during FY 2002 and into the near future. Because of the way in which collaborative groups such as the USBWP operate, the scope of this proposal is an expert generated "best-estimate" of the mix of analyses and projects that will be implemented over the next several years. The proposal represents a serious effort by the USBWP to upgrade planning and M&E efforts that have in the past been limited by staffing constraints.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199202603	Upper Salmon Basin Watershed Project (USBWP) Administration/Implementation Support	Administrative and public outreach functions associated with the actual habitat restoration planning and work (RPA Action #149, 150, 151, 152, 153, and 154) described in this proposal.
199306200	Salmon River Anadromous Fish Passage Enhancement	RPA Action # 149, 150, 151, 152, 153, 154 - Improve Passage on Lemhi, Pahsimeroi, and East Fork watersheds.
199600700	Upper Salmon River Diversion Consolidation Project	RPA Action # 149, 150, 151, 152, 153, 154 - Consolidate irrigation diversions on Lemhi, Pahsimeroi, and Upper Salmon watersheds.
199401500	Idaho Fish Screen Improvements (IDFG)	RPA Action # 149, 150, 151, 152, 153, 154 - Construction and installation of fish screens and diversions on Lemhi, Pahsimeroi, East Fork and Upper Salmon watersheds.
199107300	Idaho Natural Production M&E (IDFG)	RPA Action # 182 - Annual monitoring of salmonid abundance at established stations.
198909803	Idaho Supplementation Studies (IDFG, ShoBan Tribes, UI, USFWS)	Relationship to be developed.
199906300	Aquatic Ecosystem Review for the Upper Salmon Subbasin (UI/ERG)	RPA Action # 152, 154 - Environmental evaluations and analyses supporting selected USBWP restoration work.
199405000	Upper Salmon River Habitat Improvement and M&E (ShoBan Tribes)	RPA Action # 149, 150, 152, 183 - Habitat improvement and associated monitoring.
199705700	Upper Salmon River Production Program (ShoBan Tribes)	Relationship to be developed.

Relationship to Existing Goals, Objectives and Strategies

Holistic Restoration of Critical Habitat on Non-federal Lands in the Upper Salmon Watershed, Idaho will be an important component of salmon and ecological restoration efforts in the Columbia River Basin because it will achieve on-the-ground habitat improvements in areas critical to the persistence of ESA-listed anadromous salmonids. The importance of these areas was described earlier in Section "b" and reflected in recent federal identification of salmon habitat on non-federal lands in the Upper Salmon watershed as a high-priority for near-term funding of restoration actions. Given the ways in which the USBWP intends to revise its operations in the Upper Salmon watershed, the project will also incorporate more rigorous project planning, monitoring, evaluation, and adaptive management that will help assure that its restoration actions become increasingly effective at achieving important biological objectives through time.

Continuation of this project will address many fish and wildlife needs identified in the recently completed Salmon Subbasin Summary (Servheen et al. 2001), and will be entirely consistent with regional programs. Needs, goals, objectives, and strategies addressed by the project are identified below.

Multiple fish and wildlife needs identified in the Salmon Subbasin Summary (Servheen et al. 2001) are addressed by the proposed project:

- Protect and restore riparian and instream habitat structure, form, and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.
- Protect, restore, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.
- Reduce stream temperature, sediment, and embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.
- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases, and improved irrigation efficiency.
- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animals operations, stormwater and road runoff, and wastewater effluent.
- Monitor and evaluate habitat restoration and improvement activities, habitat baseline conditions, water quality and water quantity improvements, conditions and trends.
- Contribute to a coordinated, collaborative M&E effort in the Salmon Subbasin, to maximize effectiveness and minimize redundancy.
- Develop and implement improved practices for agricultural, mining, grazing, logging, and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.
- Develop and maintain comprehensive and consistent subbasin databases related to both aquatic and terrestrial resources, and establish a centralized data repository.
- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitats (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
- Protect key fish and wildlife habitats directly threatened by subdivision, recreation, or extractive resource uses.
- Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

The proposed project is consistent with USBWP goals, objectives, and strategies identified in the Salmon Subbasin Summary (Servheen et al. 2001):

Goal 1. Provide for safe, timely and unobstructed fish migration.

Objective 1. **Minimize losses of migrating fishes caused by irrigation withdrawal and diversions.**

Strategy 1. Assist the Idaho Fish Screen Program and BOR in prioritizing screening activities and recovery actions in critical occupied anadromous habitat.

Strategy 2. Investigate and implement new low impact diversion and screen structures in cooperation with private landowners, Idaho Fish Screen Program, and BoR.

Strategy 3. Investigate opportunities for securing instream flows (according to Idaho State water laws) through the purchase, lease, exchange, or seasonal rental of water rights in dewatered critical occupied habitat or migration corridors.

Strategy 4. By 2010, restore connectivity by providing adequate flows to at least 50 miles of tributary habitat in the Upper Salmon Subbasin for migrating fluvial trout and char and anadromous fishes.

Objective 2. **Reduce the number of physical barriers hindering fish migration.**

Strategy 1. Identify and implement remedial actions at problem diversions and fish barriers in conjunction with the IDFG, BLM, USFS, BoR, and Shoshone Bannock Tribes.

Strategy 2. Consolidate irrigation diversions in cooperation with irrigators, IDFG, and BoR where feasible and migration delays can be reduced.

Strategy 3. In cooperation with the NRCS, BOR, IDFG, SBT, and others, design and improve irrigation diversion structures to ensure safe, passable structures and to reduce the impacts of traditional diversions to stream channels.

Goal 2. Improve stream/riparian habitat and water quality for all life stages of fishes.

Objective 1. **Reduce sediment and water temperatures to improve water quality and fish spawning/rearing habitat in critical areas.**

Strategy 1. By 2010, implement grazing control measures in at least 70 miles of critical occupied habitat to adjust the duration and magnitude of grazing impacts including the use of fences (riparian pastures, exclosures), easements, and /or grazing management plans.

Strategy 2. Riparian vegetation restoration/plantings in areas slow to respond to actions implemented in strategy one.

Strategy 3. In conjunction with the NRCS, IDEQ, SCC, and others, implement feed lot improvements and relocations.

Strategy 4. Pursue off-stream livestock water development in sensitive areas to protect/reestablish riparian values.

Strategy 5. Work with private and public landowners to implement floodplain restoration in simplified streamside habitats in priority areas.

Strategy 6. Work cooperatively with willing irrigators to restore stream flows in dewatered tributary stream reaches where cooperative agreements can be negotiated and resource benefits are maximized.

Strategy 7. Continue development of the IMPACT Upper Salmon Basin with the University of Idaho to determine priority sequence for the above strategies.

The proposed project is consistent with the following July 2000 recommendations of the Governors of Idaho, Montana, Oregon, and Washington, for the protection and restoration of fish in the Columbia River Basin:

- *Partnerships*

-- Because much of the habitat is on non-federal lands, state, tribal and local governments, as well as private landowners, must be full partners in the recovery effort.

- *Water for Fish*

-- Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts.

-- We support voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. We believe this strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this

-- Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations.

- *Local Recovery Plans*

-- We strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans.

- *Fish Passage*

-- In the Columbia River Basin, over one-half of the original habitat area for salmon and steelhead has been blocked by mainstem and tributary dams.

-- For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place.

-- Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams.

The USBWP addresses the above recommendations through coordination of multiple entities, technical, financial, educational resources, and jurisdictional responsibilities for the protection, restoration, and complexity of fish habitat. Habitat projects coordinated through the USBWP respond directly to flow issues through work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems. Fish passage will be enhanced through these projects through liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

The proposed project will contribute to meeting the vision of the 2000 Columbia River Basin Fish and Wildlife Program:

- *Objectives for biological performance*
  Anadromous fish losses

-- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005.

-- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent.

-- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

The USBWP contributes to regional efforts to meet these these objectives by implementing habitat improvement projects on nonfederal land that are coordinated with the multiple entities that have jurisdictional responsibilities for the protection, restoration, and complexity of critical fish habitat.

Resident fish losses

-- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.

-- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to extent they have been affected by the development and operation of the hydrosystem.

-- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Actions that the USBWP implements with stakeholders on nonfederal land help protect and restore ecosystems and ecosystem functions that are beneficial to resident and anadromous fish.

Wildlife losses

-- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.

-- Maintain existing and created habitat values.

Actions the USBWP implements on nonfederal land help protect and restore ecological values that are important to native species of wildlife.

Habitat Strategies

Primary strategy

-- Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

Supporting strategies

-- Build from strength

-- Restore ecosystems, not just single species

-- Use native species wherever feasible

Habitat projects implemented by the USBWP focus on protecting high quality habitat, restoring poorly functioning components of ecosystems that support multiple species, and restoring native riparian vegetation.

The proposed project supports the December 2000 FCRPS Biological Opinion:

Action 149a:	BOR shall initiate programs in three priority subbasins per year over 5 years, in coordination with NMFS, FWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. The Lemhi watershed is included within these priority subbasins and is identified for immediate action.
Action 149b:	The Corps shall implement demonstration projects to improve habitat in subbasins where water diversion-related problems could cause take of listed species.
Action 149c:	BPA addresses passage, screening, and flow problems where they are not the responsibility of others.
Action 149d:	BPA expects to expand on these measures in coordination with the NWPPC process to complement BOR actions described in the action above.

Action 150:	In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-federal habitat, especially if at risk of being degraded.
Action 151:	BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage.
Action 152:	The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:
Action 152a:	Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality information, project reports, and data.
Action 152b:	Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
Action 152c:	Using or building or building on data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
Action 152d:	Participating in the NWPPC's Provincial Review meetings and subbasin assessment and planning efforts, including work groups.
Action 152e:	Sharing technical expertise and training with Federal, state, tribal, regional, and local entities (such as watershed councils or private landowners).
Action 152f:	Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).
Action 153:	BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BMP and NMFS will develop by June 1, 2001.
Action 154a:	BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006.
Action 154b:	The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-federal and federal land ownerships and programs.
Action 183:	Implement at least three tier3 habitat effectiveness monitoring studies within each ESU by 2003. In addition, at least two studies focusing on each major management action must take place within the Columbia River Basin.

All of the above actions in the Upper Salmon watershed will be done directly by, or in association with, the USBWP:

Fish Passage – Liaison with irrigation districts and private landowners relative to irrigation diversion consolidations and berm removals.

Fish Screening – Development of alternative screening methods for tributaries. Assist IDFG Screen Shop with screening priorities.

Flow – Work with irrigation districts, BoR, NMFS, IDFG, and private landowners in developing alternatives and agreements to address flow problems.

Habitat demonstration projects – Currently working with Corps of Engineers on the Challis reach of the Salmon River to restore the natural flood plain function.

Protection of productive non-federal habitat – Work with SWCDs, NRCS, and ISCC, IDEQ, BoR, and BPA in coordinating technical and financial assistance for habitat protection and enhancement projects on private land. This work is especially important as most fish spawning and rearing habitat is on private land.

Water bank establishment – Assist Lemhi Irrigation District and Water District 74 to implement and oversee Water Bank established Spring of 2001 to augment instream flows on Lemhi River.

Habitat enhancement projects – Coordinate and prioritize on-the-ground projects through the USBWP Technical Team and Advisory Committee to assure effectiveness and consistency for project application.

Data management - Maintain existing project data base and continue to compile available physical and biological information into a common, web-accessible data base.

TMDLs – Provided input to and review of Lemhi River draft TMDL plan. Continue to provide technical input and review to draft TMDL plans in the project area and assist with prioritization of TMDL implementation projects to improve water quality.

Assessments and plans – Guide in the development of subbasin assessment and plans in Upper Salmon River Basin.

Coordination with all entities – This project funds the Upper Salmon Basin Watershed Project which is the entity that directs and coordinates watershed issues in relation to ESA listed fish species across jurisdictional responsibilities for the Upper Salmon Basin.

Funding integration – Bring together funds from all available sources to achieve fish habitat goals. Funds currently being integrated include: Private landowners; BPA; Bureau of Reclamation; Idaho Department of Fish and Game; Natural Resources Conservation Service-Environmental Quality Incentive Program, Cooperative River Basin Study, Continuous Conservation Reserve Program, and Small Watershed Program; EPA-319 program; Idaho Soil Conservation Commission – Water Quality Program for Agriculture and Resource Conservation and Rangeland Development Program; U.S. Fish and Wildlife Service – Partners for Wildlife Program.

Long term habitat protection – Acquisition of easements and fee title will is being used for long term protection. There are currently four Nature Conservancy easements on the Lemhi, one on the East Fork, one on the Salmon River and four on the Pahsimeroi. Utilize long term contractual agreements with landowners through NRCS's continuous CRP sign-ups for riparian forest buffers.

River temperature, water quality monitoring, and modeling - We are using available predictive tools such as Mike-11 to incorporate data collected from temperature monitors, USGS gage stations, and sediment traps to refine habitat restoration strategies and to prioritize restoration opportunities on non-federal lands within the watershed.

Review Comments

Addresses RPA 149, 150, and 154. See comments for Project Number 28036.

Budget

FY02	FY03	FY04
$2,567,545 Category: High Priority Comments:	$2,599,500 Category: High Priority	$2,680,000 Category: High Priority

Project: 28044 – Protect and Restore Deer Creek Watershed

Sponsor: NPT F/W

Short Description:

Protect and restore valuable fluvial aquatic habitat by improving riparian and watershed conditions in upper watershed through watershed assessment and restoration activities in Deer Creek watershed.

