# Klickitat Lead Entity Region Salmon Recovery Strategy

*White Salmon River*

*Klickitat River*

*Rock Creek*

**August 2018**

# Klickitat Lead Entity

## Klickitat Citizens Review Committee

| Member | Alternate | Interest |
|---|---|---|
| Ken Bales | *None* | Klickitat County Land and Natural Resources Advisory Committee |
| John Jorgenson | *None* | Cattlemen |
| Adam Fahlenkamp | *None* | Central Klickitat Conservation District |
| Marc Harvey | Doug Miller | Mid-Columbia Fisheries Enhancement Group |
| James Kiona | *None* | Tribal Fishermen – Yakama Nation Confederated Tribes and Bands |
| Jay Letto | *None* | Environmental Interests |
| Dan Lichtenwald | *None* | Environmental Interests |
| Don Starkin | *None* | Sport Fishing |
| Kelly Clothier | *None* | Underwood Conservation District |
| Randy Knowles | *None* | Timber Interests |
| Don Struck | *None* | Klickitat County Board of County Commissioners |
| Todd Collins | *None* | River Recreation |

## Klickitat Technical Committee

| Member | Expertise and Affiliation |
|---|---|
| Brady Allen | Fisheries Biologist, US Army Corps |
| Diane Driscoll | Fishery Resource Specialist, NOAA Fisheries |
| Jill Hardiman | Fisheries Biologist, US Geological Survey |
| Gardner Johnston | Interfluve, Engineer |
| Loren Meagher | Engineer, Central and Eastern Klickitat Conservation Districts |
| Diane Hopster | Hydrologist, USDA Forest Service |
| David Lindley | Habitat Restoration Specialist, Yakama Nation Fisheries Program |
| Jay Mcglothlin | Mount Adams Resource Stewards |
| Margaret Neuman | Executive Director, Mid-Columbia Regional Fisheries Enhancement Group |
| Tova Tillinghast | District Manager, Underwood Conservation District |
| Dan Richardson (Alt.) | Field Technician, Underwood Conservation District |
| Joe Zendt, Chairman | Fisheries Biologist, Yakama Nation Fisheries Program |
| Amber Johnson | Habitat Biologist, WA Dept of Fish and Wildlife |

## Klickitat Lead Entity Staff

| | |
|---|---|
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# Klickitat Lead Entity Region Salmon Recovery Strategy

## 1 INTRODUCTION

The *Klickitat Region Salmon*[1] *Recovery Strategy* documents the vision for salmonid recovery and the goals and other components of the strategy for salmonid habitat recovery and protection in the Klickitat Lead Entity's geographic area, which includes WRIAs 29b, 30, and 31, including the Columbia River extending from the confluence with the White Salmon River upstream to the confluence with the Yakima River. The primary basins of interest are the White Salmon River, the Klickitat River and Rock Creek basins (Figures 1, 2, and 3). The strategy will be used for a number of functions, including the following:

- guiding the identification, sequencing, and prioritization of salmonid habitat projects for funding through the Salmon Recovery Funding Board (SRFB);
- recruiting project sponsors and guiding their efforts towards higher priority areas and projects;
- guiding the identification and selection of mitigation projects;
- contributing to the habitat restoration and protection (non-regulatory) component of watershed plans developed under chapter 90.82 of the Revised Code of Washington (RCW);
- enlisting the support and active participation of landowners and the community at large in the effort to restore and protect salmonid habitat;
- assessing completed projects to determine if the desired results are realized, and to refine and retune the strategy and project guidance for maximum benefit to salmonids;
- seeking sources of project funding to augment SRFB monies; and
- serving as a tool for education and community outreach.

The *Klickitat Region Salmon Recovery Strategy* was developed for use by the Klickitat Lead Entity Organization for non-regulatory purposes, such as those outlined above. The strategy has not been subject to peer review or other quality assurance processes appropriate for regulatory application of its contents. Do not cite or quote the *Klickitat Region Salmon Recovery Strategy* without the express written consent of the Klickitat Lead Entity.

1 In this strategy the terms "salmon" and "salmonid" are used interchangeably to refer to the family salmonidae, which includes chinook and coho salmon, steelhead, bull trout, and cutthroat and rainbow trout.

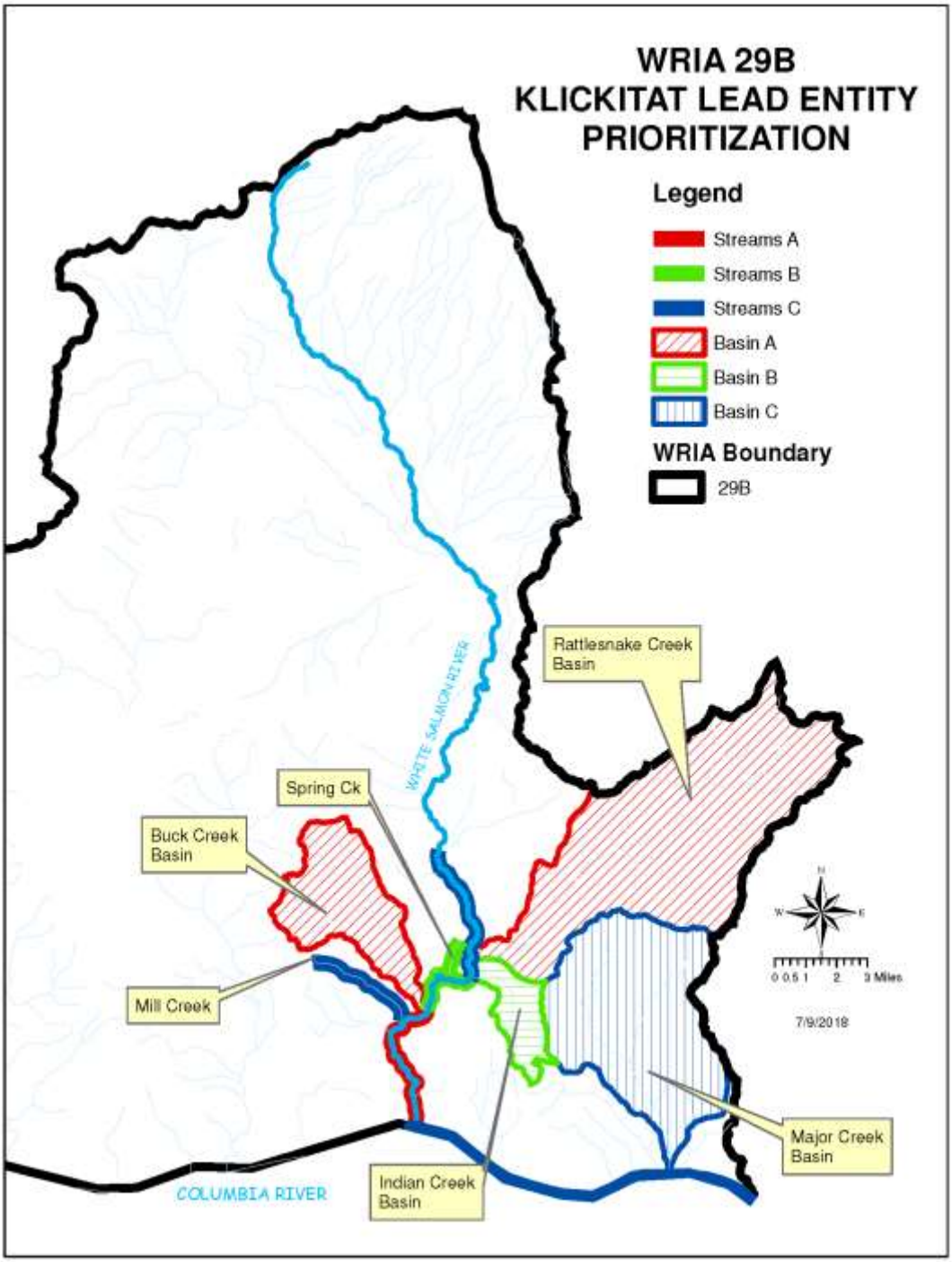


**Figure 5. Klickitat Lead Entity Priority Areas in the White Salmon River Basin**

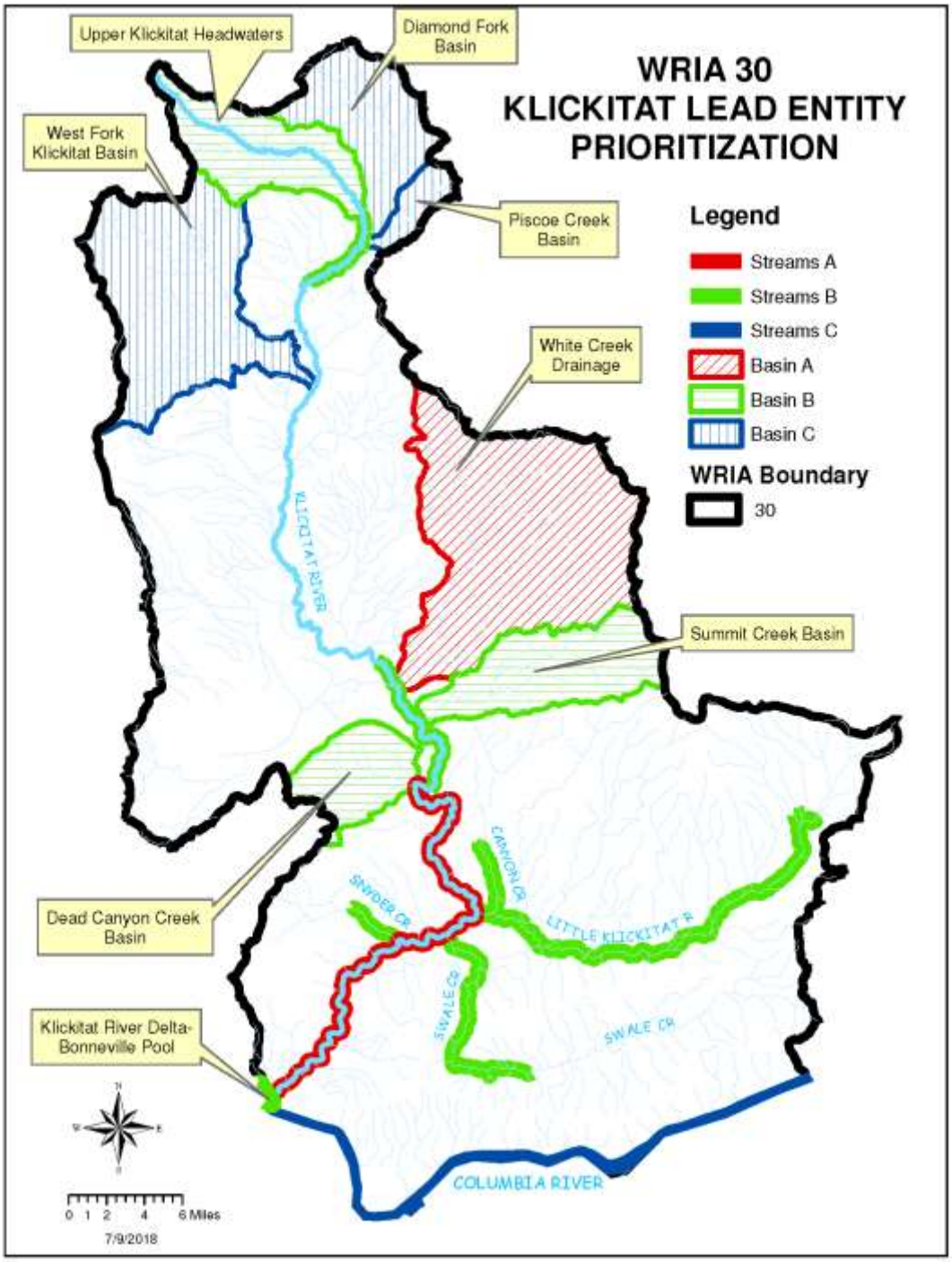


**Figure 6. Klickitat Lead Entity Priority Areas in the Klickitat River Basin**

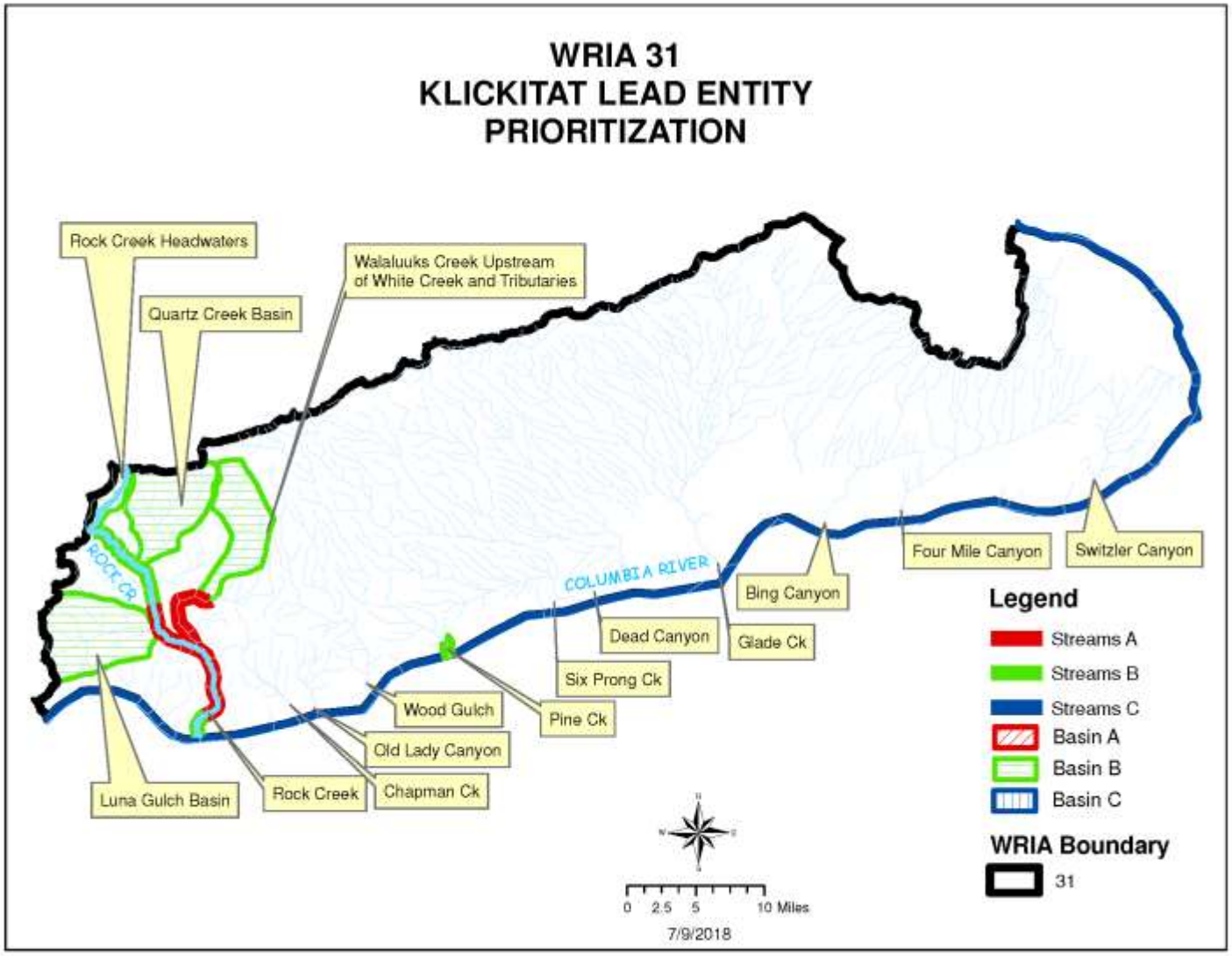
WRIA 31
KLICKITAT LEAD ENTITY
PRIORITIZATION
Rock Creek Headwaters
Quartz Creek Basin
Walaluuks Creek Upstream of White Creek and Tributaries
ROCK CR
COLUMBIA RIVER
Bing Canyon
Four Mile Canyon
Switzler Canyon
Dead Canyon
Glade Ck
Six Prong Ck
Pine Ck
Wood Gulch
Old Lady Canyon
Chapman Ck
Rock Creek
Luna Gulch Basin
Legend
Streams A
Streams B
Streams C
Basin A
Basin B
Basin C
WRIA Boundary
31
0 2.5 5 10 Miles
7/9/2018

**Figure 7. Klickitat Lead Entity Priority Areas in the Rock Creek Basin and the Eastern Tributaries of WRIA 31**

# 2 VISION

The vision for salmonid recovery is: "Restore salmon, steelhead, and trout populations to healthy, self-sustaining, and harvestable levels and improve and maintain habitat on which fish rely, with strong community support and participation in the Klickitat Lead Entity geographic area."

## 2.1 Mission

The Klickitat Citizen's Review Committee will support salmon recovery by identifying credible and fundable habitat protection and enhancement projects. This process will support related programs and activities that produce sustainable and measurable benefits for fish and fish habitat.

## 2.2 Goals

**Committee Goals**

- In conjunction with the Technical Committee (TC), regularly review and update the Klickitat Lead Entity Region Salmon Recovery Strategy (SRS) to maintain it current and technically correct as it forms the basis for committee actions.
- Solicit from and encourage regional organizations and private and public landowners involved in area watershed enhancement to submit meaningful projects for committee consideration with an emphasis on the top tier areas as defined in the SRS Matrix.
- Give serious, unbiased and fair consideration to all submitted projects and then grade them in accordance with SRFB guidelines (SRFB Manual 18) with particular attention to obtaining the maximum resource benefit with the funds available.
- Achieve committee consensus and provide SRFB project funding recommendations and rankings on or before SRFB established timelines.
- Review and evaluate completed projects to determine if they have met the projected project goals and benefits as well as financial targets.
- Maintain ongoing efforts of public outreach and awareness of committee efforts and accomplishments to enhance public support where it exists, and reduce or limit public opposition where it exists.
- As much as possible, all committee members remain current and knowledgeable through regular attendance to committee meetings, site visits, and attendance at related meetings, conferences or seminars that address committee areas of interest.

**Resource Goals**

- Achieve long-term and continuing salmonid habitat improvements in all SRS watershed areas with particular emphasis on the limiting habitat features in top tier areas of the SRS Matrix.
- Through easements and acquisitions, promote protection of SRS critical watershed areas to prevent degradation, both human and naturally caused.
- Increase salmonid spawning and rearing areas through both restoration of stream reaches and establishing or improving salmonid access.
- Bring salmonid populations to levels consistent with the maximum potential of each

of the watersheds in the Klickitat Lead Entity area.

## 2.3 Measuring Success

Progress will be measured by the number of man-made/caused limiting habitat factors that are mitigated. The criterion is whether or not the cause(s) of the limiting factor has/have been mitigated to the extent practicable. Success will be measured by the return of healthy native salmonids to harvestable and self-sustaining levels. The Lead Entity Strategy is compatible with the Middle Columbia Recovery Plan [National Marine Fisheries Service (NMFS) 2009d]; however, the Lead Entity Strategy addressed not only recovery of the species as may be defined under the Endangered Species Act (ESA), but also addresses the "broad sense" goals addressed in the recovery plan. The broad sense goals target the attainment of healthy native salmonid populations at harvestable and self-sustaining levels. The statewide strategy for monitoring watershed health will be incorporated in the Klickitat Salmon Recovery Region Lead Entity Strategy, as may be appropriate and practicable.

## 2.4 Socio-Economic Factors that Limit or Support the Vision and Goals

**Limiting Socio-Economic Factors**

- A number of residents in the Klickitat Lead Entity's geographic area oppose the acquisition of property by conservation organizations and government agencies.
- Perception that conservation acquisitions might cause tax base loss.
- Actions that affect the profitability of the natural resource-based sectors of the economy can have significant impact on individuals and the community at large.
- Uncertainty about changes following the removal of Condit Dam. Fear of tribal fishing rights vs. landowner rights will change over time. Conflicts between user groups in the White Salmon basin now that the dam has been removed.
- Concern exists regarding the possible negative effect introduction of anadromous fish into the upper White Salmon River watershed might have on the resident trout population due to the perceived potential for displacement and the introduction of diseases.
- Conflicting perceptions within the community regarding the compatibility of certain human activities with salmonid productivity.
- Fear that project sponsors may seek to expand anadromous access by removal of natural barriers.
- Concerns regarding the effects of increased large woody debris (LWD) in waterways on the safety of river users.
- Perception that benefits do not justify costs of some habitat related projects.
- Resistance of off-road recreational vehicle users to habitat projects that may restrict access to popular locations.
- Lack of understanding of the options for salmonid recovery without harming the economic base.
- Opposition to utilizing SRFB funding for road maintenance and abandonment projects and other forest practice mitigation projects on Federal/Tribal/State lands

when such projects do not meet the additional criteria that must be met in order to qualify for SRFB funding on state and private lands subject to the Washington Forest Practices Rules/Forest and Fish Agreement.
- Fear of possible future encumbrances on land owners and river users associated with recovery projects.

