SECTION 7.2
MPG-Level Assessment
Clearwater River Steelhead MPG

The Clearwater River MPG includes six independent populations (Figure 7.2-1), consisting of five extant populations and one historic population whose habitat was blocked by the construction of Dworshak Dam. Based on geography (basin topography) and several scattered genetic samples, fish in this subbasin are defined as a single major grouping. However, the Clearwater River includes substantial life-history diversity, because it supports populations traditionally classified as both A-run and B-run. Independent populations in the Clearwater River MPG include: 1) Lower Clearwater mainstem; 2) Lolo Creek; 3) South Fork Clearwater; 4) Lochsa; 5) Selway; and 6) North Fork Clearwater Creek. As defined by the ICTRT (2005), the North Fork Clearwater has been classified as a Very Large population, while the Lower Clearwater mainstem, Lochsa River, and the Selway River have been classified as *Large* populations, with the South Fork Clearwater classified as an *Intermediate* population. The remaining population in this MPG (Lolo Creek) is considered *Basic* (population size classes have been defined in ICTRT 2005).

A number of dams were built in the Clearwater River drainage, beginning probably in the late 1890s, which blocked or impaired anadromous fish migration. Lewiston Dam was built in 1927 at approximately Clearwater River mile 4 and operated until its removal in 1973. Unlike Chinook salmon, steelhead were able to maintain access to the Clearwater River subbasin during the dams existence therefore and are included in the DPS. However, the dam was thought to be a partial barrier to adult steelhead migration and reduced escapement to areas above the dam. During the course of its operation, modifications were made to Lewiston Dam to facilitate fish passage. The effects of Lewiston Dam extended to all populations in the MPG. The population-specific effects of other dams that were constructed in the subbasin are discussed in later sections.

Table 7.2-1. Clearwater River steelhead MPG population characteristics. Minimum abundance and productivity values represent levels needed to achieve a 95% probability of persistence over 100 years.

Population	Extant/ Extinct	Life History	Size	Spatial Category	Threshold Abundance	Minimum Productivity
Lower Mainstem	Extant	A-Run	Large	B-Dendritic	1,500	1.13
North Fork	Blocked	B-Run	Very Large	-	2,250	1.1
Lolo Creek	Extant	A & B-Run	Basic	C-Trellis	500	1.4
Lochsa River	Extant	B-Run	Large	B-Dendritic	1,500	1.13
Selway River	Extant	B-Run	Large	B-Dendritic	1,500	1.13
South Fork	Extant	B-Run	Intermediate	B-Dendritic	1,000	1.2

