

## 10.0 MID-COLUMBIA RIVER STEELHEAD ESU

### 10.1 POPULATIONS

#### 10.1.1 Klickitat

##### 10.1.1.1 Background

There are no reliable estimates of historical steelhead abundance in the Klickitat. WDFW and the Yakama Nation have estimated current wild steelhead escapement at less than 300 on average. The estimate is based on redd counts, and both entities admit that this method seriously underestimates actual escapement. Given the extent of habitat modification in the Little Klickitat and other tributaries and the loss of passage over Castille Falls, it is likely that historical abundance was appreciably larger than it is today. *Index of Potential Absolute Increase in Production* is medium.

Much of the Klickitat on the Yakama Reservation is largely unaltered from historical conditions. The Yakama require very large forest buffers on the mainstem and tributaries on the reservation. Irrigation withdrawals affect Little Klickitat and Swale creeks, but the mainstem and other significant tributaries retain more or less natural flow regimes. Grazing has reduced wetland function in the upper Klickitat and some tributaries. The watershed, however, retains a well-distributed network of functioning habitats. *Qualitative Assessment of Potential to Improve/Increase Habitat* is medium.

The primary limiting factors are a lack of access to the mainstem above Castille Falls and some tributaries; low flows, habitat simplification, difficult access in the Little Klickitat; sedimentation and habitat simplification in some tributaries; and channel confinement associated with roads.

##### 10.1.1.2 Suggested Mitigation Measures and Constraints

Techniques for redressing most of the limiting factors are tested and available. The Yakama Nation (YN) is currently working to provide passage over Castille Falls and into Deadman Canyon Creek, a small tributary. The YN is also proposing to restore habitats damaged by grazing in the upper watershed. Problem roads can be relocated to provide floodplain channel interaction. Tributary habitats can be improved by better managing grazing and potentially by adding complexity elements. Forest roads have been substantially improved in the last decade, but more work remains to be done. The most substantial opportunity is Castille passage, but there are many small projects that could be implemented. Cumulatively, though, these projects are not expected to yield more than a medium biological response.

There are few socio-political barriers to improving habitat conditions in the Klickitat. The largest project is fully supported by the only affected landowner. There is a small but vocal property rights organization in the watershed, but their focus is more against additional regulation and Federal land ownership than against habitat restoration.

Table 10-1. Middle Columbia River Steelhead (yearlings) Ecological Improvement Potential

|                       |         | Data Sources                            |  |  |   |                                  |   |   |
|-----------------------|---------|---|--|--|---|----------------------------------|---|---|
|                       |         | ①                                       | ②  | ③  | ④   | ⑤                                | ⑥   | ⑦   |
|                       |         | Range of System Survival Rates GAP [D*] | Index of Potential to Increase Population: H/M/L (base period abundance/productivity estimate; recent abundance/productivity estimate or % Interim Target) | Qualitative Assessment (CHART, NWFSC approach and other info) of Potential to Improve/Increase Habitat (H/M/L) | Primary Candidate Anthropogenic Limiting Factors: Flow, Channel Morphology (bed, banks, sediment, LWD, sinuos., connectiv.), Temperature, Water Quality                   | Ecological Improvement Potential | Improvement Potential Adjusted Based on Practical Constraints | Proposal to Fill Gap and Performance Measures/ Standards/ M&E |
| <b>16 Populations</b> |         |   |  |  |   |                                  |   |   |
| 1                     | MCKLI-s |   | M (very limited data, but degree of habitat alterations makes it likely population is reduced from historical)   | M  | Channel confinement, flow and temperature (little Klickitat), Channel morphology, sediment (LK and other tribs), passage barriers.  | M                                | M   |   |
| 2                     | MCFIF-s |   | H (ODFW redd cts.)   | H  | Forestry, Grazing, Agriculture, Irrigation Withdrawals, Fire Activity, Roads, and Urbanization.   | H                                | H   |   |
| 3                     | DREST-s |   | H (ODFW cts. @Sherars Falls)   | H  | Forestry, Grazing, Agriculture, Irrigation, Channel modification, Fire Activity, and Roads.   | H                                | H   |   |
| 4                     | DRWST-s |   | H (PGE Pelton Dam Wier cts.)   | H  | Grazing, Agriculture, Irrigation, Channel modification, Roads, Some Urbanization, and Pelton-Round Butte Dam Complex.   | M                                | M   |   |
| 10                    | MCROC-s |   | M (no data, but degree of habitat alteration makes it likely pop is reduced)   | M  | Flow, Temperature, channel morphology, large woody debris, sediment   | H                                | M   |   |
| 5                     | JDLMT-s |   | H (ODFW redd cts.)   | H  | Forestry, Grazing, Agriculture, Irrigation, Fire Activity, and Roads.   | H                                | M   |   |
| 6                     | JDNFJ-s |   | M (ODFW redd cts.)   | H  | Forestry, Grazing, Irrigation Withdrawals, Mining, and Roads.   | M                                | M   |   |
| 7                     | JDMFJ-s |   | H (ODFW redd cts.)   | H  | Forestry, Grazing, Agriculture, Irrigation Withdrawals, Fire Activity, Mining, and Roads.   | H                                | H   |   |
| 8                     | JDSFJ-s |   | H (ODFW redd cts.)   | H  | Forestry, Grazing, Fire Activity, Irrigation Withdrawals, Channel Modification, Roads.  | H                                | H   |   |
| 9                     | JDUMA-s |   | H (ODFW redd cts.)   | H  | Forestry, Grazing, Agriculture, Irrigation, Roads, and Fire Activity.   | H                                | H   |   |
| 11                    | MCUMA-s |   | H (ODFW 3-Mile Dam Wier cts.)  | H  | Forestry, Grazing, Agriculture, Irrigation Withdrawals, Fire Activity, Channel modification, Roads, and Urbanization in the lower reaches.                                | H                                | M   |   |
| 12                    | WWMAL-s |   | H (WDFW estimates of hist. abundance compared to current WDFW, ODFW, CTUIR adult and redd counts)  | L-M  | Sediment, Flow, Channel simplification, floodplain connectivity, temperature  | H                                | M   |   |
| 13                    | WWTOU-s |   | H (WDFW estimates of hist. abundance compared to current WDFW redd counts)   | L-M  | Sediment, Flow, Channel simplification, floodplain connectivity, temperature  | H                                | M   |   |
| 14                    | YRTOS-s |   | M (no historical data, but degree of habitat alteration suggests population was previously larger)   | M  | Channel condition, Flow (Toppenish), Temperature, Forest Roads, sediment,   | M                                | M   |   |
| 15                    | YRNAC-s |   | H (historical estimates of abundance compared to current DFW, FS redd counts and NOAA radio tagging studies)   | M  | Altered flow patterns, habitat access, channel confinement, lake of riparian habitat and large woody debris in mainstem, low flows in two tributaries, poor fish passage. | H                                | M   |   |
| 16                    | YRUMA-s |   | H (historical estimates of abundance compared to current counts at roza Dam)   | L  | Habitat Access, Altered flow patterns, Channel confinement, instream flows (winter mainstem, summer some tributaries), lack of riparian habitat and large woody debris.   | H                                | M   |   |

\*D = Delayed mortality due to transportation

C  
S  
T  
N = Council, States, TRTs, NWC

See projects discussed above.

## 10.1.2 Fifteenmile Creek

### 10.1.2.1 Background

The 368,000-acre Fifteenmile subbasin comprises 37 percent cropland (15,000 acres irrigated for orchards, vineyards and pasture), 21 percent rangeland, and 38 percent forestland. The majority of the subbasin is privately owned; however, 16 percent is owned by USFS and BLM.

The winter run of MCR steelhead occupying the Fifteenmile subbasin is considered a separate population and a unique run at the upper end of the winter steelhead distribution. Information for MCR steelhead in the Fifteenmile subbasin was somewhat limited. Data obtained from ODFW's annual reports of redds/mile for the three major creeks within the subbasin are as follows:

- Fifteenmile Creek compared ten years of surveys over the period 1964-1988 with ten years of surveys during 1992-2002 and showed a comparative reduction of 38 percent in the current number of redds per mile compared to historic counts.
- The data for 8-Mile Creek compared the five-year sampling mean for 1985-1990 with the six year mean for 1996-2002 and showed a reduction of 39 percent of MCR steelhead redds per mile.
- Ramsey Creek's data showed a 154 percent increase in redds per mile when comparing 1985-1991 (six annual surveys) to 1996-2002 (seven annual surveys).

