7.0 SNAKE RIVER STEELHEAD ESU

7.1 POPULATIONS

7.1.1 Snake River Hells Canyon Tributaries

7.1.1.1 Background

The Snake River Hells Canyon tributaries steelhead population area includes all mainstem and tributary habitats above the mouth of the Salmon River. Above the confluence with the Salmon River, most tributary watersheds are contained within either the Hells Canyon National Recreation Area or Hells Canyon Wilderness Area (exceptions include Divide, Dry, Wolf, and Getta creeks). Steelhead habitat quality above the Salmon River confluence is highest in Granite and Sheep creeks. These are generally larger tributaries and provide access to suitable spawning and rearing habitat. In Table 7-1, *Index of Potential to Increase Population* was rated medium, based on IDFG parr density counts showing that the Snake River and tributaries were at 98% of the estimated carrying capacity for 1985 through 1989 (IDFG 1992).

7.1.1.2 Suggested Mitigation Measures and Constraints

Due to the mostly short production reaches within Hells Canyon tributaries, a substantial percentage of steelhead production may occur in a relatively unprotected reach (Wild/Scenic corridor) of a seemingly well-protected watershed, so focused restoration activities may be warranted in Kirkwook, Big Canyon, Saddle, and Salt creeks (NWPCC 2004 Snake Hells Canyon Subbasin Assessment).

7.1.2 Tucannon River

7.1.2.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for steelhead because of flow, altered channel morphology, temperature, and agricultural and forestry practices. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated low. *Qualitative Assessment of Potential to Improve/Increase Habitat* was rated medium, and *Ecological Improvement Potential* and *Intrinsic Potential Adjusted Based on Practical Constraints* were both rated low.

7.1.2.2 Suggested Mitigation Measures and Constraints

Habitat for this population can be improved by addressing livestock grazing, the straightened channel, large wood reduction, sugar dikes, irrigation, flow modification, confined riparian area, dewatering, the Pomeroy Sewer plant with tertiary treatment, timber harvest in the upper watershed, non-native brook trout, the weir, eight artificial ponds that are screened but may warm the river, and a steelhead acclimation facility.

Table 7-1. Snake River Steelhead (yearlings) Ecological Improvement Potential

Data Sources

25 Populations		① Range of System Survival Rates GAP [D*]	② Index of Potential to Increase Population: H/M/L (base period abundance/productivity estimate; recent abundance/productivity estimate or % Interim Target)	③ Qualitative Assessment (CHART, NWFSC approach and other info) of Potential to Improve/Increase Habitat (H/M/L)	④ Primary Candidate Anthropogenic Limiting Factors: **F**low, **C**hannel **M**orphology (bed, banks, sediment, LWD, sinuos., connectiv.), **T**emperature, **W**ater **Q**uality	⑤ Ecological Improvement Potential	⑥ Improvement Potential Adjusted Based on Practical Constraints	⑦ Proposal to Fill Gap and Performance Measures/ Standards/ M&E
1 SNTUC-s	Tucannon River		M	L	Summer Flow, Channel Morphology (sediment), temp	L	L	
2 SNASO-s	Asotin Creek		L	H	Summer Flow, Channel Morphology (sediment), temp	L	L	
3 CRLMA-s	Lower Clearwater River		M	H	Summer Flow, Channel Morphology (sediment, water yield), temperature	M (tribs);L (mainstem)	L (Tribs); VL (mainstem)	
4 CRSFC-s	South Fork Clearwater River		VH	H	Morphology (sediment, cows, legacy dredge mining), temperature	H (tribs); L (mainstem)	L-M (tribs); VL (mainstem)	
5 CRLOL-s	Lolo Creek		VH	M	Morphology (sediment, legacy dredge mining), temperature	M	L	
6 CRSEL-s	Selway River		VH	L-M	Possibly LWD	L-M	VL-L	
7 CRLOC-s	Lochsa River		VH	M	Morphology (sediment), fish passage, temperature	M	M	
8 GRLMT-s	Lower Grande Ronde River		H	M	T,WQ, (from upstream ag.), F (most cumulative from upstream diversions)	M	M/L	
9 GRJOS-s	Joseph Creek		H	M	F,T, CM,WQ (ag., grazing, historic logging)	M	M/L	
10 GRWAL-s	Wallowa River		H	L	F,T, CM,WQ (major imapcts from ag, grazing, residental development)	H	M	
11 GRUMA-s	Upper Grande Ronde River		H	H-M	F,T, CM,WQ (major impacts from ag, grazing, and legacy logging and splash dams, channelization for flood control, urbanization)	H-M	M	
12 SRLSR-s	Little Salmon and Lower Salmon Tributaries		VH	L-M	Flow, channel morphology - sediment, riparian roads, temperatutre	L-M	VL	
13 SFMAI-s	South Fork Salmon River		VH	L	CM (Roads, legacy mining)	VL	VL	
14 SFSEC-s	Secesh River		??	VL	CM (Residences)	VL	VL	
15 SRCHA-s	Chamberlain Creek		H	VL		VL	VL	
16 MFBIG-s	Lower Middle Fork Salmon River		VH	L	CM (Leg. Mines, Resid), F (Graz)	L	L	
17 MFUMA-s	Upper Middle Fork Salmon River		VH	VL	F,CM(Leg. Mines, roads),	VL	L	
18 SRPAN-s	Panther Creek		VH	M	WQ (Legacy mining), irrigation, unscreened diversions in upper watershed, S (legacy logging, roads)	M	M	
19 SRNFS-s	North Fork Salmon River		VH	M	F,CM (Rd,Resid,For)	L	L	
20 SRLEM-s	Lemhi River		VH	H	F, CM, T, WQ, (agriculture, grazing)	H	M	
21 SRPAH-s	Pahsimeroi River		VH	H	F,CM,T (AG,Graz)	H-M	M	
22 SREFS-s	East Fork Salmon River		VH	M	F, (Div. screens) CM, (AG,Graz, Rds), T	M	M-L	
23 SRUMA-s	Upper Mainstem Salmon River		VH	H	F, CM, T, WQ, (agriculture, grazing)	H	M	
24 IRMMT-s	Imnaha River		H	M	CM (connectiv, culverts), water quality (feedlots)	M	M	
25 SNHCT-s	Hells Canyon Tributaries		M	M	Riparian Condition, S, Channel Stability, Flow, CM, High & Low Temp., Oxygen	M	M	

*D = Delayed mortality due to transportation

CSTN = Council, States, TRTs, NWC

The lower Tucannon River has lost more than 20% of its sinuosity due to channel straightening. Some watersheds occupied by this population are affected by the Little Goose or Lower Monumental reservoirs. Removal of dams to increase smolt migration is likely to meet extreme resistance. Converting private lands to public ownership and further regulation of private land use are unlikely to be supported on a large scale.

Recapturing the summer hydrograph, reducing the summer instream water temperatures, and conducting riparian restoration actions where degraded conditions exist would help offset the smolt losses from operation and maintenance of the FCRPS.