**Supporting Factors**

- A number of residents in the Klickitat Lead Entity's geographic area are dependent on a healthy tourism industry and benefit from the visitors drawn to the area by good sport fishing and other outdoor recreation activities.
- A sizeable contingent of recreational sports fishermen support enhancement of anadromous fish populations in the Klickitat River.
- There are voluntary habitat recovery and protection initiatives that have been underway in the Klickitat Lead Entity area for many years. Their success can be built upon.
- Tribes rely on self-sustaining populations of species of salmonid for revenue and for custom and tradition.
- Agricultural and small forest landowners have access to public and private programs to help fund riparian health improvement efforts that will benefit salmonid habitat.
- The natural areas of the region have retained significant species diversity and abundance valued and respected by a number of the citizens who choose to live in the Klickitat Lead Entity's geographic area.
- Agriculturists and landowners along the upper White Salmon River may qualify for much needed salmon related funds to address erosion/sedimentation problems now that anadromous salmonids have access above Condit Dam.
- Some residents in the Klickitat Lead Entity's Geographic Area support appropriate acquisition and conservation easement creation by conservation organizations and government agencies in cooperation with willing landowners.
- Conditions of acquisitions by conservation organizations can include provisions for continuation of normal tax revenues to local governments.
- Consumers include wild salmon in their family menus when available at local grocery stores and restaurants.

**Addressing Limiting Factors**

The Klickitat Lead Entity will address the limiting factors through such efforts as the following:

- informing landowners about tax diversion opportunities and sources of funding available to compensate them for loss of revenues from historic land uses, such as the Natural Resource Conservation Service's CREP (Conservation Reserve Enhancement Program) and Washington Department of Natural Resources' FREP (Forestry Riparian Easement Program);
- encouraging landowners who have participated in successful conservation easement and acquisition projects to discuss the benefits and address the concerns of other

landowners;
- requesting that applicants communicate with adjacent landowners;
- showing that trustees under conservation acquisition continue tax equivalent revenue to local governments and taxing districts;
- showing positive effect of scenic values that habitat protection can provide to resale value of existing residential real estate;
- publicizing that some habitat restoration projects have a high probability of increasing groundwater resources for local landowners dependent on wells for water;
- publicizing that successful salmon habitat projects in prime locations may ease restrictions on other landowners in the watershed;
- publicizing and encouraging other volunteer efforts such as Yakama Salmon Corps and AmeriCorps programs for young men and women;
- publicizing projects that benefit salmonids and how the concerns of residents were addressed;
- performing and publicizing solid planning, design, and cost benefit of large projects and soliciting public input prior to final approval of project funding;
- encouraging project sponsors to maximize use of local companies, workers, and supplies in project implementation to provide economic benefit to community;
- providing active outreach to White Salmon River landowners to show benefits of anadromous fish presence (e.g. access to federal and state grants to assist agricultural landowners in conservation measures) and address questions on "ESA takings" concerns; and
- developing a list of programs that assist with funding for road maintenance and abandonment projects and other forest practice mitigation projects on state and private lands when such projects do not qualify for SRFB funding due to the applicability of the Washington Forest Practices Rules/Forest and Fish Agreement.

## 2.5 Current State of Scientific Knowledge that Limits or Supports the Vision and Goals

### 2.5.1 Fish Distribution

**White Salmon Watershed:**

***Support*** – NMFS has published the Middle Columbia River Steelhead Recovery Plan for the White Salmon River, and lower Columbia River salmon recovery plans which include the White Salmon River (NMFS, 2013a; NMFS, 2013b). These documents also include information on current, historic, and potential fish distributions. Salmonid species composition and relative abundance in the White Salmon River below Condit Dam was assessed by rotary screw trapping and electrofishing and is summarized in Allen and Connolly (2011). Also, appendix C of the Washington Dept. of Ecology's Final Supplemental Environmental Impact Statement for the removal of Condit Dam has an excellent summary of aquatic resources in the White Salmon River watershed. This report is available on the YKFP website (http://www.ykfp.org/klickitat/WS.htm) and the Department of Ecology Web site at: http://www.ecy.wa.gov/biblio/0706012.html. Capture, Transportation and Reintroduction of Lower Columbia River Fall Chinook Salmon into the Upper White

Salmon River prior to Condit Dam removal is documented in Engle and Skalicky (2009). Fish distribution following the removal of Condit Dam is documented in Engle et al. (2013).

***Limitation*** – None identified

**Klickitat Watershed:**

***Support*** – The Klickitat River Steelhead Recovery Plan (NMFS, 2009a) and the draft Klickitat Anadromous Fisheries Master Plan (Yakama Nation, 2008) provide information on current and historic anadromous fish species distribution. Bull trout distribution is documented in Thiesfeld et al. (2002) and Byrne et al. (2001). Resident fish species (rainbow trout, cutthroat trout, brook trout) distribution is documented in the Klickitat Subbasin Plan (NPCC 2004) and in Yakama Nation Fisheries (YNF) unpublished data. Lamprey distribution is documented by Luke (2010). Distribution for most salmonid fish species (especially anadromous species) is well-known and documented.

***Limitation*** – Knowledge and documentation of historic and current distribution of westslope cutthroat trout is less complete than for most other species. Historically, they are believed to have been widespread in portions of the upper Klickitat watershed but their distribution now appears to be greatly reduced, with brook trout inhabiting some historic cutthroat streams (YNFP, unpublished data).

**Rock-Glade Watershed Area**:

***Support*** – Anadromous fish distribution for most parts of the watershed is documented in the Rock Creek Recovery Plan (NMFS, 2009c), 2009 Rock Creek habitat survey report (Glass, 2009), and the Yakama Nation's spawning survey report (Espirito, 2009). Resident fish distribution for much of the basin is documented in Glass (2009) and data is also being collected by ongoing projects (YN and U.S. Geological Survey (USGS) unpublished data) (Harvey, 2014).

***Limitation*** – Parts of the watershed have difficult or limited access and have not yet been thoroughly or regularly surveyed.

**Columbia River Tributaries**:

***Support*** – Known fish distribution for Major Creek is documented in the NMFS recovery plans for Mid-Columbia steelhead (Appendix I in NMFS, 2009d). Unpublished data and observations by various agency staff [U.S. Forest Service (USFS), USGS, YNF, Washington Department of Fish and Wildlife (WDFW)} also exist for Major Creek and Jewett Creek. Fish distribution in several of the eastern tributaries (Wood Gulch, Chapman Creek, Pine Creek, and Glade Creek) is documented in Glass (2008).

***Limitation*** – Comprehensive fish distribution surveys have not been documented for Major Creek and some of the other Columbia River tributaries in this area. Existing data on fish distribution could be improved.

**Columbia River Mainstem**:

***Support*** – Eight ESA-listed salmonids migrate or have historically migrated through the middle Columbia River as juveniles and again as adults (NOAA ESA listed Pacific Salmon, updated Sept. 25, 2008). These species are:

- Snake River Fall Chinook Salmon
- Snake River Spring/Summer Chinook Salmon
- Snake River Sockeye Salmon
- Snake River Steelhead
- Upper Columbia River Steelhead
- Upper Columbia River Spring Chinook Salmon
- Middle Columbia River Steelhead
- Columbia River Chum Salmon

The Mainstem Columbia river supports 37+ fish species in 13 families which spend significant time if not all their life time within this section. Species of special interest, in addition to salmonids, include Pacific lamprey and sturgeon (Columbia Gorge Mainstem Subbasin Plan, 2004, prepared for the Northwest Power and Conservation Council by Oregon Dept. of Fish and Wildlife).

The Columbia Basin Fish Passage Center (www.fpc.org/) also provides data on run timing for out-migrating juvenile salmonids through the Columbia River dams.

***Limitation*** – Little is known about specific distribution, habitat use, and duration of residency of different life stages of these fish in the mainstem Columbia River. The mainstem dams can be limiting to the production of these species through altering migration timing, direct mortality through dams, increased predation opportunities near dams and in pools, temperature changes, altering flow regimes, rearing, and spawning habitat, and increased competition/interactions/predation with invasive species.

## 2.5.2 Spawning Locations and Spawning Timing

**White Salmon Watershed:**

***Support*** – See the support for fish distribution information above.

***Limitation*** – See the limitation for fish distribution information above.

**Klickitat Watershed:**

***Support*** – Spawning locations and timing for anadromous salmonids in the Klickitat subbasin is well documented. The Klickitat Subbasin Recovery Plan (NMFS, 2009a) and the draft Klickitat Anadromous Fisheries Master Plan (Yakama Nation, 2008) give general information, and results of spawner surveys as given in annual monitoring reports (Zendt et al., 2010 and previous reports found at http://ykfp.org/klickitat/Reports&Pubs.htm) give more specific location information.

These reports, as well as results of genetic analysis of naturally-produced steelhead (Narum et al., 2007), provide information on which areas within the Klickitat subbasin are the most productive in terms of returning adults. The abundance of adults returning to the basin has been monitored for several years and is reported in Zendt et al. (2010) and in previous reports found at http://ykfp.org/klickitat/Reports&Pubs.htm and http://efw.bpa.gov/searchpublications/.

***Limitation*** – Spawner distribution and abundance in some areas of the Klickitat subbasin is not fully understood. For example, steelhead spawner passage frequency into the upper Klickitat River and upper Little Klickitat River is not well known, although steelhead use in both areas has been documented (Zendt, 2006; Zendt and Babcock, 2007; Zendt and Babcock, 2009). Lack of access and high flows often prevent complete surveys in these areas, which limits the ability to establish spawning distribution.

**Rock-Glade Watershed Area**:

***Support*** – Spawning locations and timing for anadromous salmonids for most parts of the watershed are documented in the Rock Creek Recovery Plan (NMFS, 2009c) and in Espirito (2009) (Harvey, 2014).

***Limitation*** – Parts of the watershed have difficult or limited access and have not yet been thoroughly or regularly surveyed. Steelhead can be difficult to observe during spawning (Glass 2008).

**Columbia River Tributaries**:

***Support*** – Some information for Major Creek is documented in the NMFS recovery plan for Mid-Columbia steelhead (Appendix I in NMFS, 2009d). Unpublished data and observations by various agency staff (USFS, USGS, YNF, WDFW) also exist for Major Creek and Jewett Creek.

***Limitation*** – Comprehensive and regular spawner surveys have not been documented for most of the smaller Columbia River tributaries in this area.

**Columbia River Mainstem:**

***Support*** –The Columbia River mainstem is more likely to be used as a rearing area during migration and potential overwintering. Data is available on spawning areas below Bonneville Dam, in the Hanford Reach, and Snake Rivers through the Columbia Basin Fish Passage Center (www.fpc.org/spawning_home.html).

***Limitation*** – Little is known about spawning areas for Pacific Salmonids in the mainstem Columbia River above Bonneville and below the Yakima River confluence.

### 2.5.3 Run Size Trends

**White Salmon Watershed:**

***Support*** – See the support for fish distribution information above. Also, natural fish runs were estimated from redd counts for fall chinook (tules and upriver brights[2]) through 2008 and for spring Chinook through 2002 by WDFW. This information can be found at WDFW's SalmonScape website (WDFW, 2011)

***Limitation*** – See the limitation for fish distribution information above

**Klickitat Watershed:**

***Support*** – Run size estimates beginning in the mid 1980s for Klickitat anadromous fish stocks are provided in the draft Klickitat Anadromous Fisheries Master Plan (Yakama Nation, 2008). Values are from estimated harvest and hatchery and natural escapement (natural escapement is largely estimated from redd counts). Redd count trends for spring Chinook beginning in the late 1980s are provided in Zendt et al. (2010). Mark-recapture population estimates for spring Chinook, fall Chinook and steelhead adult returns to Lyle Falls on the lower Klickitat River for 2005 and 2006 are provided in Gray (2007) and for subsequent years for spring Chinook and steelhead are documented in Zendt et al. (2010).

***Limitation*** – Most run size estimates for the Klickitat River rely on years of redd counts (spawner surveys). Due to lack of access, high winter/spring flows, and incomplete surveys, redd counts for steelhead and coho are often not reliable indicators of actual natural escapement. Fall Chinook redd counts provide a somewhat more reliable indicator, while spring Chinook redd counts (due to fairly good survey conditions in most years) provide a more accurate indicator of natural spawner abundance. Mark-recapture population estimates typically provide a more accurate assessment of run size and trends; these estimates are being conducted in the Klickitat watershed but currently there are only a few years of data and estimates are still under development for some stocks.

**Rock-Glade Watershed Area**:

***Support*** – Redd counts are being collected for ongoing projects (i.e. Espirito, 2009; Glass, 2009) (Harvey, 2014).

***Limitation*** – Only a few years of data are available, and redd counts (especially for steelhead) do not always allow an accurate assessment of spawner abundance and trends.

**Columbia River Tributaries:**

***Support*** – None

***Limitation*** – Little is known regarding run size in the smaller Columbia River tributaries of the area, although, run sizes in these streams appears to be relatively small to non-existent.

2 "Tule" Chinook generally spawn downstream of Bonneville Dam. They enter the river and quickly develop a darker color. "Freshwater Bright" Chinook generally spawn farther up the Columbia River. Since they migrate a longer distance, the typically retain their silver coloring longer.

**Columbia River Mainstem:**

***Support*** – The Columbia Basin Fish Passage Center and Columbia River Dart (Data Access in Real Time) (www.cbr.washington.edu/dart/) provide data on run timing for out-migrating juvenile salmonids and returning adults through Columbia River dams for the current year and for historical years.

***Limitation*** **-** Data gaps exist in understanding the brood-year to brood-year variation in run size trends with river conditions.

### 2.5.4 Interactions Between Introduced or Hatchery Populations and Natural Populations

**White Salmon Watershed:**

***Support*** – A radio-tagging study by USGS investigated the interaction of the fish stocked in Northwestern Lake with the naturally produced fish. Several of the radio tagged fish used the river and the reservoir for part of their life history, while other large rainbow trout remained in the river upstream of the reservoir for the duration of the two year study ( B. Allen, USGS personal communication). Tule and upriver bright hatchery Chinook from several local hatcheries on the Columbia River are known to stray and spawn in the White Salmon River (Normandeau, 2004: WDFW, 2011) Smith and Engle (2011) found that interbreeding occurs between hatchery and wild tule Chinook, and that tule and upriver bright Chinook produce offspring, but that the offspring do not survive to adulthood to reproduce. *O. mykiss* life history diversity (anadromous and resident) may play an important role in this particular basin during recolonization (Couter et al., 2013)

***Limitation*** – None identified

**Klickitat Watershed:**

***Support*** – Large numbers of hatchery fish (spring and fall Chinook, coho, and steelhead) are released into the Klickitat River. Genetic analysis of naturally-produced steelhead smolt indicates that relatively little interbreeding has occurred between hatchery and wild steelhead populations (Narum et al., 2006). Introductions of brook trout into many streams and lakes in the upper watershed may have also adversely affected westslope cutthroat populations (NPCC 2004, and YNF, unpublished data).

***Limitation*** – Except for the steelhead genetics study cited above, very little empirical research has specifically targeted interactions between hatchery and wild fish. Ongoing genetic studies will identify interbreeding effects on anadromous stocks (especially spring Chinook). Effects from competition and other non-genetic effects are not fully understood.

**Rock-Glade Watershed Area**:

***Support*** – No major releases of hatchery fish have been documented in Rock Cr. Hatchery/Wild interactions are unknown, although genetic similarities have been

observed between Rock Creek and Snake River *O. mykiss* populations (Malta, 2012; Allen, B., Personal Communication).

***Limitation*** – No research on hatchery-wild interactions in Rock Creek has been published. Ongoing studies are recording incidental sightings of hatchery fish; none have been observed to date.

**Columbia River Tributaries:**

***Support*** – No hatchery fish are released in the tributaries.

***Limitation*** – Little information is available for the smaller Columbia River tributaries in this area.

**Columbia River Mainstem:**

***Support*** – The Fish Passage Center website contains information on yearly and historical (back to 1979) hatchery release timing and numbers by species (Chinook-0, Chinook-1, Chum, Coho, Cutthroat Trout, Sockeye, Steelhead).

***Limitation*** – Little is known about interactions between hatchery and wild fish in the mainstem Columbia River.

### 2.5.5 Stream flow and Surface/Ground Water Interaction

**White Salmon Watershed:**

***Support*** – There is an automated USGS flow gage at river mile 1.9 that has been operational since 1921 (hydrologic unit 14123500). There have been many spot measurements of flow in Rattlesnake and Indian creeks, and three years of continuous (15 min.) flow records near the mouth of Rattlesnake Creek from 2003 to 2006 (see Allen et al., 2005, available at http://www.ykfp.org/klickitat/WS.htm) or http://www.efw.bpa.gov/Publications/I00005068-4.pdf.

***Limitation*** – None identified

**Klickitat Watershed:**

***Support*** – There are twenty active gages within the Klickitat Subbasin. Three are operated by the USGS, two in partnership with the YNF Program (YNFP). The YNFP operates ten other gauges in the Klickitat subbasin, six of which have data loggers that record measurements (typically on fifteen minute intervals). The Washington Department of Ecology (WDOE) operates one gage on the Little Klickitat River, formerly used by the USGS. Central Klickitat Conservation District and Klickitat County operate two gages on the Little Klickitat River and gages on Swale creek. The City of Goldendale operates one gage in the little Klickitat River.

Groundwater levels, precipitation, stream flow, and groundwater/stream flow interactions are being evaluated by the WRIA 30 Watershed Resource Planning and Advisory Committee (WPN and Aspect 2004). A study documenting losing and

gaining reaches within the Little Klickitat basin was performed by Aspect Consulting (2013).

***Limitation*** – It is unclear whether several of the ungaged streams, which are currently dry or spatially intermittent during the summer, were historically perennial. The lack of quantitative records impedes assessment of how flow regimes have changed over time.

**Rock-Glade Watershed Area**:

***Support*** – Washington Department of Ecology previously maintained a flow gage in lower Rock Creek, now maintained by USGS. Various publications (Glass, 2009; NMFS, 2009c) indicated that low base flows are a limiting factor for steelhead. .

***Limitation*** – There is a lack of detailed monitoring information on surface and groundwater for Rock Creek.

**Columbia River Tributaries**:

***Support*** – Some limited information for Major Creek is documented in the NMFS recovery plans for Mid-Columbia steelhead (Appendix I in NMFS, 2009d).

***Limitation*** **-** Comprehensive data is not available for this area.

**Columbia River Mainstem:**

***Support*** – Data is available for river discharge at Columbia River dams from the Columbia Basin Fish Passage Center (www.fpc.org/river_home.html) and Columbia River Dart (www.cbr.washington.edu/dart/) on a daily basis. The USGS also maintains stream flow gages for the mainstem Columbia River near The Dalles Dam (gage 14105700), Bonneville Dam (14128870) and at Stevenson, WA (14128600).

The USGS, Columbia River Research Laboratory has also developed two dimensional hydrodynamic models for Bonneville (USGS, unpublished data) and John Day reservoirs (see: http://wfrc.usgs.gov/research/geospatial%20studies/STGeospat3.htm) and the Hanford Reach of the Columbia River (Tiffan et al., 2002).

***Limitation*** – Some areas (i.e., The Dalles Reservoir) have not currently been modeled (2-D hydrodynamic model), so in-reservoir information on river dynamics is lacking and the Surface/Ground Water Interaction in the Mainstem Columbia River is poorly understood. Little information is available documenting habitat characteristics (e.g. temperatures, substrates, cover, etc.) at the confluences of the tributaries with the mainstem Columbia River.