The May 28, 2004 Draft Fifteenmile Subbasin Assessment estimates that the winter steelhead run for the watershed since 1990 has varied from a low of 127 adults to 1,077 adults in 2003 (considered an exceptional year). This information was obtained primarily from professional judgment and is based on: (1) extrapolations from winter adults passing Bonneville Dam (it is estimated that 25 percent go to Fifteenmile Creek and 5 percent enter Mill Creek); (2) multiplying spawners per redd by ODFW figure of 1.67; (3) applying a 6.5 percent smolt-to-adult survival ratio to the limited number of juvenile smolt counts of outmigrants (165mm and larger); and (4) best professional judgment from local Tribal, state, and Federal biologists. The 2003 BRT report stated that recent redds/mile counts were up significantly from the early 1990s. The ICB-TRT developed an interim recovery target for the Fifteenmile subbasin of 500 adult steelhead, which could be split into 417 spawners returning to Fifteenmile and 83 returning to Mill Creek or other streams in the subbasin. *Index of Potential Absolute Increase in Production* is high.

Flooding in the 1960s and 1970s led to channel straightening and clean-out, establishment of multiple fish passage barriers, aggressive upland conversion to agriculture with associated increased demand for irrigation, grazing, and heavy timber harvesting. All of these factors played a role in reducing the subbasin's capacity to support wild steelhead. Various mitigative actions have been implemented within the subbasin over the years, including: ODFW-funded installation of five fish ladders and 80 fish screens between 1988 and 1997; a reduction in timber harvest levels on Mount Hood National Forest under the Northwest Forest Plan; upland soil management

measures mandated by the 1985 Farm Bill, and an extensive effort to inventory and replace culverts that restrict or eliminate fish passage. Even with these efforts, summer stream temperatures in the Fifteenmile subbasin are high, flows are low in the lower half of the watershed, and levels of fine sediment remain detrimental to spawning and fry emergence. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

The anthropogenic limiting factors are strongly linked to current and past agricultural practices, and stream channel modifications have greatly reduced summer flows, increased water temperatures and sediment loads, and nearly eliminated floodplain function and riparian habitat. Additionally, the completion of Bonneville Dam in 1938, which backs water up into the mouths of three creeks, the Union Pacific Railway and Interstate 84, as well as wildfires of the past have impacted both MCR steelhead habitat and population within the subbasin.

Summer flows on most streams have been fully appropriated since the early 1900s. Most of the mainstem streams within the subbasin are listed by ODEQ as water quality limited for high summer temperatures. Fifteenmile and Eightmile creeks are also listed by ODEQ for high sedimentation, while Mill Creek was recently noted for organophosphate pesticides. A large part of the agricultural lands are from conversion of shrub-steppe habitat to tilled acreage. This activity increased runoff rates and peak flows by as much as 600 percent. Recent efforts to establish direct-seed/no-till farming practices is an effort to reduce runoff and erosion while increase water infiltration. Most of the steelhead habitat is found in Fifteenmile and Mill creeks and below passage barriers on Threemile, Chenowith, Mosier and Rock creeks. Besides the natural waterfalls that block passage (RM 3 of South Fork Mill Creek, RM 0.4 of Mosier Creek, and RM 2 on Rock Creek) there are numerous adult or juvenile passage barriers (culverts, water pipeline, etc.) at various flow stages. Hatchery rainbow trout were stocked in Mosier Creek (1952-1963 and 1968-1971), but because of their susceptibility to disease, they are believed neither to have survived the summer nor interbred with native rainbow or steelhead trout. Hatchery steelhead were never released in the Fifteenmile subbasin, and biologists with ODFW report that few hatchery strays are positively identified during spawning surveys.

#### **10.1.2.2 Suggested Mitigation Measures and Constraints**

Addressing the limiting factors includes identifying and controlling excessive sediment discharge from roads, agricultural lands, forestlands, and rangelands through various established techniques. Adjusting land use practices to reestablish riparian buffers, minimize the chance of catastrophic landscape fires, and re-establish a natural hydrograph are all important aspects of addressing the limiting factors. Additionally, re-establishing riparian vegetation and channel sinuosity, placement of large woody debris, reduction of valley-bottom roads and road density, removal of passage barriers, reconnecting the streams to the floodplain, establishing minimum instream flows and reducing seasonal peak flows, reducing summer stream temperatures, and addressing sources of chemical pollutants to minimize runoff into waterways are all issues that need to be addressed within the Fifteenmile subbasin.

Social and political constraints and lack of funding limit the ability to address the limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in private ownership, types and locations of on-the-ground restoration activities are closely linked

to the willingness of the landowner. Therefore, much of the necessary riparian work will likely be limited to conservation easements or activities tied to incentives through either payments or tax reductions. It is unlikely that stream sinuosity can be re-established because of the ownership of the lower reaches and their current economic value through agricultural productivity. Current emphasis on no-till or low-till farming and direct-seed programs will continue to help reduce sediment discharge. Increasing in-stream flows during summer to help prevent seasonal passage and thermal barriers will again be dependent on willing landowners and the availability of necessary incentives to participants.

### **10.1.3 Deschutes River Eastside**

#### **10.1.3.1 Background**

The Interior Columbia Basin Technical Recovery Team described the Deschutes Eastside population of steelhead as occupying the Deschutes River and tributaries from the confluence with the Columbia River to the mouth of Trout Creek, except for the Warm Springs River. Three principle tributaries – Buck Hollow, Bake Oven, and Trout creeks – provide the primary spawning and rearing habitat for steelhead within the Deschutes River subbasin. The lower eastside of the Deschutes River displays some of the highest average slope and drainage densities in the subbasin. Steelhead returning to the Deschutes subbasin have to pass only two of the many Columbia River mainstem dams.

Steve Pryble of the ODFW Madras office provided estimates of the number of wild steelhead that passed Sherars Falls (approximately RM 45, where State Highway 216 crosses the Deschutes River) for years 1977-2003 and redds/mile data for three Eastside tributaries (Buckhorn, Bake Oven, and Trout creeks) for years 1990 to 2003. Don Ratliff of Portland General Electric provided trap counts for the Pelton Dam weir from 1957 to 1997. The redd count data sets did not differentiate between hatchery and wild spawners, but the weir and trap counts did. The results showed a 23 percent mean decline of wild steelhead for Sherars Falls from 1977-1986 to 1994-2003. For this data, year 1977 included the last half of 1977 and first half of 1978 and so on. The information provided from PGE for Pelton Dam adult counts showed a mean decline for wild steelhead of 82 percent for the period 1988-1977 compared to 1957-1966. In comparison, hatchery fish represent nearly 80 percent of the 1994-2003 mean figure for hatchery + wild (n=23,450), or nearly five-fold the wild steelhead estimate. *Index of Potential Absolute Increase in Production* is high.

The May 28, 2004, Draft Deschutes Subbasin Plan provided information on historical MCR steelhead distribution. The current range of steelhead (mouth to RM100 at Pelton Dam) is fully contained within the Lower Westside and Lower Eastside Deschutes Assessment Units. Within the range of MCR steelhead, land ownership outside of the mainstem corridor of the Deschutes River is primarily private and in agricultural (dryland or irrigated cropland) or grazing use. The BLM, which permits grazing on much of its land base, owns much of the lower mainstem corridor. The volcanic geology and associated groundwater exchange through springs that feed the Deschutes River make for a fairly uniform month-to-month, and year-to-year natural flow regime. A series of large regulating dams on the middle and upper Deschutes River now control the river's flow. The highly stable lower mainstem of the Deschutes River is confined in a deep,

narrow valley that is sometimes lined with a narrow fringe of trees and riparian vegetation. This reach is heavily used for recreational fishing, boating, and camping.