Abbreviated Abstract

The Fish and Wildlife Program for the Columbia Basin is based upon a foundation of ecological principles. The program directs management entities to develop subbasin and watershed plans based on ecosystem analysis. A subbasin summary has been completed for the Salmon River and the subbasin planning process is currently underway. These documents define or will define problems and priorities at the subbasin scale. Previous regional work has identified the Salmon River as a protection and restoration priority in the Columbia Basin. Before restoration work can begin, a fine scale analysis that steps down to the reach level needs to be completed. The Ecosystem Analysis at the Watershed Scale (EAWS) for Deer Creek proposes to conduct a fine scale analysis to describe past and current conditions, and make management recommendations at the reach scale within the Deer Creek watershed. This project will provide a means by which the watershed can be understood as an ecological system and develop and document understandings of ecosystem processes and interactions occurring within the watershed. Information and analyses developed by the project will provide the means to initiate and sustain the ecological recovery of the Deer Creek watershed. The project will collect and analyze data, develop a watershed assessment and plan, implement restoration activities, and monitor and evaluate project success.

This project is designed to protect and restore in-channel, riparian and adjoining upland habitats along Deer Creek in the Salmon River subbasin. A full fish passage barrier occurs at stream mile 4.0, which consists of a 17 foot falls. The Deer Creek falls occur at approximately stream mile 6.9, and consists of an 80 foot falls. Below the falls, Deer Creek provides spawning and rearing habitat for listed steelhead trout. Deer Creek may be used for spring/summer chinook salmon juvenile rearing and subadult/adult rearing in the mouth area and lower reach when stream conditions are suitable. Juvenile chinook salmon have been documented in the lower reaches of Deer Creek. Fluvial westslope cutthroat trout may use the mouth area and lower reach when stream conditions are suitable. Brook trout are the most common fish species occurring in the upper drainage (upstream from streammile 7.0).

The documented presence of ESA listed steelhead, and suspected use of chinook salmon and fluvial westslope cutthroat trout place an emphasis on protection and restoration efforts in the Deer Creek watershed. Similar to neighboring watersheds (i.e. Eagle Creek, Maloney Creek), Deer Creek functions as a source area within the Salmon River subbasin for anadromous and resident salmonid production, and may provide important habitat refugia for various life history stages of fish. With respect to bull trout, Deer Creek is considered a medium priority watershed within the Lower Salmon River subbasin (IDEQ 1998). Medium priority watersheds are producers of forage fish for bull trout (i.e. rainbow/steelhead trout). Protection/restoration efforts in medium priority watersheds and are necessary to provide habitat for the production of bull trout prey species (IDEQ 1998).

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Salmon Subbasin Planning Process	Provides fine scale information for planning

Relationship to Existing Goals, Objectives and Strategies

The Northwest Power Council directs the development of the fish and wildlife program on the basis of ecological principles. It supports ecosystem planning and analysis at multiple watershed/landscape scales. The primary vehicle for implementing the program will be subbasin planning. An integral part of subbasin planning will be finer resolution analyses at the watershed scale (EAWS) which will guide meaningful implementation of subbasin plans. The Council has articulated eight principles that form the scientific foundation of the basinwide program. The principles are:

1. The abundance, productivity, and diversity of organisms are integrally linked to the characteristics of their ecosystems.
2. Ecosystems are dynamic, resilient and develop over time.
3. Biological systems operate on various spatial and time scales that can be organized hierarchically.
4. Habitats develop, and are maintained, by physical and biological processes.
5. Species play key roles in developing and maintaining ecological conditions.

6. Biological diversity allows ecosystems to persist in the face of environmental variation.
7. Ecological management is adaptive and experimental.
8. Ecosystem function, habitat structure, and biological performance are affected by human actions.

The proposal to conduct ecosystem analysis at the watershed scale in Deer Creek watershed complies with the direction inherent in the scientific principles. EAWS will provide the data and knowledge to achieve the Council's overarching objectives, basinwide biological objectives, objectives for biological performance, and objectives for environmental characteristics. The broad objectives described by the Council are qualitative in nature. Subbasin planning and EAWS will provide the basis for quantifying those objectives and the on-the-ground means for attaining those objectives.

The Deer Creek EAWS also meets the intent and direction contained in the Biological Opinion (BiOp) written by the National Marine Fisheries Service (NMFS, 2000) for the Federal Columbia River Power System (FCRPS). Over the long term, the BiOp's habitat strategy has three overarching objectives: 1) protect existing high quality habitat, 2) restore degraded habitats on a priority basis and connect them to other functioning habitats, and 3) prevent further degradation of tributary and estuary habitats and water quality.

In the Reasonable and Prudent Alternative (RPA), the BiOp identifies specific management actions that support EAWS. Under Section 9.6.2.1 of the BiOp, management objectives and actions related to tributary habitat are described. When related to the basic habitat needs of listed anadromous fish, tributary habitat efforts have the following objectives:

- Water quantity—increase tributary water flow to improve fish spawning, rearing, and migration.
- Water quality—comply with water quality standards, first in spawning and rearing areas, then in migratory corridors.
- Passage and diversion improvements—address in-stream obstructions and diversions that interfere with or harm listed species.
- Watershed health—manage both riparian and upland habitat, consistent with the needs of the species.

The following specific management actions can be linked to the Deer Creek proposal.

Action 150: In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.

Deer Creek is largely under state and tribal management.

Action 152: The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following:

- Supporting development of state or Tribal 303(d) lists and TMDLs by sharing water quality and biological monitoring information, project reports and data from existing programs, and subbasin or watershed assessment products.
- Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
- Using or building on existing data management structures, so all agencies will share water quality and habitat, data, databases, data management, and quality assurance.
- Participating in the NWPPC's Provincial Review meetings and Subbasin
- Assessment and Planning efforts, including work groups.
- Sharing technical expertise and training with Federal, state, Tribal, regional, and local entities (such as watershed councils or private landowners).
- Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

The Deer Creek EAWS is strongly supported by the direction in Action #152. The proposal will involve and provide useful information to both Idaho Fish and Game and the Nez Perce Tribe. Funding resources and technical expertise will be leveraged through close cooperation.

Action 154: BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans, match state and local funding for coordinated development of watershed assessments and plans, and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006. Planning for priority subbasins should be completed by the 2003 check-in. The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-Federal and Federal land ownerships and programs. In the long term, habitat recovery and watershed restoration for non-Federal public, Tribal, and private lands require state and local stewardship. An overall framework for this stewardship can be created through subbasin and watershed plans and related recovery plans, which establish goals, objectives, and priority actions that are coordinated across Federal and non-Federal ownerships and programs. BPA is funding the bulk of NWPPC's subbasin assessments and plans. These plans will provide an important context for classifying and prioritizing watersheds for protection and restoration. They will also provide the foundation for ESA recovery planning which will be conducted in a similar time frame. Several watershed scale efforts are underway.

Clearly, the EAWS complies with this guidance that is essentially a directive for the development of subbasin and watershed plans. Because the Salmon subbasin summary is complete and the subbasin planning process is underway, finalizing the subbasin plan and completing watershed assessments become the priority actions.

The Basinwide Salmon Recovery Strategy (SRS; Federal Caucus 2000) is a companion document to the FCRPS BiOp. Many of the watershed and habitat measures listed in the BiOp are repeated and expanded upon in this document. The SRS calls for a comprehensive approach to protection and restoration of federally managed tributary habitat. The strategy emphasizes the protection of existing high quality tributary habitat and the restoration of degraded habitats. The SRS expects subbasin plans and watershed assessments will delineate future restoration work. The strategy identifies fast-start actions applicable in all subbasins. One of the key actions is to integrate the compliance with the Clean Water and Endangered Species Acts. The federal agencies are directed to seek funding for pilot programs that demonstrate how objectives for the Clean Water and Endangered Species Acts can be accomplished in TMDL planning efforts. Information derived from EAWS would provide the means for integration.

The SRS strongly supports additional subbasin and watershed assessments. On page 11 of their document, the federal agencies state: "Subbasin and watershed assessment processes will be informed by scientific analysis indicating where habitat work would be most effective." The strategy further defines criteria necessary for subbasin and watershed assessments that directly relate to the Deer Creek EAWS:

- Use a locally-led implementation process.
- Integrate watershed planning efforts on private lands with those occurring on public lands.
- Create systems for storing and disseminating data, information and technology that are compatible across federal and non-federal ownerships.

The Deer Creek EAWS meets the criteria by featuring a locally-led process that will integrate management of public and private lands—and provide a site-specific database that can be used by all entities.

Review Comments

This project addresses RPA 154. This proposal will directly benefit redband trout; however, the presence of bull trout was not identified. Improved water quality will benefit anadromous fish located below the falls. The reservoir project is not currently planned for this area.

Budget

FY02	FY03	FY04
$155,213 Category: Recommended Action Comments:	$184,000 Category: Recommended Action	$330,000 Category: Recommended Action

Project: 28049 – Restore and Protect Slate Creek Watershed

Sponsor: NPT

Short Description:

Restore and protect the Slate Creek Watershed for the benefit of both resident and anadromous fish using an overall watershed approach. Restoration and protection efforts will be done cooperatively with the Nez Perce National Forest.

Abbreviated Abstract

Slate Creek is the most important tributary stream within the Lower Salmon River subbasin for providing habitat for listed fish species. Slate Creek has historic capability of supporting viable subpopulations of spring Chinook salmon, summer steelhead, bull trout, and westslope cutthroat trout and is now listed under the Endangered Species Act as critical habitat for bull trout, steelhead, and spring/summer Chinook salmon. Slate Creek is a very high priority for restoration within the Lower Salmon subbasin because of its high potential aquatic productivity, intact aquatic assemblages, and current conditions and processes affected by past management activities (USDA, 2000). Past management activities have most significantly affected sediment regimes as a result of road building and mining. In addition, in-stream and near-stream activities have affected channel morphology, cover, and habitat complexity. Mining, livestock grazing, road construction, timber harvest, and removal of large wood have contributed to altered habitat conditions.

The Nez Perce National Forest completed the Slate Creek Ecosystem Analysis at the Watershed Scale (EAWS) in May of 2000. From this detailed watershed assessment a list of watershed restoration projects has been prioritized. From this list we (Nez Perce Tribe Fisheries Watershed Program) have selected various high priority watershed restoration projects and, through cooperative efforts with the Nez Perce National Forest, plan to implement these restoration projects in order to achieve our overall goal of protecting and restoring the physical and biological aquatic habitat for the benefit of both resident and anadromous fish.

The Nez Perce Tribe Fisheries Watershed Department will work with the U.S. Forest Service and private landowners to create an interagency workgroup to pool resources for the benefit of the watershed. Within section 7.6 of the Columbia River Fish and Wildlife Plan, coordinated, cooperative efforts to protect salmon and steelhead habitat within the basin are needed. This proposal is organized to meet this objective. Restoration work monitoring will be done using the Nez Perce Tribe Fisheries/Watershed Monitoring Plan. This plan was designed to evaluate watershed restoration work and watershed recovery.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
8909801	Idaho Salmon Supplementation Studies	Control Stream in study
8909803	Clean Slate DEIS	Forest Service restoration projects in Slate Creek Watershed

Relationship to Existing Goals, Objectives and Strategies

The restoration efforts in the Slate Creek Watershed are focused on providing healthy habitat for anadromous and resident fish. This concept is included in multiple documents including; Nez Perce Tribal Hatchery (NPTH), the Tribal Recovery Program (Spirit of the Salmon), Columbia Basin System Production Plan for Salmon and Steelhead, the Columbia River Basin Fish and Wildlife Program, Salmon Recovery Strategy, NMFS Biological Opinion, and the Salmon Subbasin Summary. Each of these documents will be discussed in detail within this section.

<u>Monitoring and Evaluation Plan For the Nez Perce Tribal Hatchery</u>

The *Nez Perce Tribal Hatchery's* primary goal is to supplement fish numbers to help re-establish natural populations of Chinook Salmon in the Clearwater subbasin until natural production has stabilized at sustainable levels (Steward, 1996). Slate Creek was originally recommended to be in the Nez Perce Tribal Hatchery Master Plan for supplementation for spring Chinook salmon. It was later eliminated due to issues with the spring Chinook salmon being part of the larger ESA protected Snake River population.

<u>Wy-Kan_Ush-Mi-Wa-Kish-Wit, The Spirit of the Salmon</u>

The second regional document is *Wy-Kan_Ush-Mi-Wa-Kish-Wit, The Spirit of the Salmon,* which is the fish restoration plan of the four Columbia River Tribes. The goals for fish restoration focus on putting fish back into the rivers and tributaries with a goal that emphasizes using strategies that rely on natural production and healthy river systems to achieve the restoration activities of the tribes (CRITFC, 1995). Putting fish back into river and stream systems alone are not enough to restore their populations, they need a healthy system to return, spawn, and rear in. Our proposal will mitigate (in place, in kind) losses due to mans' activities that have adversely affected the watershed.

<u>1994 Columbia River Basin Fish & Wildlife Program</u>

The Columbia Basin's regional plan is the *Columbia River Basin Fish & Wildlife Program* (CRBFWP). Habitat Restoration (section 7) is a large part of the plan because habitat quality improvements are needed to increase the productivity of many stocks. Reduced habitat quality results in lower survival during critical spawning, incubation, rearing, and migration periods, even when population densities are low (CRBFWP, 1994). The improvement of habitat will allow greater juvenile and adult survival at each freshwater stage. Anadromous fish spend from one to three years of their life cycle in freshwater as juveniles and several months as adults. During these freshwater stages human activities have the greatest impact on the survival of these populations (CRBFWP, 1994). The Council believes the best approach to watershed restoration is for activities to be cooperative between federal, state, private, and tribal agencies. "Furthermore, if watershed restoration is to be successful, instream restoration should be accompanied by riparian and upslope restoration. Positive actions taken to rehabilitate watersheds in the interest of rescuing and restoring salmon and steelhead stocks will result in long-term benefits to other basin resources dependent on watershed health" (CRBFWP, 1994).