### 2.5.6 Current Habitat Conditions

**White Salmon Watershed:**

***Support*** – NMFS has published the Middle Columbia River Steelhead Recovery Plan for the White Salmon River, and lower Columbia River salmon recovery plans which

include the White Salmon River (NMFS, 2013a; NMFS, 2013b) – both detail the current habitat conditions of the watershed. The White Salmon River Ecosystem Diagnosis and Treatment Model (Allen and Connolly. 2005) also details habitat conditions within each reach of the historically anadromous portion of the watershed. Reach specific information can be found at (http://edt.jonesandstokes.com/). There are several watershed analyses completed by the USFS detailing conditions of the mainstem and tributaries above the potential anadromous portion. An extensive habitat and fish survey was completed in Rattlesnake Creek by USGS and is available on the BPA website (http://www.efw.bpa.gov/Publications/I00005068-4.pdf) and the YKFP website (http://www.ykfp.org/klickitat/WS.htm). This report details water chemistry, the frequency of pools, abundance of instream wood, distribution and abundance of spawning gravel, riparian condition, shade levels, portion of channel area affected by confinement, and/or instream sediment levels, and many other variables for Rattlesnake Creek and its tributaries, Indian and Mill Creeks. Current habitat conditions in Buck Creek were assessed (including most of the parameters above) in 2009 and 2010 and the report was published in 2012 (Allen et al., 2012). Information about lamprey habitat has also been collected and evaluated (Allen, 2012). A study has been completed assessing the presence of fish barriers and unscreened diversions throughout much of the potentially anadromous portion of the White Salmon River (Underwood Conservation District, 2011).

***Limitation*** – There is still a need for further evaluation of habitat quality and fish use. Further evaluation of habitat conditions in the river downstream of the reservoir will be needed after flood events redistribute the sediment and scours pools in the lower river.

**Klickitat Watershed:**

***Support*** – The YNFP has inventoried 78 habitat segments on 37 streams beginning in 1992(Figure 4). Thirty-one of these segments have been revisited at least once to facilitate evaluation of change through time. The information collected includes the Timber, Fish and Wildlife (TFW) Reference Point, Habitat Unit, and Large Woody Debris modules. The YNFP is currently in the process of making summary reports for channel dimensions, physical habitat and woody debris.

The YNFP has inventoried 25 spawning gravel sites on seven streams beginning in 1998. Annually, a sub-sample (typically 8-10) of these 25 sites are visited. Published BPA reports provide plots for percent fines and cumulative frequency size distribution through time. Published reports and static summary table are available at www.ykfp.org/klickitat/M&E.htm.

The information gathered from both the TFW habitat surveys and spawning gravel surveys was used to populate related attributes for the Ecosystem Diagnosis Treatment Model (EDT). EDT is a modeling approach integrating environmental parameters with fish and restoration potential on a landscape scale.

The YNFP has monitored stream temperature at 36 locations throughout the Klickitat subbasin. Summary tables displaying the monthly daily average temperature and daily maximum for each site can be accessed at: http://www.ykfp.org/klickitat/Data.htm, deviation from the state standard are, however, not available at that site.

Detailed information has been published on the frequency of pools (Conley, 2005), abundance of instream wood (Conley, 2005), condition of gravel at sampled sites (Raines et al., 1999; Zendt et al., 2010,), riparian conditions (Watershed Professionals Network and Aspect Consulting, 2005), and confinement (Conley, 2005; Inter-fluv, 2002). Water bodies encompassed by these reports include: portions of Little Klickitat River, Swale Creek, White Creek, Dead Canyon, and approximately 30 miles of the mainstem Klickitat River. Additional unpublished data resides with local resource specialists.

Environ completed a study in 2013 evaluating thermal refuges and fish habitat in the Little Klickitat River (Environ, 2013a)

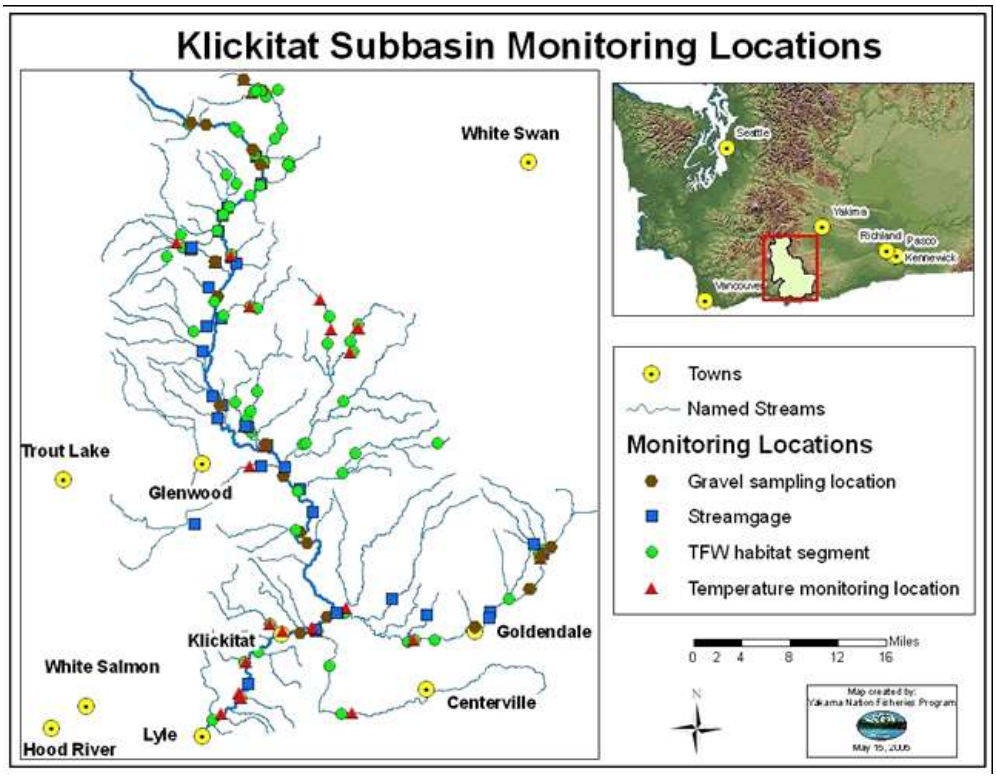


**Figure 8. Yakama Nation Fisheries Klickitat River Basin Monitoring Locations**

***Limitation*** – There is still a need for further evaluation of -habitat quality and fish utilization. The YNFP is currently working on an evaluation of habitat availability relative to habitat forming processes and artificial confinement that will be published in the near future. Another study documenting the habitat conditions in the Little Klickitat River is also underway (funded by Ecology).

**Rock-Glade Watershed Area**:

***Support*** – Summaries of current habitat conditions are provided in NMFS (2009), Glass (2009), Espirito (2009), and Aspect and WPN (2004). A study was completed documenting existing shade levels and treatment options as well as sediment transport within the basin (Environ, 2013b).

***Limitation*** – Options for improving habitat conditions require additional study, including an assessment of the depth of under substrate flow within the basin and identification of opportunities to "day light" that flow.

**Columbia River Tributaries**:

***Support*** – Some information for Major Creek is documented in the Recovery Plan for Mid-Columbia steelhead (Appendix I in NMFS, 2009). Glass (2009) documented habitat conditions in Wood gulch, Chapman Creek, Pine Creek, and lower Glade Creek.

***Limitation*** – Comprehensive data is not available for some of the streams in this area.

**Columbia River Mainstem:**

***Support*** – Data is available for river discharge, temperature, turbidity (some sites and years) and dissolved gas from the Columbia Basin Fish Passage Center (www.fpc.org/river_home.html) and Columbia River Dart (www.cbr.washington.edu/dart/) on a daily basis for Columbia River dams.

The USGS, Columbia River Research Laboratory currently houses extensive information on aquatic habitats in the mainstem Columbia River from the estuary up into the Hanford Reach of the Columbia River. This data set includes extensive bathymetric surveys, substrate information, rip-rap delineation, Eurasian watermilfoil delineation, and identification of backwater areas available in a GIS database (Leary et al., 2005; Tiffan et al., 2002; USGS, unpublished data; and http://wfrc.usgs.gov/research/geospatial%20studies/STGeospat3.htm). Inter-Fluve (2013a) published a literature review regarding the habitat and restoration potential of the entire length of the Klickitat Lead Entity portion of the Columbia River.

***Limitation*** – Some reaches of the Columbia River lack data (i.e., The Dalles Reservoir) and more detailed, smaller scale habitat data could be obtained.

### 2.5.7 Historic Habitat Conditions

**White Salmon Watershed**:

***Support*** – The Ecosystem Diagnosis and Treatment model outlined stream parameters for current and historical levels. The Allen and Connolly (2005) report of model inputs and outputs details the level of information, and confidence as well as a source of the historic parameter estimate (refer specifically to Appendix A). This document summarizes and references all documents with information about the White Salmon River known to exist at the time of writing. Historic habitat conditions for

Rattlesnake Creek are described in the Panakanic Watershed Analysis (Western Watershed Analysts, 1997) and White Salmon Subbasin Plan as well.

***Limitation*** – Documentation of historical conditions is limited for all streams and largely cannot be reproduced. The EDT model incorporated historic information as was available, but assumptions which cannot be tested were necessary.

**Klickitat Watershed:**

**Support** – There are a number of sources of information that provide inferences on historic habitat conditions. The earliest consist of cadastral survey notes and plats by the Government Lands Office from the late 1860s through 1880s. The aerial photo record begins in 1947, though some limited imagery is available for the lower 1-2 miles of the Klickitat River and the Columbia River from the 1930s. Other information providing insight on historic condition includes trappers journals, old maps, conversations with local residents, and other historical documents.

Documents published to date that include some of this historical record include the Little Klickitat TMDL report (Brock and Stohr, 2002); the Swale Creek Temperature Assessment (WPN and Aspect, 2004); the DNR watershed analyses conducted in the area (Raines et al., 1999; and Western Watershed Analysts, 1997); and the Swale Creek Channel Stability Assessment (Inter-Fluv, 2002).

**Limitation** – Information regarding historic conditions is limited and cannot be reconstructed. Modeling can be used to estimate historical conditions, but all model options require assumptions regarding historical conditions where data is not available.

**Rock-Glade Watershed Area:**

***Support*** – Historical information is available from General Land Office surveys from the 1860s, and documentation of this information is found in Aspect and WPN (2004).

***Limitation*** – Detailed information regarding historical habitat conditions in all areas is not available and limits some analyses.

**Columbia River Tributaries:**

***Support*** – Some information for Major Creek is documented in the NMFS recovery plans for Mid-Columbia steelhead. Historical information is available from General Land Office surveys from the 1860s but this information has not been evaluated.

***Limitation*** – Comprehensive data is not available for this area.

**Columbia River Mainstem:**

***Support***: The USGS, Columbia River Research Laboratory has substantial historic information on habitat in Bonneville and John Day reservoirs. Inter-Fluve published two documents (Inter-Fluve 2013a and 2013b) which discussed historic habitat

conditions and potential habitat restoration opportunities relating to historic habitat conditions.

***Limitation*** **-** Less information is available for The Dalles Reservoir, and in the mainstem, near shore areas throughout the Klickitat Lead Entity geographic region.

### 2.5.8 Pathogens

**White Salmon Watershed:**

***Support*** **-** In general, fish in the mainstem White and Buck Creek were relatively healthy, with a few instances of bacterial kidney disease (BKD). Fish in Rattlesnake creek had a higher prevalence of BKD, and also commonly were infected with Neascus (a trematode that causes a condition called blackspot, which is typically non-fatal). USGS has partnered with US Fish and Wildlife Service's Fish Health Laboratory's wild fish survey. To date, collections have been processed for Rattlesnake Creek, Buck Creek, and the mainstem White Salmon River. This information was summarized in Allen and Connolly (2006), Allen and Connolly (2011), and Allen et al. (2005) (http://www.ykfp.org/klickitat/WS.htm), and also available through the reports provided by the Fish and Wildlife Service.

***Limitation*** – None identified

**Klickitat Watershed:**

***Support*** – Surveys of resident and anadromous fish from throughout the Klickitat watershed have been conducted with pathogen analysis conducted by U.S. Fish and Wildlife Service, Lower Columbia Fish Health Center with results reported in Evenson and Zendt (2004) and Zendt (2005). Fish generally exhibit good health with low levels of bacterial kidney disease present in some areas.

***Limitation*** – Limited knowledge of pathogen levels before hatchery introductions makes a full assessment of effects of these introductions difficult.

**Rock-Glade Watershed Area:**

***Support*** **-** No major releases of hatchery fish are known to have occurred in Rock Cr.; some preliminary pathogen survey results are found in Espirito (2009). These results indicate very low prevalence of fish pathogens.

***Limitation*** – Extensive and continuous pathogen sampling has not yet been conducted, and conditions such as low stream flows and high temperatures may exacerbate any pathogen effects.

**Columbia River Tributaries:**

***Support*** – None

***Limitation*** – Currently no information is available for smaller Columbia River tributaries in this area.

**Columbia River Mainstem:**

***Support*** – The Lower Columbia River Fish Health Center monitors hatchery fish and wild fish submitted to them by researchers for pathogens, diseases, and recommends treatments to improve fish health management at the hatcheries.

***Limitation*** – There currently is very little monitoring done for new pathogens.

### 2.5.9 Invasive Species

The presence and extent of invasive species and their impact on salmonids and restoration/mitigation efforts in the Klickitat Lead Entity's geographic region is generally unknown. Invasive species are the second most important cause of imperilment for endangered species (after habitat loss; Wilcove et al., 1998). Ecological and economic costs of invasions can be high. Therefore, it is best to focus on 1) prevention, including understanding of the potential threats (e.g. the New Zealand mudsnail discovered in the Deschutes River, similar habitat types, vectors, etc.); 2) early detection through periodic inventory and monitoring; and 3) public outreach on identification and prevention of the spread of invasive species. The Northwest Power and Conservation Council state in the Columbia River Basin Fish and Wildlife Program (2009), that where aquatic non-native species pose both a direct threat to the hydropower system or to native fish and wildlife species, federal action agencies should support ongoing federal, state, and tribal efforts: to 1) detect and respond; 2) educate the public; and 3) prevent, monitor, control, and stop or minimize the spread of non-native species, including zebra or quagga mussels, hydrilla, silver carp, and Eurasian milfoil that threaten the success of Fish and Wildlife Program measures. The program also states that agencies with the appropriate authority and responsibility should monitor and manage the various pathways that could introduce the most up-to-date risk assessment methodology for aquatic nuisance species into on-the-ground fish and wildlife projects.

**White Salmon Watershed:**

***Support*** – Brook trout are known to inhabit much of the upper watershed, and also inhabit the river below Husum Falls, to a lesser extent. Many invasive plant species inhabit the watershed.

***Limitation*** – Data gaps exist as to what aquatic, riparian, and terrestrial invasive species exist in this region.

**Klickitat Watershed:**

***Support*** – The USGS has implemented an early detection survey at 8 popular access points along the Klickitat River from Parrot's crossing to the County Park. No New Zealand mudsnail were detected. The probability of detecting a New Zealand mudsnail, given the area sampled and a search efficiency of 0.95 and a density of 0.1 individual/$m^2$ was 61 percent (Hardiman et al., 2012).

***Limitation*** – The New Zealand mudsnail survey had a relatively low probability of detecting a NZMS. The Klickitat River is at high risk for an introduction of NZMS

due to its recreational popularity and close to proximity to the established Deschutes River population. Very little is known about other aquatic, riparian, and terrestrial invasive species present in the Klickitat river watershed.

**Rock-Glade Watershed Area:**

***Support*** – Some areas have invasive plant species, and non-native predatory fish have been identified in the lower basin (Espirito, 2009) (Harvey, 2014).

***Limitation*** – Comprehensive surveys for various invasive species have not been conducted.

**Columbia River Tributaries:**

***Support*** – Surveys conducted in some of the eastern tributaries of the Lead Entity area did not identify any invasive fish species (Glass, 2009).

***Limitation*** – Information regarding invasive plant and mollusk species is not available. Little information regarding invasive fish species is available for some of smaller Columbia River tributaries in the Lead Entity area.

**Columbia River Mainstem:**

***Support*** – Many invasive species are present in the mainstem Columbia River and have the ability to alter ecosystem functions by competing with, predating upon, or altering habitat and food sources for salmonids. Sanderson et al. (2009) quantified the impact on nonindigenous species on threatened and endangered salmon in the Pacific Northwest. Others have also investigated potential impacts of invasive species on salmon (Carey et al., 2011; Kuehne and Olden, 2012; Lawrence et al., 2012). Eurasian watermilfoil is present and some data exists delineating the extent of the area collected by the USGS in 2003. The introduction of Dreissenids (freshwater mussels, specifically quagga and zebra mussels) into the Columbia River mainstem is a huge concern and high threat due to their rapid spread in recent years to the West, including California and Utah (Pacific Marine Fisheries Commission, 2010).

***Limitation*** – Data gaps exist concerning the impacts of many of invasive species on salmonids. A monitoring and early detection system is not in place for invasive species and general baseline information on the mainstem Columbia River ecosystem is lacking.

### 2.5.10 Water Quality/Quantity

**White Salmon Watershed:**

***Support*** – Washington State Department of Ecology has listed portions of the White Salmon River as impaired on its 303(d) list for fecal coliform and temperature. Details can be found at http://www.ecy.wa.gov/programs/wq/303d/2008/index.html. Other water quality information can be found in USGS's EDT report, particularly Appendix A (Allen and Connolly, 2005). Water quality information for Buck Creek, Rattlesnake Creek, and the mainstem near Husum can be found in the Underwood

Conservation District's Rattlesnake Creek Report (found on the BPA and the YKFP websites listed above)

**Klickitat Watershed:**

***Support*** – Portions of the Little Klickitat River were previously listed on Ecology's 303(d) list for water temperature violations. A Total Maximum Daily Load (TMDL) for this subbasin has been adopted and the river is currently listed as 4A – plan in place. Swale Creek is currently listed on Ecology 303(d) list for violations of the temperature standards. A study was completed documenting temperature refugia in the Little Klickitat River (Environ, 2013a).

***Limitation*** – Opportunities for addressing stream temperature in the Little Klickitat River are still being identified.

***Limitation*** – A plan to address the 303(d) listing has not been developed. Opportunities to address water quality situations have not been identified.

**Rock-Glade Watershed Area:**

***Support*** – Available data indicates stream temperature is one of the most significant limiting factors for anadromous fish (Aspect and WPN, 2004; Espirito, 2009; Glass, 2009; NMFS, 2009c); (Harvey, 2014). Additional water quality data are also being collected. A portion of Rock Creek is currently listed as impaired on Ecology's 303(d) list for water temperature. A water quality management plan (known as a Straight to Implementation Plan under Ecology's water quality program) is under development. Existing shade levels were identified throughout most of the basin (Environ, 2013b).

***Limitation*** – None identified

**Columbia River Tributaries:**

***Support*** – Some information for Major Creek is documented in the NMFS recovery plans for Mid-Columbia steelhead (Appendix I in NMFS, 2009d).

***Limitation*** – Comprehensive data is not available for this area.

**Columbia River Mainstem:**

***Support*** – The U.S. Army Corps of Engineers, Northwestern Division (NWD), provides hourly water quality data at mainstem Columbia River dams including outflow, spill, percent spill, temperature (°C), Barometric pressure, dissolved gas, and percent dissolved gas. Various sections of the Columbia River are listed as impaired on Ecology's 303(d) list. Impairments include temperature, dissolved oxygen, dioxin, fecal coliform concentrations, aldrin, dieldrin, polychlorinated biphenyls (PCB), 4,4'-DDE, 2,2'-DDD, 2,3,7,8,-TCDD, chlordane, and pH. Oregon's Department of Environmental Quality (ODEQ) has listed the Columbia River as impaired on its 303(d) list for arsenic, DDE, fecal coliform concentrations, PCB, pH, polynuclear aromatic hydrocarbons (PAH), and temperature.