The uplands of this area are generally degraded, because there is limited capacity to collect and store runoff and maintain soil stability. Therefore, human activities have reduced the watershed's ability to buffer high runoff events or reduce flash flooding. Overgrazing (current and historical), periodic flooding and wildfires, berm construction for flood control, loss of riparian vegetation, channel alterations, irrigation diversion structures, water withdrawal, and loss of instream complexity have all adversely affected MCR steelhead habitat within the tributaries of this population. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

Over time, there has been a general reduction of summer stream flow and resulting increase in water temperatures for many tributaries to the Deschutes River. This in itself has greatly reduced and in some instances eliminated summer rearing habitat for MCR steelhead in many tributaries. The development of extensive irrigation systems and hydroelectric projects creates both seasonal and permanent barriers to anadromous salmon and steelhead. Similarly, the invasion of western juniper and exotic plant species has reduced the watershed's ability to collect, store, and slowly release runoff and maintain soil stability. The anthropogenic factors within the watershed have reduced the ability of the watershed to capture and slowly release precipitation, resulting in a changed hydrologic regime, specifically, lower spring, summer, and fall flows. There has been a general loss of riparian and floodplain function and connectivity, which, in turn, adversely affects habitat complexity, water quality and quantity, the level of the water table, bank stability, and stream form and function. The lower 45 miles of the Deschutes River receives heavy silt loads from its tributaries during high-intensity storms, which tends to embed lower mainstem spawning gravels with high amounts of glacial sand and silt. Much of the lower river and several Westside tributaries are listed on ODEQ's 303(d) list of water quality limited streams for temperature, pH, dissolved oxygen, and/or sediment.

### **10.1.3.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect natural hydraulics with upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help return tributary and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. Reestablishing riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component, will go far in improving steelhead rearing and spawning habitats.

It is foreseeable that changes to water management and withdrawal practices can be accomplished. Similarly, adjusting land use practices to aggressively restore tributary habitat is possible and mostly limited by unwilling landowners and lack of incentives. Sediment management also will play an important role in the design and implementation of upland land use practices on agricultural, range, and forest lands.

## 10.1.4 Deschutes River Westside Tributaries

### 10.1.4.1 Background

The Interior Columbia Basin Technical Recovery Team described the Deschutes Westside population of steelhead as occupying the Deschutes River from the Trout Creek confluence to the Pelton Re-regulating Dam and includes Shitike Creek and the Warm Springs River system.

Steve Pryble of the ODFW Madras office provided estimates of the number of wild steelhead that passed Sherars Falls (approximately RM 45, where State Highway 216 crosses the Deschutes River) for years 1977-2003 and redds/mile data for three Eastside tributaries (Buckhorn, Bake Oven, and Trout Creeks) for years 1990 to 2003. Don Ratliff of Portland General Electric provided trap counts for the Pelton Dam weir from 1957 to 1997. The redd count data sets did not differentiate between hatchery and wild spawners, but the weir and trap counts did. The results showed a 23 percent mean decline of wild steelhead for Sherars Falls from 1977-1986 to 1994-2003. For this data, year 1977 included the last half of 1977 and first half of 1978 and so on. The information provided from PGE for Pelton Dam adult counts showed a mean decline for wild steelhead of 82 percent for the period 1957-1966 compared to 1988-1997. In comparison, hatchery fish represent nearly 80 percent of the 1994-2003 mean figure for hatchery + wild (n=23,450), or nearly five-fold the wild steelhead estimate. The hatchery fish are of various origins and include thousands of strays from upper Columbia River hatcheries. Some strays are thought to move into the Deschutes River for a period, then return to the Columbia River to move on to their natal streams. The historical population of wild steelhead was likely greater than what was identified in the late 1950s. *Index of Potential Absolute Increase in Production* is high.

The May 28, 2004, Draft Deschutes Subbasin Plan provided information on historical MCR steelhead distribution. The current range of steelhead (mouth to RM100 at Pelton Dam) is fully contained within the Lower Westside and Lower Eastside Deschutes Assessment Units. Two principle westside tributaries, the Warm Springs River and Shitike Creek, provide 41.0 miles and 24.7 miles of steelhead habitat, respectively, and are entirely located on the Warm Springs Tribal Reservation. The volcanic geology and associated groundwater exchange through springs that feed the Deschutes River make for a fairly uniform month-to-month, and year-to-year natural flow regime. A series of large regulating dams on the middle and upper Deschutes River now control the river's flow. Tributary flows are more variable than mainstem flows, especially on eastside tributaries.

Historically, the Westside tributaries displayed very favorable riparian and instream channel conditions for salmonid production. Additionally, off-channel habitats and meadows along unconstrained channels were numerous and largely due to beaver activity. Overall, the riparian corridors were well developed and fully functioning. A 1995 study showed that, although side channels make up less than 10 percent of the reach between Pelton Dam and Trout Creek, the side channels between island margins and channel margins made up 68 percent of the documented steelhead spawning for the reach. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

Over time, there has been a general reduction of summer streamflow and a resulting increase in water temperatures for many tributaries to the Deschutes River. The development of extensive irrigation systems and hydroelectric projects creates both seasonal and permanent barriers to anadromous salmon and steelhead. Similarly, the invasion of western juniper and exotic plant species has reduced the watershed's ability to collect, store, and slowly release runoff and maintain soil stability. The anthropogenic factors within the watershed have reduced the ability of the watershed to capture and slowly release precipitation, resulting in a changed hydrologic regime, specifically, lower spring, summer, and fall flows. There has been a general loss of riparian and floodplain function and connectivity, which, in turn, adversely affects habitat complexity, water quality and quantity, the level of the water table, bank stability, and stream form and function.

Warm Springs and Shitike Creek have generally good spawning and rearing habitat, however, spawning gravel abundance is likely well below historical levels as a result of a loss of large wood recruitment due to land use practices. Additionally, flashy flows have accelerated floodplain scouring and loss of instream habitat structure, and there remain fish passage barriers on some streams due to road crossing structures.

#### **10.1.5.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Recent research tied to FERC relicensing of the re-regulating dams addresses fish passage; efforts are now underway to reestablish fish passage at the Pelton Round Butte Hydroelectric Dam Complex. Once this occurs, expansion of the current range of anadromous salmonids will be accomplished beyond the Pelton Round Butte Dam Complex. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank-stabilization, reduce sedimentation, reconnect natural hydraulics with upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation and revisiting flow operations at the re-regulating dams could help facilitate returning to past flow regimes that supported strong wild steelhead populations.

Before Pelton Dam was built, steelhead migrated well into the upper drainage. USFS now owns most of those lands. Efforts are underway to reestablish fish passage at the Pelton Round Butte Hydroelectric Dam Complex as part of the hydro relicensing process. Passage for steelhead and salmon would provide access to the Deschutes River, possibly up to Big Falls and the available habitat in the lower Crooked River, Metolius River, and Squaw Creek drainages.

### **10.1.5 Rock Creek**

#### **10.1.5.1 Background**

There are no good estimates of the historical abundance of steelhead within the Rock Creek subbasin. Members of the Rock Creek Band of the Yakama Nation report that steelhead were once abundant in the watershed. Presently, it is believed that adult escapement is no more than a few dozen fish. Given the reports of tribal members and the extent of habitat alteration in the

watershed, it seems likely that present returns are significantly less than they were historically. However, given the small size of the subbasin, it is unlikely that the steelhead population here was ever more than a few hundred individuals. *Index of Potential Absolute Increase in Production* is medium.

Although it is sparsely populated, anthropogenic influences occur throughout the subbasin. Most of the area has been heavily grazed, and primitive roads are present from near the Columbia River to the headwaters of most streams in the subbasin. Beaver, once abundant, are now all but absent. Despite these alterations, considerable forest canopy remains, and most stream reaches support at least shrub-dominated riparian areas. *Qualitative Assessment of Potential to Improve/Increase Habitat* is medium.

Grazing and forest roads are significant contributors to habitat problems in the watershed. They have altered basin hydrology and destabilized some stream channels. The loss of beaver has probably exacerbated these problems.