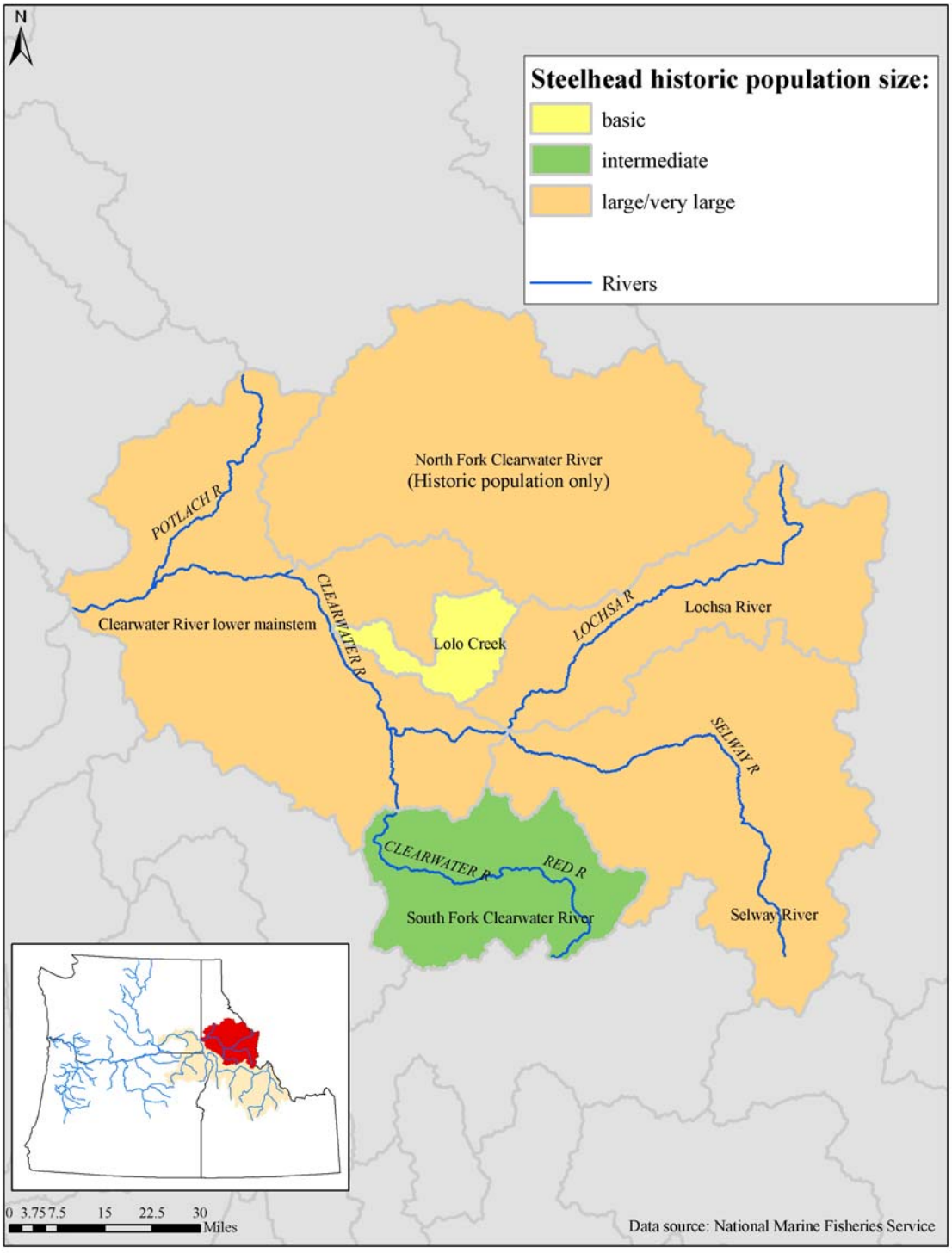

Figure 7.2-1. Clearwater River Steelhead MPG and Independent Populations.

Artificial propagation programs for steelhead in the Clearwater River basin are based on the North Fork Clearwater stock which was trapped at the foot of Dworshak Dam when that USACE project blocked access to the North Fork in 1969. The Dworshak National Fish Hatchery (NFH) has produced 2.3 million steelhead smolts annually most years since the early 1970s. About 1.2 million smolts are released direct from the hatchery located at the mouth of the North Fork at approximately Clearwater River mile 40 and the remaining 1.1 million are released off-station. Dworshak NFH supplies fertilized eggs to Clearwater Hatchery which produces 1.04 million smolts that are released in the South Fork Clearwater (including Crooked and Red rivers) for fishery mitigation and in an experimental attempt to reestablish a natural spawning population in an area which had been blocked by dams in the last century. Hatchery-origin steelhead are rarely observed in the important production areas in the Lochsa and Selway rivers or in the lower Clearwater River tributaries and are not believed to influence the natural populations.

Migration timing of steelhead in the Clearwater MPG, and the entire DPS, has changed as a result of anthropogenic impacts. Water releases from Dworshak Reservoir have caused adults to hold in the mainstem Clearwater River downstream of the North Fork Clearwater River for longer periods. Construction and operation of the lower Snake River dams and reservoirs have changed temperature and flow patterns, which in turn affects both juvenile and adult migration. Upstream migration of adults in the late summer and fall is often delayed because of warm mainstem temperatures. Smolt entry into the estuary has been delayed relative to historic conditions; passage through the reservoirs requires longer migration times.

7.2.1 Viable MPG Scenarios and Recovery Planning Objectives

Scenarios or combinations of populations that, when the populations achieve a viable state would result in a viable MPG, were determined based on the ICTRT (2005) MPG-level viability criteria. The ICTRT criteria #1 requires that at least one-half of the populations in the MPG be viable before the MPG can be deemed viable. Since there are six populations in Clearwater River MPG, at least three must be viable for the MPG to be viable in accordance with criteria #1. However, the ICTRT criteria for population size classes and life history strategies cannot be met with only three viable populations because of the distribution of those parameters across the five extant populations. Four of the five extant populations must be viable for the MPG to be deemed viable. The North Fork Clearwater population was blocked by the construction of Dworshak Dam, and currently is maintained only as a hatchery population. Therefore, the North Fork Clearwater population is not is not included in any viability scenarios for the MPG, and the status of only five of the six populations is considered when assessing MPG-level viability.

A particular population may appear in every viable MPG scenario when applying the ICTRT MPG-level criteria because of unique characteristics of the population. If a population appears in every viable MPG scenario, it absolutely must achieve a viable state before the MPG could be deemed viable. The Clearwater River Lower Mainstem population in this MPG appeared in every viable MPG scenario because it is the only A-

run type population in the MPG (criterion #6, life history strategy). Therefore, this population must be included in the minimum set of three viable populations to reach recovery. The inclusion of the Clearwater River Lower Mainstem population partially satisfies the population size class criterion (criterion #3) of needing at least two viable *Very Large* or *Large* sized populations. The South Fork Clearwater population is the only *Intermediate*-sized B-run population in the MPG and its achievement of viable status would satisfy the population size-class criterion for Intermediate sized populations. Viable status of the South Fork Clearwater River is not an absolute requirement for MPG viability since viability of an additional larger size class population (above the minimum size class requirement) could substitute for this Intermediate sized population. Therefore, viable status for any combination of two populations out of the South Fork Clearwater, Lochsa and Selway set would satisfy the size class criterion. The Lolo Creek population is the only *Basic*-sized population in the MPG but more importantly (uniquely) supports both A- and B-run types. Because of its unique life history strategy, the Lolo Creek population must be included in the set of four viable populations to achieve MPG viability.

The initial recovery planning objective (desired future MPG status) of this plan is to achieve viable status for the Lower Clearwater Mainstem, Lolo Creek, Lochsa and South Fork Clearwater populations. Some (primarily out-of-subbsin) actions that are implemented to improve the status of those populations very likely will also provide benefits to the Selway River population and it potentially could achieve viable status with few or no within-population specific actions.

7.2.2 Current MPG Status

The current status of the MPG was determined by applying the ICTRT's six MPG-level viability criteria (ICTRT 2005). Before applying the MPG-level viability criteria, viability assessments for each of the independent populations in the MPG to determine the populations' viability status. The assessment of abundance/productivity risk for steelhead populations is problematic because of the lack of population level abundance data for most populations. Pending the collection of better population abundance data, the ICTRT developed generic abundance/productivity risk assessments for A-run and B-run populations. That methodology allocated the aggregate run of natural-origin steelhead at Lower Granite Dam to the various populations.