***Limitation*** - Plans to address the 303(d) listing have not been developed. Opportunities to address water quality situations have not been identified.

# 3 POLICY FRAMEWORK

The primary salmonid species guiding habitat prioritization are those listed under the Federal Endangered Species Act (ESA) (steelhead and bull trout) and spring-run Chinook salmon due to their cultural significance. The Klickitat Lead Entity will use the following policy framework for habitat protection and restoration:

- Recognize that adequate protection may preclude the need for future restoration.
- Use scientific principles and information consistent with recovery of healthy salmonid populations as the basis to identify and establish geographic priorities for habitat protection and restoration. Science-based principles include:
    - consideration of the time needed for regeneration of the natural process that salmonids are dependent upon at various life stages;
    - maintain biological diversity;
    - improve connectivity of critical habitats;
    - improve freedom for stream channel movement;
    - analysis of the overall landscape context of the watershed; and
    - incorporate the needs and impacts of people in the analysis and priority-setting process.
- Focus on salmonid habitat protection and restoration of higher priority geographic areas.
- Incorporate socio-economic and cultural based principals in planning and priority setting processes. Socio-economic and cultural based principals include following:
    - consideration of cultural factors, such as the special significance of spring-run Chinook salmon to native peoples;
    - consideration of economic factors;
    - consideration of tax-base factors;
    - consideration of recreation and tourism factors; and
    - consideration of factors affecting quality of life.

## 3.1 Relationship to Other Salmon Recovery Efforts

**Relationship to Other Policies**

- The technical policies of the strategy are based on the resource allocation guidance developed by the Washington Governor's Joint Natural Resource Cabinet.
- The vision for salmonid recovery is consistent with the State and Federal definitions of recovery.

**Relationship to Other Programs**

- As they come available, the strategy will draw from the work products of the

watershed planning efforts underway pursuant to RCW 90.82. Some Citizens Review Committee members are members of the WRIA 30 Policy and Advisory Committee.

- The strategy considers information from the subbasin summaries generated under the Northwest Power and Conservation Council's processes.
- The strategy considers information from the habitat limiting factors analyses that were published by the Washington Conservation Commission pursuant to RCW 77.85 and subsequent assessments of limiting factors (Glass 2009).
- The Klickitat Citizens Review Committee will participate in Ecosystem Diagnosis and Treatment modeling efforts with the intent of utilizing the modeling results in project prioritization.
- The strategy draws from and is complementary to the 2005 Lower Columbia Salmon Recovery Plan (NMFS, April 2005) and the Middle Columbia Steelhead Recovery Plan (NMFS 2013a, b, c, and d)

The Klickitat Citizens Review Committee (CRC) recognizes the above referenced studies and models are works in progress and have limitations. Their work products will be used as tools in the CRC's prioritization process. They will be revised as more data and information become available.

**Relationship to Regulations**

- The strategy recognizes the regulatory driver for salmonid recovery and considers whether or not a species is listed under the Endangered Species Act in the prioritization of fish species. The strategy considers federal agencies' critical habitat designations in identifying priority areas.

## 3.2 Tools and Resources for Strategy Implementation

A number of organizations (Washington Departments of Fish and Wildlife, Ecology, and Natural Resources; YNF; NOAA Fisheries; conservation districts; timber companies; USGS; USDA Natural Resource Conservation Service; counties, the Regional Fisheries, Enhancement, Group, etc.) have technical specialists actively working within the Klickitat Lead Entity's geographic area. Support from these organizations will be sought to fill needs related to such functions as technical/scientific advice, project sponsorship, and liaison with landowners.

Washington Department of Natural Resources and RCO operate the Family Forest Fish Passage program to assist small forest landowners in complying with the Forest and Fish Rules related to road maintenance and abandonment plans. In additional to technical assistance, the Family Forest Fish Passage program offers financial assistance to landowners in correcting fish passage barriers. The Klickitat Lead Entity Organization will promote and facilitate access to this program. The Klickitat Lead Entity Organization will also provide data, information (including the current edition of the *Klickitat Lead Entity Region Salmon Recovery Strategy*), and other assistance as may be appropriate to support prioritization of fish passage barriers under the Family Forest Fish Passage program.

Mid-Columbia Fisheries Enhancement Group's (MCFEG's) mission is to restore self-sustaining salmonid populations through habitat preservation, restoration and education projects which assist landowners and promote community partnerships in the Mid-Columbia River basin. MCFEG sponsors and coordinates community-based programs in the Klickitat Lead Entity's geographic area. Support from MCFEG will be sought for developing and implementing restoration, protection, and education and outreach programs.

NMFS is leading the effort to implement the Middle Columbia Steelhead Recovery Plan. They are currently building a system to track progress in implementing the plan.

# 4 SALMONID STOCK PRIORITIZATION

The Klickitat Citizens Review Committee categorized salmonid stocks into three tiers in order to help guide protection and restoration programs in the Klickitat Lead Entity's geographic area. Tier 1 is the highest priority and is composed of salmonid stocks that are either listed under the Federal Endangered Species Act (ESA) or are native to the watershed and have exceptionally high cultural value. Twelve Distinct Population Segments (DPSs)/Evolutionary Significant Units (ESU) of salmonids are listed under the ESA as endangered or threatened within the Klickitat Lead Entity's geographic area (Table 1). Tier 2 stocks are all naturally spawned salmonids that are native to the watershed, but are not in Tier 1. Tier 3 stocks are all naturally spawned salmonids that are not native to the watershed and do not have a negative impact on Tier 1 or Tier 2 species. The status of each of the salmon and steelhead stocks listed in the Washington State Salmon and Steelhead Stock Inventory (SaSSI) is provided in Table 2.

The salmonid stocks included in each of the tiers vary by watershed within the Klickitat Lead Entity's geographic area. These are discussed in the sections below. The State of Washington and NMFS have set or proposed goals for recovery and/or escapement for some of the listed stocks/species in some of the watersheds. Goals for other stocks/species are under development. Specific recovery goals vary by watershed and are also discussed in the sections below.

A salmon recovery plan has been developed that addresses chum and chinook in the mainstem Columbia River and its tributaries downstream of the Klickitat Lead Entity's geographic area (Lower Columbia Fish Recovery Board, December 2004; NMFS, April 2005). This recovery plan addresses priorities of actions in a descriptive manner as follows:

> "*Maximize efficiency of habitat restoration activities by concentrating in currently productive areas with significant scope for improvement, adjacent areas of marginal habitat where realistic levels of improvement can restore conditions suitable for fish, and areas where multiple species benefit*."

The Middle Columbia River Steelhead Recovery Plan recognizes that there are deficiencies in the data available to identify current population size, current productivity, and hatchery interactions with native populations. The steelhead recovery plan states:

> "*The first priority for recovery for this population is to reduce these uncertainties with a targeted monitoring program*"

and

> "*The highest priority strategies for the Klickitat basin address data gaps*".

The plan also states

> "*Further identification of the factors limiting the Klickitat population is a priority action*".

The recovery plan also identifies enforcement of sport and tribal fishing regulations and control of illegal fishing on and off the reservation as a priority. Finally, the steelhead recovery plan indicates that

> "*The prioritization of projects for funding should be based on a balance between the biological benefit of the project, its cost, and feasibility of implementation. Projects that address primary limiting factors, have high biological benefit, are relatively inexpensive, and are feasible should receive highest funding priority. Projects that have high cost, low biological benefit to listed fish species, and relatively low feasibility should receive lowest funding priority*".

Where specific goals have not been set, the State of Washington defines the goal of recovery as healthy and harvestable populations (Joint Natural Resources Cabinet, 2002). NMFS and the U.S. Fish and Wildlife Service (USFWS) define recovery under the ESA to be "*improvement in the status of a listed species to the point at which listing is no longer appropriate*" (50 CFR S402.02). NMFS uses the concept of a viable salmonid population (VSP) in evaluating activities that directly affect populations and in identifying de-listing goals for listed ESUs/DPSs. NMFS defines a viable salmonid population as an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame (http://www.nwr.noaa.gov/1salmon/salmesa/ 4ddocs/4dwsvps.htm). NMFS has made the following commitment (McElhany, 2000):

> *"It is our policy that the recovery of salmonid populations must achieve two goals: 1) Restore salmonid populations to the point where they no longer require the protection of the ESA, and 2) restore salmonid populations to a level that allows meaningful exercise of tribal fishing rights. We see no conflict between the statutory goals of the ESA and the federal trust responsibilities to Indian tribes. Rather, the two federal responsibilities complement one another."*

Furthermore, NMFS has an obligation under the Sustainable Fisheries Act to restore depleted populations to optimal levels of abundance and productivity (Public Law 104-297).

**Table 1. ESA Status of Salmonid Stocks in the Klickitat Lead Entity's Geographic Area (63 FR 31647; 70 FR 37160; 71 FR 834).**

| Salmonid Species | ESU/DPS | ESA Status |
|---|---|---|
| Sockeye Salmon | Snake River | Endangered |
| | Okanogan River | Not Warranted |
| | Lake Wenatchee | Not Warranted |
| Chinook Salmon | Upper Columbia R. Spring Run | Endangered |
| | Snake River Spring/Summer Run | Threatened |
| | Snake River Fall Run | Threatened |
| | Lower Columbia River | Threatened |
| | Middle Columbia River Spring Run | Not Warranted |
| | Upper Columbia River Summer/Fall Run | Not Warranted |
| | Deschutes River Summer/Fall Run | Not Warranted |
| Coho Salmon | Lower Columbia River | Threatened |
| Chum Salmon | Columbia River | Threatened |
| Steelhead | Upper Columbia | Threatened |
| | Snake River Basin | Threatened |
| | Lower Columbia River | Threatened |
| | Middle Columbia River | Threatened |
| Bull Trout | Columbia River | Threatened |

**Table 2. WDFW Washington State Salmon and Steelhead Stock Inventory (SaSSI) Status for Lower and Middle Columbia River salmonid stocks (http://wdfw.wa.gov/fish/sasi/).**

| Species | Stock Name | WRIA | Geo Region | 1992 Status | 2002 Status |
|---|---|---|---|---|---|
| Chum3 | Bonneville Fall Chum | 28 | Columbia River Lower | Not Rated | Unknown |
| Coho2 | Bonneville Tribs Coho | 28 | Columbia River Lower | Depressed | Depressed |
| Steelhead2 | Hamilton Creek Winter Steelhead | 28 | Columbia River Lower | Unknown | Unknown |
| Chinook | Wind Spring Chinook | 29 | Columbia River Lower | Depressed | Healthy |
| Chinook | Wind Tule Fall Chinook | 29 | Columbia River Lower | Depressed | Critical |
| Chinook | Wind Bright Fall Chinook | 29 | Columbia River Lower | Healthy | Healthy |
| Chinook | White Salmon River Tule Fall Chinook | 29 | Columbia River Lower | Depressed | Depressed |
| Chinook | White Salmon River Bright Fall Chinook | 29 | Columbia River Lower | Healthy | Healthy |
| Steelhead | Wind River Summer Steelhead | 29 | Columbia River Lower | Depressed | Depressed |
| Steelhead | Wind River Winter Steelhead | 29 | Columbia River Lower | Unknown | Unknown |
| Steelhead | White Salmon River Summer Steelhead | 29 | Columbia River Middle | Depressed | Unknown |
| Steelhead | White Salmon River Winter Steelhead | 29 | Columbia River Middle | Depressed | Unknown |
| Chinook | Klickitat Spring Chinook | 30 | Columbia River Middle | Depressed | Depressed |

[3] Presence in the Klickitat Lead Entity geographic region unknown but possible.

| Species | Stock Name | WRIA | Geo Region | 1992 Status | 2002 Status |
|---|---|---|---|---|---|
| Chinook | Klickitat Tule Fall Chinook | 30 | Columbia River Middle | Healthy | Healthy |
| Chinook | Klickitat Bright Fall Chinook | 30 | Columbia River Middle | Healthy | Healthy |
| Coho | Klickitat Coho | 30 | Columbia River Middle | Depressed | Unknown |
| Steelhead | Klickitat Summer Steelhead | 30 | Columbia River Middle | Unknown | Unknown |
| Steelhead | Klickitat Winter Steelhead | 30 | Columbia River Middle | Unknown | Unknown |
| Steelhead | Rock Creek Summer Steelhead | 31 | Columbia River Middle | Unknown | Unknown |
| Steelhead | Walla Walla Summer Steelhead | 32 | Columbia River Middle | Depressed | Unknown |
| Steelhead | Touchet Summer Steelhead | 32 | Columbia River Middle | Depressed | Depressed |
| Chinook | Snake Fall Chinook | 35 | Snake River | Depressed | Depressed |
| Chinook | Tucannon Spring Chinook | 35 | Snake River | Depressed | Depressed |
| Chinook | Asotin Creek Spring Chinook | 35 | Snake River | Critical | Extinct |
| Steelhead | Tucannon Summer Steelhead | 35 | Snake River | Depressed | Depressed |
| Steelhead | Asotin Creek Summer Steelhead | 35 | Snake River | Depressed | Depressed |
| Steelhead | Grande Ronde Summer Steelhead | 35 | Snake River | Depressed | Unknown |
| Chinook | Hanford Reach Fall Chinook | 36 | Columbia River Middle | Healthy | Healthy |
| Chinook | Yakima Bright Fall Chinook | 37 | Columbia River Middle | Healthy | Healthy |
| Chinook | Marion Drain Fall Chinook | 37 | Columbia River Middle | Healthy | Healthy |
| Steelhead | Yakima Summer Steelhead | 37 | Columbia River Middle | Depressed | Depressed |
| Chinook | Naches Spring Chinook | 38 | Columbia River Middle | Depressed | Depressed |
| Chinook | American River Spring Chinook | 38 | Columbia River Middle | Depressed | Depressed |
| Chinook | Upper Yakima Spring Chinook | 39 | Columbia River Middle | Depressed | Depressed |
| Chinook | Wenatchee Summer Chinook | 45 | Columbia River Upper | Healthy | Healthy |
| Chinook | Chiwawa Spring Chinook | 45 | Columbia River Upper | Depressed | Depressed |
| Chinook | Nason Creek Spring Chinook | 45 | Columbia River Upper | Depressed | Depressed |
| Chinook | Little Wenatchee Spring Chinook | 45 | Columbia River Upper | Depressed | Critical |
| Chinook | White River (Wenatchee) Spring Chinook | 45 | Columbia River Upper | Depressed | Critical |
| Sockeye | Wenatchee Sockeye | 45 | Columbia River Upper | Healthy | Depressed |
| Steelhead | Wenatchee Summer Steelhead | 45 | Columbia River Upper | Depressed | Depressed |
| Chinook | Entiat Spring Chinook | 46 | Columbia River Upper | Depressed | Critical |
| Steelhead | Entiat Summer Steelhead | 46 | Columbia River Upper | Depressed | Unknown |
| Chinook | Lake Chelan Fall Chinook | 47 | Columbia River Upper | Healthy | Unknown |
| Chinook | Methow Spring Chinook | 48 | Columbia River Upper | Depressed | Critical |
| Chinook | Methow Summer Chinook | 48 | Columbia River Upper | Depressed | Healthy |
| Chinook | Twisp Spring Chinook | 48 | Columbia River Upper | Depressed | Critical |
| Chinook | Chewuch (Chewack) Spring Chinook | 48 | Columbia River Upper | Depressed | Critical |
| Chinook | Lost River Spring Chinook | 48 | Columbia River Upper | Depressed | Critical |
| Steelhead | Methow/Okanogan Summer Steelhead | 48 | Columbia River Upper | Depressed | Depressed |
| Chinook | Okanogan Summer Chinook | 49 | Columbia River Upper | Depressed | Healthy |
| Sockeye | Okanogan Sockeye | 49 | Columbia River Upper | Healthy | Depressed |

## 4.1 White Salmon Watershed

The following are the Tier 1, 2, and 3 stocks in the White Salmon Watershed:

**Tier 1:**

- Lower Columbia River Chinook Salmon (*O. tshawytscha)* ESU, spring chinook;
- Lower Columbia River Chinook ESU, tule fall chinook;
- Lower Columbia River Chinook ESU, bright fall chinook;
- Middle Columbia River Steelhead *(*anadromous *O. mykiss)* DPS, summer run;
- Middle Columbia River Steelhead DPS, winter run;
- Lower Columbia River Coho Salmon (*O. kisutch)* ESU;
- Columbia River Chum Salmon (*O. keta*) ESU; and
- Columbia River Bull Trout (*Salvelinus confluentus*) DPS.

**Tier 2:**

- Cutthroat Trout (*O. clarki*);
- Mountain Whitefish (*Prosopium williamsoni)*; and
- Rainbow Trout (resident *O. mykiss*).

**Tier 3:**

- None

### 4.1.1 Chinook Salmon

The Lower Columbia River Chinook ESU is listed as threatened under the ESA (70 FR 37160 to 37204; June 28, 2005). SaSSI status is summarized in Table 2. This ESU includes all naturally spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River (64 FR 14208; March 24, 1999). Several hatchery populations of Chinook salmon are included in the ESU, including the Spring Creek hatchery (70 FR 37160 to 37204; June 28, 2005). The White Salmon hatchery has not been identified as part of the ESU.

The White Salmon River salmonid habitat limiting factors analysis states: "*There are conflicting accounts regarding the historical presence of spring Chinook in the White Salmon River watershed*" (Lane and Lane, 1981). A key anecdotal recollection is by the Bureau of Fisheries personnel that operated the trap upstream of the mouth of the White Salmon River. Their rational for identifying the lack of spring Chinook presence appears to be based on the absence of spring Chinook captured in historical trapping efforts at the mouth of the river; however, there is no indication that the trap was ever in place during the normal migration of spring Chinook or summer steelhead when flows are high. LeMier and Smith (1955) indicate potential for spring Chinook habitat utilization in the White Salmon River. Spring Chinook were extirpated from the watershed when Condit Dam was built (Diane Driscoll, NMFS, March 25, 2004; Washington State Conservation Commission, 2003). The Lower Columbia River Salmon Recovery Plan states that spring Chinook are "extinct", but classifies the White Salmon River spring Chinook as a "contributing" population of low priority and proposes an abundance goal for recovery of

400 (NMFS, 2005). Lower Columbia River ESU spring Chinook are classified as a Tier 1 stock in the Klickitat Lead Entity's recovery strategy due to their ESA status and cultural significance.

Two separate fall Chinook stocks, tules and brights, exist in the White Salmon River. Tule fall Chinook are native to the system; although native, the current stock origin for the natural spawning tule fall Chinook is considered mixed. Two separate outmigrations of Chinook fry occur; the earlier tule Chinook outmigration being the larger of the two (Allen and Connolly, 2011). Hatchery tule fall Chinook were last released into the White Salmon River in the 1980's, but strays are commonly recovered in the river (WDFW, 2003). The Spring Creek National Fish Hatchery (NFH) is located on the Columbia River approximately three miles west of the mouth of the White Salmon River. Salmon from the Spring Creek NFH tule Chinook program are included in the Lower Columbia River Chinook ESU (70 FR 37199, June 28, 2005). The Lower Columbia River Salmon Recovery Plan states classifies the White Salmon River tule fall Chinook as a "contributing" population of medium priority and proposes an abundance goal for recovery of 900 (NMFS, 2005). Lower Columbia River ESU tule fall Chinook are classified as Tier 1 stock in the Klickitat Lead Entity's recovery strategy due to their ESA status.

Hatcheries at Bonneville and on the Little White Salmon River produce bright fall Chinook. Since 1988, the WDFW has observed stray upriver brights from these facilities spawning in the White Salmon River. Stray fish from upriver populations have also been documented in the White Salmon River (Keefer et al., 2004). The WDFW considers the White Salmon River bright fall Chinook a mixed-origin stock. The Lower Columbia River Salmon Plan provides no population classification or abundance goals for recovery of White Salmon River bright fall Chinook (LCFRB, 2004; NMFS, 2005). Lower Columbia River ESU bright fall Chinook are classified as Tier 1 stock in the Klickitat Lead Entity's recovery strategy due to their ESA status.