#### **10.1.5.2 Suggested Mitigation Measures and Constraints**

Techniques for redressing most of the limiting factors are tested and available. Livestock could be better managed to improve riparian conditions and increase upland water infiltration. Most of the problem roads could be easily modified to minimize sedimentation and channel confinement. Instream habitat complexity could be improved by adding LWD and rock elements. In short, nearly all of the problems within the subbasin could be corrected. However, given the intrinsic limitations on production from the subbasin, the biological response would likely rise no higher than medium.

There will likely be local resistance to wholesale change in range management practices, although substantial improvements are still likely possible. Riparian enhancement and channel improvements would be strongly supported, as would road improvements.

#### **10.1.6 John Day River Lower Mainstem Tributaries**

##### **10.1.6.1 Background**

The John Day River probably represents the largest native, naturally-spawning stock of steelhead in the region (NMFS 2000). The relatively small amount of straying of hatchery fish that does occur in the John Day system occurs in the lower mainstem of the river. Information from ODFW annual redd surveys for MCR steelhead was used to derive the recent past (1959-1968) 10-year geometric mean (n=6.6) and compared to the current (1994-2003) 10-year geometric mean (n=4.7). This comparison shows a resulting 29 percent reduction in MCR steelhead redds/mile in the lower mainstem population. The comparison of the two 10-year geometric mean data sets for the entire John Day River using the same available years (n=37.4 recent versus n=18.4 current) shows an overall reduction of 51 percent in redds/mile. The BRT's interim abundance target for natural steelhead spawners in the Lower John Day River is 3,200. *Index of Potential Absolute Increase in Production* is high.

The lower John Day River mainstem from Tumwater Falls upstream to Service Creek was classified in 1988 as “Recreational” under the Wild and Scenic Rivers Act of 1968 and is managed by BLM. Historically, it supported healthy riparian and upland areas, good water quality, and a natural hydrograph. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

During the summer months from July to September, groundwater provides much of the base flow to the Lower John Day River. Although ODEQ has listed the lower river as water quality limited for temperature, other water quality constituents such as total phosphates, biochemical oxygen demand, and fecal coliform can also limit water quality during late summer, when flows are the lowest and water temperatures are the highest. Severe streambank erosion and sedimentation exists in some tributaries to the mainstem. Eutrophication is also active during the low-flow summer months when water temperatures are high.

Agricultural practices have changed hydrology, contributing to degraded stream and riparian conditions throughout the subbasin. Draining and conversion of wetlands to pastures, diking and channelization of streams, and removal of extensive beaver colonies and large trees in the riparian corridor have all had adverse effects on the river's interaction with its floodplain (NPCC 2004c).

Cumulatively, warm irrigation return flow combined with decreased in-stream flow has significantly altered the temperature regime of area streams and rivers. Recent work done to cool these waters through subsurface return looks promising. Attempts to armor riverbanks to prevent erosion have also simplified the river channel and reduced habitat diversity.

#### **10.1.6.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect the natural hydraulics with the upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help facilitate returning tributaries and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. The reestablishment of riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component will go far in improving steelhead rearing and spawning habitats. Pursuing the cooling effect of subsurface return flows will help address high summer temperatures in the lower mainstem.

The Draft John Day Subbasin Plan (NPCC 2004c) described general approaches to address the primary limiting factors within the John Day Subbasin:

- Improve riparian habitat conditions to create more summer rearing habitat, improve adult deep pool habitat, improve over-winter survival, decrease sedimentation, increase shade, and increase terrestrial and aquatic insect production.

- Increase stream flows to improve fish passage over obstructions, decrease water temperature, increase adult deep pool habitat, improve summer rearing habitat, and improve water quality.
- Improve channel stability consistent with natural landforms that will promote riparian recovery and reduces erosion. This will result in a decrease in sedimentation and more suitable spawning gravel, as well as narrower and deeper channels that reduce instream temperatures.
- Improve passage conditions to provide access to additional habitat for spawning and rearing and improve fish production and abundance.

Social and political constraints and lack of funding limit the ability to address the limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in private ownership, types and locations of on-the-ground restoration activities are closely linked to the willingness of the landowner. As a result, much of the necessary riparian work will likely be limited to conservation easements or activities tied to incentives through either payments or tax reductions.

### **10.1.7 North Fork John Day River**

#### **10.1.7.1 Background**

USFS manages 31 percent of the lands in this subbasin, much of it in the higher elevations. Wilderness areas within the subbasin include the North Fork John Day Wilderness, Strawberry Wilderness, Black Canyon Wilderness, and Bridge Creek Wilderness. Large portions of the SFJD and NFJD are managed by the BLM. The BLM's management of the river corridor is guided by the 2001 John Day River Management Plan, which emphasizes recreation and boating. Additional reserved lands include the 14,000-acre John Day Fossil Beds National Monument managed by the National Park Service.

Information from ODFW annual redd surveys for MCR steelhead was used to derive the recent past (1959-1968) 10-year geometric mean ( $n=6.2$ ) and compared to the current (1994-2003) 10-year geometric mean ( $n=3.4$ ). All steelhead numbers for the North Fork John Day (NFJD) are believed to be wild fish, given that the small amount of straying of hatchery fish in the John Day system occurs in the lower mainstem of the river. The comparison of the two 10-year geometric mean data sets for the entire John Day River using the same available years ( $n=37.4$  recent versus  $n=18.4$  current) results in an overall reduction of 51 percent in redds/mile. The BRT's interim abundance target for natural steelhead spawners in the NFJD is 2,700. *Index of Potential Absolute Increase in Production* is therefore medium.

The NFJD River from Camas Creek upstream to its headwaters was designated in 1988 under the Wild and Scenic Rivers Act of 1968 as either "Wild, Scenic, or Recreational," depending on the reach. Most of these reaches are on the Umatilla and Wallowa Whitman National Forests. The NFJD plus the MFJD contribute 60 percent of the flow to the mainstem John Day River. According to the ODEQ, the NFJD has some of the best overall chemical, physical, and

biological water quality in the John Day subbasin. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

The ODEQ has identified several streams in the NFJD River watershed as water quality limited for sediment, high temperatures, and/or biological criteria, primarily because of vegetation disturbance, stream straightening/relocation, livestock grazing, timber harvest, road building, irrigation water withdrawals, and historical mining and dredging. In addition, fire suppression practices have affected both the composition and structure of forestlands in the subbasin. Use of ground-based logging equipment on steep (greater than 30 percent) slopes and high road densities often contribute sediment to streams, adversely impacting steelhead spawning and rearing areas.

Past or ongoing livestock management practices that result in high-intensity riparian grazing and/or season-long use of riparian areas cause bank destabilization, excessive sedimentation, and increased stream temperatures, because the width-to-depth ratio of the channel is increased when livestock trample banks, collapsing those that are undercut.

A high number of pushup dams are used for irrigation, with some of these temporary dams resulting in intermittent passage and interrelated impacts such as sedimentation, reduced flows, channel alteration, and associated water quality impacts (NWPPC 2001). Additionally, there still remain many legal water diversions that are unscreened or have screens that do not meet current NOAA Fisheries screen criteria (NWPPC 2001).

Boulder Creek, a tributary in the Granite Creek watershed, has a dewatered section resulting from past mining activities. Lightning and Salmon creeks in the Granite Creek watershed are negatively affected by the Pete Mann mining ditch. The ditch diverts water from Granite Creek to the Burnt River watershed and impedes bull trout movement upstream

The Draft John Day Subbasin Plan (NPCC 2004c) described the primary limiting factors for fish species (including steelhead) in the NFJD:

- Temperature was identified as a limiting factor throughout the North Fork.
- Flow, habitat diversity, sediment load, and key habitat quantity are limiting factors in all but one of the fifth-field watersheds.
- Channel stability was identified as a limiting factor in over half of the fifth-field watersheds in the North Fork John Day subbasin.
- Competition with other species, passage barriers, subsistence fisheries, and food supply were also identified as minor limiting factors.

#### **10.1.7.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect the natural hydraulics with the upland

vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help facilitate returning tributaries and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. The reestablishment of riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component, will go far in improving steelhead rearing and spawning habitats.