Independent population viability assessments were completed for five of the six populations in the MPG and are summarized in later sections. Status of the North Fork Clearwater population was not assessed since access to the entire historic habitat is currently blocked by Dworshak Dam. The Clearwater River steelhead MPG currently does not meet MPG-level viability criteria. For the MPG to be considered viable, a minimum of four of the five extant independent populations in the MPG must be considered viable. The recovery planning objective for the MPG is for the Lower Clearwater Mainstem, Lolo Creek, Lochsa and South Fork Clearwater populations to be rated as viable, and one must be rated as highly viable. Currently, none of the five extant populations in the MPG meet population level viability criteria (Table 7.2-2).

Table 7.2-2. .Population characteristics and viability status of independent populations in the Clearwater River steelhead MPG. Risk levels indicated in italics are tentative and based on a qualitative assessment of risk.

Population Name	Population Size & Complexity	VSP Parameter Risk		Status (Meets viability criteria?)	
		A/P	SS/D	Population	MPG
Lower Clearwater River Mainstem	Large	*High*	Low	Does not meet	Does not meet
Lolo Creek	Basic	High	Moderate	Does not meet	
Lochsa River	Large	High	Low	Does not meet	
Selway River	Large	High	Low	Does not meet	
South Fork	Intermediate	High	Moderate	Does not meet	

7.2.3 Viability Gap

Of particular concern in the Clearwater River steelhead MPG is the *High* risk rating for the combined abundance/productivity Viable Salmonid Population (VSP) parameters. Populations were characterized at either *Low* or *Moderate* risk for spatial structure and diversity, a result of the large geographic size of most populations and similar effects operating across the MPG. Abundance/productivity risk of at least four populations must be reduced before the MPG can be considered viable. Spatial structure/diversity risk is sufficiently low for any population to achieve viable status, and three populations could achieve Highly Viable status. There is concern that lack of genetic data may have resulted in characterizing risk for the Lolo Creek and South Fork Clearwater River populations, areas with high hatchery influence too low. Special attention should be paid to that issue since four populations need to be viable for the MPG to be viable. Figure 7.2-2 summarizes the viability assessments for populations in the Clearwater River steelhead MPG.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)		Clearwater Lower Mainstem, Lolo Creek, Lochsa, Selway	South Fork Clearwater	

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-2. Viable Salmonid Population (VSP) risk matrix for independent steelhead populations. The viability status of populations in the Clearwater River steelhead MPG, as determined from population viability assessments is shown.

7.2.4 MPG Recovery Strategy

Approximately 47% of the Clearwater River MPG is designated as having some degree of protected status, the majority of which is either inventoried roadless or wilderness area. Portions of the Selway-Bitterroot and Gospel Hump Wilderness exist within the Clearwater River subbasin, contributing substantially to the total protected area (NWPCC 2004, p. 5). Much of the habitat in these protected areas is considered to be in near reference conditions. The remainder of habitat within the Clearwater River MPG is within managed landscapes with varying levels of anthropogenic influence. Sediment, temperature, and low smolt to adult return (SAR) rates are major factors affecting populations in this MPG. Low SAR's have been identified as a major out-of-basin limiting factor for the Clearwater River basin in the recently completed subbasin assessment (NWPCC 2004, p. 342). The assessment suggests that improvements in anadromous fish populations in the Clearwater River subbasin will benefit from improvements in out-of-basin survival, particularly important for populations in areas that currently have high-quality habitat like the Lochsa River and Selway River watersheds.

7.2.5 MPG Research, Monitoring and Evaluation Needs

[to be developed]

7.2.6 Population Viability Assessments

The following sections summarize the results of the population viability assessments completed for five of the six populations in the MPG (an assessment was not done for the North Fork Salmon River population). The detailed population viability assessments can be found in Appendix #_. Also, included for each population is a description of habitat conditions and threats to the population, limiting factors assessment and recovery strategy for the population. Limiting factors assessments have not been completed. Maps, based on existing databases, showing threats and potential limiting factors are in Appendix #_.

SECTION 7.2.6.1
Lower Clearwater Mainstem Steelhead Population

The Lower Clearwater mainstem population is a *Large* sized population with a branched discontinuous B type spawning complexity. This population is considered A-run fish (ICTRT 2003, p. 73). The Lower Clearwater mainstem has five MaSAs (Big Canyon, Clear, Lapwai, Lawyer, and Upper Potlatch) and sixteen MiSAs (Beardy Gulch, Bedrock, Butcher, Cottonwood-Clearwater, Cottonwood-South Fork Clearwater, Hatwai, Howard Gulch, Jim Ford, Lindsay Creek, Little Potlatch, Maggie, Middle Potlatch, Orofino, Rabbit, Sixmile and Suttler,). All Five MaSAs are occupied at the upper and lower ends.

Viability Assessment Summary

Results of the population viability assessment are summarized here. Population viability assessments integrate the four viable salmonid population parameters described in McElhany et al. (2000) – abundance, productivity, spatial structure and diversity – and were done following the ICTRT (2005) methodology. An empirical assessment of abundance/productivity risk was not completed for this population because of the lack of abundance and productivity data. A qualitative determination was made that abundance/productivity risk was *High*, based on the current status of the DPS (Threatened) and the abundance/productivity risk status of other populations in the MPG. See the population Viability Assessment for detailed information on the abundance/productivity and spatial structure/diversity risk ratings.