7.1.3 Asotin Creek

7.1.3.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for steelhead because of alterations in instream flows and the natural hydrograph, channel morphology, water temperatures, and some agricultural and forestry practices. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated low. *Qualitative Assessment of Potential to Improve/Increase Habitat* was rated high, and *Ecological Improvement Potential* and *Intrinsic Potential Adjusted Based on Practical Constraints* were both rated low. The lower 17 miles of Asotin Creek are roaded, the lower eight miles are bordered by small ranches, and the last mile flows through the city of Asotin, Washington. These watersheds have a considerable amount of water withdrawal by irrigation diversions, and they are affected by a wide array of forestry and livestock grazing practices. Public lands are in good to excellent condition, while private lands are in fair to good condition.

7.1.3.2 Suggested Mitigation Measures and Constraints

Many habitat improvement projects have been completed. The removal of residential and commercial development on lower Asotin Creek is not feasible, although some gains from nonpoint source pollution controls are possible.

Recapturing the natural summer hydrograph, reducing summer instream water temperatures, and conducting riparian restoration actions where degraded conditions exist would all help offset smolt losses from the operation and maintenance of the FCRPS.

7.1.4 Grand Ronde River Upper Mainstem

7.1.4.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for Snake River Basin steelhead because of reductions in instream flows, increased water temperatures, altered channel morphology, some forestry practices, and livestock grazing. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated high. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were rated high to medium, as was *Intrinsic Potential Adjusted Based on*

Practical Constraints. There is severe habitat degradation in the upper watershed from historical and current logging, agriculture, and livestock grazing activities.

7.1.4.2 Suggested Mitigation Measures and Constraints

There are water temperature and instream flow problems throughout the watersheds, and the Grande Ronde has been channelized for agricultural flood control. Addressing these factors will require the design and implementation of a strategy to acquire instream flows within the major tributaries and mainstem Upper Grande Ronde River sufficient to establish rearing habitat for juvenile steelhead. There is a need to improve the efficiency of irrigation techniques and equipment on Catherine Creek and the mainstem river by replacing flood irrigation with center-pivot sprinkler systems, changing from ditch to piped waters, and consolidating points of diversion and ditches. This will depend on the voluntary participation of local agricultural water users. Possible enticements might be financial incentives and new, more efficient irrigation systems with new conveyance systems that require less maintenance with no net loss in agricultural production.

Recapturing the natural summer hydrograph, reducing summer water temperatures, improving the sinuosity in lower-gradient reaches (particularly La Grande Valley), restoring riparian habitat components, and implementing diversion consolidation and irrigation improvements will help offset smolt losses due to operation and maintenance of the FCRPS.

7.1.5 Grand Ronde River Lower Mainstem Tributaries

7.1.5.1 Background

The Grand Ronde River lower mainstem tributaries population area includes mainstem Snake River tributaries in Hells Canyon below the mouth of the Grande Ronde River. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated high. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were rated medium, and *Intrinsic Potential Adjusted Based on Practical Constraints* was rated medium to low. Water temperatures, water quality, and instream flow concerns within the lower mainstem are strongly linked to upstream activities.

7.1.5.2 Suggested Mitigation Measures and Constraints

The most significant issues are the need to reduce summer water temperatures and increase instream summer flows, which will reconnect the riparian habitat of the stream, improve water quality, and increase the rearing and migratory habitats for steelhead.

Recapturing the natural summer hydrograph and lowering summer water temperatures by increasing the instream flows during low-flow periods will benefit juvenile rearing and migration life stages for Snake River Basin steelhead and will help offset smolt losses due to operation and maintenance of the FCRPS.

7.1.6 Imnaha River

7.1.6.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for Snake River Basin steelhead because of diminished instream flows, altered channel morphology, some agricultural and forestry practices, and livestock grazing. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated high. *Qualitative Assessment of Potential to Improve/Increase Habitat*, *Ecological Improvement Potential*, and *Intrinsic Potential Adjusted Based on Practical Constraints* were rated medium. The majority of the headwater areas are in designated wilderness. There are livestock feedlots along the mainstem, and high summer water temperatures are a problem in the lower river. Logging and roads have contributed to habitat degradation by adding fine sediments, removing inputs of large woody debris, and increasing inputs of other nonpoint source pollutants (e.g., fuels, lubricants, heavy metals, insecticides, herbicides).

7.1.6.2 Suggested Mitigation Measures and Constraints

Recent USFS and State of Oregon culvert passage analyses identified a large number of fish passage impediments in these watersheds. To remedy these problems, private and Federal landowners will have to participate voluntarily and cooperate with one another.

Annually correcting 10 percent of the fish passage impediments identified in the USFS and State of Oregon assessments will help offset smolt losses associated with operation and maintenance of the FCRPS. A strategy of replacing culverts at priority passage sites first and working progressively upstream to ensure fish access to and beyond project sites will be most successful and efficient and will most quickly provide habitat offsets to FCRPS operation and maintenance.

7.1.7 Wallowa River

7.1.7.1 Background

The Wallowa River population area is located within the Lower Snake River basin and contains the Wallowa River, Minam River, Lostine River, Bear Creek, and Hurricane Creek. In Table 7-1, *Index of Potential Absolute Increase in Production* and *Ecological Improvement Potential* were rated high. *Qualitative Assessment of Potential to Improve/Increase Habitat* and the *Intrinsic Potential Adjusted Based on Practical Constraints* were rated medium. The watersheds occupied by this population have been degraded from their historical conditions. There is a need for riparian restoration on several tributary streams. Water quality concerns include high summer water temperatures, chemical contamination of the irrigation return flows, and the overall reduction in the instream flows during critical summer periods.

7.1.7.2 Suggested Mitigation Measures and Constraints

The summer instream flows in Bear Creek at the confluence of the Wallowa River, in the Lostine River, and in Hurricane Creek for the three-mile stretch below the USFS boundary must be restored to 5 cfs, 25 cfs, and 5 cfs, respectively, to improve steelhead juvenile rearing and migration habitat and survival.

Some habitat improvements may be attained through point-of-diversion and ditch consolidations, permanent diversion structures that do not require regular instream bulldozing of native substrates, improved conveyance techniques (e.g., converting from losing ditches to pipes), or incorporating other forms of irrigation efficiencies (e.g., converting from flood irrigation to more efficient irrigation sprinklers). Accomplishing these improvements relies heavily upon the willingness of private and Federal landowners to participate and cooperate.

By partially restoring the summer instream flows (July through September) in Bear Creek, the Lostine River, and Hurricane Creek to 5 cfs, 25 cfs, and 5 cfs, respectively, some of the smolt losses associated with operation and maintenance of the FCRPS may be offset.

7.1.8 Joseph Creek

7.1.8.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for Snake River basin steelhead because of reductions in instream flows, some agricultural and forestry practices, livestock grazing, exotic weeds introductions, and range expansions, as well as the construction, maintenance, and use of roads in the valley bottoms and floodplains. In Table 7-1, *Index of Potential Absolute Increase in Production* was rated high. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were rated medium, and *Intrinsic Potential Adjusted Based on Practical Constraints* was rated medium to low. Large numbers of upland impoundments for livestock watering reduce (by evaporation) or delay water delivery (or discharge) to the stream course. Chesnimnus Creek experiences hot summer ambient water temperatures, which, when combined with the wide, shallow nature of the stream channel, can create suboptimal or even unsuitable salmonid fluvial habitat in some areas. Much of this creek's riparian area is fenced through CREP.