Screening of unscreened water diversions, updating those screens that do not presently meet NOAA Fisheries criteria, reducing livestock pressure and impacts to riparian area vegetation and stream banks, and reducing sediment discharge into streams at their sources (roads, mines, etc.) are all needed to promote the population of steelhead in the NFJD River.

The Draft John Day Subbasin Plan (NPCC 2004c) described general approaches to address the primary limiting factors within the John Day Subbasin:

- Improve riparian habitat conditions to create more summer rearing habitat, improve adult deep pool habitat, improve over-winter survival, decrease sedimentation, increase shade and increase terrestrial and aquatic insect production.
- Increase stream flows to improve fish passage over obstructions, decrease water temperature, increase adult deep pool habitat, improve summer rearing habitat and improves water quality.
- Improve channel stability consistent with natural landforms that will promote riparian recovery and reduces erosion. This will result in a decrease in sedimentation and more suitable spawning gravel as well as narrower and deeper channels that reduces instream temperatures.
- Improve passage conditions to provide access to additional habitat for spawning and rearing and improves fish production and abundance.

Social and political constraints and lack of funding limit the ability to address limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in public ownership, types and locations of on-the-ground restoration activities are closely linked to agency funding and public support.

## **10.1.8 Middle Fork John Day River**

### **10.1.8.1 Background**

The 75 miles of Middle Fork John Day River (MFJD) drain approximately 506,853 acres, of which 53 percent are within USFS ownership. Since the 1960s, the USFS has conducted harvest activities on over 25 percent of its lands in the MFJD subbasin. Elevations range from 8,110 feet at its headwaters within the Elkhorn Mountains to 2,185 feet where it joins the Mainstem John Day River. Over 90 percent of the appropriated water in the MFJD sub-basin goes to irrigation and mining, with half of the mining water rights being authorized post-1970. Within three

subwatersheds of the MFJD (Galena, Upper Middle Fork, and Camp Creek), there exist a total of 113 mining sites: two tunnel mines, 39 placer claims, and 72 lode claims. Road density of this watershed is high, averaging 3.56 mi/mi<sup>2</sup>. The MFJD is listed under Oregon's Clean Water Act 303(d) as a water quality limited streams for high summer temperatures and flow modification (irrigation) (USDA 2001 MFJD Biological Assessment; NPCC 2004c).

The John Day River probably supports the largest native, naturally spawning stock of steelhead in the region (NMFS 2000). All steelhead numbers for the Middle Fork John Day River are believed to be wild fish, given that the small amount of straying of hatchery fish that does occur in the John Day system occurs in the lower mainstem of the river. Information from ODFW annual redd surveys for MCR steelhead was used to derive the recent past (1959-1968) 10-year geometric mean (n=6.1) and compared to the current (1994-2003) 10-year geometric mean (n=4.1). This comparison shows a resulting 33 percent reduction in MCR steelhead redds/mile. The comparison of the two 10-year geometric mean data sets for the entire John Day River using the same available years (n=37.4 recent versus n=18.4 current) results in an overall reduction of 51 percent in redds/mile. The BRT's interim abundance target for natural steelhead spawners in the MFJD is 2,700. *Index of Potential Absolute Increase in Production* is therefore high.

The NFJD plus the MFJD contribute 60 percent of the flow to the mainstem John Day River. The area historically supported healthy riparian and upland areas, good water quality, and a natural hydrograph. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

ODEQ has identified several streams in the MFJD River watershed as water quality limited for high temperatures, dissolved oxygen, or biological criteria, with the most serious water quality problem being elevated summer temperatures caused by vegetation disturbance, stream straightening/relocation, livestock grazing, timber harvest, road building, irrigation water withdrawals, and historical mining and dredging. In addition, fire suppression practices have affected both the composition and structure of forestlands in the subbasin. Use of ground-based logging equipment on steep (greater than 30 percent) slopes and high road densities often contribute sediment to streams, adversely impacting steelhead spawning and rearing areas.

Past or ongoing livestock management practices that result in high intensity riparian grazing and/or season-long use of riparian areas cause bank destabilization, excessive sedimentation, and increased stream temperatures, because the width-to-depth ratio of the channel is increased when livestock trample banks, collapsing those that are undercut.

Heavy and often summer-long grazing has resulted in several areas in the upper reaches of the MFJD River now lacking adequate riparian vegetation and shrubs necessary to prevent bank erosion and increased instream water temperatures.

A large number of pushup dams are used for irrigation. Some of these temporary dams result in intermittent passage and interrelated impacts such as sedimentation, reduced flows, channel alteration, and associated water quality impacts (NWPPC 2001). Additionally, there still exist many legal water diversions which remain unscreened or have screens that do not meet current NOAA Fisheries screen criteria (NWPPC 2001).

Many parts of the mainstem Middle Fork were dredge-mined (particularly near Galena at RM 45 and near the mouth of Granite Boulder Cr. at RM 57), and several tributaries (such as Davis, Vincent, Vinegar, Ruby, Ragged and Butte creeks, among others) were placer-mined.

The Draft John Day Subbasin Plan (NPCC 2004c) described the primary limiting factors for fish species (including steelhead) in the MFJD:

- Flow, habitat diversity, temperature, and key habitat quantity were identified as limiting factors throughout the Middle Fork John Day River.
- Sediment load and channel stability were found to be limiting factors in all but one of the fifth-field watersheds.
- Predation is a minor limiting factor found in only one fifth-field watershed.

#### **10.1.8.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect natural hydraulics with upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help facilitate returning tributaries and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. The reestablishment of riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component, will go far in improving steelhead rearing and spawning habitats.

The Draft John Day Subbasin Plan (NPCC 2004c) described general approaches to address the primary limiting factors within the John Day Subbasin:

- Improve riparian habitat conditions to create more summer rearing habitat, improve adult deep pool habitat, improve over-winter survival, decrease sedimentation, increase shade, and increase terrestrial and aquatic insect production.
- Increase stream flows to improve fish passage over obstructions, decrease water temperature, increase adult deep pool habitat, improve summer rearing habitat, and improve water quality.
- Improve channel stability consistent with natural landforms that will promote riparian recovery and reduce erosion. This will result in a decrease in sedimentation and more suitable spawning gravel, as well as narrower and deeper channels that reduce instream temperatures.
- Improve passage conditions to provide access to additional habitat for spawning and rearing and improve fish production and abundance.

Social and political constraints and lack of funding limit the ability to address the limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in public ownership, types and locations of on-the-ground restoration activities are closely linked to agency funding and public support. Recent acquisition of several large tracts of land in the MFJD by the Confederated Tribes of the Warm Springs Reservation and also by The Nature Conservancy for purposes of improving aquatic resources and fish populations provides a significant cornerstone to continue further restorative actions.

## 10.1.9 South Fork John Day River

### 10.1.9.1 Background

All steelhead numbers for the South Fork John Day are believed to be wild fish, given that the small amount of straying of hatchery fish that does occur in the John Day system occurs in the lower mainstem of the river. Information from ODFW annual redd surveys for MCR steelhead was used to derive the recent past (1959-1968) 10-year geometric mean ( $n=18.4$ ) and compared to the current (1994-2003) 10-year geometric mean ( $n=6.1$ ). This comparison shows a resulting 67 percent reduction in MCR steelhead redds/mile in the combined South Fork and Upper Mainstem survey reaches. Data were not available separately for these two populations. The comparison of the two 10-year geometric mean data sets for the entire John Day River using the same available years ( $n=37.4$  recent versus  $n=18.4$  current) results in an overall reduction of 51 percent in redds/mile. The BRT's interim abundance target for natural steelhead spawners in the Upper Mainstem (2,000) and South Fork John Day River (600) combined is 2,600. *Index of Potential Absolute Increase in Production* is therefore high.