Overall spatial structure and diversity has been rated *Low* risk for the Lower Clearwater Mainstem population. This overall risk rating is largely influenced by diversity metrics. Spatial structure risk alone is Very Low; it is a large population distributed across a large geographic area with substantial environmental variation. Within the diversity metrics the population was rated at Low Risk for all mechanisms that influence diversity. Both juvenile and adult movement patterns likely have been affected by reduced flows and elevated temperatures in the mainstem. The magnitude of the effect is unknown and should be monitored to ensure that risk is accurately characterized.

The Clearwater Lower Mainstem steelhead population does not currently meet population level viability criteria because Abundance productivity risk is too high (Fig. 7.2-3). Without survival rate increases that lead to increases in abundance and productivity the population cannot achieve viable status. The population also does not currently meet the criteria for a “maintained” population.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)			Clearwater Lower Mainstem	

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-3. Viable Salmonid Population parameter risk ratings for the Clearwater Lower Mainstem steelhead population. The population does not meet population-level viability criteria.

Habitat Conditions and Population-level Threats

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 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. 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.

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.

Limiting Factors Analysis
(Section not completed)

Population Recovery Strategy

Abundance and productivity are the primary factors impairing the viability status of the population: the recovery strategy is to implement actions that lead to increases in overall life cycle survival. The status of all populations in the DPS is impaired by out of subbasin life cycle survivals (SAR). There are habitat conditions, land use activities and threats within the boundaries of the population that affect abundance and productivity. The recovery strategy for the population is to seek opportunities for increasing survival both within and out of the Clearwater Lower mainstem population boundary. Although no an all-inclusive list, the following restoration actions have been identified that would contribute to improving habitat condition and survival and productivity rates for the population:

1) Address localized areas where riparian function is most limited, including those segments of stream where roadbeds have been constructed adjacent to or within the immediate floodplain.
2) Restore riparian area composition, structure, and function in localized areas of the Lower Clearwater by improving riparian vegetation and hydrologic function through decommissioning or obliterating of roads within riparian areas and returning road surfaces, cuts, and fills to productivity.
3) Fine sediments in the Lower Clearwater mainstem are currently high due to the geologically unstable nature of the watershed and legacy effects from land management. Promote landscape management activities that minimize the threat of chronic sediment inputs.
4) Improve water quality and geomorphic integrity by implementing watershed restoration and reducing accelerated sediment impacts in localized areas of the Lower Clearwater mainstem.
5) Contribute to de-listing Lower Clearwater mainstem stream segments from the 303(d) list of water quality limited waterbodies by applying appropriate and active watershed restoration to reduce sediment (identified as the pollutant of concern).
6) Inventory existing roads (classified and unclassified) within the Lower Clearwater mainstem to identify watershed improvement activities, particularly in relation to fish passage

SECTION 7.2.6.2
North Fork Clearwater River Steelhead Population

A population viability status assessment was not done for the North Fork Clearwater River steelhead population. Access to all historic habitat is blocked by Dworshak Dam, situated two miles above the mouth of the North Fork Clearwater River. The construction of Dworshak Dam was completed in 1971 and the reservoir began filling in 1972 (Hanson and Martin 1989, USACE 1974). Steelhead returning to the river were trapped and then spawned and reared at Dworshak National Fish Hatchery (NFH). The current Dworshak NFH B-run steelhead stock represents the historic North Fork Clearwater River population. Genetic analyses indicate this population is unique. Samples from the Dworshak stock that were analyzed are distinct from all other Clearwater River samples[1]. Dworshak NFH operation fulfills USACE mitigation responsibilities for the construction of Dworshak Dam. Juveniles are released annually for harvest augmentation when they return as adults. Dworshak B-run stock also has been extensively outplanted in the Clearwater River and Salmon River drainages as part of other harvest augmentation and supplementation programs.

[1] Genetic ratings were based on ICTRT analysis of allozyme data presented in Winans et al. (2004) and Waples et al. (1993), and microsatellite data presented in Moran (2003).

SECTION 7.2.6.3
Lolo Creek Steelhead Population

The Lolo Creek population is a *Basic* sized population with a Branched Continuous C type spawning complexity. This population has tentatively been characterized as containing both A-run and B-run type adult life histories. A steep-gradient narrow canyon approximately 15 miles upstream of the mouth of Lolo Creek separates the upper and lower production areas. The lower production area is thought to be used by A-run fish and the upper area by B-run fish. However, the Lolo Creek steelhead population contains only one MaSA (Lolo) and no MiSAs. The MaSA is occupied in both the upper and lower halves.

Dworshak Hatchery B-run steelhead stock has been outplanted into the population intermittently since 1977. Fry have been released in six years (1977-1983 period), fingerlings in five years (1985-1991 period), smolts in six years (1989-2005 period) and adults in 6 years (1978-2002 period). During the period 1992 through 2000 no hatchery fish were released. Annual releases have ranged from 40,000 – 625,000 fry, 11,000 – 202,000 fingerling, 18,000 – 53,000 smolts and 150 – 1,150 adults.

Viability Assessment Summary

Results of the population viability assessment are summarized here. Population viability assessments integrate the four viable salmonid population parameters described in McElhany et al. (2000) – abundance, productivity, spatial structure and diversity – and were done following the ICTRT (2005) methodology.