2000 Fish and Wildlife Program

The Fish and Wildlife Program (FWP) is directed at protecting, mitigating, and enhancing fish and wildlife in the Columbia River and its tributaries, including related spawning grounds and habitat and the biological systems within them. This project proposal works towards accomplishing the objectives of the FWP by protecting and restoring the physical and biological characteristics within the watershed. This project strives toward protecting habitat by reducing excessive sedimentation through decommissioning roads, restoring habitat access by replacing barrier culverts, and restoring spawning and rearing habitat that was lost due to mining impacts.

Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy

The Federal Caucus published the *Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy* (also known as the all-H Paper or SRS). This paper presents the federal government's recommendations for actions needed to recover threatened and endangered salmon and steelhead in the Columbia River Basin. Their strategy places priority on actions with the best chance of being implemented, the best chance of providing solid and predictable biological benefits, and the best chance of benefiting the broadest range of fish species (SRS, 2000). The Federal Caucus states that with limited resources for funding, recovery efforts will be most effective – and resources most efficiently used - if all of the federal agencies coordinate their respective programs, and if they collectively coordinate with state and tribal programs. This proposal does indeed coordinate watershed restoration activities between the tribe, state, and federal agencies. A cost-share partnership has already been fostered between the Nez Perce Tribe and the Nez Perce National Forest (see Nez Perce National Forest / Nez Perce Tribe Cost Share Agreement section below). All restoration activities will be coordinated with the state and other federal agencies. The SRS also places significant importance on habitat actions. Habitat actions will protect and restore tributary habitat to improve survival during spawning and rearing. Such actions would include, but not be limited to, removing passage barriers, screening diversions, reducing livestock impacts, restoring natural sediment regime, purchasing in-stream flow rights, restoring water quality, and acquiring high-quality habitat.

Programs goals that correspond with this proposal are:

- *Conserve Ecosystems;* conserve the ecosystems upon which salmon and steelhead depend, including watershed health.
- *Conserve Species;* avoid extinction and foster long-term survival and recovery of Columbia Basin salmon and steelhead and other aquatic species
- *Balance the Needs of Other Species;* ensure that salmon and steelhead conservation measures are balanced with the needs of other native fish and wildlife species and do not unduly impact upriver interests, in implementing recovery measures, seek to preserve the resources important to maintaining the traditional culture of basin tribes.

As stated above, the SRS places significant importance on habitat actions and recognizes that fixing habitat is central to any recovery plan. Habitat recovery strategies include: taking immediate actions to restore streamflow, remove passage barriers, protect high quality habitat, screen diversions; and complete subbasin assessments and plans to prioritize longer-term actions (SRS, 2000). Also included in the habitat plan is to manage federal lands to protect fish, protect and improve estuary habitat, protect and improve tributary habitat, and improve mainstem habitat. This proposal addresses most of these actions that fall under the habitat plan. Performance standards and measures have been set for each H. For habitat, the standards are to prevent habitat degradation, restore high quality habitat, and restore/increase habitat complexity. All of these standards coincide with the objectives and tasks of this proposal.

<u>The Biological Opinion for the Federal Columbia River Power System</u>
The National Marine Fisheries Service has authored a Biological Opinion for the Federal Columbia River Power System (FCRPS). In the Biological Opinion, 199 RPA actions are incorporated and these actions are aimed at protecting or improving the survival of listed salmon and steelhead stocks. These actions span a wide range of activities. Actions that correspond with this proposal are:

Action # 149 BOR shall initiate programs to address all flow, passage, and screening problems.

This action is intended to address water diversion issues (flow, passage, and screening) in priority subbasins. While the BOR has the primary responsibility for this initiative, BPA is expected to supply funding for passage, screening, and water for flows to complement the BOR actions as needed in 2001. This project proposal addresses passage problems in the analysis area by replacing culverts that do not meet fish passage and flow objectives.

Action # 150 In sub-basins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.

Steelhead trout (Oncorhynchus mykiss) and Bull trout (Salvelinus confluentus) are currently listed as threatened species under the Endangered Species Act. Spring/summer Chinook salmon Oncorhynchus tshawytscha are considered a species of special concern by the State of Idaho and a sensitive species by Region 1 of the US Forest Service. Westslope cutthroat trout (Oncorhynchus clarki lewisi) are considered a sensitive species by Region 1 of the US Forest Service and a species of special concern by the State of Idaho. Pacific lamprey (Lampetra tridentate) are listed as a state endangered species by the Idaho Department of Fish and Game (USDA 2001).

This project will protect currently productive habitat from being degraded further by excessive sediment from road/trails, unstable stream banks through road obliteration and streambank stabilization, meadow vegetation treatments/plantings, cattle exclusion, and a channel realignment project.

Although the proposed project does occur on public lands administered by the US Forest Service, these are lands on which the Nez Perce Tribe has treaty-reserved fishing, hunting and gathering rights. As such, the Tribe serves as a co-manager of these resources with federal and state resource agencies.

Action #152 The action agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments.

Although this Habitat RPA was overlooked and not included on the list of applicable RPA's in Part 1 of this proposal, it is very relevant to the objectives of this project.

This project supports the development of the 303d listed Salmon River TMDL. Slate Creek is a tributary to the Salmon River, which is listed for sediment and temperature impairment. Personnel from this project participate in TMDL coordination and work groups. Information, such as temperature monitoring data are shared for the development of the TMDL.

Water quality and habitat data are shared with all agencies. Technical expertise are shared between agencies, and on occasion, multiple agencies work together to complete portions of this project (i.e. surveys for monitoring and inventories).

The implementation of this project will allow action agencies to meet their action objective of supporting important habitat enhancement measures (streambank stabilization, road decommissioning, barrier culvert replacements) and locations (Nez Perce Tribal Ceded Territory) undertaken by the Nez Perce Tribe. It will also work towards the federal government meeting their tribal trust responsibility to the Nez Perce Tribe.

Action #154 BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006. Planning for priority subbasins should be completed by the 2003 check-in. The action agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-Federal and Federal land ownerships and programs.

Although this Watershed Assessment RPA was overlooked and not included on the list of applicable RPA's in Part 1 of this proposal, it is very relevant to the objectives of this project.

The Nez Perce National Forest completed the Slate Creek EAWS in May of 2000. After completion implementation of recommended projects is expected. This project proposal supports some of the recommended projects that have come out of the analysis such as road decommissioning, culvert replacements, erosion stabilization projects, stream channel realignment,etc. As stated previously all project work will be a cooperative effort between the Nez Perce Tribe and the Nez Perce National Forest.

This project would comply with the following BiOp objectives and actions:

- Restore watershed health and degraded habitat.
- Restore connectivity with the critical habitat in the lower Salmon River subbasin (LOS).
- Removing fish migration barriers and connecting critical habitats.

- Help recover the ESU of Snake River summer steelhead. If possible, quantify the likely habitat and population responses.
- Avoid the jeopardy standard for the steelhead ESU.
- Complies with the *Reasonable and Prudent Alternative* selected by NMFS to avoid the jeopardy standard.
- Improving drainage networks of existing road systems.
- Supporting improved and more intensive maintenance of existing road systems.
- Eliminate future road failures/landslides and protect the watershed from future degradation.
- Improving spawning and rearing habitats with in-stream structural enhancement when passive restoration does not work or structural enhancement is necessary because streamside roads have removed a functioning riparian zone.
- Reconstruction and restoration of critical channel reaches severely altered and degraded by mining activities.
- Help meet water quality standards and comply with the Clean Water Act.
- Cost-share project with the U.S. Forest Service.
- Critical spawning and rearing areas will be monitored as an integral part of this project.
- This project will help the Forest Service and the Federal Caucus meet their commitments under the BiOp, SRS, ICBEMP, and their respective Forest Plans.
- Fencing off critical spawning and rearing areas from livestock impacts.

This project, with reference to watersheds and habitat, meets the BiOp's three overall objectives: protecting existing high quality habitat; restoring degraded habitats on a priority basis and connecting them to other functioning habitats; and protecting from further degradation of tributary habitats and water quality. This project will be implemented through a cost-share agreement with the Nez Perce National Forest (see Nez Perce National Forest / Nez Perce Tribe Cost Share Agreement section below).

The Salmon River Subbasin Summary

The Salmon River Subbasin Summary has been developed as part of the rolling provincial review process developed by the Northwest Power Planning Council (NWPPC) in February 2000 in response to recommendations by the Independent Scientific Review Panel (ISRP) and the Columbia Basin Fish and Wildlife Authority (CBFWA). The summary is an interim document that provides context for project proposals during the provincial reviews while a more extensive subbasin plan is developed.

Slate Creek is a main tributary to the lower Salmon River Subbasin. Slate Creek is listed as a water quality limited stream on the 2000 State of Idaho 303(d) list for sediment. Habitat alteration, watershed disturbance and connectivity are also viewed as limiting factors for the watershed. Timber harvest, road construction, mining, and grazing are some of the activities that have played a large part in the alteration of habitat.

Roads have a major impact on the water quality of the watershed and contribute to a modeled sediment yield of XX% over natural base (see table below for % over natural base for each subwatershed).

> *Note: Sediment yield is estimated using NEZSED, the Forest's adaptation of the R1/R4 Sediment yield guide (USDA Forest Service, 1981). This model estimates natural or base sediment yield from landtype-derived mass erosion ratings. It estimates surface erosion only from roads, timber harvest, and fires.*

Slate Creek along with John Day and Partridge Creeks has been identified as a key bull trout watershed for spawning and rearing (Clearwater Basin Bull Trout Technical Advisory Team 1998). The mainstem Salmon River within this area provides for migration, adult and sub-adult foraging, rearing, and winter habitat (Summary 2001). Governor Batt's Bull Trout Conservation Plan (State of Idaho 1996) identifies key watersheds that contain streams with the greatest potential for protecting and restoring bull trout populations. The plan has two phases: 1) development of problem assessments and conservation strategies by Technical Advisory Teams, and 2) implementation of conservation measures, monitoring, and progress evaluation, to be directed by citizen-led Basin and Watershed Advisory Groups (BAGS and WAGS). This proposal directly correlates with the plan's second phase.

The following is a list of the Existing Goal, Objectives and Strategies for the Bonneville Power Administration, Nez Perce Tribe and Nez Perce National Forest that are pertinent to this proposal.

<u>Bonneville Power Administration</u>

Objectives

- Avoid jeopardy and assist in meeting recovery standards for Columbia Basin salmon, steelhead, bull trout, sturgeon, and other aquatic species that are affected by the FCRPS.
- Conserve critical habitats upon which salmon, steelhead, bull trout, sturgeon, and other listed aquatic species depend, including watershed health.
- Assure tribal fishing rights and provide non-tribal fishing opportunities.
- Balance other needs.

Habitat Strategies

- Prevent degradation of existing high quality habitat.
- Restore degraded habitat.
- Restore and increase habitat complexity.
- Comply with Federal, State, and Tribal management standards.

Targeted areas will include important headwaters, diverse riparian areas, biotic refuges, and biological hot spots (Summary 2001). For disturbed areas within each habitat zone, restoration actions will focus on water quality and quantity, connectivity, riverine-riparian habitat diversity, channel condition and dynamics, and watershed condition (Summary 2001). The habitat strategy is designed to be preventative as well as curative, and to address the causes as well as the symptoms of habitat degradation (Summary 2001).

Priority will be given to actions that protect good habitat, improve habitat carrying capacity, and increase the survival rates of anadromous fish (Summary 2001). These include: improving riparian habitat; securing additional riparian areas and estuary habitat; improving water quality, including reduction of sediment loads and temperature; restoring tributary flows; screening water diversions; addressing passage obstructions; preserving productive habitat; and restoring degraded habitats connected to viable habitat (Summary 2001).

Nez Perce Tribe

Goals

- Restore and recover historically present fish species.
- Manage aquatic resources for healthy ecosystem function and rich species biodiversity.
- Implement and enforce existing federal laws for protection of water quality, habitat and aquatic resources.
- Integrate aquatic habitat and species management with terrestrial species management.
- Coordinate with the National Marine Fisheries Service and U.S. Fish and Wildlife Service to fund and implement actions identified in the Biological Opinions, and to implement other emergency actions that address imminent risk to listed salmon, steelhead, and bull trout populations.

Strategies

- Implement effective monitoring and evaluation of supplementation and habitat enhancement programs on project-specific and reference stream (control) locations.
- Conduct necessary planning activities.
- Restore the natural production potential of anadromous and resident fish species.

USFS and BLM

Watershed and Habitat Restoration Objectives

- Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserve the genetic integrity of native species, and contributes to attainment of RMOs.
- Cooperate with federal, state, and tribal agencies, and private landowners to develop watershed-based CRMPs or other cooperative agreements to meet RMOs.

Fish and Fish Habitat Objectives

- Establish pool frequencies (#pools/mile) dependent on width of wetted stream, with interim widths as follows: (see Salmon River Subbasin Summary page 120).
- Comply with state and Federal water quality standards in all systems (max < 68 F).
- Establish large woody debris in all forested systems.
- Ensure > 80% bank stability in non-forested systems.
- Comply with Forest Plan objectives and standards.

The following list includes specific immediate or critical needs that pertain to this proposal and were defined collectively by aquatic resource managers within the Salmon River subbasin. Needs have been defined to address limiting factors to aquatic species, ensure that gaps in current data or knowledge are addressed, enable continuation of existing programs critical to successful management of aquatic resources, and to guide development of new programs to facilitate or enhance fish/aquatic management (Summary 2001).