The South Fork Day River from Smokey Creek upstream to the Malheur National Forest boundary was classified in 1988 as "Recreational" under the Wild and Scenic Rivers Act of 1968 and is managed by BLM. The area historically supported healthy riparian and upland areas, good water quality, and a natural hydrograph. However, it is in very degraded shape at present. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

The ODEQ has identified several streams in the Upper John Day River and the SFJD River watershed as water quality limited for high temperatures, dissolved oxygen, or biological criteria, with the most serious water quality problem being elevated summer temperatures caused by vegetation disturbance, stream straightening/relocation, livestock grazing, timber harvest, road building, and irrigation water withdrawals. In addition, fire suppression practices have affected both the composition and structure of forestlands in the subbasin.

The Draft John Day Subbasin Plan (NPCC 2004c) described the primary limiting factors for fish species (including steelhead) in the SFJD:

- Key habitat quantity, flow, and temperature are the greatest limiting factors on the South Fork John Day River. These factors are rated as moderate or high.
- Channel stability, habitat diversity, and sediment load are also severe limiting factors. Half of the fifth-field watersheds are rated high for all three of these factors.

- Obstructions range from high to low throughout the South Fork John Day River, averaging moderate.
- Withdrawals (unscreened diversions as defined by EDT) and predation are very minor limiting factors found in only two of the fifth-field watersheds.

#### **10.1.9.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect natural hydraulics with upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help return tributaries and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. The reestablishment of riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component, will go far in improving steelhead rearing and spawning habitats.

The Draft John Day Subbasin Plan (NPCC 2004c) described general approaches to address the primary limiting factors within the John Day Subbasin:

- Improve riparian habitat conditions to create more summer rearing habitat, improve adult deep pool habitat, improve over-winter survival, decrease sedimentation, increase shade and increase terrestrial and aquatic insect production.
- Increase stream flows to improve fish passage over obstructions, decrease water temperature, increase adult deep pool habitat, improve summer rearing habitat and improves water quality.
- Improve channel stability consistent with natural landforms that will promote riparian recovery and reduces erosion. This will result in a decrease in sedimentation and more suitable spawning gravel as well as narrower and deeper channels that reduces instream temperatures.
- Improve passage conditions to provide access to additional habitat for spawning and rearing and improves fish production and abundance.

Social and political constraints and lack of funding limit the ability to address the limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in public ownership, types and locations of on-the-ground restoration activities are closely linked to agency funding and public support.

## 10.1.10 John Day River Upper Mainstem

### 10.1.10.1 Background

Information from ODFW annual redd surveys for MCR steelhead was used to derive the recent past (1959-1968) 10-year geometric mean (n=18.4) and compared to the current (1994-2003) 10-year geometric mean (n=6.1). This comparison shows a resulting 67 percent reduction in MCR steelhead redds/mile in the combined South Fork and Upper Mainstem survey reaches. Data were not available separately for these two populations. The comparison of the two 10-year geometric mean data sets for the entire John Day River using the same available years (n=37.4 recent versus n=18.4 current) results in an overall reduction of 51 percent in redds/mile. The BRT's interim abundance target for natural steelhead spawners in the Upper Mainstem (2,000) and South Fork John Day River (600) combined is 2,600. *Index of Potential Absolute Increase in Production* is therefore high.

The area historically had healthy riparian and upland areas, good water quality, and a natural hydrograph. Much of the degradation tied to mining activities is not associated with current activities. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

ODEQ has identified several streams in the Upper John Day River and the SFJD River watershed as water quality limited for high temperatures, dissolved oxygen, or biological criteria, with the most serious water quality problem being elevated summer temperatures caused by vegetation disturbance, stream straightening/relocation, livestock grazing, timber harvest, road building, and irrigation water withdrawals. In addition, fire suppression practices have affected both the composition and structure of forestlands in the subbasin.

Agricultural practices have changed hydrology, contributing to degraded stream and riparian conditions throughout the subbasin. Draining and conversion of wetlands to pastures, diking and channelization of streams, and removal of extensive beaver colonies and large trees in the riparian corridor have all had adverse effects on the river's interaction with its floodplain (NPCC 2004c).

Steelhead in the upper mainstem can become seasonally isolated due to high water temperatures and reduced flows in the connecting mainstems. Multiple agricultural diversions on Strawberry Creek prevent all upstream fish passage. A section of Indian Creek is virtually dewatered during the summer.

Mining activity in the upper mainstem John Day River was extensive in the past and included large-scale dredging of the upper John Day River and lode mines in the Canyon Creek watershed and above Prairie City. Although active claims exist in a number of tributaries, the majority of current activity consists of small-scale placer mining along area streams, such as Canyon Creek. It is believed that if the price of precious metals increased significantly, mining activities would increase, as well.

The Draft John Day Subbasin Plan (NPCC 2004c) described the primary limiting factors for fish species (including steelhead) in the Upper Mainstem:

- Key habitat quantity is the greatest limiting factor on the Upper John Day River. Key habitat quantity is moderate or high in nearly all the fifth-field watersheds.
- Habitat diversity and flow are also moderate to high limiting factors throughout the South Fork.
- Temperature as a limiting factor ranges from low to high, averaging moderate.
- Obstructions as a limiting factor range from low to high, averaging low.
- Competition with other species, predation, channel stability, and sediment load are all minor limiting factors, averaging low.

#### **10.1.10.2 Suggested Mitigation Measures and Constraints**

Techniques for addressing many of the limiting factors are tested and available. Land use practices that create or maintain a degraded riparian zone can be adjusted to help reestablish bank stabilization, reduce sedimentation, reconnect natural hydraulics with upland vegetation, and establish natural stream sinuosity. Emphasizing water conservation, installing more efficient water withdrawal equipment, and revisiting flow operations at the re-regulating dams will help facilitate returning tributaries and mainstem flows to past flow regimes that supported all steelhead life stages and a strong wild steelhead population. The reestablishment of riparian vegetation and incorporating meanders in tributaries that have been straightened, along with limiting grazing impacts to the riparian areas to help establish and maintain this important bank stabilizing component, will go far in improving steelhead rearing and spawning habitats.

The Draft John Day Subbasin Plan (NPCC 2004c) described general approaches to address the primary limiting factors within the John Day Subbasin:

- Improve riparian habitat conditions to create more summer rearing habitat, improve adult deep pool habitat, improve over-winter survival, decrease sedimentation, increase shade, and increase terrestrial and aquatic insect production.
- Increase stream flows to improve fish passage over obstructions, decrease water temperature, increase adult deep pool habitat, improve summer rearing habitat, and improve water quality.
- Improve channel stability consistent with natural landforms that will promote riparian recovery and reduce erosion. This will result in a decrease in sedimentation and more suitable spawning gravel, as well as narrower and deeper channels that reduce instream temperatures.
- Improve passage conditions to provide access to additional habitat for spawning and rearing and improve fish production and abundance.

Social and political constraints and lack of funding limit the ability to address the limiting factors. A wide array of techniques is readily available; however, with much of the subbasin in public ownership, types and locations of on-the-ground restoration activities are closely linked to agency funding and public support.

### 10.1.11 Umatilla/Willow Rivers

#### 10.1.11.1 Background

The 89-mile long Umatilla River, which enters the Columbia River at RM 289, drains an area of nearly 2,290 miles.<sup>2</sup> Entering at RM 253 of the Columbia River, 79-mile long Willow Creek drains approximately 880 miles.<sup>2</sup> This collective area consists of agricultural cropland (37 percent, of which 27 percent is irrigated cropland, rangeland and forest-range mixes (42 percent), and forested lands (14 percent). The early spring (April) and late summer (September) represent the peak and low flow period for the subbasin, respectively. The lower portion of the Umatilla River has been substantially modified through engineered channel simplification. The Umatilla River and Willow Creek are on Oregon's list of water quality-limited streams under Section 303(d) of the Clean Water Act of 1972.

The Bureau of Reclamation (USBR) developed the Umatilla Project in 1906 and Umatilla Basin Project in 1988, and these projects directly influence the lower 52 miles (from MacKay Creek downstream) of the Umatilla River. There are multiple systems of canals, pumping stations, and storage reservoirs that make up USBR's Umatilla and Umatilla Basin Projects. Similarly, a flood control dam on Willow Creek near RM 5, which also serves as an irrigation water source, directs the flow regime for this system.