The assessment of abundance/productivity risk is dependent on time series of abundance and age structure for each independent population. That data is not available for any B-run steelhead population. While the aggregate B-run abundance for the DPS can be quantified based on counts at Lower Granite Dam, it is extremely difficult to census abundance at the population level. The ICTRT developed a generic dataset for B-run steelhead populations to be used for a preliminary assessment of abundance productivity risk. The dataset was derived by distributing the natural-origin steelhead counted annually at Lower Granite Dam equally across the nine extant B-run populations. The average size category across the nine populations is Intermediate, therefore the generic abundance/productivity risk was measured against a minimum threshold abundance of 1,000 spawners. Results of this generic assessment indicate the populations are at *High* abundance/productivity risk. The 10-year geometric mean natural abundance was 272 or 27% of the minimum threshold abundance. The 13-year mean return/spawner productivity was 0.85, substantially less than the approximate 1.25 that would be required at an abundance of 1,000 spawners. The A-run component of this population was not included in the generic abundance/productivity risk assessment. The population is predominantly sustained by B-run production; A-run fish are believed to occupy only the lower 10 to 15 miles of Lolo Creek. The inclusion of the A-run component in the abundance/productivity risk assessment would not likely reduce risk.

Overall spatial structure and diversity has been rated *Moderate* risk for the Lolo Creek population. This overall risk rating is largely influenced by diversity metrics. Spatial structure risk alone is Low; even though there is only one MaSA there is a large amount of available production habitat with several branches. However, within the diversity metrics the population was rated at High Risk for spawner composition because of the long history of hatchery outplanting with out-of-population fish, and Moderate Risk for the selective impacts related to hydrosystem, harvest and hatchery actions affecting the population. No genetic diversity information was available for the population so genetic diversity risk was rated Moderate. The analysis of samples from the population is likely to indicate the influence of out-of-population hatchery fish on the endemic population and genetic diversity risk may actually be High for the population, and overall spatial structure diversity risk would be rated High.

The Lolo Creek steelhead population does not currently meet population level viability criteria because Abundance productivity risk is too high (Fig. 7.2-4), and the population does not currently meet the criteria for a "maintained" population. Without survival rate increases that lead to increases in abundance and productivity the population cannot achieve viable status. Spatial structure/diversity risk also is a significant concern in the population as it may have been rated too low because of the lack of genetic data.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)			Lolo Creek	

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-4. Viable Salmonid Population parameter risk ratings for the Lolo Creek steelhead population. The population does not meet population-level viability criteria.

Habitat Conditions and Population-level Threats

Land ownership within the Lolo Creek drainage 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.

The Lolo Creek drainage 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. 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.

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. 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. High summer water temperatures are a potential threat to production in the lower mainstem of Lolo Creek.

Limiting Factors Analysis
(Analysis not completed)

Population Recovery Strategy

Abundance and productivity are the primary factors impairing the viability status of the population: the recovery strategy is to implement actions that lead to increases in overall life cycle survival. Additional genetic analyses may indicate that diversity is also impairing population viability. The status of all populations in the DPS is impaired by out of subbasin life cycle survivals (SAR). There are habitat conditions, land use activities and threats within the boundaries of the population that affect abundance and productivity. The recovery strategy for the population is to seek opportunities for increasing survival both within and out of the Lolo Creek watershed. Lolo Creek will require an active restoration strategy because of the high levels of anthropogenic

disturbance in this watershed and its departure from proper functioning habitat conditions. 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. As part of a strategy to address diversity impairments, a supplementation and genetics management plan should be developed to guide the use of hatchery fish in the basin and promote local adaptation of natural origin recruits returning to the basin.

Although no an all-inclusive list, the following restoration actions have been identified that would contribute to improving habitat condition and function and survival and productivity rates for the population:

1) Address the lack of functioning LWD in Lolo Creek to improve habitat quality, and improve riparian function to increase future LWD recruitment.
2) Improve water quality by reducing road-related accelerated sediment delivery to Lolo Creek and its tributaries.
3) Evaluate road networks for opportunities to reduce sediment delivery and provide for fish passage.
4) Restore aquatic and riparian habitats in Lolo Creek and its tributaries by reducing streambank instability and accelerated sediment resulting from roads and other disturbances.
5) Restore instream fish habitat in upper Lolo Creek.
6) Evaluate campgrounds, trails, trailheads, and dispersed recreation sites along Lolo Creek and its major tributaries, improving sites as needed to reduce resource damage and sediment delivery to aquatic habitat.
7) Restore fish habitat degraded from past mining activities in the Lolo Creek drainage.
8) Contribute to de-listing Lolo Creek stream segments from the 303(d) list of water quality limited waterbodies by applying appropriate and active watershed restoration to reduce sediment and stream temperatures (identified as the pollutants of concern).

SECTION 7.2.6.4
Lochsa River Steelhead Population

The Lochsa River population is a *Large* sized population with a Branched Discontinuous B type spawning complexity. This population consists of B-run fish.

The Lochsa steelhead population has seven MaSAs (Boulder Locsha, Crooked Fork, Fish, Fish Lake, Lower Lochsa, Warm Springs, and White Sands). Warm Springs is occupied in the lower end, but not the upper end. All other MaSAs are occupied in both halves. There are five MiSAs (Big Stew, Canyon, Fire, Old Man, and Pete King). Big Stew is not occupied on either end. All other MiSAs are occupied on both halves.

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.