- Collect appropriate information to assess both passage and flow issues potentially associated with culverts throughout the subbasin.
- Continue M&E programs to assess the extent and quality of habitat at the stream reach scale.
- Where stream reach scale data exists, aggregate and utilize the information in watershed scale planning and decision-making.
- Monitor ongoing and completed habitat improvement projects to assess effectiveness of projects in improving habitat and in enhancing production of salmonid species.
- Monitor water quantity and water quality improvements throughout the subbasin.
- Monitor trends in sediment, fertilizer, pesticides, and temperature in important aquatic habitat areas.
- Restoration and protection of riparian habitat and structure, channel function and form, base flows, and water quality parameters including temperature, sediment, and nutrients.
- Restore, protect, and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity; need to especially restore floodplains in areas degraded by dredge mining.
- Restore in-stream habitat to natural conditions and protect as much as possible to provide suitable holding, spawning, and rearing areas for anadromous and resident fish.
- Reduce stream temperature, sediment, and embeddedness levels to levels meeting appropriate state, Federal, and Tribal standards.
- Inventory natural and artificial passage barriers within the subbasin and evaluate if removal or modification is warranted.
- Remove or modify identified natural or artificial barriers where fish restoration guidelines have been met.
- Reduce stormwater, road, and urban/suburban sewage impacts to aquatic resources.
- Address streambank instability issues where they are defined or can be shown to be a potential problem.
- Inventory and map the distribution of riparian plant communities.
- Inventory, map, and gather population data for riparian associated wildlife and plant species.
- Protect, restore, and create wetland and riparian habitat in lower elevation riparian areas.
- Reconnect historic streams to recover lost riparian plant communities and habitats.

All of these needs coincide with this proposal's goals, objectives, and tasks. These needs are listed in the Salmon River Subbasin Summary.

<u>Nez Perce National Forest / Nez Perce Tribe Cost Share Agreement</u>

This project is a cost share with the Nez Perce National Forest. The funding requested through this proposal will be combined with appropriated funding through the National Forest System (NFS). The overall objective of this restoration partnership is to restore the aquatic conditions in this watershed. This will include the implementation of additional projects by the Forest Service that are not included in this proposal, but do contribute to the restoration of the aquatic conditions in this area. The overall goal is to have a balance of funding within the watershed, with the actual cost share ratio varying by specific project and implementation circumstances. The funding shown in the cost share table is a rough estimate of the contribution from NFS for FY 2002 through FY 2004 in this watershed. The specific dollar amounts contributed by the National Forest will be determined during the annual appropriation process and program of work planning for NFS. Most of the cost share funding on this project will be for in-kind expenses as reflected in the table, with the transfer of funds between the partners occurring on an as-needed basis to most efficiently accomplish the work. In-kind expenses on this project are expected to include: seasonal field inventories, condition assessment, environmental planning (including NEPA, consultation, & permitting), field preparation and final project design, contract preparation and administration, project implementation, contract inspection, and monitoring and evaluation. These in-kind cost contributions are in addition to the work specified in this proposal.

Review Comments

Slate Creek is a known production site for anadromous and resident fish. This project addresses RPA 400.

Budget

FY02	FY03	FY04
$231,841 Category: High Priority Comments:	$422,554 Category: High Priority	$311,704 Category: High Priority

Project: 28050 – Protect and Restore Little Salmon River

Sponsor: NPT F/W

Short Description:

Protect valuable riparian corridor and fluvial aquatic habitat while increasing habitat quality and quantity within the mainstem Little Salmon river basin.

Abbreviated Abstract

This project is designed to protect and restore in-channel, riparian and adjoining upland habitats along the Little Salmon River. The Little Salmon River is designated as critical habitat for Snake River spring/summer Chinook salmon, steelhead and bull trout, all ESA listed species. Unique opportunities currently exist for partnering with private landowners in efforts to restore presently degraded habitat conditions. Restoration efforts will focus on restoring wetland functions and values lost due to draining, water diversions, roading, diking, and livestock grazing. Required work will include riparian restoration, cattle exclusion, streambank stabilization, ditch reclamation and culvert replacement. Restoration will provide onsite habitat improvements for aquatic and terrestrial components as well as indirect habitat improvements realized in critical downstream reaches. Restorative actions will improve riparian/wetland functions, base flow conditions, water quality, stream channel morphology, fish and wildlife habitat and aesthetic values.

Current landowner relations allow for restoration of approximately 2.5 miles of river frontage. Restoration will result in increased riverine-riparian composition leading to decreased stream temperatures and stabilization of chronically eroding banks. Fisheries will benefit by decreased sediment contributions, reduced temperature and improved habitat complexity.

This project compliments ongoing work in the basin being completed by the Natural Resource Conservation Service (NRCS),Bureau of Reclamation (BLM), Idaho Department of Fish and Game (IDFG) and Fish and Wildlife Service (FWS).

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	NA	Although no projects currently exist in the LSR basin, BPA has an extensive history of funding projects aimed at improving water quality and fisheries habitat through riparian management.
0	NPTF/W Watershed Monitoring and Evaluation Plan	Monitoring data derived from this project will aid tracking the effectivenss of restoration activities in addition to providing vital watershed health trend data.

Relationship to Existing Goals, Objectives and Strategies

The objectives of this proposal are to reduce sediment delivery, improve thermal conditions, increase riparian functional capacity and improve overall watershed health.

Salmon Sub-Basin Summary Support

The Salmon River Basin is managed and used by many Federal, State, Tribal and private groups for multiple goals and objectives. The Salmon River Summary provides a short description of these goals and the corresponding strategies. Fortunately, many goals are not mutually exclusive. These organization’s overriding objectives are the recovery and or protection of native fish populations and healthy watersheds.

Protection of the annual return of spring/summer Chinook to the Little Salmon River is a high priority within the Salmon River Sub Basin. Summary section 5.1.1 states the Federal Caucus All-H Paper position that the Little Salmon River is one of only three Salmon River sub-basins in critical need of near-term habitat improvements as defined by the Federal Bi-Op (Pg. 98).

Restoration of the Little Salmon River riparian zone is one step leading to salmon and watershed recovery for the Salmon River Basin. As stated in summary section 3.1.7.c (Riparian and Wetland Vegetation), “Principal concerns are wetland loss and functional shifts involving impairment of function and vegetative type changes due to agricultural practices, livestock grazing and land development”. The Circle C ranch has been exposed to or is still exposed to all the above referenced land uses and suffers from the same problems described in the summary. Section 3.2.7.c emphasizes the concerns losses in function and vegetative manipulation have on riparian areas due to managerial practices including; agricultural practices, livestock grazing, and land development (Pg. 20). The summary's recurring theme of degraded habitat condition at the hands of past land practices is not lost on the project sponsor. Our proposal to restore the Little Salmon River watershed falls directly in line with data and objectives presented in the Sub-basin Summary.

Nez Perce Tribe Goals and Objectives

The Nez Perce Tribe supplied Goals and Objectives to the Salmon Sub-Basin Summary. The goals and objectives that this project aims to fulfill are listed below.

Goals

- Restore anadromous fish in rivers and streams at levels to support the historical, cultural, and economic practices of the tribes.
- Restore degraded stream and riparian habitat in order to create healthy river systems.
- Protect Tribal sovereignty and treaty rights.
- Reclaim anadromous and resident fish resource and the environment on which the resource depends for future generations.
- Conserve, restore and recover native resident fish population including sturgeon, westslope cutthroat trout, and bull trout (NPTDFRM 2000)

While the project meets many of the listed objectives for management, artificial production and monitoring phases of the Tribes work, the following are the tribal habitat objectives that this project meets.

- Increase anadromous and resident fish populations through tribal, federal, and state coordinated supplementation, management, and habitat restoration.
- Restrict or eliminate land management activities such as logging, road building, grazing, and mining that are harming the health of riparian ecosystems including water quality degradation, stream habitat degradation, loss of riparian vegetation, streambank destabilization, and altered hydrology.
- Improve water quality including reducing temperatures (for cold water biota T<60F), sedimentation, and agricultural runoff.
- Restore riparian ecosystems.
- Restore spawning and rearing habitat.

Federal Plans

PACFISH

The Little Salmon River Riparian Restoration project is consistent with the majority of the Federal PACFISH Strategies for federally managed lands. Although this project is not on

Federal lands, being that it borders federal property, having consistent management over the landscape is a benefit to the fish and wildlife of the region.

Salmon Recovery Strategy (All-H Paper)
The SRS habitat plan includes; 1) fast start actions – restore water quality, remove passage barriers, secure high quality habitat, 2) Manage federal lands to protect fish, 3) Protect and improve tributary habitat.

The SRS calls for fast start actions on non-federal tributary habitat. Summary section 5.2.1 lists goals objectives and strategies for jeopardy avoidance under the SRS. Strategy 2 states the "BPA funds protection of currently productive non-federal habitat, especially if at risk of being degraded." At 31% private ownership, the LSA has the second highest private component of all 10 Salmon River sub-basins. Further, the Little Salmon River is characterized as a High Priority subbasin. Riparian, wetland and channel restoration of Circle C property explicitly meets the requirements of fast start habitat improvements on non-federal lands in a high priority watershed.

Further SRS objectives met by this proposal include:

- Preservation, protection and restoration of fish habitat consistent with Clean Water Act and Endangered Species Act
- This proposal occurs within a 303 (d) listed watershed containing ESA listed species. Pollutants being sediment and temperature; species being chinook, steelhead, and bull trout.
- The LSR ESA stocks are significant and have a reasonable opportunity for restoration if water quality and habitat issues are addressed.
- Future assessment development will direct out year restoration efforts.
- This project provides off-site mitigation credit necessary to avoid a jeopardy situation for ESA listed species in the Snake River Basin.

NMFS Biological Opinion
Activities in this proposal meet NMFS goals and current management plan as stated in the Sub Basin Summary on page 98-99. The restoration of riparian vegetation, improvement of riparian function and sediment reduction actions we propose directly contribute to activities identified in Viable Salmonid Populations (2000) and Matrix of Pathways and Indicators (1996) for recovery of Snake River spring/summer and fall Chinook (Draft Salmon Subbasin Summary, 2001).

In addition to the general compliance above, the proposed riparian restoration project and associated M&E will comply with the following Bi-Op Objectives:

- Protect existing high quality habitat.
- This project will restore degraded habitats and connect them to other functioning habitats.
- This project protects further degradation of tributary habitats and water quality.
- This project complies with water quality standards and the Clean Water Act for spawning and rearing areas and migratory corridors.
- This project addresses in-stream obstructions and diversions that interfere with or harm listed species.

- This project restores riparian and upland habitat.
- This project provides habitat improvement of nonfederal habitat that is at risk of further degradation.
- This project will aid in reducing 303 (d) listed pollutants sediment and temperature.
- This project implements NMFS' recommended actions necessary to avoid jeopardy status of ESA listed Spring/Summer Chinook, Steelhead and Bull trout.
- This project provides cost sharing benefits with IDF&G and Boise Cascade.
- Monitoring and evaluation data from this project will examine water quality standards, grazing and logging practices, road closures and stream restoration effectiveness and applicability.

This project proposal will address the following RPA actions:

Action #149: BOR shall initiate programs to address all flow, passage, and screening problems.

This action is designed primarily to address water diversion and flow issues. The 2002 project actions may lead to increased riparian function and therefore a positive impact on natural flow regulation. Following watershed assessment completion, fish passage barrier and water diversion and rights issues are anticipated to be identified. This project will work towards alleviating these problems to provide increased tributary access, improved water flows and enhanced water quality to the Little Salmon River.

Action #150: In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, In accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001.

The focus of this action is the protection of non-federal habitat that limits an existing ESU's productivity. The LSR provides habitat for ESA listed Snake River spring/summer Chinook, steelhead and bull trout. Current habitat conditions in the mainstem LSR limit these fishes productivity by reducing available habitat for spawning and rearing uses. The project focus is on non-federal lands that currently contribute both sediment and temperature pollutants to the downstream habitat. The current agreement with landowner association establishes a means to protect critical habitat on non-federal land. Future private land agreements are anticipated to complete similar work during out year activities. The following action item was not available on the supplied form. We feel this action is directly applicable to this project and all Mountain Snake sub-basins.

Action #152: The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other federal agencies, states, *tribes*, and local governments.

Approval of this project and its successful completion will enable action agencies to meet the objective of supporting habitat enhancement measures (riparian restoration, water quality improvement, culvert replacement, flow enhancement etc.) undertaken by the Nez Perce Tribe. Funding this proposal furthers the federal agencies commitment to meeting their treaty trust obligations to the Nez Perce Tribe. Data from this project will be shared with TMDL development agencies. With BLM, Forest Service, Idaho State and private agencies performing water quality work in the basin; addition of a tribal entity will aid successful policy development and restoration and monitoring approaches.

Needs

The summary identified an extensive list of needs designed to further the understanding, management, monitoring and restoration of aquatic and watershed resources within the Salmon River basin. Included below are the needs organized by section that this proposal meets as well as a narrative of how that need is fulfilled.

Multi-scaled Ecological Research and Development of New Analytical Tools

- Rigorously evaluating whether and/or how habitat enhancement activities affect egg-smolt survival, particularly at low seeding densities.

  This project will employ a rigorous new monitoring and evaluation program. Objectives of the monitoring will be to quantify the changes in egg-smolt survival and the degree of habitat improvement.

Fisheries/Aquatic Needs

- Protect and restore riparian and instream habitat structure, form and function to provide suitable holding, spawning and rearing areas for anadromous and resident fish.

  The project's first year work plan will serve to fully conform to the needs outlined above. Our project is designed to improve wetland function and habitat complexity while reducing sediment and temperature problems stemming from the project area. This work will serve to benefit both resident and anadromous fish populations within the basin.
- Protect, restore and create riparian, wetland, and floodplain areas within the subbasin and establish connectivity.

  Floodplain connectivity, function and riparian health will improve after this project re-establishes the riparian community in the project area following the removal of the pressing cattle disturbance. Wetland areas will be enhanced through the planting of vegetation and resultant increase in floodplain connectivity.