The years available for ODFW count data at 3-Mile Dam on the Umatilla River are 1967-2003. The years 1967-1978 were tabulated to represent the "recent past" for which the mean value of  $n = 2,066$  wild fish. The "current" data set (1994-2003) resulted in a 10-year mean value of  $n = 1,821$ . Comparing the current with the recent past 10-year means, ODFW data at the 3-Mile Dam weir shows a reduction of wild steelhead of approximately 12 percent. The recent (1997-2001) 5-year average (geometric mean) return of natural MCR steelhead of 1,492 is up from previous years but remains well below the interim abundance target of 2,300 for the MCR steelhead in the Umatilla subbasin (adapted from NOAA Fisheries 2003). It is important to note, however, that the steelhead population was much higher in earlier years and was severely impacted by heavy water withdrawals for agricultural purposes that began in the early 1900s. These numbers are based on ODFW count data at 3-Mile Dam on Umatilla River and the NPCC 2004 draft Umatilla/Willow Subbasin Plan. *Index of Potential Absolute Increase in Production* is therefore high.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR 2001) report that a limited amount of high quality salmonid habitat persists, especially at higher elevations. *Qualitative Assessment of Potential to Improve/Increase Habitat* is high.

The Draft Umatilla Subbasin Plan (NPCC 2004x) states:

“...irrigation diversion projects and McKay Reservoir have had important impacts on the hydrology of the Umatilla subbasin. During the summer months, discharge in the lower Umatilla River decreases with water withdrawals and shows slight increases with irrigation return water. Water is released from McKay Reservoir during peak irrigation

periods. The impact of storage of water in McKay Reservoir and releases of water during the summer months is to lower mean monthly instream flows during the winter when water is stored and increase flows during the summer when stored water is used for irrigation.”

“The hydrology of Willow Creek is also greatly influenced by irrigated agriculture as well as the construction of the Willow Creek Dam. Irrigated agriculture began in the late part of the 19<sup>th</sup> century. Currently, total annual flows are reduced by approximately 23 percent due to extensive irrigation withdrawals. The Willow Creek Dam was constructed mainly as a flood control structure, and not for irrigation (although a permit issued by OWRD does allow the storage of 3,500 acre-feet for irrigation purposes). As such, its influence on downstream hydrology is different than diversions built for irrigation purposes. This hydrology is characterized by no natural floods, a regular fall peak in flow during reservoir draw-down, and constant high winter and spring flows.”

Cultivation, grazing, forestry, urban development, and water storage and diversion for irrigation and flood control have dramatically degraded aquatic habitats throughout the Umatilla subbasin. The draft Umatilla/Willow Subbasin Plan (NPCC 2004) characterized the watershed as having inadequate stream flows, excessive temperatures, excessive erosion, simplified and reduced instream habitat, and inadequate riparian cover. Many of the streams in the Umatilla Basin are on the Clean Water Act (CWA) 303(d) list for temperature, sediment, and nutrients (ODEQ) 2001).

Agricultural, rangeland, and forestland practices along with urban development have led to widespread changes in vegetation throughout the basin. The most significant change has been the disappearance of large forested riparian areas along the Umatilla River and the conversion of native prairie to farmland (Kagan *et al.* 2000). ODEQ (2001) estimates that bottomland hardwood and willow communities have been reduced by 87 percent since 1850, and NPCC (2004) reports that 70 percent of all Umatilla River tributaries need riparian improvement.

Large-scale water developments by USBR have altered natural stream flows through water storage and irrigation diversions. Summer withdrawals annually subject large sections of the lower Umatilla River to extremely low flow conditions that often reduce the river to a series of disconnected pools (USBR 2001). ODEQ (2001) also reports the lack of water in many basin areas where the original General Land Office surveyors reported abundant springs and small creeks. Additionally, the NPCC (2004) reports that dikes, levees, and rip-rapped banks have straightened and channelized streams in many parts of the subbasin.

Many point and non-point pollution sources contribute to poor water quality within the basin. Point sources include five wastewater treatment plants that release effluent into the mainstem Umatilla. Non-point sources include urban and agricultural runoff laced with hydrocarbons, pesticides, and fertilizers. High sediment levels and turbidity from streambank erosion and poor agricultural practices on highly erodible soils further degrade water quality.

Reduced riparian shading, increased channel width/depth ratios, reduced flows, and irrigation return flows all contribute to elevated stream temperatures. ODEQ found that Umatilla Basin stream temperatures often exceed state water quality standards between June and September.

Water diversions, land use practices, and stream channelization have reduced side channel access, habitat diversity, rearing space, food production areas, and longitudinal connectivity along stream courses (ODEQ 2001).

For Willow Creek, the anthropogenic limiting factors primarily result from water impoundment, some water withdrawal, and access barriers to suitable habitats throughout a significant portion of the drainage.

#### **10.1.11.2 Suggested Mitigation Measures and Constraints**

Rearing juveniles face unfavorably high summer water temperatures throughout most of the Umatilla basin, especially in the mainstem. Consequently, most juveniles migrate back up into the cooler waters of the middle tributaries during the hot summer months. Additionally, water quality conditions throughout the Umatilla basin have been cited by ODEQ as a factor specifically linked to poor egg-to-smolt survival ratios.

Social and political constraints limit the options for restoring habitat in the Umatilla/Willow subbasin. Most of the suitable steelhead habitat in the Willow Creek watershed is above flood control structures that block steelhead access. There is both local support and local opposition to restoring passage in Willow Creek; the primary concern among those opposed is possible land use restrictions that would be required if steelhead were present. USBR owns and operates McKay Reservoir and several large irrigation systems on the lower Umatilla River. USBR should consider options for improving McKay Creek for steelhead rearing and spawning and work toward improving flows and water temperatures during the summer months. The Confederated Tribes of the Umatilla Reservation have actively pursued improved water flows and other habitat improvements on the Umatilla River. It is doubtful that the mainstem could be significantly cooled, because doing so would require substantial changes in water management and irrigation system configuration.

#### **10.1.12 Walla Walla and Touchet**

##### **10.1.12.1 Background**

WDFW estimates that the Walla Walla (including the Touchet) historically produced approximately 16,000 steelhead, compared to roughly 1,100 today. *Index of Potential Absolute Increase in Production* is therefore high for both populations.

Patches of highly functional habitat remain in both systems, the South Fork Walla Walla, Upper North Fork WW, upper Mill Creek, and portions of the upper forks of the Touchet, for example. However, habitat throughout most of these subbasins has been substantially altered. Irrigation withdrawals severely limit habitat suitability, and portions of the mainstem and tributaries (e.g., Mill Creek) have been diked and channelized. Riparian habitats have been largely removed throughout the agricultural portion of the basin. The mainstem Touchet has been straightened and has deeply incised as a result. Poor farming practices deliver a substantial sediment load to both rivers and many of their tributaries. The habitat that is in good shape is exceptional, but

there is very little of it. Most of the rest of the basin is in very poor condition. *Qualitative Assessment of Potential to Improve/Increase Habitat* for both populations is low to medium.

The primary limiting factors are low flows, high sediment rates, high summer water temperatures, inadequate riparian vegetation, and lack of floodplain/channel interaction (either from diking or channel incision). Until recently, inadequate screens were also a problem, but most diversions have been properly screened in the last 5 to 6 years. A conspicuous remaining screen problem is at the Corps' flood control project at Bennington Dam on Mill Creek. The Corps diverts unscreened water during floods into an off-channel reservoir from which entrained fish are unable to reenter the Walla Walla River.

#### **10.1.12.2 Suggested Mitigation Measures and Constraints**

Flows could be improved through water conservation, lease, or purchase. There are legal means in both states to protect saved water from diversion by other users. Floodplain lands could be purchased and measures implemented to allow channel processes to recover. CREP and other programs could be used to improve riparian conditions. There are similarly multiple Farm Bill programs that could be used to encourage better soil management to reduce sedimentation. *Ecological Improvement Potential* is high for both populations.