Viability Assessment Summary

Results of the population viability assessment are summarized here. Population viability assessments integrate the four viable salmonid population parameters described in McElhany et al. (2000) – abundance, productivity, spatial structure and diversity – and were done following the ICTRT (2005) methodology.

The assessment of abundance/productivity risk is dependent on time series of abundance and age structure for each independent population. That data is not available for any B-run steelhead population. While the aggregate B-run abundance for the DPS can be quantified based on counts at Lower Granite Dam, it is extremely difficult to census abundance at the population level. The ICTRT developed a generic dataset for B-run steelhead populations to be used for a preliminary assessment of abundance productivity risk. The dataset was derived by distributing the natural-origin steelhead counted annually at Lower Granite Dam equally across the nine extant B-run populations. The average size category across the nine populations is Intermediate, therefore the generic abundance/productivity risk was measured against a minimum threshold abundance of 1,000 spawners. Results of this generic assessment indicate the population is at *High* abundance/productivity risk. The 10-year geometric mean natural abundance was 272 or 27% of the minimum threshold abundance. The 13-year mean return/spawner productivity was 0.85, substantially less than the approximate 1.25 that would be required at an abundance of 1,000 spawners.

Overall spatial structure and diversity has been rated *Low* risk for the Lochsa River population. This overall risk rating is largely influenced by diversity metrics. Spatial structure risk alone is Very Low; it is a large population distributed across a large

geographic area with substantial environmental variation. Within the diversity metrics the population was rated at Low Risk for all mechanisms that influence diversity. Both juvenile and adult movement patterns likely have been affected by reduced flows and elevated temperatures in the mainstem. The magnitude of the effect is unknown and should be monitored to ensure that risk is accurately characterized.

The Lochsa River steelhead population does not currently meet population level viability criteria because Abundance productivity risk is too high (Fig. 7.2-5). Without survival rate increases that lead to increases in abundance and productivity the population cannot achieve viable status. Also, the population does not currently meet the criteria for a "maintained" population.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)		Lochsa River		

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-5. Viable Salmonid Population parameter risk ratings for the Lochsa River steelhead population. The population does not meet population-level viability criteria.

Habitat Conditions and Population-level Threats

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 in these roaded portions of the watershed create full or partial migration barriers for anadromous salmonids. The Clearwater National Forest and Plum Creek Timber Company 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 historic 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, logging activities, 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 Riparian Habitat Conservation Area. 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.

Limiting Factors Analysis
(Analysis not completed)

Population Recovery Strategy

Abundance and productivity are the primary factors impairing the viability status of the population: the recovery strategy is to implement actions that lead to increases in overall life cycle survival. The status of all populations in the DPS is impaired by out of subbasin life cycle survivals (SAR). Much of the habitat within the Lochsa River watershed is in good to excellent condition and properly functioning therefore, there is very little opportunity to achieve survival rate increases through within-subbasin actions. A conservation or passive restoration recovery strategy would be implemented for this population in roadless areas and areas without substantial habitat degredation, while seeking opportunities for increasing out-of-subbasin survival. The drainages with active land use management (the headwaters and those tributaries to the north of the mainstem Lochsa River) require a more active restoration strategy because of the higher levels of anthropogenic disturbance in these watersheds and their departure from proper functioning conditions. Although not an all-inclusive list, the following restoration actions have been identified that would contribute to improving habitat condition and function in the watershed:

1) Restore riparian area composition, structure, and function in the Lochsa River watershed by improving riparian vegetation and hydrologic function through decommissioning or obliterating of surplus roads within riparian areas and returning road surfaces, cuts, and fills to productivity.
2) Support the Clearwater National Forest's ongoing efforts, and encourage other landowners, to remove or replace impassable culverts and obliterate or decommission surplus roads in areas of high road density.
3) Remove barriers that are impeding anadromous fish migration in the watershed.
4) Inventory existing roads (classified and unclassified) within the Lochsa River drainage to identify watershed improvement activities, particularly in relation to sediment production/delivery and fish passage.

5) Address the lack of functioning LWD in the Lochsa River and its tributaries to improve habitat quality, and improve riparian function to increase future LWD recruitment.

SECTION 7.2.6.5
Selway River Steelhead Population

The Selway River population is a *Large* sized population with a Branched Discontinuous B type spawning complexity. This population consists of B-run fish. Like all populations in the MPG, 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).

The Selway River Steelhead population has nine MaSAs (Bear, East Fork Moose, Indian Selway, Little Clearwater, Lower Selway, Meadow, North Fork Moose, Upper Selway, and White Cap). All MaSAs are occupied at both the upper and lower ends. There are seven MiSAs (Gedney, Lower Moose, Marten, Mink, Ohara, Pettibone, and Three Links). Mink is unoccupied at either end. All other MiSAs are occupied at both ends of the MiSA.

Viability Assessment Summary

Results of the population viability assessment are summarized here. Population viability assessments integrate the four viable salmonid population parameters described in McElhany et al. (2000) – abundance, productivity, spatial structure and diversity – and were done following the ICTRT (2005) methodology.