- Continue coordinated temperature monitoring throughout the subbasin. Identify spatial and temporal gaps, establish additional flow and temperature gauging stations and upgrade existing to provide real-time data, and expand longitudinal profiles. Fish distribution and habitat quality are highly influenced by water temperature. This parameter must be monitored in both wilderness and managed watersheds to provide baseline to evaluate population recovery and watershed restoration activities.

  Temperature monitoring will be performed as part of the effectiveness monitoring program to be developed. Additional temperature monitoring will likely not be needed as BLM and State of Idaho have multiple logger deployment sites in the watershed.

- Reduce stream temperature, sediment and Embeddedness to levels meeting appropriate standards for supporting self-sustaining populations of aquatic species.

  Overriding goals of the project fully comply with the needs expressed above. Stream temperatures will be improved by increasing the available riparian shade on the LSR through cattle removal and riparian plantings. Sediment reductions will occur through the same methods. Embeddedness levels are likely to improve over the long term due to decreases in sediment contributions. However, quantifying expected Embeddedness reductions is problematic and poorly understood.

- Restore and augment streamflows at critical times using (but not limited to) water right leases, transfers, or purchases and improved irrigation efficiency.

Streamflows may experience slight increases due to the improved hydrologic function (i.e. improved storage capacity, improved floodplain access) expected from increased riparian vegetation and reduced cattle density on the river bottom. Following completion of a watershed assessment it is expected that water rights acquisitions and irrigation efficiency improvements will be identified and need to be completed. Benefits of such actions will be twofold, increased in-channel water and decreased water temperature through decreased irrigation returns.

- Reduce impacts from agricultural sediment, fertilizer, pesticide loading, confined animal operations, stormwater and road runoff and wastewater effluent.

  Road runoff may be decreased if watershed assessment identifies road derived sediment and or density problems that are detrimental to fish and corrective actions such as road obliteration, adequate drainage or closures are implemented.

Wildlife / Terrestrial Needs

- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity and for mitigation of lost wildlife habitat (land purchases, land trusts, conservation easements, landowner cooperative agreements, and exchanges).

  The Nez Perce Tribe and Circle C Landowners Association have developed a Memorandum of Agreement that outlines party responsibilities and restrictions. The agreement is vital to completing restoration within the predominantly private LSR river bottom. In addition to the fisheries resources being improved, restoration of the river corridor will prove invaluable to the many species of birds and mammals inhabiting the property.

Riparian Plant Communities

- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity for riparian plant communities and for mitigation of lost wildlife habitat for riparian associated species (land purchases, land trusts, conservation easements, landowner cooperative agreements, and exchanges).

  The Nez Perce Tribe and Circle C Landowners Association have developed a Memorandum of Agreement that outlines party responsibilities and restrictions. The agreement is vital to completing restoration within the predominantly private LSR river bottom. In addition to the fisheries resources being improved, restoration of the river corridor will prove invaluable to the many species of birds and mammals inhabiting the property. With the Browns Industry riparian restoration project adjoining this project, riparian connectivity and enhancement will be provided for approximately 5 miles of LSR bottom.

- Protect, restore, and create wetland and riparian habitat in lower elevation riparian areas.

  Nearly 2.5 miles of LSR riparian habitat will be restored along the Meadow Valley when this project is completed. Future activities may create additional wetlands through the eventual plugging of irrigation ditches and eventual wetland reclamation.

- Develop an information and education stewardship program to foster riparian community protection.

  By participating with local landowners and associations like the Circle C and Little Salmon River Basin Advisory Group the Tribe will foster development of a land ethic and educate public parties to the avenues available to promote a healthy and functional watershed.

- Reconnect historic streams to recover lost riparian plant communities and habitats.

  Restoration of riparian plant communities along the LSR will re-establish floodplain connectivity. Riparian vegetation aids the establishment of connectivity by elevating seasonal water levels and promoting floodplain function.

Habitat Fragmentation

- Acquire critical habitats threatened by development when opportunities arise for improved habitat protection restoration, and connectivity (land purchases, land trusts, conservation easements, landowner cooperative agreements, and exchanges).

  Circle C properties have well established CC&R's that serve to develop the property in a manner consistent with protecting and preserving the natural resource attributes belonging to the property. The MOA the Tribe and Circle C have in place can serve as a functioning example of co-operative efforts to strive for in future project area procurement.

- Reduce road densities through closures, obliteration, and reduced construction.

  Future work is sure to identify forest roads in need of maintenance and or obliteration efforts. When implemented, road densities and associated problems will be reduced in compliance with this and other needs.

- Maintain riparian plant communities because of their connectivity value.

  Riparian zone restoration will enhance riparian connectivity and associated values over 2.5 miles of this project area in addition to the 2.5 miles being restored immediately upstream.

Combined Aquatic and Terrestrial Needs

- Continue ongoing, and establish new, monitoring and evaluation programs for fish supplementation, habitat restoration and improvement, habitat baseline conditions, water quality and water quantity improvements, conditions and trends. These M&E activities are critical to evaluating the effectiveness of projects at improving habitat, watershed health and enhancing production of target species.

  Monitoring and evaluation (M&E) will play a vital role in the adaptive strategies employed to out year work and additional projects in the region. Currently this projects monitoring and evaluation will be comprised of two components, 1) Project specific effectiveness monitoring and 2) Comprehensive Nez Perce Tribe Monitoring and Evaluation program being submitted as a **new** project proposal for 2002 *(NPTF/W Watershed Monitoring and Evaluation Plan)*. Both programs will be geared toward providing quantitative, meaningful data. Data will then be used to determine level of project success and resource response.

- Develop and implement improved practices for agricultural, mining, grazing, logging and development activities to protect, enhance, and/or restore fish and wildlife habitat, streambank stability, watershed hydrology, and floodplain function.

  This project will provide improved grazing management for the LSR basin. By working with local citizens and groups we aim to provide guidance in development of sound management practices. Developing working relationships with local landowners will serve to promote, identify and complete needed restoration activities to benefit fish, wildlife and the entire watershed.

- Acquire lands when opportunities arise for improved habitat protection, restoration, and connectivity, and for mitigation of lost fish and wildlife habitat (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).

The Nez Perce Tribe and Circle C Landowners Association have developed a Memorandum of Agreement that outlines party responsibilities and restrictions. The agreement is vital to completing restoration within the predominantly private LSR river bottom. In addition to the fisheries resources being improved, restoration of the river corridor will prove invaluable to the many species of birds and mammals inhabiting the property. Future participation with landowners in the valley will serve to further expand the number and scope of agreements and opportunities available within the LSR.

- Continue to develop watershed assessments at multiple scales to facilitate integrated resource management and planning efforts.

  Completion of a basin-wide watershed assessment is scheduled to occur in fiscal year 2003. This document will guide future restoration efforts while narrowing the scope of limiting factors within the basin.

- Complete road inventory and assess impacts to aquatic and terrestrial resources. Use information to facilitate transportation planning and to reduce road densities. Support planned road closures on public land and encourage closure of other roads.

  Following the watershed assessment, road inventories will be completed for areas identified in the watershed assessment. The inventory will provide data to make final cost estimates of restoration and serve as a core piece of baseline monitoring data.

- Support timely updates and resource inventories related to local land use plans to further prevent degradation of floodplains, wetlands, riparian and other sensitive areas.

  Routine reporting of completed and ongoing activities will be done in local newsletters and reports. These briefs will serve to educate and promote wise use of private lands and develop a consciousness of the surrounding environment and the resources being used to support it.

- Continue and enhance the cooperative/shared approach in research, monitoring and evaluation between tribal, federal, state, local and private entities to facilitate restoration and enhancement measures. Protection and restoration of fish and wildlife populations and habitat will not be successful without the interest and commitment of all parties.

  This project is working cooperatively with the Circle C Landowners Association as our main partner. Cooperation with IDF&G, BLM, Boise Cascade and Forest Service officials has occurred to develop this project and will continue to aid in its successful completion.

- Better educate the public on issues and policies important to natural resource restoration, protection, and enhancement to encourage meaningful public participation.

  As members of the community, project leaders, agency participants and Circle C member's presence alone will serve to facilitate education and need for proper management and restoration of natural resources in the area. Participating in local advisory groups and maintaining a presence in the valley will pass along summary goals and objectives along to the local public.

2000 NWPPC Fish and Wildlife Program

This proposal is consistent with the NPPC's vision in that it aims to protect and restore the natural ecological functions, habitats and biological diversity of the Little Salmon River basin. This proposal's benefits will provide positive movement toward fulfilling all four overarching objectives discussed in the program.

Objectives identified to mold anadromous salmon recovery will also be met through this proposal. Improvement of habitat conditions that will occur following implementation will aid in suppressing declining populations, aid in restoring naturally reproducing salmon and steelhead populations and increase total adult salmon and steelhead runs to the Columbia River Basin.

Resident fish and wildlife populations will benefit from improved habitat and hydrologic functions effected by the completion of this project. Improved resident fish populations will aid the ecosystem as a whole. Healthy ecosystems serve to complete the chain in salmon and watershed cycles.

As stated in the program plan, "this program relies heavily on protection of, and improvements to, inland habitat as the most effective means of restoring and sustaining fish and wildlife populations." The Little Salmon River is already designated as a key watershed for threatened chinook, steelhead and bull trout populations. The potential benefits of this proposal in the context of the potential rewards makes implementation of this proposal critical and more than adequate in the fulfillment of the Council's objectives and strategies.

Monitoring and evaluation components are crucial to the success of a project. This project will posses it's own effectiveness monitoring program in addition to being tiered to the new tribal lands monitoring program being submitted by the Nez Perce Tribe under the title *NPTF/W Watershed Monitoring and Evaluation Plan*. Both programs will collect quantifiable data in order to properly evaluate the level of success the project enjoys. Examples of physical habitat data include, amount of sediment kept from entering the LSR, riparian density inventory, % shade, cobble embeddedness, temperature and bank stability among others. Biological data will include fish density, redd, juvenile and riparian species monitoring. All derived data from the monitoring plans will be made available under either STREAMNET or BPA websites as electronic files as well as local hard copies.

1994 NWPPC Fish and Wildlife Program
List of relevant NWPPC plan 1994 goals and objectives.

This proposal supports Section 2.2a through supporting efforts in the Columbia River Basin to rebuild native species within native habitat.

Section 2.2C.1 is met by cost sharing measures between BCC, IDFG and Circle C landowners association to perform riparian cattle protection fencing.

Section 7.6 (Habitat Objectives) recognizes the importance of habitat recovery and the recommended actions to protect and restore native salmonid stocks. This project will work towards accomplishing the listed objectives in the following manner:

- 7.6A2 This project will reduce downstream habitat degradation therefore improving the productivity for Snake River spring/summer Chinook, Steelhead and bull trout.
- 7.6B1 We will be working extensively with private landowner organizations within the Little Salmon River basin in efforts to protect and restore aquatic conditions.

- 7.6B.3 This project is designed to improve water quality by decreasing contributing pollutants of temperature and sedimentation within the basin. Additionally, it is a cooperative effort with private landowners.
- 7.6B.4 Riparian restoration's ability to protect and improve habitat has been extensively documented in the literature. Riparian restoration provides mitigation for many types and classes of fish and fauna, thereby providing multiple benefits with only one expenditure.
- 7.6B.5 Much of the 'on the ground work' will be accomplished through volunteer effort and Salmon Corps members. All results and activities will be reported to *Salmon Tales* and local news agencies when appropriate.
- 7.6C2 Our project will further serve to implement the NPT monitoring program that will allow Tribal input on watershed management activities throughout the basin. It will make data available on a national scale (STREAMNET). All effectiveness monitoring will be reported in a timely manner to the Council and kept on file for future reference and adaptive management needs.
- 7.6C5 There is a direct relation to our project by restoring, protecting and enhancing riparian and floodplain zones in an effort to improve salmon and steelhead habitat while encouraging natural ecological functions.
- 7.6D Section 7.6D presents multiple habitat objectives needed to recover native fish stocks. Our project will result in improvements to all the habitat variables listed. Examples include, reduction of sediment contributions to downstream redd locations. Decreased river temperatures by improving water flow conditions and revegetation shading effects. Current water temps exceed the 68 degree threshold. Water quantity and timing may be influenced by positive effects riparian restoration activities have on hydrologic connectivity and wetland function. There is a direct relation to the council's objectives by restoring degraded meadow and wetland habitat. Riparian restoration has the potential to modify channel form in a manner beneficial to the fishery.
- 7.7 Our project has already created working relationships between private, state and federal agencies in the basin. Participation in these relationships will continue to expand with implementation. Participation in local advisory groups is ongoing. Initial project identification was made by a private association and brought forth in search of expertise in restoration.
- 7.8A.2 The Little Salmon River is designated as a 303d listed stream for sediment and temperature pollutants. This project is designed to reduce the delivery and propagation of these pollutants.
- 7.8A.5 Livestock management plans will be improved for the region by removing cattle stresses to already compromised riparian habitats.
- 7.8B.1 Project implementation will remove grazing from sensitive riparian areas, providing improved habitat conditions to downstream waterways.
- 7.8D.1 We currently work with landowner associations, private corporations and federal agencies in efforts to identify and restore riparian and stream conditions. The LSR is a 303d listed stream for sediment and temperature

pollutants. This project is designed to reduce the delivery and propagation of these pollutants through increasing vegetation and stabilizing streambanks.

Expected Benefits

This proposal targets the recovery of riverine-riparian zones, water quality and channel condition. We expect to observe; reduced sediment delivery (estimated at 60% reduction), improved channel morphology, elevated riparian function, decreased water temperature, improved flood storage, increased habitat complexity and improved wildlife and aesthetic attributes with the completion of riparian planting, bank stabilization and cattle exclosure measures we propose.

Outyear projects are still somewhat vague in lieu of a completed watershed assessment. Anticipated projects include road obliteration and fish passage barrier elimination, water rights acquisition and irrigation method improvements. These activities will result in decrease sediment contributions, improved hydrology, increased fish passage and improved river flow.