### 4.1.2 Steelhead

Naturally spawned steelhead in the White Salmon River are in included in the Mid-Columbia Steelhead DPS, which is listed as threatened under the ESA (71 FR 834). SaSSI status is summarized in Table 2. Summer and winter hatchery steelhead are released into the White Salmon River which come from the Skamania Hatchery. The Skamania hatchery summer and winter steelhead are not considered part of the Middle Columbia River Steelhead DPS (71 FR 834). Naturally spawned steelhead are Tier 1 priority stock due to their ESA listing status. Steelhead/rainbow trout were the most abundant juvenile salmonid below Condit Dam, when electrofished in August and September (Allen, 2011).

WDFW lists both summer and winter steelhead in the White Salmon River (WDFW, 2003) although NMFS considers the populations to be functionally extirpated (NMFS, 2010) due to the isolation of the upper watershed for the 99 years that Condit Dam was in place. Prior to Condit's removal, available habitat in the lower 3.3 miles of the river (below the former dam location) supported a population of roughly 50 wild summer and

50 wild winter adult steelhead (WDFW 2003). In addition, strays from several upriver stocks have been found in the lower White Salmon River (Keefer et al, 2004), possibly attracted by the cool waters which serve as a thermal refuge for fish (Rawding 2000b).

The Interior Columbia Basin Technical Recovery Team (ICTRT) developed viable salmonid population (VSP) criteria for Mid-Columbia River steelhead DPS populations, including the White Salmon River, based on general guidance from a NOAA Technical Memorandum: *Viable Salmonid Populations and the Recovery of Evolutionary Significant Units* (McElhany, 2000) and other considerations (ICTRT, 2007). The criteria address steelhead population abundance, productivity, distribution, and diversity. The viability criteria group the winter and summer run stocks as one population. The viability criteria list the White Salmon River steelhead population in the "basic" population size category, which has a minimum abundance threshold of 500. The ICTRT has provided updated steelhead viability recommendations for inclusion in a White Salmon River salmon/steelhead recovery plan being developed by NMFS in cooperation with other parties (NMFS2013).

The draft White Salmon Steelhead Recovery Plan identified the White Salmon population as a potentially significant contributor to the long term viability of the Middle Columbia River steelhead population, but does not identify the population as critical to recovery (NMFS, 2013b). Steelhead are considered a Tier 1 stock in the Klickitat Lead Entity strategy due to their ESA listing status.

### 4.1.3 Chum Salmon

The Columbia River Chum Salmon ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries (70 FR 37160 to 37204; June 28, 2005). Chum salmon have been extirpated from the White Salmon River (Johnson et al., 1997). Any chum salmon that may spawn in the White Salmon River are assumed to be part of the Upper Gorge population. The Upper Gorge population also includes fish spawning in the mainstem Columbia River above Bonneville Dam and fish present in other tributaries above Bonneville Dam. The Upper Gorge population is considered to be contributing to the viability of the Lower Columbia River population. At present, viability of this population is considered to be very low (NMFS, 2005). The numeric recovery goal for the upper gorge population is set at 600 fish (NMFS, 2013a). The SaSSI status for the Columbia River chum salmon is provided in Table 2. Chum salmon are a Tier 1 stock in the Klickitat Lead Entity strategy due to their ESA listing status.

### 4.1.4 Bull Trout

Bull trout (*Salvelinus confluentus*) were listed under ESA as threatened in 1998 (63 FR 31647). No bull trout were found in the White Salmon River during extensive snorkel surveys conducted in 2001 (Thiesfeld et al., 2001). Prior to these surveys, sightings of bull trout in the basin were rare. WDFW biologists reported capturing two bull trout in 1986 in Northwestern Lake (USFWS, 2002). Anglers have also reported two bull trout below Condit dam. These fish were likely fish that strayed in from other rivers. Snorkel surveys conducted in 2000 found no bull trout in the basin (Byrn et al., 2001). The 1998 SaSSI status of the White Salmon River bull trout population is "Unknown.". In 2012,

after the breaching of Condit Dam, anglers captured a bull trout 200 m downstream of Husum Falls, indicating at least a migratory population may be re-establishing (Ian Jezorek, USGS, personal communication.)

Critical habitat has been designated for bull trout extending from the mouth of the White Salmon River to BZ falls (http://www.fws.gov/pacific/bulltrout/pdf/BTCHFR101810.pdf). The draft recovery plan (USFWS, 2002) recommends the establishment of a population in the White Salmon basin. No numeric recovery goals have been specified. Bull trout are in the list of Tier 1 species due to their ESA listing status.

### 4.1.5 Other Native Populations

Cutthroat trout, mountain whitefish, and rainbow trout are all native fish species in the White Salmon basin. These species are included as Tier 2 species.

## 4.2 Klickitat River Watershed

**Tier 1:**

- Middle Columbia River Chinook Salmon (*O. tshawytscha)* ESU, spring run
- Middle Columbia River Steelhead *(*anadromous *O. mykiss)* DPS, summer run;
- Middle Columbia River Steelhead *(*anadromous *O. mykiss)* DPS, winter run; and
- Columbia River Bull Trout (*S. confluentus*) DPS.

**Tier 2:**

- Cutthroat Trout (*O. clarki*);
- Mountain Whitefish (*P. williamsoni)*; and
- Rainbow Trout (resident *O. mykiss*).

**Tier 3:**

- Tule Fall Chinook (*O. tshawytscha)*; and
- Upriver Bright Fall Chinook (*O. tshawytscha).*

### 4.2.1 Chinook Salmon

Spring Chinook are native to the Klickitat watershed. Bryant (1949) referred to large runs of spring Chinook prior to 1920 and a significant Native American fishery at Lyle Falls (RM 2.2). There are reports of spring Chinook spawning in the West Fork of the Klickitat River (RM 63.1) as well as the mainstem (Bryant, 1949). Hatchery production of spring Chinook began in 1950 with the release of 11,900 yearlings of unknown origin (WSCC, 1999). Currently, the stock is considered to be of mixed origin and is sustained by both hatchery and natural production. Spring Chinook are primarily found in the mainstem of the Klickitat River, downstream of Castile Falls (WSCC,1999). This Chinook population is part of the Middle Columbia Spring Chinook ESU. Listing of this ESU under ESA was found to be not warranted (Good et al., 2005). The SaSSI status of the Klickitat River spring Chinook stock is provided in Table 2. This is a Tier 1 stock due to its cultural significance.

Lyle Falls (RM 2.2) was considered historically impassable during low water conditions in the fall. As a result, fall Chinook were largely blocked from habitats above Lyle Falls (NMFS, 1998). In 1952 Washington Department of Fisheries removed rock and constructed two fishways at the falls providing year round access to the watershed (WSCC, 1999). Fall Chinook were first planted in the watershed in 1946 and the Klickitat Hatchery began releasing fish in 1952 (WSCC, 1999). The SaSSI status of Klickitat River tule and bright fall Chinook stocks is provided in Table 2. Klickitat River tule and bright fall Chinook salmon are Tier 3 stocks due to their recent introduction into the watershed above Lyle Falls.

### 4.2.2 Steelhead

Naturally spawned steelhead from the Klickitat River are in the Mid-Columbia Steelhead DPS, listed as threatened under the ESA (71 FR 834). The SaSSI status of the stock is provided in Table 2. Hatchery summer steelhead are released annually from the Skamania Hatchery into the Klickitat River (WDFW, 2003). Skamania Hatchery steelhead are not considered part of the Mid-Columbia River steelhead DPS (71 FR 834).

Both summer and winter steelhead occur in the Klickitat River. Recent estimates of escapement, or run size to the lower Klickitat River, are found in Zendt et al. (2010). Population estimates in recent years have ranged from 1,272 to 1,669 wild steelhead. The State of Washington's escapement goal for both wild summer and winter steelhead in the Klickitat River basin is 2,965 fish (http://wdfw.wa.gov/fish/sasi/). The target for delisting for of steelhead in the Klickitat River at 1,000 fish (NMFS, 2009a). Naturally spawned summer and winter steelhead are Tier 1 priority stocks due to their ESA listing status.

The mainstem Klickitat River (exclusive of that portion of the river within Tribal reservation and trust lands), the Little Klickitat from its confluence with the mainstem Klickitat to Three Creeks, and portions of Bowman Creek, Swale Creek, Snyder Creek, Dillicort Canyon, and the lowest reach of a few other lower river tributaries were identified as critical habitat by NMFS (NMFS, 2005).

The viability criteria group the winter and summer run stocks as one population. The draft viability criteria list the Klickitat River steelhead population in the "intermediate" population size category, which has a minimum abundance threshold of 1,000 (ICTRT, 2007; NMFS, 2009a). The viability criteria designate the Klickitat River special complexity in the "B" category, which has a dendritc tributary structure including two or more major spawning areas. For the Klickitat, the ICTRT criteria for the number of major or minor spawning aggregations are eight and nine, respectively.

### 4.2.3 Coho Salmon

Like fall Chinook, coho are not native to the Klickitat Subbasin (Sharp et al., 2000). Lyle Falls (RM 2.2) is considered historically impassable to coho during low water conditions in the spring and fall. In 1952, Washington Department of Fisheries removed rock and constructed two fishways at the falls providing year round access to the watershed (WSCC, 1999). Hatchery releases began prior to 1952 from the Klickitat Hatchery. Evidence of natural juvenile production has been sporadic; smolt production is

dominated by the hatchery component (WSCC, 1999). See Table 2 for the SaSSI status of the Klickitat River coho stock. No data are available on natural production. Coho are not a priority stock in the Klickitat Lead Entity recovery strategy because of concerns regarding the effects of this introduced species on native steelhead populations.

### 4.2.4 Bull Trout

The Columbia River bull trout DPS is listed as threatened under ESA (63 FR 31647). Bull trout have been documented in Trappers, Clearwater and Little Muddy Creeks, and, in Two Lakes Stream and a tributary to Fish Lake Stream (tributaries to the West Fork Klickitat River) (Thiesfeld et al., 2001). The Klickitat River basin has been listed as a Critical Habitat Area by the USFWS (USFWS, 2010). Bull Trout are a Tier 1 stock due to their ESA listing status.

### 4.2.5 Other Native Populations

Cutthroat trout, mountain whitefish, and rainbow trout are all native fish species in the Klickitat basin. These species are Tier 2 stocks.

## 4.3 Rock-Glade Watershed Area

**Tier 1:**

- Middle Columbia River Steelhead *(*anadromous *O. mykiss)* DPS, summer run;

**Tier 2:**

- Rainbow Trout (resident *O. mykiss*)
- Upriver Bright Fall Chinook (*O. tshawytscha).*
- Coho Salmon (*O. kisutch)*

**Tier 3:**

- None

### 4.3.1 Steelhead

Naturally spawned steelhead from Rock Creek are in the Mid-Columbia Steelhead DPS (summer run), which is listed as threatened under the ESA (71 FR 834). The SaSI status of the stock is provided in Table 2. No hatchery steelhead are released in the Rock Creek watershed.

Data are currently not available to accurately estimate annual escapement or basin productivity, but research is underway collecting data to make such an estimate (Allen, B., personal communication). NMFS has classified the Rock Creek steelhead population as a “Basic” sized population, based on historical habitat potential, which requires a mean minimum abundance threshold of 500 naturally produced spawners (NMFS, 2009c). This is a minimum ESA delisting recovery goal, and may not meet broad sense recovery goals as defined by other managing agencies and stakeholders. Steelhead are considered Tier 1 priority stocks due to their ESA listing status.

### 4.3.2 Other Salmonids

Coho salmon, upriver bright fall Chinook salmon, and rainbow trout are considered Tier 2 species. Rainbow trout are thought to be present in the basin as evidenced by the size classes present in the upper basin (Glass, 2009). Chinook and coho have been documented in low abundance in the basin (Espirito, 2009). These species are considered Tier 2 species.

## 4.4 Columbia River Mainstem

**Tier 1:**

- Upper Columbia River Spring-Run Chinook (*O. tshawytscha*) ESU;
- Snake River Spring/Summer Run Chinook (*O. tshawytscha)* ESU;
- Snake River Fall Run Chinook(*O. tshawytscha)* ESU;
- Lower Columbia River Chinook (*O. tshawytscha)* ESU;
- Middle Columbia River Spring-Run Chinook (*O. tshawytscha)* ESU;
- Snake River Sockeye (*O. nerka)* ESU;
- Ozette Lake Sockeye (*O. nerka)* ESU;
- Columbia River Chum Salmon *(O. keta)* ESU;
- Lower Columbia River Coho Salmon *(O. kisutch)* ESU;
- Columbia River Bull Trout (*Salvelinus confluentus*) DPS;
- Middle Columbia River Steelhead *(*anadromous *O. mykiss)* DPS, summer & winter runs;
- Upper Columbia River Steelhead *(*anadromous *O. mykiss)* DPS; and
- Snake River Basin Steelhead *(*anadromous *O. mykiss)* DPS.

**Tier 2:**

- Upper Columbia River Summer/Fall Run Chinook (*O. tshawytscha)*;
- Deschutes River Summer/Fall Run Chinook (*O. tshawytscha)*;
- Okanogan River Sockeye (*O. nerka)*;
- Lake Wenatchee Sockeye (*O. nerka)*;
- Cutthroat Trout (*O. clarki*);
- Mountain Whitefish (*Prosopium williamsoni)*; and
- Rainbow Trout (resident *O. mykiss*).

**Tier 3:**

- None

### 4.4.1 Chinook Salmon

Many Chinook salmon stocks are found in the mainstem Columbia River between the mouth of the Little White Salmon River and the Yakima River (Tables 1 and 2). All of these stocks use the Columbia River as a migratory corridor. The extent to which Chinook salmon utilize the Columbia River for rearing is unknown. All naturally spawned spring run Chinook salmon stocks are Tier 1 priority stocks due to their cultural significance and several stocks are also Tier 1 priorities due to their ESA status (Table 1).

Two stocks of summer/fall run Chinook were included in the Tier 2 list. These two stocks are not listed under the ESA and were not deemed to have significant local cultural importance.

### 4.4.2 Steelhead

Many steelhead stocks are found in the mainstem Columbia River between the mouth of the Little White Salmon River and the Yakima River (Tables 1 and 2). Steelhead from ESA-listed DPSs (Table 1) are Tier 1 priority stocks. All of these stocks use the Columbia River as a migratory corridor. The extent to which the various stocks utilize the Columbia River for rearing is unknown.

### 4.4.3 Chum Salmon

Columbia River chum salmon are listed under ESA as threatened (70 FR 37160 to 37204; June 28, 2005). The ESU boundary for Columbia River chum salmon extends up the Columbia River to include the White Salmon River (70 FR 37160 to 37204; June 28, 2005). Columbia River chum salmon are a Tier 1 priority stock that utilizes the mainstem Columbia River for rearing and migration and to some extent spawning.

### 4.4.4 Coho Salmon

The Lower Columbia River coho ESU is listed as threatened under the ESA and is a Tier 1 priority stock. The geographic area of this ESU extends up the Columbia River to the White Salmon River and includes 25 hatchery stocks (70 FR 37160 to 37204). However, the majority of the coho salmon in the Columbia River mainstem are of hatchery origin (Good et al., 2005) and are not classified in the Klickitat Lead Entity strategy as priority stocks.

### 4.4.5 Sockeye Salmon

Sockeye salmon from the Snake River ESU are listed under the ESA as endangered (70 FR 37160 to 37204; June 28, 2005), and are a Tier 1 priority stocks in the Klickitat Lead Entity strategy. Okanogan River and Lake Wenatchee origin sockeye salmon are not listed under the ESA, but are Tier 2 priority stocks. These three sockeye stocks utilize the Columbia River in the Klickitat Lead Entity's area as a migration corridor.

### 4.4.6 Bull Trout

The Columbia River bull trout DPS is listed under ESA as threatened in 1998 (63 FR 31647) and is therefore a Tier 1 priority stock. Use of Columbia River mainstem habitats by bull trout is currently unknown.

### 4.4.7 Other Native Populations

Twenty-five (25) native species have been identified in the mainstem Columbia River in addition to the species discussed above. Of these, naturally spawned cutthroat trout, mountain whitefish, and rainbow trout are salmonids are therefore categorized as Tier 2 stocks.

# 5 GEOGRAPHIC AREA AND ACTION PRIORITIES

Geographic area and action prioritization is updated annually through an iterative process involving the Klickitat Lead Entity's Citizens and Technical Committees. The process was initiated by the Klickitat Citizens Review Committee developing a request for technical assistance. The prioritized list of information needs along with "Attachment II" from the SRFB Issues Task Force containing the Core Strategy Outline was forwarded to the Klickitat Technical Committee. The Citizens Committee also met with representatives from the technical committee to discuss geographic area prioritization.

The Technical Committee delineated what it perceived to be the most important mainstem reaches of the major rivers (i.e., Klickitat River, Rock Creek, White Salmon, and Little White Salmon) and tributary basins within the Klickitat Lead Entity's geographic area based on the Citizens Committee's information request, Core Strategy Outline guidance, and consideration of the question of where they would conduct habitat restoration or protection if they were allowed to implement only one project. Priority areas for restoration and protection were identified within these geographic areas. Priority areas collectively comprise a little over half of the Klickitat Lead Entity's geographic area. The priority areas were then sorted into groups of relative importance. All areas identified are of high priority for restoration and protection. In addition to producing a map depicting the prioritized geographic areas, the Technical Committee developed a matrix in which species, limiting factors, actions, and other information pertaining to each priority area were documented. Only high priority areas were delineated on the map and addressed in the matrix.

The Lead Entity strategy was reviewed with the SRFB Review Panel, which provided input on ways to improve. The map, matrix and comments received from the SRFB Review Panel were discussed during a joint meeting of the Citizens and Technical Committees. The Technical Committee revised the map and matrix based on input received at the joint meeting.

The Lead Entity strategy has been revised/updated most years since 2005, based on new information, completed projects, SRFB guidance documents, input from the Klickitat Lead Entity Technical Committee, and input from the SRFB Review Panel. In 2015, monitoring was included as a type of project that can be funded using SRFB funds. Therefore, priority monitoring efforts that address critical uncertainties or adaptive management goals were added to the Lead Entity Strategy. More detail is available in the ESA Recovery Plan for the White Salmon River, dated June 2013.

An overview of each watershed in the Klickitat Lead Entity's geographic area is provided below followed by brief descriptions of the priority areas within the watershed. The map of priority geographic areas and the Top Priority Areas and Actions Matrix are provided at the beginning of this chapter.

## 5.1 White Salmon River Watershed

The White Salmon River drains approximately 386 square miles (250,459 acres) of Skamania, Yakima, and Klickitat counties over a distance of 45 miles (Rawding, 2000b).

Elevation ranges from 80 feet to 7,500 feet. Principal tributaries include Trout Lake, Buck, Mill, Dry, Gilmer, and Rattlesnake Creeks. Average precipitation ranges from roughly 40 inches per year in the eastern portion of the watershed to as much as 95 inches per year in the western and northern portions (Rawding, 2000b).

The upper portion of the basin (roughly 50%) and its tributaries are located within the Gifford Pinchot National Forest. Another 40% of the basin is forested and managed by state and private landowners. Land use in the balance of the watershed consists of small private timber lands, irrigated cropland, orchards, and residential area (Rawding, 2000b). Approximately the lowermost three miles of mainstem lies within the Columbia River Gorge National Scenic Area. A segment of the lower river is designated a "scenic" river under the Federal Wild and Scenic River Act (Public Law 99-663). In 2005, part of the upper White Salmon was designated a federal "wild and scenic river." The river is a popular recreational destination for whitewater boating, winter sports, fishing, wildflower viewing, camping, hiking, picnicking, sightseeing, hunting, and berry picking (Rawding, 2000b).