The assessment of abundance/productivity risk is dependent on time series of abundance and age structure for each independent population. That data is not available for any B-run steelhead population. While the aggregate B-run abundance for the DPS can be quantified based on counts at Lower Granite Dam, it is extremely difficult to census abundance at the population level. The ICTRT developed a generic dataset for B-run steelhead populations to be used for a preliminary assessment of abundance productivity risk. The dataset was derived by distributing the natural-origin steelhead counted annually at Lower Granite Dam equally across the nine extant B-run populations. The average size category across the nine populations is Intermediate, therefore the generic abundance/productivity risk was measured against a minimum threshold abundance of 1,000 spawners. Results of this generic assessment indicate the population is at *High* abundance/productivity risk. The 10-year geometric mean natural abundance was 272 or 27% of the minimum threshold abundance. The 13-year mean return/spawner productivity was 0.85, substantially less than the approximate 1.25 that would be required at an abundance of 1,000 spawners.

Overall spatial structure and diversity has been rated *Low* risk for the Selway River population. This overall risk rating is largely influenced by diversity metrics. Spatial structure risk alone is Very Low; it is a large population distributed across a large geographic area with substantial environmental variation. Within the diversity metrics the population was rated at Low Risk for all mechanisms that influence diversity. Both juvenile and adult movement patterns likely have been affected by reduced flows and

elevated temperatures in the mainstem. The magnitude of the effect is unknown and should be monitored to ensure that risk is accurately characterized.

The Selway River steelhead population does not currently meet population level viability criteria because Abundance productivity risk is too high (Fig. 7.2-6). Without survival rate increases that lead to increases in abundance and productivity the population cannot achieve viable status. Also, the population does not currently meet the criteria for a "maintained" population.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)		Selway River		

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-6. Viable Salmonid Population parameter risk ratings for the Selway River steelhead population. The population does not meet population-level viability criteria.

Habitat Conditions and Population-level Threats

The Selway River drainage is predominantly forested, Federal land, of which approximately 90% is designated as wilderness. There are few anthropogenic impacts within the wilderness boundary and some outside of the wilderness boundary. 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.

Limiting Factors Analysis

(section not completed)

Population Recovery Strategy

Abundance and productivity are the primary factors impairing the viability status of the Selway River steelhead population: the recovery strategy is to implement actions that lead to increases in overall life cycle survival. The status of all populations in the DPS is impaired by out of subbasin life cycle survivals (SAR). Most of the habitat within the Selway River watershed is protected and considered pristine or properly functioning therefore, there is little or no opportunity to achieve survival rate increases through within-subbasin actions. A conservation or passive restoration recovery strategy would be implemented for this population while seeking opportunities for increasing out-of-subbasin survival. As part of a passive restoration strategy, the following two site-specific restoration actions have been identified that could contribute to improving habitat condition and function in the watershed:

1) Improve water quality by reducing road-related accelerated sediment delivery to the Selway River and its tributaries.
2) Address the lack of functioning LWD in the Selway River to improve habitat quality, and improve riparian function to increase future LWD recruitment.

SECTION 7.2.6.5
South Fork Clearwater Steelhead Population

The South Fork Clearwater population is an *Intermediate* sized population with a Branched Discontinuous B type spawning complexity. This population consists of B-run fish. Fish passage in the South Fork Clearwater River has been intermittently blocked or impaired by several dams. The greatest impacts were from Harpster Dam which was in place at river mile 22 from 1910 through 1963 (removed in 1963). It completely precluded steelhead passage upstream of the dam from 1911 to 1935 and from 1949 to 1963 (Cramer *et al.* 1998). A fish ladder had been installed in the dam in 1935 and provided some passage opportunity until 1949 when it was destroyed by high flows (Paradis et al. 1999). Sidall (1992) reported that the ladder did not pass significant numbers of fish. Two other low head (6-8 feet) were built near the mouth of the South Fork Clearwater River. Dewey Dam was built in about 1895 at river mile 0.1 and was washed out a few years later. The Kooskia Flower Mill Dam was built in 1910 at river mile 0.6 and existed into the 1930s. The ability of steelhead to navigate past those two dams is unknown although Gerhardt (1999) reported that migration past the latter dam may not have been impaired.

The SF Clearwater population has four MaSAs (Newsome, Johns, Upper South Fork and American) and they are all currently occupied (based on agency defined distribution). There is only one MiSA (Lower South Fork) and it is currently rated as unoccupied.

There is a substantial history of hatchery steelhead releases in the South Fork Clearwater River drainage. From 1969 through 2005 totals of 17.5 million eyed eggs, 17.9 million fry and fingerling (presmolts), 9.7 million smolts and 11 thousand adults have been released at various locations within the subbasin (data obtained from IDFG stocking database). Most smolts are released as part of the Lower Snake River Compensation Program for harvest augmentation, mitigating for the impacts of the four lower Snake River dams. Releases of other life stages were done primarily for supplementation and reintroduction programs. The magnitude of the releases is especially important considering that steelhead endemic to the subbasin most likely were extirpated while Harpster Dam was in place.

Viability Assessment Summary

Results of the population viability assessment are summarized here. Population viability assessments integrate the four viable salmonid population parameters described in McElhany et al. (2000) – abundance, productivity, spatial structure and diversity – and were done following the ICTRT (2005) methodology.

The assessment of abundance/productivity risk is dependent on time series of abundance and age structure for each independent population. That data is not available for any B-run steelhead population. While the aggregate B-run abundance for the DPS can be quantified based on counts at Lower Granite Dam, it is extremely difficult to census

abundance at the population level. The ICTRT developed a generic dataset for B-run steelhead populations to be used for a preliminary assessment of abundance productivity risk. The dataset was derived by distributing the natural-origin steelhead counted annually at Lower Granite Dam equally across the nine extant B-run populations. The average size category across the nine populations is Intermediate, therefore the generic abundance/productivity risk was measured against a minimum threshold abundance of 1,000 spawners. Results of this generic assessment indicate the population is at *High* abundance/productivity risk. The 10-year geometric mean natural abundance was 272 or 27% of the minimum threshold abundance. The 13-year mean return/spawner productivity was 0.85, substantially less than the approximate 1.25 that would be required at an abundance of 1,000 spawners.