7.1.8.2 Suggested Mitigation Measures and Constraints

Recapturing the natural summer hydrograph, reducing summer instream water temperatures, and conducting riparian restoration actions where degraded conditions exist may help offset smolt losses associated with operation and maintenance of the FCRPS.

7.1.9 Little Salmon and Rapid River (SRLSR-s)

7.1.9.1 Background

This subpopulation of A-run fish occupies the Little Salmon River and its tributaries, as well as steelhead-supporting tributaries of the lower Salmon River downstream from the mouth of the Little Salmon (Whitebird Creek, Skookumchuck Creek, Slate Creek, and several smaller tributaries). The watersheds occupied by this subpopulation have been degraded from their historical conditions and are believed to be limiting for steelhead because of reduced instream flows, altered channel morphology, increased summer water temperatures, livestock grazing, some forestry practices, and road construction, maintenance, and usage. The lack of a properly functioning riparian corridor in the Little Salmon River has increased stream temperatures and affected the structure of the channel by the lack of large woody debris recruitment (NWPCC 2004 draft Salmon River Subbasin Plan). Other habitat challenges for steelhead include diversions of stream water for several types of uses, urban and suburban encroachment on the floodplain and RHCA (i.e., homes are built near the high water mark), and lack of accessibility to most tributaries by spawning adults and outmigrating smolts.

State Highway 95 constricts the channel migration and has helped create a fish passage barrier. Remedying these habitat challenges relies heavily upon the willingness of private landowners to participate. Moving buildings and roads and making other improvements are not feasible, because they lack local support. The opportunity to improve instream flows is constrained by prior appropriation of water rights under state water law.

The larger, fish-producing tributaries for this subpopulation include the Rapid River, Slate Creek, and White Bird Creek. The anadromous fish production from the remaining streams in the bounds of this subpopulation is relatively less important, either because of natural limitations (i.e., small stream size, steepness, or passage barriers such as waterfalls or landslides) or anthropogenic alterations, such as instream flow diversions, water consumption, dams and impoundments, and channelization. Fish habitat conditions in this subpopulation area range from near-pristine, mostly unaltered roadless areas in the Rapid River drainage to the significantly-altered Little Salmon River, which is severely degraded by poor water quality, cattle grazing, urban encroachment in the riparian zone, and past straightening and channelization of the stream channel to accommodate State Highway 95. Land ownership is a mix of Federal, state, and private, with private lands concentrated along the lower-elevation floodplains.

Many of the watersheds occupied by this subpopulation are degraded from their historical conditions and are believed to be limiting to steelhead because of their seasonal lack of instream flows, altered channel morphology, accelerated sediment deposition in stream channels, high water temperatures, and the encroachment of roads on stream channels and their floodplains. Water withdrawals may limit fish production because of reduced streamflows in Boulder and White Bird creeks and in many of the smaller tributaries to the lower Salmon River, such as Race Creek and Deer Creek. Many of the small tributaries to the Salmon River have fish passage barriers, including road culverts and small, unscreened, temporary diversion structures constructed of rocks and plastic sheeting. High summer water temperatures and intermittent summer flows often occur in the lower reaches of most moderate and small-sized streams in this area (fourth-order streams and smaller). Extensive logging road systems have been constructed in portions of the area, adding fine sediments, increasing water temperatures with decreased shading, and decreasing inputs of large woody debris. Elevated sediment inputs and impaired stream flows may be inhibiting fish production in the White Bird Creek drainage, and high loading of sediments from roads, cattle grazing, and legacy mining are the significant limiting factors in the Slate Creek drainage.

7.1.9.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high based on information from the IDFG parr density counts. IDFG parr monitoring from 1985 through 1989 showed that the mean percent of estimated carrying capacity in monitored sections of the Little Salmon River, the Little Salmon River tributaries, and the Lower Salmon River were 38 percent, 67 percent, and 98 percent, respectively (IDFG 1992). The overall rating for the *Improvement Potential Adjusted for Practical Considerations* for this subpopulation is very low, due to the low amount of natural production potential, the largely irreversible effects of construction of Highway 95, and residential developments that encroach on the aquatic ecosystems. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were each rated low to medium.

Many of the potential habitat improvements in this subpopulation area rely heavily upon the voluntary cooperation of private landowners; however, the USFS and BLM own the majority of lands along the larger fish-producing streams (Rapid River, Slate Creek, and White Bird Creek). In these areas, Federal agencies have the responsibility to help restore ESA-listed species and the authority to rehabilitate or restore their habitat.

7.1.10 Selway River (CRSEL-s)

7.1.10.1 Background

The Selway River drainage is predominantly forested, Federal land, of which approximately 90 percent is designated as wilderness. There are few anthropogenic changes outside the wilderness boundaries. The Selway River population occupies areas upstream from the historical Lewiston Dam, which was in place from 1927 to 1973. The dam was fitted with a wooden fish ladder, which only provided marginal fish passage for migrating steelhead adults and smolts (Cramer *et al.* 1998).

Selway Falls is sometimes a natural impediment to upstream fish passage, but many steelhead are capable of swimming up the falls under favorable stream flows or via a fish ladder that has been constructed there. In the non-wilderness portion of the drainage, steelhead habitat has been degraded by the development, maintenance, and use of recreational sites and riparian roads, and by sediment loads originating from logging system roads. Large woody debris is lacking or reduced at the mouths of many tributaries to the Selway River due to road maintenance practices that call for the removal of large woody debris upstream from culverts and bridges, past logging practices, and the indirect effects of fire suppression. Most streams are functioning at or near their potential, with little opportunity for improvement, except for reestablishing large woody debris where it has been removed and reducing sediment inputs from the road system. Exotic weeds are advancing upstream in many of the tributary floodplains and valleys with unknown aquatic and RHCA effects.

7.1.10.2 Suggested Mitigation Measures and Constraints

In Table 7-1, the rating for *Index of Potential to Increase Population* was very high, based on IDFG parr density counts showing that the Selway River was only at 13 percent of its estimated carrying capacity from 1985 through 1989 (IDFG 1992). *Improvement Potential Adjusted for Practical Considerations* for this subpopulation is low to very low, since most of the fish habitat is functioning at or near its potential; thus, there are limited opportunities for habitat improvement. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were each rated low to medium.

Sediment from roads, reduction of large woody debris, and losses of riparian vegetation from roads and recreational developments are the primary anthropogenic changes that could be remedied to offset smolt losses associated with operation and maintenance of the FCRPS.

7.1.11 Lochsa River (CRLOC-s)

7.1.11.1 Background

The Lochsa River drainage is predominantly forested, with National Forest lands covering more than 94 percent of the drainage. Most of the private lands are owned by Plum Creek Timber Company and are located in the headwaters of the drainage, along the Continental Divide. Sixty percent of the Lochsa River basin is roadless, and most of the roaded tributary drainages in the basin have average road densities less than 4 miles per square mile. However, several sections have road densities greater than 20 miles per square mile. Many of the stream crossings create full or partial migration barriers for anadromous salmonids. The Clearwater National Forest has removed or replaced a large number of impassable culverts in recent years and obliterated hundreds of miles of high-density road systems designed for jammer logging, which typically could drag logs by cable for a distance of no more than 300 feet. The Lochsa River subpopulation occupies areas upstream from the historical Lewiston Dam.