The benefits described above directly contribute to increased survival during the egg to smolt life stage. This is accomplished by decreased sedimentation in spawning gravels, decreased water temperature during critical spawning and incubation periods and improved channel condition which aids rearing survival through decreased predation and increased primary production.   The Federal Bi-Op suggests that to avoid jeopardy for the Columbia River basin listed stocks, upstream habitat improvements that increase juvenile survival be implemented. This proposal is tantamount with the objectives and methods outlined within the RPA's and additional federal and tribal restoration plans.

Review Comments

This project addresses RPA 149 and 154. The goal is to eventually establish anadromous fish populations above the falls where good habitat would have been established through this project. Although no biological monitoring is identified, it has been proposed for this site through Proposal 28045. The existing monitoring appears to be of low intensity and may not be sufficient since it is performed downstream of the implementation. Reviewers expressed concerns that there needs to be more intensive monitoring (e.g., fish presence/absence and abundance). Monitoring of biological characters is important due to the due to the presence of resident fish (e.g., redband trout) at the site of implementation. The sponsors indicated that a plan to monitor biological parameters is currently being developed.

Budget

FY02	FY03	FY04
$262,896 Category: High Priority Comments:	$155,048 Category: High Priority	$142,594 Category: High Priority

Project: 28051 – Assess and Monitor Steelhead in the Middle Fork Salmon River Subbasin

Sponsor: NPT

Short Description:

Assess current population status, dynamics and genetics of steelhead in the Middle Fork Salmon River subbasin.

Abbreviated Abstract

The goal of this project is to assess the current status of and monitor juvenile and adult abundance and distribution, life history, and genetic composition of wild steelhead in the Middle Fork Salmon River subbasin where current study efforts are deficient. This project addresses several needs as identified in the *Bi-Op*, *FWP* and *Salmon Subbasin Summary*. This study will provide information on abundance and distribution of juvenile wild steelhead, wild steelhead population age structure and smolt emigration characteristics and survival, and genetic composition of wild steelhead in the Middle Fork Salmon River subbasin. This project will also investigate feasibility of monitoring wild adult steelhead spawning abundance and distribution in the Middle Fork Salmon subbasin.

This project will closely complement other steelhead research and monitoring studies in the Middle Fork Salmon basin. This study will implement a more comprehensive and cohesive steelhead research and monitoring program in the Middle Fork Salmon basin to establish baseline data to compare the effectiveness of management actions in other basins (such as supplementation) and monitor long-term population viability within the Middle Fork Salmon by narrowing the possible risk factors to specific potential management actions in the *Bi-Op* action area with the ultimate goal of improving survival and increasing wild steelhead productivity in the Middle Fork Salmon and the entire Snake River steelhead ESU in general.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199005500	Steelhead Supplementation Studies in Idaho Rivers	Assessment of B-run steelhead supplemenatation in the Salmon and Clearwater subbasins. Assessment of wild steelhead life history traits and genetic structure will lead to a better understanding of wild steelhead population in the Salmon River Basin.
199107300	Idaho Natural Production Monitoring and Evaluation	Monitors trends in chinook salmon and steelhead trout populations in the Salmon River Basin. Additional abundance estimates and emigration timing data will be collected and shared between this project.

Relationship to Existing Goals, Objectives and Strategies

The *FWP* vision is an "ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife", in part, through ecological health assessment, support of native species in native habitat, monitoring and evaluation of program measures, and adaptive management. In addition, the *NMFS Bi-Op* (9.1.6) states "specific scientific studies must be undertaken with rigorous monitoring and evaluation, focusing on determining population status and the mechanisms that regulate salmon populations." The *NMFS Bi-Op* (9.1.6) recommends to implement monitoring programs to "provide data for resolving a wide range of uncertainties, including determining population status, establishing causal relationships between habitat (or other) attributes and population response, and assessing the effectiveness of management actions. The information gathered through monitoring programs will be a cornerstone in identifying alternative actions and refining recovery efforts. Such programs are, therefore, critical to the successful implementation of this RPA."

The NMFS (2001) calls for a five-step approach to reaching the objectives of the Bi-Op. This project will play a major role in achieving the first four of these steps for an important component of the Snake River steelhead ESU in a relatively undisturbed subbasin:

1) Define the biological requirements and current status of each listed species.
2) Evaluate the relevance of the environmental baseline to the species current status.
3) Determine the effects of the proposed or continuing action on listed species.
4) Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.

This project will address many objectives or "specific immediate and/or critical needs" defined in the *Salmon Subbasin Summary*. General needs were defined to 1) address limiting factors to fish, wildlife and plant communities, 2) ensure that gaps in current data or knowledge are addressed, 3) enable continuation of existing programs critical to successful management of fish and wildlife resources, and 4) guide development of new programs to facilitate or enhance fish and wildlife management. This project would directly address all of these needs. Specific needs this project will address to accomplish these overall goals are:

1) Continue and expand genetic profiling to define steelhead sub-populations within the subbasin.
2) Gather improved wild B-run steelhead population status information.
3) Collect population status information for wild steelhead.
4) Validate index survey areas for steelhead.
5) Calculate returns per spawner from index surveys.
6) Monitor adult movements.
7) Investigate life history diversity and genetics of steelhead.
8) Investigate the distribution and abundance of redds, life history, and genetic composition of wild steelhead in the Middle Fork Salmon.
9) Quantify the types and extent of straying by steelhead.

The NPPC (2001) has adopted supplementation as an acceptable method of rebuilding natural runs. The object of such supplementation is to restore and maintain healthy fish populations, with sufficient genetic and life history diversity to ensure that eventually, after appropriate habitat improvements, they will become self-sustaining. Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics. This project will facilitate the establishment of steelhead in the MF Salmon as a model population to which supplemented populations may be compared and evaluated.

NMFS (2001) states that "pursuant to ESA, to fully consider the current status of the listed species, they evaluate the species-level biological requirements of a species, subspecies, or distinct population segment level. The attributes associated with VSP's include adequate abundance, productivity (pop growth rate), pop spatial scale, and diversity. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle and are therefore distinguished from the more specific biological requirements associated with the action area and the particular action under consultation." The NMFS *1998 Supplemental FCRPS Biological Opinion* states that Action Agencies proposed actions and those in the *1995 FCRPS Biological Opinion* would not jeopardize the continued existence of Snake River steelhead. Since the MF Salmon portion of the ESU is essentially unaffected by habitat degradation and hatchery influence, it provides a more focused scope and valuable means of measuring the efficacy of specific *Bi-Op* recovery actions in the Federal Columbia River Power System (FCRPS) action area.

The NMFS (2001) states that biological populations have not yet been identified for most of the ESU's listed in the *Bi-Op*. This project will collect samples for genetic sampling in order to assist in reaching this goal. Our sampling will complement the genetic sampling currently in progress under the IDFG Steelhead Supplementation Studies (9005500).

Review Comments

Although the IDFG has completed genetic analyses in this area, this project would compliment and expand what has been completed to date. This project addresses RPA 179 and 180.

Budget

FY02	FY03	FY04
$416,147 Category: High Priority Comments:	$406,954 Category: High Priority	$427,301 Category: High Priority

Project: 28052 – Adult Snake River steelhead monitoring in the South Fork Salmon River Basin.

Sponsor: NPT/PNNL

Short Description:

We propose to initiate collection of baseline steelhead adult abundance information critical for determining population status and viability in addition to identifying potential management actions needed for Snake River steelhead in Johnson Creek.

Abbreviated Abstract

Snake River steelhead were listed as threatened in August of 1997. Counts at Lower Granite Dam represent the only indicator of Snake River steelhead abundance showing a decline in abundance from a four-year average of 58,300 in 1964 to a four-year average of 8,300 ending in 1998. Independent populations within the Snake River steelhead ESU have not been defined according to criteria in McElhany et al. (2000). However, based on the limited available data, the NMFS assumes that there are at least 5 populations of A-run and 5 populations of B-run steelhead in the Snake River Steelhead ESU. The NMFS considers the status of the component populations as an indicator of the status of the entire ESU, as such the NMFS Biological Opinion (2000) (Action 179) calls for defining populations based on biological criteria and evaluating population viability in accordance with NMFS' Viable Salmonid Population (VSP) approach. The VSP defines population performance measures in terms of four key parameters: abundance, population growth rate, spatial structure, and diversity. The VSP then relates performance and risks at the population scale to risks affecting the persistence of the entire ESU. However, the information needed to determine status and viability of the assumed populations within the Snake River steelhead ESU as defined by the VSP is non-existent. The basic lack of information for any of the populations within the Snake River steelhead ESU prohibits developing, implementing, and monitoring recovery plans or actions. We propose to initiate collection of baseline steelhead adult abundance information critical for determining population status and viability in addition to identifying potential management actions needed for Snake River steelhead in the South Fork Salmon River Basin using a temporary weir and advanced hydroacoustics technologies. The goals of this proposed project is to establish baseline steelhead adult population abundance in the Johnson Creek subbasin to support a scientifically defendable fisheries management process.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
199005500	Steelhead supplementation studies in Idaho Rivers	Determining genetic stock structure in Idaho streams including three spawning aggragates in the South Fork Salmon River.
198909800	Salmon supplementation studies in Idaho Rivers	Indirectly esitmating juvenile steelhead migration from mainstem South Fork Salmon River.
198909802	Salmon supplementation studies in Idaho Rivers	Indirectly esitmating juvenile steelhead migration from mainstem Secesh River.
199604300	Johnson Creek artifical progagarion enhancement	Estimating stage specific juvenile steelhead survival. Will furnish the majority of field equipment, office and field facilities, and personnal for the proposed project.

Relationship to Existing Goals, Objectives and Strategies

Initiation of this project would allow movement toward developing the escapement abundance data sets that provide a scientific basis for management, conservation, and allow evaluation of recovery thresholds (NMFS Biological Opinion 2000). This proposed project is a critical aspect of a viable population management strategy in that it provides quantitative adult escapement abundance information that is recognized within the scientific community (Foose et al. 1995, Botkin et al. 2000) and in recovery planning efforts (NMFS Biological Opinion 2000). Quantifying adult salmon spawner abundance will provide a direct measurement of benefits of the Northwest Power Planning Council's Fish and Wildlife Program (NPPC 2000) projects (funded by BPA) and effects of recovery alternatives. In addition, the goals and objectives of this proposal are consistent with and recommended by action plans identified in the NMFS Biological Opinion (2000), Fish and Wildlife Program (NPPC 2000), Salmon Subbasin Summary (Servheen et al. 2001), Wy-Kan-Ush-Me-Wa-Kush-Wit (CRITFC 1996)(Spirit of the Salmon) and the Validation Monitoring Panel (Botkin et al. 2000).

Action 175 in the NMFS Biological Opinion (2001) calls for implementation of a four step planning process, and if so determined by the process, implement safety-net projects for salmon and steelhead populations. The South Fork Salmon River is one of two B-run steelhead populations identified for implementation of the safety-net planning process. Information that would be generated from this proposed project could be invaluable in guiding the development of a monitoring and evaluation plan if a safety-net project is implemented.

Action 179 in the NMFS Biological Opinion (2001) call for defining populations based on biological criteria and evaluating population viability in accordance with NMFS' Viable Salmonid Population approach. While the data required for determining the viability of steelhead in the South Fork Salmon Basin is limited, current ongoing projects will provide data to assess steelhead diversity and spatial structure. This proposed project will focus on assessing steelhead population abundance and data necessary to estimate population growth rate.

Action 180 in the NMFS Biological Opinion (2001) calls for Population Status Monitoring. This proposed project was developed to mirror the Tier 2 level of population monitoring which in cooperation with BPA project # 199604300, will define population growth rates, detect changes in those growth rates or relative abundance in reasonable time, estimate juvenile freshwater abundance and survival rates, and identify association between population status or stage-specific survival and environmental attributes.

Action 193 in the NMFS Biological Opinion (2001) states that the action agencies shall investigate state-of-the-art, novel fish detection and tagging techniques for use, if warranted, in long-term research, monitoring, and evaluation efforts.

The proposed steelhead project fulfills existing goals, objectives, and strategies in the draft Salmon Subbasin Summary (section 5.2). Objective 8 of the Research Monitoring and Evaluation of section 5.2.2a (NPT) is to conduct juvenile and adult population status monitoring for steelhead in the South Fork Salmon River. The IDFG identified a single goal for steelhead (section 5.2.3a), to assess how or if artificial propagation can be used to rebuild natural populations to self-sustaining and harvestable numbers without an adverse impact on the existing natural populations. This proposed project will help in fulfilling objective 5 associated with their goal; assessing the abundance, habitat, and life history characteristics of existing steelhead populations in the Salmon River and Clearwater River drainages. The proposed project will also fulfill stated fish and wildlife needs (section 5.4.2) for summer steelhead; 1) Gather improved wild, natural, and hatchery A-run and B-run steelhead population status information including tributary specific life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, spawning areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded Idaho Supplementation Studies, Idaho Natural Production Monitoring Program, and selected Tribal efforts in the South Fork Salmon River. 2) Collect population status information for wild steelhead including adult spawner abundance, spawner to spawner ratios, spawning locations, spawning timing, juvenile abundance, and SARs in the South Fork Salmon River.

The intended goals of the Fish and Wildlife Program (NPPC 2000) are furthered with the initiation of this project. The Fish and Wildlife Program (FWP) calls for monitoring techniques that are biologically quantifiable and fill measurable data gaps. Monitoring projects must use techniques that are appropriate for evaluating outcomes in the stated biological objectives. Proposals must also plan for the dissemination of collected data, proven technology and project results (NPPC 2000). Therefore, salmon abundance monitoring as described in this proposal falls within the conceptual framework and strategy established in the FWP.