Overall spatial structure and diversity has been rated *Moderate* risk for the South Fork Clearwater River population. This overall risk rating is largely influenced by diversity metrics. Spatial structure risk alone is Low; it is a large population distributed across a large geographic area with substantial environmental variation. Loss of occupancy in the MiSA is a concern because of its impact on connectivity with other populations. Within the diversity metrics the population was rated at High Risk for spawner composition because of the long history of hatchery outplanting with out-of-population fish, and Moderate Risk for the selective impacts related to hydrosystem, harvest and hatchery actions affecting the population. Genetic diversity information for the population should be re-evaluated as past analyses may not have completely or accurately captured the influence of hatchery fish. The analysis of additional samples from the population may indicate the influence of out-of-population hatchery fish on the endemic population was greater than previously observed. Genetic diversity risk may actually be High for the population, and overall spatial structure diversity risk would be rated High.

The South Fork Clearwater River steelhead population does not currently meet population level viability criteria because Abundance productivity risk is too high (Fig. 7.2-7). Without survival rate increases that lead to increases in abundance and productivity the population cannot achieve viable status. Also, the population does not currently meet the criteria for a "maintained" population.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	
	Low (1-5%)	V	V	V	
	Moderate (6 – 25%)				
	High (>25%)			South Fork ClearwaterRiver	

Viability Key: HV – Highly Viable; V – Viable; Shaded cells = does not meet viability criteria.

Figure 7.2-7. Viable Salmonid Population parameter risk ratings for the South Fork Clearwater River steelhead population. The population does not meet population-level viability criteria.

Habitat Conditions and Population-level Threats

The South Fork Clearwater River watershed has changed substantially since human activities began in the 19th century (USFS 1999), and the area occupied by the population is moderately to severely degraded. 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.

The South Fork Clearwater has the most diverse and extensive mining histories of any area in the Clearwater subbasin. A large number of the historic mines have high ecological hazard ratings, and many of the major tributary systems have been historically dredged. In addition, hydraulic mining was commonly used throughout the South Fork Clearwater, leaving "glory holes" which continue to produce high sediment loads (NWPCC 2004, p. 18). Sedimentation is a principal factor affecting fish populations within much of the South Fork Clearwater drainage. Upland and instream habitat disturbances are also important, and temperature limits the use or distribution of some species, particularly in the mainstem South Fork Clearwater River. Steep stream gradients are known to limit use of some areas by anadromous species, and similar impacts probably impact resident species as well (NWPCC 2004, p. 18).

Steelhead populations in the South Fork Clearwater River are widely distributed and have been influenced by hatchery practices for a long period of time. Hatchery origin steelhead have been released into the mainstem South Fork Clearwater River, Crooked River, Newsome Creek, Meadow Creek, Mill Creek, Ten Mile Creek, Red River and South Fork Red River.

Limiting Factors Analysis
(Analysis not completed.)

Population Recovery Strategy

Abundance and productivity are the primary factors impairing the viability status of the population: the recovery strategy is to implement actions that lead to increases in overall life cycle survival. Additional genetic analyses may indicate that diversity is also

impairing population viability. The status of all populations in the DPS is impaired by out of subbasin life cycle survivals (SAR). There are habitat conditions, land use activities and threats within the boundaries of the population that affect abundance and productivity. The recovery strategy for the population is to seek opportunities for increasing survival both within and out of the South Fork Clearwater River watershed. South Fork Clearwater River will require an active restoration strategy because of the high levels of anthropogenic disturbance in this watershed and its departure from proper functioning habitat conditions. Improvements in water quality (temperature, sediment, habitat complexity), riparian condition and floodplain connectivity and function should be included in a restoration strategy. As part of a strategy to address diversity impairments, a supplementation and genetics management plan should be developed to guide the use of hatchery fish in the basin and promote local adaptation of natural origin recruits returning to the basin. Although not an all-inclusive list, the following restoration actions have been identified that would contribute to improving habitat condition and function in the watershed:

1) Address localized areas where riparian function is most limited, including those segments of stream where roadbeds have been constructed adjacent to or within the immediate floodplain.
2) Restore riparian area composition, structure, and function in localized areas of the South Fork Clearwater by improving riparian vegetation and hydrologic function through decommissioning or obliterating of surplus roads within riparian areas and returning road surfaces, cuts, and fills to productivity.
3) Fine sediments in the South Fork Clearwater are currently high due to the geologically unstable nature of the watershed and legacy effects from land management. Promote landscape management activities that minimize the threat of chronic sediment inputs.
4) Contribute to de-listing South Fork Clearwater stream segments from the 303(d) list of water quality limited waterbodies by applying appropriate and active watershed restoration to reduce sediment (identified as the pollutant of concern).
5) Inventory existing roads (classified and unclassified) within the South Fork Clearwater to identify watershed improvement activities, particularly in relation to fish passage.
6) Remove barriers that are impeding anadromous fish migration in the watershed.
7) Restore channel integrity from past land management activities.
8) Restore fish habitat degraded from past mining activities in the South Fork Clearwater drainage.

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