Habitat conditions range from near-natural potential to moderately degraded, with the majority of the habitat in the drainage in good to excellent condition. Habitat degradation in the Lochsa River drainage occurs primarily from high levels of sediment loading in some of the tributary streams due to granitic geologies, past wildfires, road systems, historical logging, and both natural and road-related landslides. The mainstem of the Lochsa River is functioning near its natural potential but is impaired slightly from deleterious effects associated with State Highway 12, which parallels the stream, and from urban encroachment in the floodplain and RHCA. Mature riparian vegetation is lacking or inadequate in many areas where timber harvest has occurred, and these degraded riparian conditions contribute to the elevated summer water temperatures that commonly occur in the Lochsa River drainage. Most of the private timber lands in the headwaters have been clear-cut over the last two decades in a checkerboard pattern, leaving high road densities, streams deficient in large woody debris, and few remaining mature riparian trees. Roadless areas are largely intact and functioning well ecologically.

Juvenile steelhead rearing has been documented in most of the Lochsa River drainage that is accessible to adult migration. Juvenile steelhead production is considered very low, primarily due to a lack of overall adult escapement but also because of habitat conditions in several drainages. Steelhead spawning has been observed in the upper mainstem Lochsa River and several tributaries (Squaw and Papoose creeks), but high-flow conditions usually prevent documentation of spawning in most streams.

7.1.11.2 Suggested Mitigation Measures and Constraints

Index of Potential to Increase Population was rated very high based on IDFG parr density counts showing that the Lochsa River was only at 34 percent of its estimated carrying capacity for 1985 through 1989 (IDFG 1992). *Improvement Potential Adjusted for Practical Considerations* is medium, since there are many surplus roads and impassable culverts that could be removed, and the stream system is likely to respond quickly to improvements due to the high sediment transport potential of most streams in the drainage. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were each rated medium.

Sediment inputs from roads and barriers to fish passage by impassable culverts are the primary anthropogenic changes that could be improved. Losses of riparian vegetation and large woody debris in legacy timber harvest units cannot readily be improved in a short timeframe. The riparian canopy will be reestablished naturally in legacy harvest units in two to three decades, while large woody debris may continue to be deficient in some streams for more than 75 years without active restoration.

7.1.12 South Fork Clearwater River (CRSFC-s)

7.1.12.1 Background

Fish passage in the South Fork Clearwater River was blocked by the Harpster Dam from 1910 to 1935 and from 1949 to 1963, when the dam was removed (Cramer *et al.* 1998). Local anadromous steelhead runs were extirpated by the dam. The South Fork Clearwater River subpopulation is mostly B-run fish derived from resident rainbow trout, juvenile stocking from Dworshak Hatchery stock, adults trapped at Lewiston Dam, and possibly residualized (resident) endemic *O. mykiss*. The area occupied by the population is moderately to severely degraded. The South Fork Clearwater River watershed has changed substantially since human activities began in the 19th century (USFS 1999). Mining, road building, and agricultural developments in the lower subbasin are largely responsible for altered steelhead habitat in the South Fork Clearwater River watershed. Legacy impacts from dredge mining, such as straightened and confined stream channels, elevated sediment yields, and lack of riparian vegetation persist in Leggett and Newsome creeks and in the Crooked, Red, and American rivers. Increased sediment loads from road systems have impaired fish habitat in the Meadow, Cougar, and Peasley creek drainages, while Johns, Tenmile, and Silver creeks and the upper portion of Crooked River have high quality habitat with little or no road development. Road encroachment on stream channels causes significant impairment in Mill, Peasley, and Newsome creeks, lower Crooked River, and the entire SFCR mainstem. Roads occupy the floodplain and riparian area of the mainstem of the South Fork Clearwater River throughout most of its length. Potential spawning areas are abundant in the South Fork Clearwater River drainage; however, present steelhead production is likely well below its potential, due to habitat alterations.

7.1.12.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high based on IDFG parr density counts showing the South Fork Clearwater River was only at 40 percent of its estimated carrying capacity from 1985 through 1989 (IDFG 1992). The rating for *Improvement Potential Adjusted for Practical Considerations* for this subpopulation is low to medium in the tributaries and very low for the mainstem. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were each rated high.

Steelhead production potential is high in this subpopulation; however, the presence of Elk City, Idaho active mining claims and strong community concerns about wildfire risks at the wildland-urban interface limit the potential to reduce sediment loading from roads and to rehabilitate many degraded areas. There is virtually no opportunity to ameliorate the effects of Highway 14, which parallels the mainstem. Additionally, many of the stream segments where a large portion of steelhead spawning likely occurred in the past are on private property. Sediment inputs originating from roads and dredged valley bottoms are the primary anthropogenic changes that could be improved to help offset smolt losses associated with operation and maintenance of the FCRPS.

7.1.13 Clearwater River Lower Mainstem (CRLMA-s)

7.1.13.1 Background

The watersheds occupied by this population are the lowest in elevation for the Snake River basin steelhead ESU, and they are located in the most developed region of Idaho that is still accessible to steelhead. The vegetation in the drainage includes forests and prairie, which are used extensively for dryland agricultural production. The topography consists of steep canyons and rolling plateaus. Most of the land in this area is state- or privately owned and managed for commercial timber production, farming, or urban uses. The USFS and BLM own a few scattered parcels with land use practices that have a negligible effect on the streams in those areas. The primary fish-producing areas for this subpopulation are Big Canyon Creek, Little Canyon Creek, and the Potlatch River. Lapwai Creek and Lawyers Creek produced significant numbers of steelhead in recent history, but in the last decade, the streams were dry or intermittent for most summers, and current steelhead production is not significant. Orofino Creek and most of the remaining small, named tributaries to the mainstem Clearwater River provide minor amounts of spawning or rearing habitat for steelhead.

Most tributaries in this area have three distinct sections consisting of a mountainous plateau at higher elevations, a steep canyon that forms an anadromous salmonid passage barrier at mid-elevations in most streams, and an alluvial valley in the lower reaches. With the exception of the Potlatch River and Orofino Creek, the tributaries in this area have intermittent summer flows during most years. Nearly all of the streams have water temperatures that approach or exceed lethal limits for steelhead in the lower reaches. In this area, steelhead rely on thermal refugia at middle to higher elevations for their survival. Several riparian landowners construct temporary diversion dams each summer or pump water from the streams to irrigate their lands. Roughly one-third of the surface water in the Lapwai Creek drainage is diverted from Sweetwater and Webb creeks in summer for irrigation by the BLM or the Lewiston Orchards Irrigation District, leaving Webb, Sweetwater and Lapwai creeks dry or nearly dry downstream from the diversion dams. Stream channels in this area are extremely unstable and prone to flash flooding. Few channels have recovered from floods that occurred in the late 1990s, causing many stream channels to scour to bedrock. As a consequence, most streams have relatively uniform streambeds with little pool or bar formation, except where bedrock outcrops or large cottonwood trees influence the hydrology. Large woody debris is almost non-existent in most of the streams in this area. Riparian areas and floodplains are encroached upon by buildings, roads, and railroad lines, and the lower reaches are extensively diked for flood control or riprapped for bank stability. Lapwai Creek is forced for several miles into a narrow, confined ditch constructed between the Camas Prairie Rail Line and State Highway 95, and the length of the mainstem Clearwater River is bordered by State Highway 12 on one bank, while a rail line borders an extensive reach of the river on the opposite bank. Fish densities are generally low throughout this population, except for a few areas where streams are fed by perennial groundwater sources. Most of the population occurs upstream from the historical Lewiston Dam (in place from 1927 to 1973), which provided marginal fish passage conditions for steelhead. Fish in these areas are all A-run steelhead, with no evidence of hatchery influence on their genetic composition.