Anadromous fish passage was restored RM 3.25 upon the breach of Condit Dam in 2011 after completely blocking passage for 99 years. Historically, anadromous fish may have migrated upstream as far as BZ (RM 7.6). A 12-foot falls at Husum (RM 7.6, roughly 2 miles upstream of the reservoir) is likely a partial barrier to some anadromous fish and the 20-foot BZ Falls at RM 16 is likely the upper extent of current anadromous potential. Resident rainbow, cutthroat and brook trout are found upstream of the dam and Northwestern Lake (Boyd, 2003). The mainstem of the White Salmon River downstream of the former Condit Dam site is designated as critical habitat for salmon and steelhead (NMFS, 2005). The mainstem of the White Salmon River is designated as bull trout critical habitat from the mouth to the falls at RM 16 (USFWS, 2010). A recovery plan for the White Salmon River salmon and steelhead population has been developed (NMFS 2013). The Plan included a variety of recommended recovery strategies and actions and was appended to both the lower Columbia/Willamette River Recovery Plan and the MCR Steelhead Recovery Plan, because the river's fish populations straddle two NMFS Recovery Domains. The Plan also proposes a number of actions focused on research, monitoring, and adaptive management. These efforts are needed to monitor the current population status and habitat conditions and to improve the likelihood that efforts to reintroduce salmon and steelhead in the White Salmon are efficient and successful (NMFS 2013). The NMFS White Salmon River Recovery Plan stated that the recovery of White Salmon River populations of fall Chinook salmon and steelhead, and the re-establishment of spring Chinook salmon, coho, and chum salmon populations in the White Salmon River will contribute to the conservation and survival of the threatened LCR Chinook salmon, LCR coho salmon, and CR chum salmon ESUs, and the threatened MCR steelhead distinct population segments (NMFS 2013). The plan sets abundance goals of 900 fall Chinook salmon, 400 spring Chinook salmon, 150 coho salmon, 600 chum salmon, and 500 steelhead (Page 3-11, NMFS 2013). The NMFS 2006 viability criteria (McElhany et al. 2006) used three population-level attributes as indicators for viability: 1) adult and juvenile productivity and abundance, 2) population diversity, 3) spatial structure. In the recovery strategy and actions of the NMFS 2013 Recovery Plan, it outlined a 4-5 year monitoring period to determine if natural production

is occurring and the source of that production. It also states that monitoring and evaluation are key to the successful implementation of the recovery plan (Page 6-6, NMFS 2013). Table 6-1 and section 8 of this plan outline the necessary monitoring and critical uncertainties that need to be addressed to understand salmonid population viability in the White Salmon River. Key questions, outlined in the monitoring section (Section 8.4), were; what is the source and abundance of colonizing salmon and steelhead and what is the productivity (juvenile abundance) of those fish.

Tributaries and major reaches evaluated for potential SRFB projects are listed below. Details regarding limiting factors and species present can be found on the Top Priority Areas and Actions Matrix. ADD HOW THESEE RANKS ARE DETERMINED.

- Rattlesnake Creek (Rank A)
- Indian Creek (Rank A)
- White Salmon Mainstem, Condit Dam to Buck Creek (Rank A)
- White Salmon Mainstem, Buck Creek to Husum (Rank B)
- Buck Creek (Rank B)
- White Salmon Mainstem, Mouth to Condit Dam (Rank C)
- White Salmon Mainstem, Husum Falls to BZ Falls (Rank C)
- Spring Creek (Rank C)

ICTRT's draft viability criteria for the Mid-Columbia River steelhead ESU provide that the White Salmon River should have two or more major spawning areas (ICTRT, 2005). The mainstem White Salmon River, Buck Creek, Indian Creek, and Rattlesnake Creek have been identified as areas that currently support spawning and rearing of resident *O. mykiss*. No formal study has been conducted, but it is likely that Spring Creek also supports resident *O. mykiss*. All of these tributary watersheds are likely to support anadromous *O. mykiss* as well, evidence from USGS PIT (passive integrated transponder) tagged fish movement suggests that the steelhead life history persisted, even with Condit Dam in place. In the years since Condit Dam removal, increasing anadromous fish use is being documented in the mainstem and accessible tributaries.

## 5.2 Klickitat River Watershed

The Klickitat River, a tributary to the Columbia River located in Water Resource Inventory Area (WRIA) 30, is located on the east slope of the Cascade Range and drains approximately 1,350 square miles in Klickitat and Yakima counties (Sharp, 2000). Elevation within the basin ranges from 75 feet at the mouth to 12, 276 feet at the peak of Mount Adams (WPN and Aspect, 2005). The north and west portions of the watershed drain the Cascade Range and the eastern portion of the watershed drains the Simcoe Mountains. Mean annual precipitation within WRIA 30 generally increases with elevation and from east to west. Mean annual precipitation is as little as 9 inches per year in the eastern end of the Columbia Tributaries subbasin and as much as 105 inches per year on Mount Adams in the Upper Klickitat subbasin (WPN and Aspect, 2005). Basin wide average precipitation is 45 inches per year. Primary tributaries include the Little Klickitat River, Swale Creek, White Creek, Big Muddy Creek, West Fork Klickitat River, and Diamond Fork.

The Klickitat River supports two salmonid species that have been listed under the ESA: Mid-Columbia steelhead and Columbia River bull trout. NMFS has identified critical habitat for the Mid-Columbia steelhead within the Klickitat basin (70 FR 52630, Sept. 2, 2005). The critical habitat includes the mainstem Klickitat River (exclusive of Tribal reservation and trust lands), the Little Klickitat River to Three Creeks, and portions of Swale Creek, Dillacort Canyon, Snyder Canyon, Bowman Creek, and Dead Canyon, and the mouths of a few minor drainages in the lower basin. NMFS has published a recovery plan for the Klickitat River (NMFS, 2009a).

The only known bull trout populations are found in the upper basin within the Yakama Indian Reservation. U.S. Fish and Wildlife Service (USFWS) designated all or portions of the following water bodies as critical habitat for bull trout: Klickitat River, Clearwater Creek, Fish Lake Stream, Little Muddy Creek, Trappers Creek, Two Lakes Stream, unnamed creek off Fish Lake Stream, and West Fork Klickitat River (USFWS, 2010). The USFWS has identified a need for additional information regarding Columbia River bull trout population before recovery goals can be specified (USFWS, 2002). In the meantime, recovery goals focus on maintaining existing bull trout populations and restoring existing and adjacent habitats.

A major limitation of anadromous fish production is the presence of a number of natural migration barriers in the watershed. The Klickitat River flows through a deep, steep walled canyon with impassable or marginally passable falls and cascades where the river flows over bedrock (Narum et al., 2008). In addition, access to many of the tributaries is restricted due to impassably high gradients close to the tributary mouths (WSCC, 1999). The most significant natural barriers include:

- Lyle Falls (RM 2.2), is a series of five falls from 4 to 12 feet high that historically were considered impassable during low water conditions in the summer and early fall, preventing fall Chinook and coho from utilizing the watershed (WSCC, 1999). In 1952, Washington Department of Fisheries removed rock and constructed two fishways at the falls. Currently Lyle Falls is not a barrier to anadromous salmon and steelhead stocks, but passage at the falls is considered difficult (WSCC 1999). Further improvements to facilitate passage at the falls are currently being implemented.

- Little Klickitat River Falls (RM 6.1) has been variably reported as 15 to 16 feet high. Steelhead redds above the falls have been occasionally documented in low numbers. The frequency of steelhead passage and the conditions required to allow passage are unknown.

- Castile Falls (RM 64.0) is a series of 11 falls with an elevation change of 80 feet over one-half mile. These falls are considered the historical upper limit of anadromous fish usage on the mainstem (WSCC, 1999); although anecdotal information indicates that some minor passage occurred historically during high water years. Early efforts by Washington Department of Fisheries to improve fish passage provided marginal

success. Bonneville Power Administration (BPA) funding was subsequently made available to complete the design and construction of the Castile Falls Fishway to provide passage into the headwaters of the Klickitat River. Improvements to the fishway were completed in 2005 and passage above the falls by spring Chinook and steelhead has been documented since.

The subbasins and reaches considered in the project prioritization are listed below. The Top Priority Areas and Actions Matrix contains details on these reaches regarding limiting factors and species present in each area.

- Upper Klickitat Mainstem: McCreedy Creek (RM 70) to Diamond Fork (Rank A)
- White Creek Drainage (Rank A)
- Mainstem Klickitat River: Little Klickitat to Leidl Bridge (Rank A)
- Lower Klickitat Mainstem: Sportsman Park to the Little Klickitat River (Rank A)
- Klickitat River Bonneville Pool interface (Sportsman Park downstream to include the delta (Rank B)
- Klickitat Mainstem: Leidl Bridge to Hatchery (Rank B)
- Little Klickitat Basin Mouth to Little Klickitat Falls, including Canyon Creek up to its falls (Rank B)
- Little Klickitat Basin from river mile 6.1 to confluence of Three Creeks (Rank B)
- Swale Creek to river mile 3.1 (Rank B)
- Upper Klickitat Mainstem: Diamond Fork to Headwaters (Rank B)
- West Fork Klickitat River (Rank B)
- Summit Creek (Rank B)
- Dead Canyon Creek (Rank B)
- Diamond Fork Basin (Rank C)
- Piscoe Creek Basin (Rank C)
- Snyder Canyon Creek (Rank C)

ICTRT's draft viability criteria for the Middle Columbia River steelhead ESU provide that the Klickitat River should have two or more major spawning areas (ICTRT, 2005). Based on observed redds, the following areas are two most significant spawning areas in the Klickitat River basin: White Creek Drainage (Rank A) and Mainstem Klickitat River: Little Klickitat to Leidl Bridge (Rank A) (YNF, annual monitoring and evaluation reports, available at http://www.ykfp.org/klickitat/Reports&Pubs.htm).

## 5.3 Major Creek Subbasin (Rank C)

Major Creek is a small drainage tributary to the Columbia River. The creek is 9.5 miles long and has natural partial blockages in the lower basin (Boyd, 2003). Fish usage of habitat is largely unknown. Local biologists believe it supports summer steelhead, coho, fall Chinook, rainbow trout, and possibly winter steelhead between the mouth and river mile 0.32 (Boyd, 2003). This creek is in the Columbia River chum salmon ESU. The stream was not designated as critical habitat (70 FR 52630, Sept. 2, 2005) and NOAA Fisheries has not proposed VSP criteria for steelhead within Major Creek. Actions

recommended in this basin are currently limited to an assessment of the distribution of species within the basin and an evaluation of current habitat conditions.

## 5.4 Rock-Glade Watershed Area

Rock Creek drains approximately 258 square miles (165,084 acres) of Klickitat County (Aspect and WPN, 2004). Elevation ranges from 266 feet to 4,728 feet. Principal tributaries include Walaluuks Creek, Quartz Creek, and Luna Gulch. Average precipitation is 16.2 inches per year (Aspect and WPN, 2004).

Land cover in the basin is predominately shrubland intermixed with grasslands. Land use in these areas is primarily grazing. The upper basin is forested and is managed by private landowners, WDFW, EKCD, and CKCD. Roughly 10 percent of the basin is cultivated and roughly 1 percent of the land is irrigated (Aspect and WPN, 2004).

Resident rainbow, anadromous steelhead, and dace (*Rhinichthys sp*.) are the dominate fish species in the basin (Glass, 2009). The majority of observed steelhead are found in Rock Creek downstream of the Bickleton Bridge, in Luna Gulch, and in Walaluuks Creek downstream of the confluence with White Creek (Espirito, 2009; Glass, 2009). The mainstem of Rock Creek extending from the mouth to the confluence with Quartz Creek and the lower portion of Walaluuks Creek, extending from its confluence with Rock Creek upstream to the confluence with Harrison Creek have been designated as critical habitat for steelhead (NMFS, 2005).

The Middle Columbia Steelhead Recovery Plan specifies that a population of at least 500 steelhead in the Rock Creek basin is needed to attain viability of the Mid-Columbia River steelhead ESU (NMFS, 2009c). The recovery plan specifies numerous actions that may be implemented in the basin.

Tributaries and major reaches evaluated for potential SRFB projects are listed below. Details regarding limiting factors and species present can be found on the Top Priority Areas and Actions Matrix.

- Rock Creek Mainstem (USACE Park to Bickleton Bridge) (Rank A)
- Walaluuks Creek from the confluence with Rock Creek to White Creek (Rank A)
- Luna Gulch (Rank A)
- Confluence to USACE Park (Slack water reach) (Rank B)
- Walaluuks Creek upstream of White Creek and the Walaluuks Creek tributaries (Rank B)
- Quartz Creek (Rank B)
- Rock Creek Headwaters Above RM 19.4 and Tributaries (Rank B)
- Pine Creek Confluence with Columbia River (Rank B)
- Rock Creek between Bickleton Bridge and RM 19.4 (Rank C)
- Columbia River Tributaries in Rock-Glade Watershed Area (Rank C)

## 5.5 Columbia River Mainstem (Rank C)

The Columbia River mainstem from the mouth of the White Salmon River to the Yakima River confluence is within the Klickitat Lead Entity's geographic area. Species present in the area include 17 races or subpopulations of salmon, twelve of which are listed as threatened or endangered under the Endangered Species Act (Table 1), bull trout which are also listed as threatened under the ESA, rainbow trout, and numerous other native and introduced species. The SaSSI status of the various stocks as listed by WDFW is provided in Table 2.

Habitats in the mainstem Columbia River are used as migration corridors for all of the anadromous species present in the reach. Chum and Chinook salmon are known to spawn in portions of the mainstem Columbia River (Good et al., 2005). No information is available regarding the use of the river within the area covered by this document; however some spawning in the river is possible and is thought to have occurred prior to construction of Bonneville Dam. The mainstem habitats may also be used as rearing habitat for some juvenile fish. All or portions of this mainstem segment have been designated as critical habitat for Columbia River chum salmon, Mid-Columbia steelhead, Lower Columbia Chinook, and all other ESA-listed salmon populations migrating through the area to spawning area further upstream (Good et al., 2005).

The Middle Columbia River Steelhead Recovery Plan addresses mainstem habitats and has identified actions to address issues of concern (NMFS, 2009d). Limiting factors include hydropower effects on passage and habitat, harvest, estuary and ocean conditions, hatchery operations, competition and predation, and habitat conditions. Restoration measures identified in the recovery plan include the following:

- Improve fish passage in the mainstem Columbia River.
- Address predation by fish species in the mainstem Columbia.
- Address predation by avian species.
- Reduce Effects of climate change on populations.
- Restore estuary habitat.

In addition to these measures, the Critical Habitat Analytical Review Team identified the control of invasive species impacting fish habitat as a priority action (NOAA Fisheries, 2005).

## 5.6 Community Interests Regarding Salmon Recovery

The Citizens Committee filled in the "Community Interest" column in the "Klickitat Lead Entity Top Priority Geographic Areas and Actions" matrix for the priority actions in geographic areas "A" and "B". The primary community interest limiting salmon habitat restoration actions in each "A" priority geographic area was also identified in the matrix by the Citizens Committee.

The items listed below are the community interests and concerns associated with fish restoration, enhancement, and protection projects listed as priority areas and actions

identified in the "Klickitat Lead Entity Top Priority Geographic Areas and Actions" matrix. Codes listed below were incorporated into the column on the matrix labeled "Community Interest". Codes that start with "S" are support comments. Codes that start with "L" are comments regarding concerns and/or limitations.

**Support Codes**

**S1**: A sizeable contingent of local and regional recreational sports fishermen support any measures to enhance the Klickitat River anadromous fish populations.

**S2**: A number of local businesses significantly to partially depend on Klickitat River recreational sports fishing as a source of revenue, and support enhancement measures.

**S3**: Drano Lake is probably the most popular anadromous fish destination in the region. Sports fishermen and the local businesses they patronize support protection of this sports fishery.

**S4**: Local sports fishermen support the potential increased presence and variety of fishing opportunities with the removal of Condit Dam in the White Salmon River watershed. Increasing spawning and rearing habitat in this watershed will help mitigate concerns about resident trout being potentially displaced by Anadromous fish.

**S5**: Willing landowner.

**S6**: Increased scenic value will enhance real estate value for private property (benefit to owner and tax base).

**S7**: Downstream landowners benefit from recharge.

**S8**: Potential for local contracts to do the work resulting in economic benefit to community.

**S9:** Buy large woody debris material from our local timber companies for economic benefit to community.

**S10**: Supports community efforts to address issues and actions identified in a TMDL.

**S11:** Local and regional fisherman support any measures which limit the spread or prevent invasive species.

**Limitation Codes**

**L1:** Local sports fishermen are very concerned about the negative effect that projects enhancing anadromous fish habitat into the White Salmon River watershed will have on the resident trout population due to potential displacement and potential for introduction of disease. Address Limits: Ensure that these effects are monitored for long-term consequences. Fish passage is inevitable.

**L2**: This area receives heavy use by recreational boaters who will likely oppose (and perhaps try to remove) LWD and/or boulder placements. Address limits: outreach, education and coordinated planning with other river users.

**L3**: Need thorough assessment of options to determine best cost/benefit. Concerns regarding cost/benefit of project should be addressed.

**L4:** Needs a sound feasibility / design study before implementation to address community questions regarding project credibility and benefit.

**L5:** Some public opposition to using public moneys on reservations. Need public outreach to address this problem.

**L6**: Find opportunities to use local people to do the work on projects.

**L7:** (Not used)

**L8:** Do downstream barriers first.

**L9**: Use press releases to show public benefit to community to address this situation.

**L10**: Conduct public outreach to show public that this is a benefit for salmon without cost/loss for people.

**L11**: Concerned about reaction of RV or ORV owners.

**L12:** Fear of loss of tax base. Show tax paying track record and plans of trustee.

**L13**: May not have willing landowners.

**L14**: Concern regarding long term viability of project (e.g. mortality and/or washout of plantings or LWD placements).

**L15**: Impact on river recreation; could have economic impacts as well.

**L16**: Project needs to be well thought out; high potential for failure if not dealt with properly.

**L17**: (Not used)

**L18**: (Not Used)

**L19**: Road projects may affect use by locals; this needs to be addressed before project is initiated.

**L20**: There is concern about passing natural barriers.

**L21**: Use public relations to show that we verify before we act on restoring salmon.

**L22**: (Not Used)

**L23:** Fear of "takings" under ESA for riparian landowners. This needs to be addressed. Need outreach to community affected to address their fears and concerns.

**L24**: A great deal of money has already been spent here. Need to know cost/benefit of additional expenditures.

**L25**: Conduct outreach to community to show how restored habitat can take pressure off of other areas for salmon restoration.

**L26:** Public perception of unwise use of public money.

**L27**: Conduct public outreach to show that monitoring gives feedback to reduce cost on similar projects.

**L28**: Public outreach needed. Can build on past projects by UCD with willing landowners and PR to show a successful project can be accomplished in area of project.

**L29:** (Not used)

**L30**. Talk directly with water rights users and show incentives to change irrigation practices.

**L31:** (Not Used)

**L32:** (Not Used)

**L33:** (Not Used)

**L34:** (Not Used)

**L35:** (Not Used)

**L36:** (Not Used)

**L37**: There are concerns regarding whether the situation described is a natural situation or process or will be addressed through natural processes.

**L38**: Focus on area upstream of the lower 3 miles. Lower 3 miles of White Creek are affected by and may reflect natural processes.

**L39**: Project addresses situation that falls under regulatory requirements for all landowners except tribal lands and small landowners (<20 acres). Community concern exists regarding efficacy of spending public money to address the situation.

**L40**: Many existing regulations, if applied, limit the potential for this impact. Proposed projects should address cost/benefit of acquisition.