The degree to which water has been over-appropriated in the Walla Walla makes it unlikely that sufficient flows could be secured to restore suitable habitat conditions across a substantial portion of the historically suitable habitats. Shallow aquifer storage during the winter might be a useful technique to reduce summer water temperatures, but the extent to which this might work is unclear. Many of the diked and channelized stream reaches will likely remain so, given the extent of capital development enabled by confining the channel and floodplain. There is excellent local support for riparian improvement and other activities that are less disruptive to the local economy than large-scale flow improvement. There is local support for some level of flow improvement, and projects that resolve reach-scale flow problems are likely to be supported. With continued funding and pressure from the local community, or a regulatory response from state and Federal agencies, upland soil management will likely improve. Even with the social limits on the extent to which flows may be improved, *Intrinsic Potential Adjusted Based on Practical Constraints* is medium for both populations.

#### **10.1.13 Toppenish and Satus Creek**

##### **10.1.13.1 Background**

There are no estimates of historical abundance of steelhead in Satus and Toppenish Creeks. They currently account for roughly two-thirds of all steelhead in the Yakima basin, yet the two watersheds make up less than 20 percent of the area in the basin. Furthermore, the amount of stream habitat in this drier portion of the basin is substantially lower per unit area of watershed than in the Upper Yakima or Naches population areas. It therefore appears that the Toppenish and Satus population is much closer to its historical abundance level than either the Naches or Upper Yakima populations. *Index of Potential Absolute Increase in Production* is therefore medium.

Upper Toppenish Creek contains some of the best-functioning habitat in the Yakima basin. In the areas where there are anadromous fish, the Satus Watershed is roaded, but habitat within the forest is still fairly functional. Within the shrub steppe zones of both basins, habitat conditions are fair to poor. In the Satus watershed, this is mostly a result of historical grazing practices, while in Toppenish Creek, irrigated agriculture is the cause. Conditions in both watersheds are improving as a result of Yakama Nation and BPA efforts. Grazing is now largely under control in Satus, and much of the Toppenish Creek floodplain has been reclaimed and revegetated. It will take time for the benefits of these efforts to be fully realized. *Qualitative Assessment of Potential to Improve/Increase Habitat* is medium.

The primary limiting factors are sedimentation, high water temperatures, water quality (Lower Toppenish Creek), channel simplification, low flows (portions of Toppenish Creek and tributaries), low pool density in portions of both watersheds, and inadequate screening (portions of Toppenish Creek)

#### **10.1.13.2 Suggested Mitigation Measures and Constraints**

As mentioned previously, significant steps have been taken to improve riparian conditions in both watersheds, and these efforts should continue. Additional road improvements could reduce sedimentation and ensure passage. Improved soil management could improve water quality in Toppenish Creek. All diversions could be properly screened as the Yakama Nation has been doing. Further efforts to reconnect Toppenish Creek to its floodplain could increase the amount of summer rearing habitat. Water use efficiency projects and POD changes could improve (or provide) flows in portions of Toppenish Creek and some of its tributaries. Given the generally good condition of most habitat in this system and the relative strength of the population, the *Ecological Improvement Potential* for Toppenish and Satus creeks is medium.

With the Yakama Nation as a strong champion for restoring habitat for this population, restoration activity will be more limited by funding and technical feasibility than social and political constraints. *Intrinsic Potential Adjusted Based on Practical Constraints* is medium.

#### **10.1.14 Naches River**

##### **10.1.14.1 Background**

The Naches population was historically probably second to the Yakima River Upper Mainstem in population in size. Today it is second to the Satus/Toppenish population. The estimated present population in the Naches is approximately 500. If the historical Yakima Basin population was 80,000, historical return to the Naches may have been 20,000 or more. *Index of Potential Absolute Increase in Production* is therefore high.

Portions of the lower Naches floodplain are still intact, and many of the tributaries within the national forest are still functional, though they are somewhat degraded by forest management, grazing, and recreational activities. Portions of the watershed are nearly pristine. However, irrigation diversions, inadequate fish passage facilities, and floodplain revetments limit habitat

quality throughout much of the watershed. Two USBR storage dams limit access to many miles of high quality habitat. Perhaps most significantly, the operation of USBR's dam has rendered the Tieton River all but unsuitable. Dam operations have radically altered the hydrology of the river, disrupted sediment transport, and created a heavily armored, highly simplified river environment within the Tieton. USBR recently purchased a large water right in the lower Naches and has been able to improve flows in an approximately 7-mile-long reach by about 200 cfs. That effort is expected to significantly increase steelhead rearing habitat. *Qualitative Assessment of Potential to Improve/Increase Habitat* is medium.

The primary limiting factors are habitat access, altered flow regime, loss of floodplain function, profound habitat simplification (in the Tieton) and poor riparian conditions in portions of the watershed.

#### **10.1.14.2 Suggested Mitigation Measures and Constraints**

USBR operations could be altered to provide normative conditions in the Tieton and Bumping rivers. Passage into Cowiche Creek and above Rimrock and Bumping reservoirs could also be provided. USBR could take steps necessary to further improve minimum flows in the lower Naches (i.e., place the full quantity of the water they purchased back instream). Measures could be taken to increase habitat diversity in the mainstem (where channel is confined), Tieton, and at various locations on the National Forest. Irrigation diversion facilities can be brought up to current standards to ensure safe passage. Lower river flows could be improved to increase smolt survival through the lower Yakima River. Thus *Ecological Improvement Potential* is high.

USBR is currently evaluating alternatives for passage at Bumping Dam but not at Rimrock. It is unlikely that USBR will radically alter operations at Rimrock because of irrigator objections, but better winter flows may be provided as a result of the recent adoption of less conservative winter operating rules. Yakima County is actively pursuing improved floodplain management rules and is supportive projects that restore floodplain function. There is general support for physical habitat improvement projects, but *Intrinsic Potential Adjusted Based on Practical Constraints* is medium.

#### **10.1.15 Yakima River Upper Mainstem**

##### **10.1.15.1 Background**

The estimates of historical abundance of steelhead in the Yakima Basin range up to 80,000, while present returns average around 1,700. Of these, approximately 5 percent belong to the Upper Mainstem population. Since the Upper Yakima drains well over one-third of the entire basin, it is likely that the Upper Yakima Mainstem population was once substantially larger than at present. Given upper Yakima's broad floodplain valley with numerous significant tributaries, it is likely that the Upper Yakima Mainstem population was the largest of the Yakima Basin populations. It is currently the smallest. *Index of Potential Absolute Increase in Production* is therefore high.

Runoff patterns have been substantially altered by USBR reservoir operations, and these reservoirs (particularly Cle Elum) have blocked many miles of historical habitat. Operations at Roza Dam, near the downstream terminus of the population boundary, complicated and in some years may have prevented steelhead migration into the upper Yakima. Diversions and diversion structures prevent access to most of the basin's tributaries. As a result, steelhead are largely forced to rear in the unnatural hydrograph of the mainstem. In addition, a substantial portion of the upper mainstem is cut off from its floodplain by a host of floodplain revetments. *Qualitative Assessment of Potential to Improve/Increase Habitat* is low.

The primary limiting factors are the unnatural hydrograph, lack of access above the storage dams and into most tributaries, a restricted floodplain, and general lack of riparian habitat (mostly associated with levees).

#### **10.1.15.2 Suggested Mitigation Measures and Constraints**

The upper Yakima has tremendous restoration potential. Access could be provided above the dams and into the tributaries (though tributary passage would also require screening many diversions). If the river were run normatively below the reservoirs, the 60 or so miles of mainstem habitat would be substantially more productive for steelhead. Operations at Roza Dam could be improved to provide better downstream passage and improved flow conditions below the dam during the summer and winter. Migration flows to better enable passage through the lower Yakima River could also be provided. Levees could be selectively breached to improve floodplain/channel interaction.

It is unlikely that the mainstem Yakima will be operated in a normative manner, given the potential consequences to irrigation water supply. Passage at Cle Elum Dam may eventually be provided, as USBR is evaluating the prospects at present. It is unclear, however, if that effort will result in passage. A number of small-scale tributary passage projects have been implemented, but larger efforts have encountered a number of problems. There is general support for selective reconnection of side channel habitats, but it is likely that many revetments will remain. Given the uncertainty that the more compelling actions will be implemented, *Intrinsic Potential Adjusted Based on Practical Constraints* is medium.

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