7.1.13.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated medium based on IDFG parr density counts showing that the Lower Clearwater River was at 98 percent of its estimated carrying capacity from 1985 through 1989 (IDFG 1992). The rating for *Improvement Potential Adjusted for Practical Considerations* for this subpopulation is low in the tributaries and very low in the mainstem. The rating for *Qualitative Assessment of Potential to Improve/Increase Habitat* is high based on the numerous anthropogenic changes that could potentially be remedied. *Ecological Improvement Potential* is rated medium in the tributaries and low in the mainstem due to the limited production potential even if anthropogenic limitations could be ameliorated.

Natural production is limited by the hydrogeomorphologic characteristics of the streams, lethal water temperatures, and deficient stream flows, which are exacerbated by water withdrawals and reduced instream habitat complexity.

7.1.14 Lolo Creek (CRLOL-s)

7.1.14.1 Background

Note: Information on the CRLOL-s subpopulation is from the Clearwater River Assessment (USFS 1997), unless noted otherwise.

This subpopulation is found in the Lolo Creek drainage, which is predominantly forested mountains, with some private agricultural lands in the middle and lower reaches of the drainage. Much of the lower 15 miles of mainstem Lolo Creek flows through a steep, inaccessible canyon. Land ownership is mixed and includes state, private, corporate timber lands, and Federal. The land is managed primarily for commercial timber production on state and private lands in the lower half of the drainage and secondarily for agriculture. The USFS manages the majority of the land in the headwater tributaries, and the BLM manages a contiguous block of land surrounding the lower seven miles of the Lolo Creek mainstem. Habitat conditions in the drainage have been altered by farming, mining, livestock grazing, timber harvest, and road building. The primary anthropogenic changes affecting fish production are legacy effects of mining, aggressive removal of wood from streams, elevated sediment loadings, and elevated water temperatures. Roads are located in riparian areas and floodplains throughout the drainage, which has increased sediment delivery to stream channels, altered streambank and floodplain conditions, and reduced large woody debris recruitment and shade. High summer water temperatures, channel instability from channelization, and decreased quantity and quality of spawning and rearing habitats are caused by the road developments. A fish hatchery constructed at Yoosa Creek blocks upstream fish migration.

Habitat conditions are at or near their natural potential in much of the lower 14 miles of Lolo Creek, where it flows through a canyon. Portions of the lower 30 miles of Lolo Creek are heavily impacted by livestock grazing, where the stream channels are not confined by steep, inaccessible canyons. High fish densities were found in the canyon section. The primary limiting factor for salmonid production within the lower mainstem Lolo Creek is high summer water temperatures. Stream channels in the Lolo Creek drainage generally have fair to poor substrate conditions, fair to good riparian conditions, and fair rearing habitats. Moderate to high levels of cobble embeddedness have reduced the quality and quantity of summer and winter rearing habitat, and these are significant factors limiting fish production in reaches where high summer water temperature is not limiting. Low levels of large woody debris recruitment and instream cover are limiting factors in a number of stream reaches. Instream fish habitat structures installed from 1981 to 1992 have been constructed as a surrogate for woody debris and have improved juvenile rearing habitat. Instream sediment removal activities for fish habitat restoration have also taken place in the mainstem Lolo Creek, Eldorado Creek, Yoosa Creek, and several tributaries. Removal of instream sediment from natural and constructed sediment traps has improved substrate conditions in localized areas, and long-term sediment trends are likely to be improving.

Fish population surveys in the Lolo Creek drainage over the past 19 years have documented juvenile steelhead at most sampling sites throughout the mainstem Lolo Creek; however, the Lolo Creek drainage produces very few steelhead due to a low number of returning adults and degraded habitat conditions. Steelhead mostly spawn in the mainstem of Lolo Creek (from Musselshell Creek to Yoosa Creek) and in accessible tributaries in the upper Lolo Creek and Yoosa Creek drainages. Limited spawning occurs in the Musselshell Creek and Eldorado Creek drainages. The overall number of redds observed has been relatively low. Although steelhead habitat is available in the Eldorado Creek drainage, natural returning steelhead trout have only been observed a few times. Eldorado Falls may present a partial migration barrier under some streams flow regimes and stages. Steelhead production during the last four years (2000 to 2003) indicates very low production, as average densities ranged from 0.3 fish/100m^2 (2000) to 2.1 fish/100m^2 (2003). Information suggests that steelhead trout production over the last 10 years has been in a static to downward trend within the Lolo Creek system, while habitat conditions have remained relatively unchanged or improved slightly during the same time period.

7.1.14.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high based on IDFG parr density counts that showed Lolo Creek was only at 31 percent of its estimated carrying capacity from 1985 through 1989 (IDFG 1992). The rating for *Improvement Potential Adjusted for Practical Considerations* for the CRSEL-s subpopulation is low, given the declining trend in adult returns despite the habitat conditions remaining the same or improving. *Qualitative Assessment of Potential to Improve/Increase Habitat* and *Ecological Improvement Potential* were each rated medium, since the steelhead adult returns appear to be depressed, significant limiting factors can be improved in portions of the Lolo Creek drainage, and portions of the drainage are functioning near their natural potential.

Actions required to improve steelhead production in the Lolo Creek drainage include reduction of cattle grazing impacts; reductions in sediment loading from road construction, maintenance, and operations; restoration of degraded riparian areas; and possibly the use of artificial structures to substitute for large woody debris that was removed from the system.

7.1.15 South Fork Salmon River

7.1.15.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for Snake River basin steelhead because of altered channel morphology, road encroachments, and legacy mining and logging practices. Fine sediments in the South Fork Salmon River mainstem are currently high due to the geologically unstable nature of the watershed and legacy effects from some ecologically unsound land management practices. Some restoration efforts have taken place, and it is unlikely that additional efforts will effectively change sediment volumes in the channel. There is, however, a threat of additional sedimentation occurring, and this would retard previous restoration efforts (NWPCC 2004 draft Salmon River Subbasin Plan). Localized riparian degradation affects anadromous salmonids and their habitat in the South Fork watershed. A common factor limiting the condition of salmonid rearing habitat throughout the South Fork Salmon watershed is the lack of shade-providing, bank-stabilizing, riparian vegetation (NWPCC 2004 draft Salmon River Subbasin Plan). A lack of functioning large woody debris recruitment is affecting channel structure in Johnson Creek and reducing habitat quality for salmonids (NWPCC 2004 draft Salmon River Subbasin Plan).

7.1.15.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Qualitative Assessment of Potential to Improve/Increase Habitat* was rated low based upon the degree of habitat degradation and the restoration efforts accomplished to date. Sediment loading is a major problem that is on an upward trend in most of the watersheds due to changes in land management practices. *Index of Potential Absolute Increase in Production* was rated very high based on smolt capacity estimates conducted in the 1980s. Thurow (1987) found that existing smolt production was 45,000, and its full potential was 200,000. He also predicted that a reduction in the percent fines from 30 percent to 20 percent would result in an improvement in egg-to-emergent-fry survival from less than 10 percent to nearly 80 percent.