**L41**: Concern about project effect on public safety.

**L42**: Concern about failure to enforce regulations and/or tribal laws that will affect success of project.

**L43**: There is local disagreement regarding passage at this location.

**L44**: Priority is on culverts downstream of falls.

## Klickitat Lead Entity – White Salmon River Watershed
## Top Tier Actions and Areas
## (Only high priority areas are included in this matrix)

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | **Rattlesnake Creek** | Significant White Salmon River tributary for spawning & rearing of resident fish (especially rainbows) and expected to be highly productive to anadromous fish now that fish passage has been restored with the removal of Condit Dam | RR<br><br>SS, WS, SC(?), (P)FC (P)C | S,R,MR<br><br>S,R,MA | Low quality pools. Sediment inputs affecting spawning gravels. Limited in-stream cover. | Habitat lacking instream structure that creates pools. Channel is down cutting due to lack of structure which is further simplifying the habitat and introducing sediments into the stream. Down cutting of the channel is also reducing floodplain connectivity. | A | Place LWD as appropriate. Add structure to form pools. Restore floodplain connectivity. Remove man-made confinement structures. | Channel degraded and simplified. Restoration of wood will increase rearing habitat through the formation of pools, improve sediment sorting, and provide for greater habitat complexity. Restoring floodplain connectivity will provide more capacity for flood flows, reduce bed scour, and slow runoff of peak flows. | Western Watershed Analysts. 1997, Connolly, P. J. 2002; Allen and Connolly 2005, Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4<br><br>L1, L13 |
| | | | | | Lack of spawning gravel. | Gravel retention is poor due to lack of wood or other structure in stream | B | Add instream structure to trap gravels | Increase available spawning habitat. | Western Watershed Analysts. 1997, Connolly, P. J. 2002; UCD White Salmon Fish Passage Inventory Report 2011 | S4<br><br>L1, L23 |

Codes:
SS = summer steelhead (FT); WS = winter steelhead (FT); SC = spring Chinook (PS, FT-White salmon); FC = fall Chinook (PS, FT - White Salmon);
SUC = summer Chinook (PS, FT - White Salmon)
RR = resident rainbow (PS); CT = cutthroat trout (PS); CCT = coastal cutthroat (PS); BT = bull trout (Ft); BRT = brook trout; WF = whitefish
Life History: S = Spawning; R = Rearing; MR = resident migratory; MA = anadromous migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Low summer flows and high peak flows | Stream adjacent wetlands store water and release it slowly over a period of time. Lack of connectivity with the floodplain reduces the recharge of wetland and other stream adjacent areas. | A | Restore wetlands, floodplain connectivity and other water holding capacity on the plateau (i.e. check dams to capture sediments and elevate streambed). Assess watershed conditions, road effects on sediment inputs and peak flows.<br><br>Add in Conservation piece- That would be an A as well. | Increase water table elevation in upper plateau. Improve recharge of groundwater aquifers. Slow runoff to reduce high flows and extend runoff duration. | Western Watershed Analysts. 1997, Connolly, P. J. 2002; Allen and Connolly 2005, Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4<br>L1, L13, L28 |
| | | | | | High summer stream temperature. Long term pool habitat availability. | The riparian vegetation is dominated by alder which limits long term wood recruitment potential. Riparian vegetation could also be improved to reduce stream temperature. | B | Riparian conversion project needed to establish conifers in riparian area. | Improve long term wood recruitment which will provide structure for long term pool forming processes. | Western Watershed Analysts. 1997, Connolly, P. J. 2002; Allen and Connolly 2005, Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4<br><br>L1, L13, L28 |
| | | | | | | | | | | | |

Codes:

Species, Statues: FT = Federal threatened, PS = priority species, P = Potential (Following Condit Dam Removal)

SS = Summer Steelhead (FT); WS = Winter Steelhead (FT); SC =Spring Chinook (PS, FT- White Salmon); FC = Fall Chinook (PS, FT- White Salmon);

SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | **Indian Creek** | Unique coastal cutthroat population.<br><br>Potential use for reintroduced or re-colonizing anadromous fish due to Condit Dam Removal | CCT<br><br>SS, WS, SC, (P)C RR | S,R,MR<br><br>S,R,MA | Low quality pools, poor quality spawning gravels (below RM 1.5). | LWD enhances the development of quality pools and aids the sorting of gravels. | A | Place LWD and/or add instream structure as appropriate. | Stream currently has limited LWD in the channel. Placement of wood will improve gravel sorting, increase quality of spawning habitat, improve pools used for rearing, and provide cover for fish. | Graziano and Nielson 2003, Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4, S9<br><br>L1, L13 |
| | | | | | Poor long term pool habitat. | Lower 1.5 miles of riparian vegetation dominated by alders; hence this area has poor long term wood recruitment potential | B | Riparian conversion project needed to establish conifers in riparian area. | Improve long term wood recruitment which will provide structure for long term pool forming processes. | Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4<br><br>L1, L13, L28 |
| | | | | | Partial fish passage barriers | Culverts block juvenile migration. | A | Replace culverts with larger crossing structures. Culverts located at RM 1.2; 3.3; 3.68 and 3.72 | Improves juvenile fish access to existing upstream habitat. Upstream migration of juvenile is important in this area due to low flow situations further downstream. Several miles of spawning and rearing habitat are available upstream of these culverts. | Allen et al 2006; UCD White Salmon Fish Passage Inventory Report 2011 | S4,S8<br><br>L1, L3, L8, L9, L13, L23, L25, L28 |
| | | | | | | | | | | | |

Codes:

Species, Statues: FT = Federal threatened, PS = priority species, P = Potential (Following Condit Dam Removal)

SS = Summer Steelhead (FT); WS = Winter Steelhead (FT); SC =Spring Chinook (PS, FT- White Salmon); FC = Fall Chinook (PS, FT- White Salmon);

SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | **White Salmon Mainstem: Mouth to Former Condit Dam** | Changing conditions with the removal of Condit Dam provide an opportunity for assessment<br><br>This reach has high potential for anadromous salmon and steelhead spawning, rearing and adult holding.<br><br>listed as proposed critical habitat for bull trout. | FC, SC, SUC, SS, WS, C, (P)BT, (P) chum, (P) Pink | S,R,MA | | | A | Add from Klickitat | Add from Klickitat | Margret report- add here | Talk with CRC- |
| | | | | | | | | | | | |

Codes:

Species, Statues: FT = Federal threatened, PS = priority species, P = Potential (Following Condit Dam Removal)

SS = Summer Steelhead (FT); WS = Winter Steelhead (FT); SC =Spring Chinook (PS, FT- White Salmon); FC = Fall Chinook (PS, FT- White Salmon);

SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. Plant native vegetation. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/ NZ_mudsnail (New Zealand mudsnail distribution and literature website) | L11 |

Codes:

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Pool quality and quantity for rearing habitat and LWD for cover. | Lack of riparian vegetation is anticipated in some areas near the headwaters of the reservoir now that the dam has been removed as well as in the delta area near confluence with the Columbia. | B | Revegetate any riparian areas that are affected by actions related to Condit Dam Mitigation | Provides for stability of banks and long term wood recruitment to stream. | Allen et and Connolly 2005 | S4<br><br>L1, L23 |
| | | | | | | Lack of LWD limits development of pools and sorting of gravels. | B | Place LWD as appropriate and feasible, must address removal of wood by boaters through education and management. | Restoration of wood will increase rearing habitat, improve sediment sorting, and provide for greater habitat complexity. | Allen et and Connolly 2005 | S4, S9<br><br>L1, L2, L23 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential competition for food and space by invasive species and alteration of native ecosystem and community dynamics | Invasive species can crowd out native species and degrade habitat. Colonization by the New Zealand mudsnail or other aquatic invasive species has been shown in other areas to alter the composition of macroinvertebrate communities, and could reduce the productivity of Salmonids. Newly exposed stream banks are vulnerable to invasive plant colonization. | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and / or eradicate invasive species that pose a threat to important habitat. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/ NZ_mudsnail (New Zealand mudsnail distribution and literature website) | S4<br><br>L1, L23, L30 |
| | | | | | | | | | | | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

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| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | **Buck Creek** | Currently a major spawning tributary for resident rainbows Coho, Steelhead. | RR )SS, )WS, (P)SC, C | S,R,MR<br><br>S,R,MA | Limited availability of pools. | The stream has limited LWD, which contributes to the formation of pools and provides cover habitat. | B | Increase LWD | Restoration of wood will increase rearing habitat through the formation of pools, improve sediment sorting, and provide for greater habitat complexity. | USGS/WDFW unpublished survey data; Allen and Burkhardt 2011 | S4, S9<br><br>L1, L23 |
| | | | | | Limited availability of spawning gravel | LWD and other instream structures contribute to the capture and sorting of gravels used for spawning. | B | Place structures to retain spawning gravels. | Placement of structures to slow water velocity increase roughness to trap and hold smaller substrates. | USGS/WDFW unpublished survey data. Allen and Burkhardt 2011 | Su4<br><br>L1, L23 |
| | | | | | Low summer flows resulting in higher stream temperatures | Diversion of water during summer reduces flows in stream and contributes to the warming of water. | A | Improve base flow, by returning unused diverted water. Improve irrigation efficiencies. Engineering / assessment needed for identifying potential projects. | Ag. diversion withdraws up to 70% of flow, unused diverted water returns to mainstem White Salmon River via gully. The City of White Salmon may be increasing withdraws for municipal purposes, further necessitates projects. | Chapman et al. 1990; Washington Department of Fisheries, U.S. Fish and Wildlife Service, NMFS, and Washington Department of Wildlife. 1989; Young, B. and E. Rybak. 1987. Stampfli, S. 1994; UCD White Salmon Fish Passage Inventory Report 2011. Allen and Burkhardt 2011, (add ecology listing) | |
| | | | | | Partial fish barrier | Partial fish barrier dam associated with ag. diversion is located at RM 2.04. | A | Restore fish passage | Improves juvenile fish access to existing upstream habitat. Upstream migration of juvenile is important in this | UCD White Salmon Fish Passage Inventory Report 2011 | L9, L30 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | area due to low flow situations further downstream. Open up to 2 miles of habitat. | | |
| | | | | | Diversion of fish into unsuitable habitat | Potential entrapment of fish at agricultural diversion. | A | Screen ag. (RM 2.04) and domestic diversions. | Entrapment in irrigation ditches may contribute to mortality | | S4<br>L1, L23, L30 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **C** | **Mill Creek** | Newly accessible habitat with potential to be an anadromous fish spawning and rearing area since removal of Condit Dam | RR<br><br>SS, WS, C | S,R,MR<br><br>S,R,MA | Limited data | Unknown | A | Assessment of passage and rearing habitat conditions | Possible partial barrier above the road culvert | UCD White Salmon Fish Passage Inventory Report 2011 | S8<br><br>,<br><br>All other White Salmon Basin community interests (support and concerns) apply here as well |
| | | | | | | | | | | | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| **A** | **White Salmon Mainstem: former Condit Dam site to Buck Creek (NW Reservoir Reach)** | This reach has potential for anadromous salmon and steelhead spawning, rearing, and migrating . Mainstem up to Husum Falls listed as proposed critical habitat for bull trout (Tier 1 Species). Area is also important to cutthroat trout, a Tier 2 species.<br><br>Pacificorp is responsible for the restoration of this reach. Re-evaluate following Pacificorp's | RR, CCT<br><br>(P)BT, SS, WS, C, FC, P(SUC) SC | S,R,MR<br><br>S,R, MA | Unknown | Unknown | A | Assess habitat limiting features and identify restoration needs<br><br>I think we should consider adding the conservation/acquisition idea here too, since Pacificorp is likely to divest from the property. This is an Action A Priority for the next reach Buck Creek to BZ on the mainstem, page 62 | Assess spawning gradient & habitat limiting features with Condit dam removal, and restore the exposed banks. With the recent removal of Condit Dam, exposed banks are unstable. High sediment loads and low wood loads are also possible. | | L1, L23 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | restoration efforts. | | | | | | | | | |

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RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential competition for food and space by invasive species and alteration of native ecosystem and community dynamics | Invasive species can crowd out native species and degrade habitat. Colonization by the New Zealand mudsnail or other aquatic invasive species has been shown in other areas to alter the composition of macro invertebrate communities, and could reduce the productivity of salmonids. Newly exposed and newly created stream banks are vulnerable to invasive plant colonization. | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. Plant native vegetation. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/ NZ_mudsnail (New Zealand mudsnail distribution and literature website) | L11 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Add acquisition here | | | |
| | | | | | | | | | | | |
| **B** | **White Salmon Mainstem: Buck Creekto BZ Falls** | Management recommendations should include actions that include restoration of anadromous | RR, CCT<br><br>(P)BT, SS, WS, C, FC, P(SUC) SC | S,R,MR | Sediment inputs affecting spawning gravels. | | B | Improved grazing management and improved road drainage. | | | S1<br><br>L9, L10, L13, L28 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | habitat in this basin with the removal of Condit dam. | | | Limited availability of pools. | The stream has limited LWD, which contributes to the formation of pools and provides cover habitat. | B | Place LWD as appropriate and feasible, must address removal of wood by boaters through education and management. | Restoration of wood will increase rearing habitat through the formation of pools, improve sediment sorting, and provide for greater habitat complexity. | USGS/WDFW unpublished survey data | S4, S9<br><br>L1, L2, L15, L16, L23 |
| | | | | | Potential competition for food and space by invasive species and alteration of native ecosystem and community dynamics | Invasive species can crowd out native species and degrade habitat. Colonization by the New Zealand mudsnail or other aquatic invasive species has been shown in other areas to alter the composition of macro invertebrate communities, and could reduce the productivity of salmonids. | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. Plant native vegetation. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/ NZ_mudsnail (New Zealand mud snail distribution and literature website) | S4<br><br>L1, L11, L13, L28 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential for future development with associated road construction (sediment inputs), floodplain encroachment | New road construction may increases sediment inputs and increases peak flows. Floodplain encroachment from residential development may alter riparian and floodplain functions. Increased potential runoff (pesticide, sediment, nutrient ,etc…) may impact water quality. | A | Voluntary land acquisitions and / or easements; Land owner education | This reach currently has some high quality habitat. Acquisitions or easements can protect existing riparian and floodplain functions. Education can encourage good stewardship. | Klickitat County Planning Dept planning documents. | S1<br>L10, L13 |
| | | | | | Diversion of fish into unsuitable habitat | Potential entrapment of fish at agricultural diversion. | A | Screen ag. and domestic diversions. | Entrapment in irrigation ditches may contribute to mortality | UCD White Salmon Fish Passage Inventory Report 2011 | L28 |
| | | | | | Partial fish barrier | Partial fish barriers in tributaries at RM 7.4 and 9.9.<br><br>Also, barrier culverts are known to exist between on tributaries throughout this reach. | B | Restore fish passage | Improves juvenile fish access to existing upstream tributary habitat. | UCD White Salmon Fish Passage Inventory Report 2011 | L8, L28 |
| | | | | | | | | | | | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | **Spring Creek (RM 6.5)** | | RR<br><br>SS, WS, SC, (P)C | S,R,MR<br><br>S,R,MA | Access blocked due to artificial impoundment | Barrier (RM 0.6) blocks adult and juvenile migration, another culvert (and potentially others) may prevent fish passage<br><br>Barriers are also present on Tributary of Spring Creek at RM 0.04, 0.25, 0.45 | A | Restore fish passage | Improves adult and juvenile fish access to existing upstream habitat (approximately 0.5 miles)<br><br>Opening upstream habitat on Tributary of Spring creek (approximately 0.7 miles) | UCD White Salmon Fish Passage Inventory Report 2011 | L8, L28 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)

RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish

Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

## Klickitat Lead Entity – Klickitat River Watershed
## Top Tier Actions and Areas
## (Only high priority areas are included in this matrix)

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Factors | Habitat Forming Processes | Action Priority | Actions/Needs | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | **Klickitat: Little Klickitat to Leidl Bridge** | Accounts for 60% of the surveyed mainstem steelhead spawning (approx 20% of basin). Greatest amount of mainstem channel complexity in the lower Klickitat River. Migration and rearing corridor for ~75% of steelhead and 100% of spring Chinook. (Sampson and Evencon 2003) | SS, WS, SC, FC<br><br>WF, BT, RR | S,R,MA<br><br>S,R, MR | | | | | | | |
| | | | | | Opportunity to protect the important habitat. | With the exception of the Haul Road on west side of the river, development in this geographic area is very limited. | B | Conservation easements, conservation acquisition, or other management actions controlling potential future impacts of development | Protection of existing high quality habitat may preclude the need for future restoration. | | S1 & S2;<br><br>L12, L13, & L40 |

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SUC = Summer Chinocck (PS< FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

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RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential competition for food and space by invasive species and alteration of native macroinvertebrate community dynamics | Invasive species can crowd out native species and degrade habitat. Colonization by the New Zealand mudsnail or other aquatic invasive species has been shown in other areas to alter the composition of macroinvertebrate communities, and could reduce the productivity of salmonids | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids.<br><br>Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/NZ_mudsnail (New Zealand mudsnail distribution and literature website) | S1 & S2;<br><br>L3, L9, L10, L16 L26 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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| A | **Klickitat Basin: White Creek Drainage** | The White Cr. watershed accounts for roughly 40% of observed total steelhead spawning within the surveyed areas of the Klickitat River Basin (Source: Sampson and Evenson 2003). High levels of benefit to fish are anticipated with improval of habitat. | SS, RR | S,R,MA, MR Rearing habitat is believed to be most limiting factor within White Creek | Low pool frequency and volume. Poor channel complexity. This is particularly an issue in the lower portion of the drainage and in areas that go dry seasonally. | Historical stream cleaning and riparian harvest has resulted in low instream LWD abundance and, subsequently, decreased pool frequency and volume and has also contributed to downcutting of the channel bed. Current tribal forest management plan requires adequate levels of instream LWD). | A | Restore channel roughness and increase pool frequency by placing LWD or other structures in channel. | Actions will restore channel roughness and will halt or reduce downcutting of channels. Improved channel complexity will also increase pool frequency and improve the channel's ability to handle peak flows and may improve base flows. Placement of wood is rated as a high priority for habitat improvement in this drainage due to the high level of benefits expected through the actions. | Conley, 2005; Northwest Hydraulic Consultants, 2003; Sampson and Evenson 2003 | S1, S2, S5, & S8; |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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| | | | | | Some segments within the drainage go dry seasonally. | Failures of old culverts and road prisms have resulting in changes in channel morphology. This process was exacerbated by increased peak flows caused by runoff of concentrated flows from roads. Channels have moved and incised. Incision of the channel subsequently results in loss of floodplain connectivity and reduced recharge of groundwater. Low LWD abundance (see previous row) also contributes to the situation. | A | Place LWD or other in stream structure to reduce incision.<br><br>Reduce connectivity of roads to streams to reduce peak flows | Channel incisement and bed degradation due to loss of LWD in channel is reducing habitat complexity. As a consequence the size distribution of sediments in bed have shifted towards larger material. Placement of structures will correct these situations. Disconnecting roads will reduce direct runoff of water into streams during peak flow events. | Northwest Hydraulic Consultants, 2003 | S8, S9, L5, L26 |

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| | | | | | Spawning gravel is limiting fish production. This is most pronounced in the 2 to 3 percent stream segments. Velocity refugia areas are also limited. | In meadow areas, channel incisement and bed degradation (see causes above) has resulted in a loss of connectivity to flood plain. Subsequently, the effects of peak flows are more pronounced. Habitat within the channel is also affected by lack of structure in the channel. | A | Install LWD and other structures. | LWD and other structures will provide capture and sorting of spawning gravel. LWD and other structures also provide areas of lower flow that can be used as refugia. | Unpublished data, Yakama Nation | S1, S2, S5, S8;<br><br>L3, L4, L5 |
| | | | | | Access to habitat is limited | Undersized culverts on the mainstem White Creek block primarily juvenile and some adult upstream migration in some areas | A | Remove, repair, or replace barrier culverts | Improves juvenile fish access to existing upstream habitat. Three culverts remain that impede upstream migration of juveniles. Upstream migration of juveniles is important in this area due to low flow situations further downstream. Several miles of spawning and rearing habitat are available upstream of these culverts. | Sampson and Evenson 2003 | S1, S2, S5, & S8;<br><br>L3, L4, L5, L10, & L39 |

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| | | | | | L5: There is some public opposition to using public monies on reservations. | The level of public awareness of the shared benefits of habitat restoration within the Reservation. | A | Conduct a public relations effort to increase the level of awareness of habitat work within the reservation. This action has value on and off reservation because ananadromous fish are a shared resource. | This limiting habitat factor is common to all priority actions within this priority area. Public support for funding habitat restoration and protection on reservations can be increased through communication and education. | Klickitat CRC opinion To be discussed by CRC. | L5 |
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| B | **Snyder Creek** | Documented spawning use by Steelhead and Coho. PIT tag derived life-history suggests high productivty. Upstream of former mill site habitat is intact and of high quality. | RR, SS, C | S, R, MR<br>S,R<br>S,R | Low pool frequency and volume. Poor channel complexity. Lack of LWD. Incised single-thread channel. Potential for delayed or limited passage that short-stops fish. Note: this is specific to the lowermost 2 km | Historical clearing of floodplain and manipualtion of stream location. Alluvial fan holds former mill site (structures, impervious surfaces, concrete lined channel, etc). Confined channel. Multiple stream x-ings. | B | Floodplain reconnection. Reconstruct natural channel. Revegetation. Alluvial fan remediation (asphalt and buildings removal; potential toxic waste clean-up) | Actions could restore fish passage, juvenile rearing, alluvial fan dynamics, and natural channel conditions for 2 km of a critical Klickitat River Tributary. | Unpublished Yakama Nation Data; Zendt et. Al (2016); WDFW (early 2000's) | S1, S2, L24 |