Wy-Kan-Ush-Me-Wa-Kush-Wit (Spirit of the salmon) provides guidance to "Establish and monitor escapement checkpoints at mainstem dams and in index subbasins. ….Methods to be used include video counting at hydropower dams and at key locations in tributaries…. The least intrusive method should be used to collect the necessary information…. Establish additional monitoring programs for each of the subbasin tributary systems to monitor adult escapement and resulting smolt production, and to evaluate (by measuring the number of adults returning) the ability of managers to meet goals set by the Columbia River Fish Management Plan (CRFMP)."

The Validation Monitoring Panel (Botkin et al. 2000) provided a science-based analysis for monitoring of salmon for conservation plans. The panel identified the need for adult salmon abundance information in relation to conservation and restoration plans. They also reviewed methods for determining adult escapement. The authors highlighted video, hydroacoustics and resistivity because these technologies offer a non-intrusive method of counting fish while not altering fish migration and behavior. The advantages of these technologies also include the ability to count fish in turbid and high flow conditions.

Review Comments

Presently, adult steelhead monitoring (i.e., abundance trends of Snake River steelhead ESUs) occurs only at Lower Granite Dam. Reviewers suggested that population specific information (e.g., status and viability) is needed for the development of management actions. The NMFS BiOp (2000) also identified the need for accurate population abundance. This project addresses RPAs 179, 180 and 193.

Budget

FY02	FY03	FY04
$708,000 Category: High Priority Comments:	$474,000 Category: High Priority	$495,000 Category: High Priority

Project: 28054 – Evaluation of Pisces Fish Protective Guidance and Monitoring System

Sponsor: BPI

Short Description:

Guide fish and monitor water conditions and fish passage

Abbreviated Abstract

The creation of a fish friendly environment at hydropower facilities in the northwestern region of the United States, where hydropower generation can result in the entrainment of listed or endangered species of fish through turbines, is critically needed. Balaton Power, Inc. proposes using a float mounted water intake system, the "Pisces" unit as a means for directing fish away from hydropower turbines, while monitoring water and fish passage conditions through on-board systems. This will be done with the assistance of Idaho Fish and Game and an independent contracting watershed specialist/biologist.

Downstream migrating salmon use turbulent flows for guidance and assistance in migration. The Pisces is designed to take advantage of biological responses of migrating smolt to greatly reduce or eliminate their entrainment through hydropower systems while guiding the migrants to safe bypass. The Pisces represents a technology that could be used to modify existing turbines to the status of being "fish friendly" thereby precluding the purchase and installation costs of a new turbine system.

The satellite accessible environmental monitoring sensor system for the Pisces will measure water flow rate, level, turbidity, temperatures at various depths and locations and record passage of fish through the Pisces system, transmitting the information in a real-time, continuous manner.

Model testing of the Pisces has been completed. The proposal herein is for expanded testing of the Pisces intake and monitoring systems a location on the Big Wood River, in southeastern Idaho. Preliminary testing of three Pisces units will take place using released fish and the technical assistance of Idaho Fish and Game and Watershed Professionals Network. Final testing will be conducted on non-released fish to determine the success of the Pisces directional system to prevent the entrainment of migrating smolt, as well as that of the monitoring systems. While these tests will not be conditioned in the

Mountain Snake Province, impacts and successes of the tests will enhance the Clearwater and Salmon Watersheds through protection of fish, habitat and hydropower.

Relationship to Other Projects

Project ID	Title	Nature of Relationship

Relationship to Existing Goals, Objectives and Strategies

testing of the Pisces intake and monitoring systems at a working hydropower operation on the Big Wood River, located in southeastern Idaho, using released fish and the technical assistance of Idaho Fish and Game and Watershed Professionals Network. Final testing will be conducted on non-released fish to determine the success of the Pisces directional system to prevent the entrainment of migrating smolt, as well as that of the monitoring systems. While the tests will not be conditioned in the Mountain Snake Province, impacts and successes of the tests will enhance the Clearwater and Salmon Watersheds, through protection of fish, habitat and hydropower.

It is envisioned that the Pisces intake system represents a cost-effective solution to prevent the entrainment of migrating smolt into irrigation canals, and cooling water intakes as required under the Clean Water Act 316(b) regulations. Still, the rigorous testing included herein is required to determine the effectiveness of the Pisces system to reduce or eliminate migrant entrainment.

Following are ways that this project can help to achieve the requirements set forth in several of the Reasonable and Prudent Alternative (RPA) Actions listed. The Pisces aids in passage, screening and flow problems. It most certainly is effective in all water diversion related issued.

(RPA) Action # 107

For RPA # 107, Balaton Power, Inc. can help to identify factors affecting passage, survival and reproductive success in adult salmonids by collecting water quality data and assisting in fish counts through the use of the satellite accessible environmental monitoring sensor system for the Pisces, which measures water flow rate, level, turbidity, temperatures at various depths and locations and record passage of fish through the Pisces system, transmitting the information in a real-time, continuous manner.

Additionally, the majority of water quality data collected today continues to be obtained by on-site visitation by agency employees and/or agents. Due to the need to monitor water quality at numerous and often remote locations the collection of data by personnel site visitation is both expensive and sporadic, being limited by available manpower.

RPA Action # 118

Balaton Power, Inc. can assist in fish directional guidance to be effectively used in connection with tributary turnoff and accessing upstream dams. The Pisces' monitoring system can, at a click of a computer key from any location, provide fish counts, nutrient levels, cold water biota, flow rate and turbidity, just to mention a few of the conditions that can be measured and transmitted.

RPA Action # 141
The Pisces can, by increasing the flow and turbulence, assist in directional guidance of the migrating juveniles as well as give indication of water temperature, fish counts, and flow rates to help formulate a conclusion to the cumulative effects of conditions that may contribute to disease in juvenile fish.

RPA Action # 149
Irrigation/industrial water use industries are facing litigation and will be coupled with the requirements of the Endangered Species Act and the Environmental Protection Agency's Article 316(b) of the Clean Water Act to ensure that they are consistent in their protection of endangered aquatic species. This Article requires that any industry/user of cooling water and irrigation system intakes must install fish-protective devices that will prevent the impingement and entrainment of fish.

The Pisces float mounted intake system is designed to greatly reduce or eliminate the entrainment of out-migrating smolt. The Pisces design is based upon scientific knowledge of how migrating smolt travel river systems and the use of turbulent flows to direct their movement. By utilizing opportunities for recapturing kinectic energy from turbulence, smolt are able to reduce the metabolic energy expended in swimming. Most studies of juvenile salmonid orientation during outmigration show them positioned head upstream so as to use their energy most efficiently in maintaining orientation with flow, rather than actively swimming downstream (Smith, 1982: Kada et al, 1997).

RPA Action # 151
The Pisces can help to achieve RPA Action 151 goals by increasing turbulence to aid in juvenile outmigration, while BPA establishes other methods to actually increase tributary flows. While doing this, the Pisces can monitor for water quality, nutrients, cold water biota and fish counts.

RPA Action # 155
The Pisces can collect the requisite data to be compulated to describe cause and effect and possibly identify further research needs. While doing this, the Pisces can help eliminate entrainment and impingement of migrants.

RPA Action # 182
Effective monitoring can be achieved through use of the Pisces system. This will assist in subasin assessments, templates and defining requisite background information. It can also be used to futher define specific monitoring needs and objectives while protecting the fish.

Review Comments

Not part of this province - referred to Upper Snake Province. Project sponsor should resubmit proposal in the Upper Snake Province solicitation.

Budget

FY02	FY03	FY04
\$ Category: Defer to Upper Snake Province Comments:	\$ Category:	\$ Category:

Project: 28056 – Four-Step Safety-Net Plan for South Fork Salmon River B-Run Steelhead

Sponsor: CRITFC

Short Description:

This project is identified under hatchery RPA 175. The project goal is to determine whether intervention is necessary to prevent the decline or immediate extirpation of South Fork Salmon River B-run steelhead, and to identify management alternatives.

Abbreviated Abstract

Despite previous and ongoing conservation/restoration activities, steelhead (*Oncorhynchus mykiss*) populations in the Snake River and tributaries continue to exist at depressed and declining abundance. The continued decline of the B-run steelhead inhabiting the South Fork Salmon River prompted the National Marine Fisheries Service (NMFS) to request completion of a four-step planning process to assess the efficacy of implementing an "artificial propagation safety-net program" for this population (NMFS 2000). Listed as "Reasonable and Prudent Action 175" (9.6.4.3 NMFS 2000), the four-step planning process consists of: 1) an extinction risk analysis; 2) development of intervention options, and proposal of a management alternative; 3) a benefit-risk analysis for the proposed management alternative; and 4) development of a hatchery and genetic management plan to guide implementation of the safety-net project. This project seeks funding to complete these documents, in a timely manner, in the hopes of implementing a management action that will increase the abundance of steelhead in the South Fork Salmon River while maintaining the genetic and life history characteristics of South Fork Salmon River steelhead.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
200001700	Recondition Wild Steelhead Kelts	Results of this study will be reviewed as a potential management alternative should management intervention be necessary.
9703800	Preserve Salmonid Gametes	Gamete cryopreservation will be assessed for its efficacy as a management alternative for the South Fork Salmon River.

Project ID	Title	Nature of Relationship
9306200	Salmon River Anadromous Fish Passage Enhancement	Data generated by this stidy will be reviewed to determine if habitat alteration of this type is a viable management alternative for South Fork Salmon River steelhead.
9107300	Idaho Natural Production Monitoring and Evaluation	Data generated by these studies will be used to estimate natural reproduction parameters.
9005500	Steelhead Supplementation Studies in Idaho Rivers	Data generated by these studies will be used to model the probable effects of supplementation on the population growth rate, as a means to assess the efficacy of supplementation as a management alternative for South Fork Salmon River steelhead.

Relationship to Existing Goals, Objectives and Strategies

The following sections describe the relationship of this proposal to: 1) objectives described in the Clearwater subbasin summary; 2) the 2000 fish and wildlife program; and 3) the NMFS (2000) biological opinion.

Review Comments

Addresses RPA 175. There is a current effort to combine all 4-step process proposals into one unified effort to ensure that overlap and redundancy are avoided. Refer to Safety Net Artificial Production Program proposal.

Budget

FY02	FY03	FY04
$ Category: Withdrawn, defer to SNAPP Comments:	$ Category: Withdrawn, defer to SNAPP	$ Category:

Project: 28057 – Four-Step Safety-Net Plan for Lower Salmon River A-Run Steelhead

Sponsor: CRITFC

Short Description:

This project is identified under hatchery RPA 175. The goal of this project is to determine whether intervention is necessary to prevent the decline or immediate extirpation of Lower Salmon River A-run steelhead, and to identify management alternatives.

Abbreviated Abstract

Despite previous and ongoing conservation/restoration activities, steelhead (*Oncorhynchus mykiss*) populations in the Snake River and tributaries continue to exist at depressed and declining abundance. The continued decline of the A-run steelhead inhabiting the Lower Salmon River prompted the National Marine Fisheries Service (NMFS) to request completion of a four-step planning process to assess the efficacy of implementing an "artificial propagation safety-net program" for this population (NMFS 2000). Listed as "Reasonable and Prudent Action 175" (9.6.4.3 NMFS 2000), the four-step planning process consists of: 1) an extinction risk analysis; 2) development of intervention options, and proposal of a management alternative; 3) a benefit-risk analysis for the proposed management alternative; and 4) development of a hatchery and genetic management plan to guide implementation of the safety-net project. This project seeks funding to complete these documents, in a timely manner, in the hopes of implementing a management action that will increase the abundance of steelhead in the Lower Salmon River while maintaining the genetic and life history characteristics of Lower Salmon River steelhead.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
200001700	Recondition Wild Steelhead Kelts	Results of this study will be reviewed as a potential management alternative should management intervention be necessary.
9703800	Preserve Salmonid Gametes	Gamete cryopreservation will be assessed for its efficacy as a management alternative for the LOS.
9107300	Idaho Natural Production Monitoring and Evaluation	Data generated by these studies will be used to estimate natural reproduction parameters.
9005500	Steelhead Supplementation Studies in Idaho Rivers	Data generated by these studies will be used to model the probable effects of supplementation on the population growth rate, as a means to assess the efficacy of supplementation as a management alternative for LOS steelhead.

Relationship to Existing Goals, Objectives and Strategies

The following sections describe the relationship of this proposal to: 1) objectives described in the Salmon subbasin summary; 2) the 2000 fish and wildlife program; and 3) the NMFS (2000) biological opinion.

Relationship to Goals and Objectives Identified in the Salmon Subbasin Summary

The following goals and objectives are duplicated verbatim from the Salmon subbasin summary (Servheen *et al*. 2001). For ease of reference we have retained the section headings and objectives as numbered in the subbasin summary, followed by the relationship of this proposal to those objectives.

5.4.2. Fisheries/Aquatic Needs

3. Continue and expand investigations of interactions between hatchery and wild chinook, steelhead, and resident fish.

4. Quantify the types and extent (amount) of straying by chinook and steelhead occurring within subbasins, within the Mountain Snake Province, and within designated ESUs.

5. Investigate connectivity between populations and the role of natural and artificial barriers in population isolation.

13. Conduct gamete preservation on all salmonids throughout the Salmon Subbasin (*Nez Perce Tribe*).

14. Implement/continue artificial propagation or supplementation programs on salmon and steelhead stocks deemed at risk (*Nez Perce Tribe*).

15. Use artificial production, i.e., egg outplants, parr releases, smolt releases, and adult outplants to reestablish salmon and steelhead runs into vacant habitat throughout the Salmon Subbasin (*Nez Perce Tribe*).