IDFG parr density monitoring from 1985 through 1989 showed that the mean percent of estimated carrying capacity in monitored sections of the South Fork Salmon River was 13 percent (IDFG 1992).

Poor road maintenance practices continue to contribute additional sediment to the SF Salmon River. Disconnection from floodplain, limited large wood recruitment, chronic road effects, historical and recent mining, and unremediated CERCLA sites are problems that can be addressed but will probably meet with local resistance, reducing their feasibility. For example, in 2003, the county removed a log jam from the East Fork SF Salmon. Risk from stochastic events is high in the SF Salmon River.

7.1.16 Secesh River

7.1.16.1 Background

The watersheds occupied by this population are degraded from their historical conditions and are believed to be limiting for steelhead because of altered channel morphology. Residential developments encroach into the low-gradient meadows that support most of the spawning for this population, degrading their ecological functions for supporting anadromous salmonids.

7.1.16.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* is rated very high. IDFG parr density monitoring from 1985 through 1989 showed that the mean percent of estimated carrying capacity in monitored sections of the Secesh River was 13 percent (IDFG 1992).
Protecting existing high quality habitat around the low-gradient meadows that support most of the spawning for this population will prevent losses to this population, but may meet great resistance from the local property owners, thus reducing its feasibility.

7.1.17 Chamberlain Creek

7.1.17.1 Background and Suggested Mitigation Measures and Constraints

Most of the watersheds occupied by this population are in designated wilderness areas. With the exception of small, reach-scale, local, anthropogenic impacts, these watersheds are not degraded from historical conditions and therefore offer very low potential for habitat improvements and FCRPS offsets.

In Table 7-1, *Index of Potential to Increase Population* is rated high based on information from IDFG parr density monitoring that showed the mean percent of estimated carrying capacity for Chamberlain Creek was 53 percent from 1985 through 1989 (IDFG 1992).

7.1.18 Big, Camas, and Loon Creeks

7.1.18.1 Background and Suggested Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high. Thurow (1985) stated that an escapement of 8,000 fish may be required to fully use the productive capabilities of the available habitat in the Middle Fork. Thus, a tripling of escapement would be necessary to fully seed rearing areas. Spawner escapement is far below historical levels. In 1970, estimated escapement was over 5,000. From 1974 to 1982, spawner escapement was below 2,000. IDFG parr density monitoring from 1985 through 1989 showed that the mean percent of estimated carrying capacity in monitored sections in the Middle Fork Salmon River was 11 percent (IDFG 1992).

7.1.18.1.1 Big Creek - Most of this watershed is in designated wilderness areas. With the exception of small, reach-scale, local, anthropogenic impacts, these watersheds are not degraded from historical conditions. The anthropogenic impacts are related to legacy mining that caused altered channel morphology.

7.1.18.1.2 Camas Creek - This watershed has been degraded from its historical conditions and is believed to be limiting for Snake River Basin steelhead because of reductions in instream flows and stream channel and riparian impacts by livestock grazing. There is minor, site-specific potential to improve habitat at old road crossings, to increase flows and restore the natural hydrograph, to screen irrigation diversions, and to improve grazing management.

7.1.18.1.3 Loon Creek - Most of this watershed is properly functioning, with site-specific potential to improve habitat at road crossings, water diversions, and a mill site.

7.1.18.1.4 Pistol Creek - Most of this watershed is properly functioning, with site-specific potential to improve or protect habitat. Altered channel morphology and potential threats from private residential inholdings within the wilderness area are concerns for this population. Recent fires and debris flows have altered substrate composition, and impacts from legacy mining at the headwaters of Little Pistol Creek are evident.

7.1.19 Middle Fork Salmon River Upper Mainstem

7.1.19.1 Background and Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high. Thurow (1985) stated that an escapement of 8,000 fish may be required to fully use the productive capabilities of the available habitat in the Middle Fork. Thus, a tripling of escapement would be necessary to fully seed rearing areas. Spawner escapement is far below historical levels. In 1970, estimated escapement was over 5,000. From 1974 to 1982, spawner escapement was below 2,000. IDFG parr density monitoring from 1985 through 2989 showed that the mean percent of estimated carrying capacity in monitored sections of the Middle Fork Salmon River was 11 percent (IDFG 1992).

7.1.19.1.1 Sulphur Creek - This watershed has been degraded from its historical conditions and is believed to be limiting for steelhead because of reductions in instream flows and the effects of legacy livestock grazing. There are water diversions for irrigation and storage. The headwaters of Sulphur Creek are recovering from past grazing.

7.1.19.1.2 Bear Valley Creek - This watershed has been degraded from its historical conditions and is believed to be recovering from legacy livestock grazing and mining. In Table 7-1, *Intrinsic Potential Adjusted Based on Practical Constraints* was rated low, because restoration efforts have taken place, and it is unlikely that additional efforts will effectively increase production or abundance.

7.1.19.1.3 Marsh Creek - This watershed has been degraded from its historical conditions and is recovering from legacy livestock grazing and mining. Existing sheep grazing effects are of concern.

7.1.19.1.4 Middle Fork Salmon River (above Indian Creek) - Most of this watershed is properly functioning, with site-specific potential to improve or protect habitat.

7.1.20 North Fork Salmon River

7.1.20.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for steelhead because of instream flow reductions, altered channel morphology, road and residential development encroachments into the floodplain and RHCA, and some forestry practices that diminish the ecological function of the aquatic ecosystem to support anadromous salmonids. Some of the 60 miles of stream have been negatively impacted by mining, logging, and channelization (IDF&G 2001 Fisheries Management Plan). The North Fork Salmon River currently supports limited Snake River spring/summer chinook salmon and Snake River basin steelhead spawning and juvenile rearing.

7.1.20.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* is rated very high based on IDFG parr density monitoring from 1985 through 1989 that showed the mean percent of estimated carrying capacity in monitored sections of the North Fork Salmon River was 47 percent (IDFG 1992).

7.1.20.2.1 Salmon River from Panther Creek To Squaw Creek – The mainstem Salmon River is properly functioning with minor opportunities for improvement in the tributaries. Boulder Creek is blocked by a hydroelectric generation dam. The owner is willing to build a structure around it. There are irrigation diversions on Squaw Creek. Spring Creek has some diversions for domestic water supplies, while reconnections have been completed on Squaw, Spring, and Pine creeks. Indian Creek is mostly protected, though it has some horse grazing. There are legacy effects from mining and logging, and the drainage is recovering from fire-induced blowouts. There is some housing development, a guest ranch, a heliport fire camp and training center, and irrigated land along Indian Creek and its riparian corridor. The Salmon River from Tower Creek to Indian

Creek is impacted by recreation, roads, and floodplain development. Upstream of the North Fork, the floodplain of the mainstem Salmon River is impacted, but downstream, the floodplain is functioning well. The North Fork Salmon River is impacted by private land, agriculture, livestock grazing, bridge crossings to home development on the mainstem, screened diversions, legacy mining and timber harvest, recreational development, and dispersed recreation.

7.1.21 Panther Creek

7.1.21.1 Background, Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* is rated very high based on IDFG parr density monitoring (IDFG 1992). According to monitoring conducted in Panther Creek from 1984 through 1992, average densities of rainbow/steelhead trout were more than 50 percent higher in the areas below the Blackbird mine site than were above the mine site (Mebane 1994).

7.1.21.1.1 Salmon River from Panther Creek to Middle Fork - The canyon of the mainstem Salmon River is the dominant feature of this watershed. The habitat is generally excellent with minor improvement potential in the tributaries. Dewatering upstream has negative thermal effects on steelhead. There are lingering effects from mining and logging. Roads cause increased sedimentation rates and are treated with magnesium chloride for dust abatement. An irrigation dam on Colson Creek prevents adult and juvenile fish passage, and there is a significant level of water-based recreation (e.g., commercial and noncommercial rafting, kayaking, jet boats, steelhead angling, tubing, swimming, etc.) in the watershed. Large-scale habitat changes are caused by geomorphology in action, which may be exacerbated by past logging, mining, road construction and maintenance, fire suppression, and uncharacteristic wildfires.

7.1.21.1.2 Owl Creek - This watershed is recovering from logging, mining, and fire damage. Sediment loading has increased because of the recent fires. This watershed should improve with time as natural processes restore the area, although timber management and other ecologically sound land management restoration efforts could accelerate recovery.

7.1.21.1.3 Upper Panther Creek: Headwaters to Musgrove Creek - This is a core area for the upper half of the Panther Creek watershed. Some rehabilitation efforts are under consultation, including diversion consolidations. There is a historical town site in the area. Steelhead are currently planted via egg incubators. Improvements to irrigation systems, livestock grazing, and unscreened diversions would benefit the survival of steelhead in this population. One irrigation water right diverts water from the Panther Creek watershed into the Morgan Creek watershed.

7.1.21.1.4 Moyer Creek – This is the second-best steelhead tributary in the upper Panther Creek watershed. A road along the creek and livestock grazing diminish the steelhead habitat quality. Water diversions and screens are being rehabilitated, but a culvert five miles from the mouth of Moyer Creek is a barrier to steelhead migration.

7.1.21.1.5 Panther Creek from Fawn Creek to Musgrove Creek - The habitat in Musgrove Creek is in excellent condition and is the best tributary in the upper Panther Creek watershed. The Panther Creek road encroaches on the floodplain, and campgrounds with dispersed recreation are located along the stream within the RHCA. There was historical mining in the lower third of Musgrove Creek and Blackbird Mine, a large gold mine, is located partially in this HUC.

7.1.21.1.6 Deep Creek – Historically, this was a core area for spawning. It is one of the colder tributaries and is in mostly natural condition. Some habitat improvement can be made by addressing roads and culverts.

7.1.21.1.7 Napias Creek - The physical habitat in this HUC is excellent, but it has chemical problems (e.g., heavy metals, cyanide, acid-mine drainage) associated with the Beartrack Gold Mine. Upstream legacy mining also affects this area. Historically, Napias Creek was part of a mining claim for conveying mine wastes. An associated road constructed by the CCC in the 1930s resulted in encroachment into the RHCA and stream channel, and deposition of large boulders blasted from the high banks often act as additional barriers to anadromous salmonid passage.

7.1.21.1.8 Panther Creek from Big Deer Creek to Fawn Creek - This reach receives mine waste from both Beartrack Mine and Napias Creek. Historically, this was a core spawning area in the lower half of the watershed with high habitat quality. Water quality is currently the most significant problem.

7.1.21.1.9 Big Deer Creek – This stream drains the north half of the Blackbird Mine. The streambed is contaminated from past mining, and a large cobalt mine is proposed. Big boulders in the mouth of Big Deer Creek are a possible migration barrier. The habitat upstream of the fork is in good condition.

7.1.22 Lemhi River

7.1.23.1 Background

The watersheds occupied by this population have been degraded from their historical conditions and are believed to be limiting for steelhead because of diminished instream flows, altered natural hydrograph, altered channel morphology, increased water temperatures, degraded water quality, livestock grazing, and some agricultural practices, all of which detract from the ecological functioning of the watershed to produce anadromous salmonids. The hydrologic regime (i.e., peak flows, base flows, flow timing) and connectivity of most Lemhi River tributaries have been altered by irrigation withdrawals. Only 7 percent of all tributaries remain connected to the mainstem. These changes significantly limit resident and anadromous populations' access to high-quality habitat and delay anadromous smolt and adult migration in the lower reaches of the mainstem Lemhi River, which contributes to increased mortality rates (NWPCC 2004 draft Salmon River Subbasin Plan). Habitat in the mainstem Salmon River between the confluences of the North Fork Salmon and Pahsimeroi Rivers is primarily limited by a modified hydrologic regime, inadequate pool/riffle ratios, and structural migration barriers (NWPCC 2004 draft Salmon River Subbasin Plan). Irrigation diversions result in disconnected tributaries that deny juveniles access to important thermal refugia, create fish passage problems, and, in the case of unscreened diversions, cause take of listed species.

7.1.23.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population is* rated very high based on information from IDFG parr density monitoring and information provided by Salmon-Challis Forest personnel on the Critical Habitat Analytical Review Team (IDFG 1992). Their records indicated that the steelhead runs were historically much larger. This is supported by the highly degraded habitat in comparison with pre-listing conditions. Numerous tributaries are currently dewatered and disconnected from the mainstem Lemhi. Redd count data for chinook indicate that the Lemhi is currently producing only 9 percent of the redds it produced from 1957 to 1966 (Brown 2002). A similar decline can be assumed for steelhead because of the dewatering and disconnection of tributaries that steelhead historically used for spawning.

IDFG parr density monitoring from 1984 to 1989 showed that the mean percent of estimated carrying capacity in monitored sections of the Lemhi River was 47 percent (IDFG 1992). *In* Table 7-1, *Intrinsic Potential Adjusted Based on Practical Constraints* is rated medium, because mitigation measures are dependent on funding from private landowners and their willingness to modify land and water use.

Recapturing the natural hydrograph, reducing summer instream water temperatures, and restoring riparian areas where degraded conditions exist may help offset smolt losses associated with operation and maintenance of the FCRPS. The vast majority of the most depleted streams, where flow enhancement will have the most effect, have impaired hydrographs that no longer resemble naturally-shaped hydrographs. The ultimate goal of a flow enhancement project should be to establish more naturally-shaped hydrographs by restoring:

- Summer and winter base flows that are adequate for the survival of the species/life stages present and adequate to maintain riparian habitat.
- Early spring flows (pre-runoff) that are higher than summer base flows, adequate for high survival and growth of newly-emerged and one-year-old (pre-migration) juveniles (i.e., provide access to undercut banks, side channels, etc.), and adequate for unimpaired upstream and downstream migration.
- Spring flows (runoff) adequate for channel maintenance, floodplain connectivity, rapid downstream migration, etc.

Implementing sufficient measures will be contingent on the cooperation of many private landowners. Although the parties to the short-term Lemhi Agreement recognize that the measures contained therein are not sufficient for resident and anadromous fish, a long-term agreement has not been reached. The first short-term agreement was signed in 2001. When the most recent short-term agreement expired, irrigation depleted the Lemhi below the 35 CFS minimum flow measured at the L5 gauge.