If funded, the proposed research would investigate the need for, and efficacy of, implementing an artificial propagation safety-net program for lower Salmon River steelhead. One of the goals of such a program would be to increase the range of habitats occupied by steelhead in the lower Salmon River, which could serve to reestablish connectivity between spawning aggregates. Several artificial propagation strategies will be considered including egg outplants, parr releases, smolt releases and adult outplants. Gamete cryopreservation would likely be pursued as insurance against skewed sex ratios. The RM&E components identified by this proposal will include assessment of a variety of parameters including interactions between hatchery reared and wild fish, success of hatchery fish in natural environments, and population expansion via adult straying.

Genetic Profiles of Anadromous Fish

The establishment of genetic baselines for salmon and steelhead is a key element for identifying stock or management units within populations and conserving existing genetic resources. Also, baselines allow standard against which shifts or losses of genetic resources through various management practices (e.g. supplementation or hatchery practices) can be monitored.

1. Complete a province-wide chinook salmon genetic assessment that will provide a baseline for monitoring hatchery introgression into wild populations.

2. Continue and expand genetic profiling to define steelhead sub-populations within the subbasin to determine geographic structure, gene flow, genetic similarity and hatchery introgression into wild populations.

The RM&E elements identified by this proposal will address gaps in genetic data, and identify data needs for the determination of fine-scale population structure within lower Salmon River spawning aggregates.

Summer Steelhead

1. Gather improved wild, natural, and hatchery A-run and B-run steelhead population status information including tributary specific life history characteristics, juvenile and adult migration patterns, juvenile rearing areas, adult holding areas, spawning areas, survival factors, smolt-to-adult survival, adult spawner abundance, distribution, timing and parentage, spawning success, and spawner to spawner ratios. Improvements should include maximizing the use of spatial technology (GIS) in data collection. Mechanism is through continued and expanded Idaho Supplementation Studies, Idaho Natural Production Monitoring Program, and selected Tribal efforts in the South Fork Salmon River.

2. Collect population status information for wild steelhead including adult spawner abundance, spawner to spawner ratios, spawning locations, spawning timing, juvenile abundance, and SARs in the South Fork Salmon River (*Nez Perce Tribe*).

3. Need to calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.

6. Investigate life history diversity and genetics of steelhead and relationship(s) to redband trout.

7. Evaluate the extent and impacts of hatchery straying into the subbasin to control potentially adverse genetic effects on the natural population.

8. Determine the extent of interaction between redband trout and steelhead, including overlap in distribution.

9. Investigate the distribution and abundance of redds, diversity of life history traits, and genetic composition of wild steelhead in the Middle Fork Salmon (*Nez Perce Tribe*).

10. Continue gene conservation efforts (cryopreservation) for steelhead to preserve genetic diversity within the geographic population structure (*Nez Perce Tribe*).

11. Develop conservation hatcheries with native steelhead broodstock (*Nez Perce Tribe*).

If funded, the proposed research will identify gaps in genetic and life history data for lower Salmon River steelhead. These data gaps will be addressed by the RM&E components recommended in the B-RA. Given that artificial propagation safety-net programs are intended to maintain genetic and life history characteristics of the targeted spawning aggregates, local broodstock will be used, and novel techniques (e.g., gamete cryopreservation) will be investigated.

Relationship to Goals and Objectives Identified in the 2000 Fish and Wildlife Program

The following objectives are from the Northwest Power Planning Council 2000 Fish and Wildlife Program (NWPPC 2000). The objectives are listed verbatim, and the objectives are numbered as they appear in the document. The relationship of this proposal follows each listed objective.

5. Allow for biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability.
    - Manage human activities to minimize artificial selection or limitation of life history traits.

Obviously, the expansion of biological diversity requires that genetic and life history variation of extant populations is maintained. This proposal seeks funding to develop an artificial propagation safety-net program aimed at maintaining extant life history and genetic diversity.

6. Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of population structures.
    - Increase the abundance and range of existing habitats and populations.

We envision artificial propagation safety-net programs as a means to increase the abundance of lower Salmon River steelhead. As population size increases, we expect the safety-net program to act as a core population allowing the population as a whole to expand into existing unused habitat. We hope that expansion into unused habitat will increase the resiliency of the population to localized catastrophic events (such as scouring floods).

8. Enhance the natural expression of biological diversity in salmon and steelhead populations to accommodate mortality and environmental variability in the ocean.

The expected increase in steelhead smolt abundance resulting from artificial propagation is expected to buffer random mortality, such as variation in ocean conditions. If increased smolt production translates into increased adult escapement, competition for spawning sites could promote expansion into underutilized habitat. Given the remarkable phenotypic plasticity of steelhead, use of peripheral habitat could result in the expression of a greater range of biological diversity (e.g., increased temporal variation in spawn and emergence timing).

9. Accept significant variation in the productivity, capacity and life-history diversity for any particular population over any particular time period, as part of the normal environmental condition. A measure of whether key ecological functions have increased sufficiently will be whether the system can accept normal environmental variation without collapse of the fish and wildlife population and community structure.

We envision an artificial propagation safety-net program as one component of a restoration and recovery strategy for lower Salmon River steelhead. In concert with improvements in habitat and passage such a program may increase the resiliency of lower Salmon River steelhead to stochastic and deterministic factors currently limiting the natural productivity of the stock. The associated monitoring and evaluation component of this proposal will measure the resiliency of the population over the range of environmental variation, with the goal of ensuring persistence within normal environmental stochasticity.

Relationship to Goals and Objectives Listed in the NMFS (2000) Biological Opinion
This proposal directly follows from hatchery RPA 175, 177, and 178 from section 9.6.4.3 of the NMFS (2000) Biological Opinion. These RPA's are listed below, and the relationship of this proposal to the RPA follows.

Action 175: BPA shall, in coordination with NMFS, USFWS, and the relevant state and tribal comanagers, fund the four-step planning process described above as quickly as possible and, if so determined by that process, implement safety-net projects as quickly as possible at least for the following salmon and steelhead populations: 1) A-run steelhead populations in the Lemhi River, main Salmon River tributaries, East Fork Salmon River, and Lower Salmon River; 2) B-run steelhead populations in the Upper Lochsa River and South Fork Salmon River; and 3) spring/summer chinook populations in the Lemhi, East Fork, and Yankee Fork Salmon rivers, and Valley Creek.

This proposal seeks funding to complete the four-step planning process to implement an artificial propagation safety-net program (if deemed necessary) for lower Salmon River A-run steelhead.

Action 177: In 2002, BPA shall begin to implement and sustain NMFS-approved, safety-net projects.

The four-step process proposed in this document will be completed in 2002, providing the basis for implementation of an artificial propagation safety-net program, should it be deemed necessary for lower Salmon River steelhead.

Action 178: BPA shall commit to a process whereby funds can be made quickly available for funding the planning and implementation of additional safety-net projects for high-risk salmon and steelhead populations NMFS identified during the term of this biological opinion.

One of the products of the proposed research will be a standardized methodology for the completion of the NMFS four-step process. Such a standardized methodology will be a useful application for identifying additional populations for which artificial propagation safety-net programs may be appropriate.

Review Comments

Addresses RPA 175. There is a current effort to combine all 4-step process proposals into one unified effort to ensure that overlap and redundancy are avoided. Refer to Safety Net Artificial Production Program proposal.

Budget

FY02	FY03	FY04
$ Category: Withdrawn, defer to SNAPP Comments:	$ Category: Withdrawn, defer to SNAPP	$ Category:

Project: 28058 – Restore Fish Passage and Habitat on the Upper East Fork of the South Fork of the Salmon River

Sponsor: IDEQ-IOSC

Short Description:

Restoration of fish passage and aquatic and riparian habitat through a historic open pit mine which created a migration barrier in the middle of the east Fork of the South Fork of the Salmon River (EFSFSR)

Abbreviated Abstract

The Salmon is a priority subbasin under the National Marine Fisheries Service (NMFS) Biological Opinion (BI-OP) with respect to the Columbia River Basin. Downstream migration of juvenile Snake River spring/summer chinook salmon, and summer steelhead, and the upstream migration of late summer adult chinook salmon depends on passage through critical reaches of the Lemhi and Salmon Rivers.

This project will utilize native materials that exist at an abandoned mine Site (the Yellow Pine Mine) to recreate fish passage through a pool and plunge spillway where fish passage has been curtailed when the mine was excavated within the center of the East Fork of the South Fork of the Salmon River at Stibnite (EFSFSR). In addition to providing access to over seven miles of recently rehabilitated spawning and rearing habitat in the Upper EFSFSR, the construction of the fish passage will result in reclamation of abandoned mined lands and restoration of approximately one mile of fisheries habitat within the construction footprint.

Materials utilized to construct a pool and plunge structure, which is suitable for fish passage at both high and base flows, will be extracted from relatively inert overburden waste dumps at the Yellow Pine Mine. The materials will be sorted to produce several sized fractions of materials suitable to construct the pool and plunge system and withstand various flow regimes in the EFSFSR. Once the foundation of the passage is constructed from boulders, finer material will be bedded in the bottoms of pools to help retain adequate volumes of water in the pools for fish to rest, accelerate as they leap from pool to pool, and land prior to entering the next successive pool.

Standard reclamation practices will be applied to the construction, barrow and access areas prior to completion. This will involve recontouring to minimize erosion and sediment delivery, soils construction and revegetation with native species to provide for a self-sustaining surface area, and evaluatio0n to ensure that construction and reclamation actions were effective.

Implementation of the project will require consultation and coordination with the Nez Perce Tribe, Idaho Departments of Water Resources, Fish and Game, and Environmental Quality. Additional stakeholders in the project include the National Marine Fisheries Service, Fish and Wildlife Service, Army Corp of Engineers, and USDA Forest Service – Payette and Boise National Forests. Currently, the Nez Perce Tribe, Idaho Departments of Water Resources, Fish and Game, Environmental Quality, and USDA Payette National Forest have expressed great interest in participating as cooperative entities in the project, and will provide either in-kind matching funds or sub-contractual services.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Lower Snake River Conservation Plan	Reestablishing fish passage and habitat will provide access for native brood stock to recolonize an additional seven miles of high quality stream habitat which has been rehabilitated in

Relationship to Existing Goals, Objectives and Strategies

Species present include: Snake River Spring/Summer Chinook Salmon (Oncorhynchus tshawytscha), Snake River Summer Steelhead trout (Oncorhynchus mykiss), Salmon River Basin Bull trout (Salvelinus confluentus), and Salmon River Basin Cutthroat trout (Oncorhynchus clarki lewisi).

Documents written by the National marine Fisheries Service to list chinook salmon and steelhead, and to designate critical habitat under the Endangered Species Act cite the loss of mainstem river habitat and tributary connectivity as one of the reasons for the decline in these species. Furthermore, the U.S. Fish and Wildlife Service has also state in its Biological Opinion that loss of habitat and connectivity between tributaries and mainstem rivers has also contributed to the listing of bull trout.

One of the objectives in the Idaho Department of Fish and Game draft Fishery Management Plan – 2001-2005, is to “Maintain and improve habitat quality throughout the Lemhi and Salmon River drainages.” This one-time project proposes to mitigate the potential effects of a power system by providing for passage of migrating fish on the East Fork of the South Fork of the Salmon River (EFSFSR), improve aquatic and riparian habitats, and eliminate significant sources of sediment which adversely impact critical spawning, rearing and over wintering habitat for resident and anadromous fishes in the SFSR Subbasin.

The nature of the risk on the Upper EFSFSR is blocked passage, both upstream and downstream, for fish. This risk will be mitigated prior to December 2002 through a coordinated and direct, on-the-ground action that will provide fish passage for the upstream migration of late summer adult Chinook salmon and downstream migration of juvenile Snake River Spring/Summer Chinook salmon and summer steelhead, and mid-summer migration of Salmon River Basin Bull trout to six miles of additional spawning and rearing habitat, which has recently been recovered, but has lain inaccessible to fish for almost sixty years. As a secondary benefit, reconstruction of the fish passage will eliminate a significant sediment source, which contributes to the adverse effects on spawning, rearing and overwintering habitat on the SFSR below the project. And as stated, the benefits to both ESA- and non-listed species will be realized during the 2003 migration seasons.

U.S. Army Corps of Engineer's and Idaho Department of Water Resource's permits will be in place by the time work is ready to begin in the summer of 2002. Consultation with the Nez Perce and Shoshone bannock Tribes, the U.S. Fish and Wildlife Service and National Marine Fisheries Service will also be completed prior to implementation of the project.

Review Comments

Addresses RPA 149. Although monitoring does not exist in the proposal, activities would take place through other projects funded outside the BPA process. Removal of the passage barrier would allow passage to areas suitable for anadromous fish spawning as well for use by fluvial bull trout.This project will immediately provide information for the management of bull trout and cutthroat trout and eventually anadromous fish. Reviewers question why the removal of this barrier is now a desire of the sponsor. The IDFG, NPT, and NMFS support the concept that has been proposed but NPT questions the priority of the removal versus other proposed actions that have been submitted by proposal sponsors.

The RFC expressed concern relative to the lack of inclusion of fisheries information. The RFC suggests that without specific goals and objectives related to fisheries benefits this project should not be funded. If specific fisheries goals and objectives can be determined than this project could be considered as a recommended action if the proponents address information about downstream effects and hazards as a result of this large scale project. Until downstream effects are better addressed the RFC questions whether possible downstream damage might out weigh up stream gains. In addition, the RFC questions whether the work could be completed in one year as proposed. The RFC believes the tie to the Federal Hydropower system is unconvincing.

Budget

FY02	FY03	FY04
$842,000 Category: Recommended Action Comments:	$31,000 Category: Recommended Action	$21,000 Category: Recommended Action

Research, Monitoring and Evaluation Activities

Needed Future Actions

Actions by Others

Table 28. Subbasin Summary FY - Funding Proposal Matrix (Excel File)

6. References

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