7.1.24 Pahsimeroi River

7.1.24.1 Background

The watersheds occupied by this population are degraded from their historical conditions and are believed to be limiting for steelhead because of severe reductions in instream flows, highly altered channel morphology, increased water temperatures, livestock grazing, and some agricultural practices. In the Pahsimeroi River Valley, all mainstem tributaries are disconnected throughout the year because of water diversions. The disconnection has resulted in alterations to the mainstem Pahsimeroi's (mouth to Hooper Lane) hydrologic regime (i.e., peak and base flows and flow timing) and has created barriers to migration (NWPCC 2004 draft Salmon River Subbasin Plan). Over a century of livestock grazing and instream flow alterations have substantially altered species diversity, structure, and composition, as well as the connectivity of riparian zones in the Pahsimeroi watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability, each of which may act cumulatively or independently to adversely affect chinook and steelhead populations (NWPCC 2004 draft Salmon River Subbasin Plan). The high number of irrigation diversions in the mainstem Pahsimeroi from Patterson Creek to Big Springs Creek has created numerous barriers to fish migration (NWPCC 2004 draft Salmon River Subbasin Plan). Under the FCRPS Biological Opinion (2000), the Pahsimeroi River watershed was omitted from the priority list of watersheds, so restoration has been hampered by the lack of committed resources from FCRPS agencies and NOAA Fisheries.

7.1.24.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* is rated very high based on information from IDFG parr density monitoring from 1985 through 1989. Monitoring results showed that the mean percent of estimated carrying capacity in monitored sections of the Pahsimeroi River was 47 percent (IDFG 1992).

7.1.25 East Fork Salmon River

7.1.25.1 Background

The watersheds occupied by this population are degraded from their historical conditions and are believed to be limiting for steelhead because of altered channel morphology, diminished instream flows, increased water temperatures, the impacts of livestock grazing, some agricultural practices, and roads. Reductions in riparian shading and irrigation return flows are the primary factors contributing to increased water temperatures (NWPCC 2004 draft Salmon River Subbasin Plan). A reduction in riparian vegetation has also resulted in a decrease in streambank stability (NWPCC 2004 draft Salmon River Subbasin Plan).

7.1.25.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential Absolute Increase in Production* is rated very high based on information from IDFG parr density monitoring from 1985 through 1989. Monitoring results showed that the mean percent of estimated carrying capacity in monitored sections of the East Fork Salmon River was 38 percent (IDFG 1992). *Intrinsic Potential Adjusted Based on Practical Constraints* is rated medium to low.

7.1.26 Salmon River Upper Mainstem

7.1.26.1 Background

The watersheds occupied by this population are degraded from their historical conditions and are believed to be limiting for steelhead because of instream flow reductions, altered channel morphology, and the aquatic effects of livestock grazing, some agricultural practices, and road construction, operation, and maintenance. The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) is altered by streamflow withdrawals. The effects from these pressures include a reduction in base flow conditions and some modifications to flow timing (NWPCC 2004 draft Salmon River Subbasin Plan). Fish are entering irrigation systems when irrigation is turned on before fish screens are in place, during operation of diversions and control structures, and via wastewater return flows and breached ditches (i.e., ‘backdoor’ access). Upon entering the hydrologically unstable irrigation system, fish are subject to threats from dewatering (i.e., high temperatures, reduced forage, increased predation, etc.) (NWPCC 2004 draft Salmon River Subbasin Plan). Sedimentation from various land use activities has impacted habitat quality and quantity in the mainstem from the East Fork confluence to the headwaters (NWPCC 2004 draft Salmon River Subbasin Plan). The diversion of water for irrigation and its subsequent return, combined with reductions in riparian shading, are the dominant factors contributing to increased water temperatures in the mainstem Salmon River from the “12-mile section” upstream to Challis (NWPCC 2004 draft Salmon River Subbasin Plan). Channel confinement and development of riparian areas, from the “12-mile section” upstream to the headwaters, has caused a reduction in the pool:riffle ratio, a reduction in streambank stability, a reduction in shade, and has limited salmonid access to side channel habitat (NWPCC 2004 draft Salmon River Subbasin Plan). Because of these disconnects to side channel and tributary habitat, anadromous salmonids are denied access to vital thermal refugia.

7.1.26.2 Suggested Mitigation Measures and Constraints

In Table 7-1, *Index of Potential to Increase Population* was rated very high based on information from IDFG parr density monitoring from 1985 through 1989. Monitoring results showed that the mean percent of estimated carrying capacity in monitored sections of the Upper Salmon River was 11 percent (IDFG 1992).

7.1.26.2.1 Yankee Fork Salmon River - This watershed is degraded from its historical conditions and is believed to be limiting for steelhead because of reductions in instream flows, altered channel morphology, and legacy mining. Historical dredge mining has left unconsolidated dredge tailings in the lower Yankee Fork Salmon River (USRITAT 1998). These tailings, as well as other mining waste, may contribute toxic chemicals to the Yankee Fork and other downstream reaches and constrict the stream channel from interacting with adjoining floodplain areas. These problems thereby limit habitat suitability for Snake River spring/summer chinook salmon (SRYFS), Snake River basin steelhead (SRUMA-s), and bull trout (UPS) populations (NWPCC 2004 draft Salmon River Subbasin Plan). In Table 7-1, *Intrinsic Potential Adjusted Based on Practical Constraints* is rated low, because private landowners would have to modify their land and water use and absorb expenses associated with habitat improvements. However, Bonneville Power Administration is entering into a grant agreement with the Shoshone-Bannock Tribes to remove the floating dredge spoils along the lower Yankee Fork over a multi-year period.

7.1.26.2.2 Valley Creek - This watershed is degraded from its historical conditions and is believed to be limiting for steelhead because of reductions in instream flows, altered channel morphology, and livestock grazing impacts. Grazing impacts include sediment generation and mobilization, increased water temperatures, bank alteration, channel alteration, and riparian vegetation destruction. There are also fish passage impediments and life history alteration due to timing modifications. Downstream, fish face challenges due to increased predation, warmer water temperatures, and the seasonal lack of flow. In Table 7-1, *Intrinsic Potential Adjusted Based on Practical Constraints* is rated medium to low because of the heavy reliance upon cooperation from private landowners, including owners of commercial and residential development around Stanley, Idaho.

7.1.26.2.3 Salmon River, upper mainstem (above Redfish Lake) - These watersheds are degraded from their historical conditions and are believed to be limiting for steelhead because of reductions in instream flows, altered channel morphology, and livestock grazing impacts. The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) is significantly altered by streamflow withdrawals. The effects from these pressures include a reduction in base flow conditions and some modifications to flow timing (NWPCC 2004 draft Salmon River Subbasin Plan). Increases in the rates of sedimentation from various land use activities degrades habitat quality and quantity in the mainstem Salmon River from the East Fork confluence to the headwaters (NWPCC 2004 draft Salmon River Subbasin Plan). Roads, timber harvest, grazing, and changes to the hydrologic regime of the small Upper Salmon tributaries have acted alone or cumulatively to contribute excessive amounts of fine sediment to channels (NWPCC 2004 draft Salmon River Subbasin Plan).

7.2 LITERATURE CITED

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