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| A | **Lower Klickitat Mainstem: Sportsman's Park to Little Klickitat** | Migration and/or rearing corridor for 100% of steelhead and spring and fall Chinook | SS, WS, SC, FC<br><br>WF, BT, RR | S,R,MA<br><br>S,R,MR | Lack of pools and cover for rearing fish. In some places, lack of access to lower velocity refugia areas during high flow events. | The road and railroad prisms have confined the channel resulting in incision. In several locations, these prisms have reduced natural floodplain and side channel habitat which would provide cover and velocity refugia during high flows. As a result of the incision, channel complexity has been reduced. | A | - Place LWD and/or structures as appropriate. (Flows are high in this area, hence boulders may be preferred over LWD.)<br><br>-Floodplain restoration/ reconnection<br><br>Acquisition when necessary for floodplain reconnection projects. | The upper portion of this reach has been simplified through the construction of roads and railways adjacent to the river. Instream habitat is lacking access to high velocity habitat, undercut banks, and other channel structures that provide cover and velocity refuges. Feaasibility of full floodplain may be difficult due to public infrastructure. | Sampson and Evenson 2003; Evenson et al 2004; get reference from Joe | S1, S2, S8, & S9;<br><br>L2, L3, L4, L14, L15, L16, L41 |
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| | | | | | Potential predation, competition for food and space by invasive species, and alteration of native community dynamics | Invasive species can prey upon and compete with native species and degrade habitat. Aquatic invasive species has been shown in other areas to alter the composition of community dynamics, and could reduce the productivity of salmonids | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.) and bull frogs are present in the Klickitat basin. Prevention of new introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/NZ_mudsnail | S1 & S2;<br><br>L3 & L26 |

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| | | | | | This section of the Klickitat River is heavily use by boaters who may oppose (and perhaps remove) LWD or other instream structure placements. Potential impact of instream structures on recreational use and local economy. Potential for failure if LWD projects are not well thought out. Concern about LWD/instream structures and public safety. | Projects that have real or perceived negative impacts on safety and/or recreational use are generally not supported by the community. | A | At a project level, the design phase should include public meetings, especially with river guides, to get input on structure design and location, address public concerns, and build community support. At the programmatic level, the Lead Entity supports a high level of public involvement in development a comprehensive plan for in-stream habitat improvement. | Public involvement will build support for instream structure placement in sections of the Klickitat River that have recreational use and may prevent the project from being removed by the public. Enabling public input on instream structure projects will increase public awareness of the benefits of instream structures and reduce the level at which natural structures are removed. Public involvement and awareness will help reduce safety concerns. | Klickitat CRC opinion | |
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| B | **Upper Klickitat Mainstem: McCreedy Creek (RM 70) to Diamond Fork** | High potential for productivity if restored. | SS, SC | S,R,MA | Lack of pools to support rearing of juveniles. Restriction of access to floodplain habitats. High peak flow velocity. | Confinement of the channel by the road increases peak flow velocities. LWD, which contributes to pool formation, is lacking due to road construction and stream cleaning. The confinement limits accumulation of wood in the channel. | A | Place ballasted LWD to increase rearing habitat. Realign channel in areas where benefits can be reasonably attained. | There are large sections of stream that are simplified with little pool volume. Placement of wood will increase rearing habitat through the formation of pools, improvement of sediment sorting, and improvement of habitat complexity. Perforation of the road where realignment is impractical will allow peak flow to be reduced by allowing waters to move onto floodplain. | Unpublished data, Yakama Nation-Joe add RM & E reports | S1, S2, S5, & S8;<br><br>L3, L4, L5, & L14 |
| | | | RR, BRT | S,R,MR | | | | Perforate road with culverts or other structures to allow peak flows to move onto floodplain. | | | |

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RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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| | | | | | L5: Some public opposition to using public monies on reservations. | The level of public awareness of the shared benefits of habitat restoration within the Reservation. | A | A public relations effort to increase the level of awareness that habitat work within reservations has value on and off reservation because anadromous fish are a shared resource. | This limiting habitat factor is common to all priority actions within this priority area. Public support for funding habitat restoration and protection on reservations can be increased through communication and education. | Klickitat CRC opinion | |
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| C | **Upper Klickitat Mainstem: Diamond Fork to Headwaters** | Potential for additional production | SS, SC<br><br>BRT, RR | S, R, MA<br><br>S, R, MR | Lack of spawning and rearing habitat. | Historic grazing caused channel incision which subsequently disconnected secondary channels from the main channel. Hence, the amount of spawning and rearing habitat was reduced. Riparian vegetation has also been reduced which affects lateral channel stability. | A | Reconnect secondary channels<br><br>Place LWD or other structures in stream<br><br>Vegetate riparian areas | This is Phase 2 of the SRF Board Meadows Restoration Project. Current habitat simplification is the result of historic overgrazing. Project increases the length of channel available as rearing habitat and will increase quality and abundance of pools used for rearing habitat, provide cover habitat, help sort sediments, provide for increased habitat complexity. | Unpublished data, Yakama Nation Joe Add RM & E reports | S1, S2, S5, S8, & S9;<br><br>L3, L4, L5, L8, L20 |
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| B | **Klickitat Mainstem: Leidl Bridge to Hatchery** | All salmonids accessing the upper Klickitat must pass through this reach. Therefore, habitat in this reach is important for migration and holding. | SS, WS, SC, FC BT, WF, RR | S,R,MA, MR | Lack of rearing and holding habitat (pools, cover). | Road fill encroaches on the channel, limiting LWD recruitment. Low instream LWD levels and Lack of scour pools have reduced pool frequency and the amount of rearing and holding habitat. Riparian vegetation provides long-term LWD recruitment that will support the continued availability of pool habitat. | A | Place LWD or other structures as appropriate. | Action will restore channel roughness and complexity and provide increased pool abundance used as rearing and holding habitat for fish. | Sampson and Evenson 2003; Evenson et al 2004 | S1, S2, S5; & S8;<br><br>L6, L15, L41, L14, & L16 |
| | | | | | | | B | Establish riparian vegetation where possible along road. | Road currently restricts riparian vegetation. Establishing riparian vegetation where possible will provide future LWD recruitment and cover. | | S1, S2, S5; & S8;<br><br>L3 & L14 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential predation, competition for food and space by invasive species, and alteration of native community dynamics | Invasive species can crowd out native species and degrade habitat. Colonization by the New Zealand mudsnail or other aquatic invasive species has been shown in other areas to alter the composition of macroinvertebrate communities, and could reduce the productivity of salmonids | A | Support collection of information regarding the presence and extent of aquatic invasive species, as a means to identify threats to salmonids. Educate the public regarding identification and methods to prevent or minimize further introductions and spread of invasive species. Support efforts to control and/or eradicate invasive species that pose a threat to important habitat. | Invasive species (most recently New Zealand mud snails) have been found in nearby locations (e.g., Deschutes R.). Prevention of introductions is the most effective method of control. Early detection and early treatment (when possible) make the most sense ecologically and are most cost-effective. | Wilcove et al. 1998, www2.montana.edu/NZ_mudsnail (New Zealand mudsnail distribution and literature website) | S1 & S2;<br><br>L3 & L26 |
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| B | **Little Klickitat Basin mouth to Little Klickitat Falls including Canyon Creek up to its waterfall** | Lower 6.1 miles provide spawning and rearing habitat. Upper basin is used by anadromous fish at an unknown rate and also provides habitat for trout and other resident fish. | SS, WS, FC, SC CT, BRT, RR | S,R,MA | Stream temperature exceeds state standards throughout much of the subbasin. | Shade, which reduces stream temperature, is lacking in some areas. Inputs of fine sediments also affect channel complexity and are identified as a process affecting stream temperature in the TMDL. | A | Plant trees along the stream where riparian vegetation is sparse or lacking. | A TMDL exists which identifies numerous actions for addressing stream temperature, including actions to improve riparian vegetation and reduce sediment inputs. Actions would reduce temperature in stream that would benefit fish and help to attain objectives | Anderson, 2004; Brock and Stohr, 2002; Sampson and Evenson 2003; Evenson et al 2004 Joe add RM & E reference | |

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| | | | | | | Recharge of groundwater provides for increased late season flow and cool water inputs. | C | Assess spatial distribution of cool water inputs (tributaries and groundwater) to identify existing refugia and help prioritize areas for future work. Restore floodplain connection, add structure to restore pool habitat. | of TMDL (Anderson 2004, Brock and Stohr 2002). Actions would also benefit habitat through improvements in pool quality and volume, increases in the abundance of terrestrial insects, and reductions of sediment inputs. | | |
| | | | | | Low abundance of instream wood has limited the sorting and retention of spawning gravel. | Natural | B | Place LWD in areas where existing pool habitat is low. Planting of riparian areas (see above) also will provide long-term LWD recruitment. | | | |
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| B | **Little Klickitat Basin from river mile 6.1 to confluence of 3-creeks** | Believed to support an unknown abundance of steelhead in some years | SS, WS<br><br>CT, BRT, RR | S,R,MA<br><br>S, R, MR | Unknown passage frequency. | The frequency that steelhead pass above falls at RM 6.1 is known to be limited; however the extent of that limitation is unknown. | C | Assess the frequency that steelhead pass the falls and determine the numbers of fish passing under various flow conditions. | The relative contribution of habitat upstream of the Little Klickitat falls to the production of steelhead is uncertain. This information will allow us to determine appropriate priority of the reaches upstream. | WPN & Aspect 2005; Narum et al. 2008. | |
| | | | | | Stream temperature | Low shade levels, low flow, and possible sediment inputs, were identified in the Ecology TMDL as affecting stream temperature | A | Implement programs to increase shade, reduce sediment, and increase cool water refugia in the Little Klickitat basin (see TMDL Detailed Implementation Plan and WRIA 30 Watershed Management Plan for details) | Benefits resident fish populations and may also benefit anadromous species downstream | WPN & Aspect 2005 | |
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| B | **Swale Creek** | Has potential to provide viable habitat for anadromous salmonids if channel is restored. Note, lower 3.1 miles are perennial; upstream of the perennial reach, scattered intermittent pools are present in | RRSS, WS, SC (juv) | S,R,MRSR, R, MA | Water temperatures are high (7-day running average maximum temperatures are 23 to 30 degrees C). Stream flow is less than 0.5 cfs in summer and intermittent upstream of RM 3.1. | Lack of riparian vegetation combined with low baseflow and shallow depths warms water. Low base flows are due to geologic conditions. | A | Enhance riparian habitat<br>Enhance beaver analog activity.<br>Restoration of natural sediment and water / drainage patterns | Riparian vegetation could be improved in some areas. Enhancement of riparian vegetation may potentially decrease water temperature. | WPN 2004, Inter-Fluve 2002 | |

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| | | summer to roughly river mile 12. | | | Limited high quality perennial pools in reach (and cover habitat). | Possible effects of upstream channelization on pool characteristics in lower 3.1 miles of creek. Inadequate stream-adjacent riparian vegetation to provide LWD and shade. Possible reduction in downstream transport of the LWD from upstream sections due to channelization of the upstream segments (adjacent to old RR bed). | B | Place structures as appropriate (LWD). Restoration of natural sediment and water / drainage patterns | May increase pool volume and provide cover from predation | WPN 2004, Inter-Fluve 2002 | |
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| B | **Dead Canyon Creek Basin** | Relatively high numbers of steelhead spawn in the basin. Currently accounts for significant portion (roughly 5 to 10%) of observed steelhead spawning in the surveyed portions of the Klickitat Basin. Most spawning habitat is in the lower 2 miles. | SS, WS, C, RR | S,R,MA | Lack of water in the lower mile of the stream. Artificial confinement. | Sediment accumulating upstream of the Haul Road bridge contributes to periodic subsurface flows, which effectively block upstream movement of fish and locally affect the quality of fish habitat. | A | Develop design alternatives for removing the Haul Road Bridge.<br><br>Assess headwater meadow conditions for restoration opportunities.<br><br>Add conservation here as well. A priority as well. | Removal of channel constrictions would restore natural channel processes and improve available rearing and spawning habitat. | Sampson and Evenson 2003 | |

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| | | Upstream processes may affect downstream habitat. | | | Sediment inputs reduce the quality of spawning habitat in the stream. | Lack of LWD in stream associated with deteriorated riparian condition on the upper plateau in the headwaters of the creek has resulted in localized downcutting of channel which reduces recharge potential of the floodplain and introduces sediment to downstream locations. | B | Assess current situation to determine if riparian areas are adequately regenerating. Place wood or other structure in the channel to reduce bed cutting and encourage trapping of sediments. | Additional roughness in bed will reduce bed scour. | | |
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| C | West Fork Klickitat Basin | Core population of resident Bull trout present in the basin. This is some of the most remote sparsely roaded habitat in the Klickitat basin. | RR, BT, BRT | S,R,MR | Fine sediment | Undersized road crossings upstream from bull trout habitat lead to road failures and sediment inputs. Sediment delivery can reduce egg survival, macroinvertebrate production, and limit juvenile habitat. Debris torrent from road failure can alter channel morphology. | A | Replace culverts with appropriately-sized crossing structures. | Larger crossing structures will be less likely to fail, reducing sediment inputs and road-related debris | | |

**Codes:**

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SS = Summer Steelhead (FT); WS = Winter Steelhead (FT); SC =Spring Chinook (PS, FT- White Salmon); FC = Fall Chinook (PS, FT- White Salmon);
SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Potential competition with brook trout. | Not habitat related. | B | Population & genetic assessment | Brook trout have been documented in many areas to out compete bull trout. An assessment of the amount of physical separation between the species and the amount of interbreeding occurring would help to assess the long term potential of survival of the bull trout species in the presence of brook trout and would help to determine if a brook trout eradication program is warranted. | Byrn et al, 2001; Theisfeld et al 2002 | |
| | | | | | | | | | | | |

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RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| B | **Klickitat River Bonneville pool interface Sportsman's Park downstream to include the delta)** | 6 Tier 1 species and 8 salmonid populations listed under ESA; Ranked a B due to uncertainties regarding actions that can be taken to improve habitat; (no recovery plan is yet available for this area, the lower Columbia recovery plan indicated that mainstem habitat was not high priority). Few factors can feasibly addressed in the mainstem. | SS, WS, SC, FC, SUC, BT | Migration; some rearing; unknown, likely limited, spawning | Limiting habitat features largely unknown; flow, predation, temperature, competition with other species, harvest, invasive vegetation (milfoil) and hatcheries affect Columbia River fisheries | Unknown, aside from dams. Shallow delta reach with milfoil growth that may be improving predator habitat. This needs to be evaluated. | A | Assessment of habitat restoration opportunities. Possible options for improving stream temperature and reducing predation? | Do not have information regarding potential fish response to modification of nearshore habitat.<br><br>Extreme caution needed to ensure that projects do not increase predation or delay migration. | Data Gap- reference from D L- Delta study. Site some EPA Cold water refugia work. | |
| | | | | | | | | | | | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| B | **Klickitat Basin: Summit Creek** | Lower 1.5 miles provides spawning and rearing habitat for steelhead and critical refuge habitat from high turbidity on the mainstem (for spring Chinook and steelhead juveniles). | SS, WS, SC (juv), RR, BRT, CT? | S,R,MA | Pools are sparse and gravels are not well sorted. | This reach is lacking sufficient wood (possibly due to historic stream cleaning and/or changes in flow regime) to form adequate pools and sort gravels. | B | Place wood or other appropriate structure focusing on the lower 1/2 mile of the stream segment. | Wood and/or boulders provide the structure needed to encourage the development of pools and the sorting of spawning gravels. | | |
| | | | | | Not habitat related. | Not habitat related. | B | Conduct fish presence/absence surveys. | Previously documented cutthroat populations upstream of the anadromous barrier may be extirpated. Need to check for populations. | | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | High peak flows and fine sediment loads | Poorly designed roads concentrate flow during rainfall and snowmelt events and reduce infiltration of water into soils, thereby increasing peak flows. Erosion from poorly designed or badly located roads contributes sediment to streams. | A | A road assessment is needed to determine effect of roads on basin habitat. Hydrologically disconnect roads from stream as appropriate and treat roads to reduce sediment inputs and landslide potential. | Should reduce flows and fine sediments delivered to stream. | | |
| | | | | | | | | | | | |
| C | **Diamond Fork Basin** | Expected high production of anadromous fish (primarily steelhead) once these areas are restored. | S, SC | S,R,MA | Lack of pools and excessive fine sediments in spawning gravels. | Historic grazing trampled and widened the creek. Subsequent incision has resulted in the development of a plane bed channel. Mass wasting of incised banks is contributing fine sediment to the channel. | A | Place LWD or other structures to stop headcutting of erosion areas that threaten to capture the stream. Revegetate riparian areas. | Placement of wood will improve sorting of gravels, enhance formation of pools, stabilize banks, and will improve channel complexity. Cattle grazing has been discontinued in this area; hence does not need to be addressed. | Unpublished Data, Yakama Nation | S1, S2, S5, & S8;L5 |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Excessive fine sediments clog spawning gravels and reduce survival of eggs and alevins. | Channel is currently well aligned and, with the exception of fine sediment inputs, natural channel processes are functioning. | B | Control use of unauthorized ORV trail | ORV trails are impinging on the channel and threaten to capture and realign the stream and are contributing sediment to stream through erosion. Control of unauthorized ORV use in the area will reduce the potential effects on the channel. | | S1, S2, & S5;<br><br>L5, L11, L16, & L42 |
| | | | | | Fine sediment levels in spawning gravel are somewhat elevated. | Erosion of sediments from poorly designed roads contribute fine sediment to streams. Landslides related to roads can also contribute sediment to streams. | A | Reduce sediment delivery to streams from roads and potential for road related landslides. | Road modifications will reduce sediment levels in spawning gravels, improving productivity of spawning beds. | Sampson and Evenson 2003 | S1, S2, & S8;<br><br>L3, L4, L9, L5, & L39 |
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RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
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|---|---|---|---|---|---|---|---|---|---|---|---|
| C | **Piscoe Creek Basin** | Potential for increased use by anadromous species above Castile Falls (Unpublished Data, YNF) | RR<br><br>SS, SC (juv) | S,R, MR<br><br>S, R, MA | Access to upstream habitats. | A culvert barrier is present that limits upstream movement of fish. | A | Improve passage | Culvert barrier present; may be replaced by BIA ; call out with river mile. | | |
| | | | | | High peak flows. | Roads are delivering runoff to the stream network resulting in higher peak flows | B | Hydrologically disconnect roads from stream | Will decrease peak flows and also will reduce sediment inputs to stream. | | |
| | | | | | | | | | | | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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|---|---|---|---|---|---|---|---|---|---|---|---|
| C | **Columbia River from Little White Salmon to the Yakima River Confluence** | 6 Tier 1 species and 8 salmonid populations listed under ESA; Ranked a C due to uncertainties regarding actions that can be taken to improve habitat; (no recovery plan is yet available for this area, the lower Columbia recovery plan indicated mainstem habitat was not high priority). Few factors can feasibly addressed in the mainstem. | SS, WS, SC, FC, SUC, BT | Migration; some rearing; unknown, likely limited, spawning | Limiting habitat features largely unknown; flow, predation, temperature, competition with other species, harvest, and hatcheries affect Columbia River fisheries | Unknown, aside from dams. | A | Assessment of habitat restoration opportunities. Possible options for improving improving cold water refugia, confluence habitat, nearshore habitat, backwater connectivity, fish passage, shoreline complexity.<br><br>Addressing impacts of native/non-native species relationships<br><br>Possible actions identified (MCRFEG, 2013), fill data gaps for informing potential actions<br><br>Seek multi-entity coordination for assessment and funding of actions. | Do not have information regarding potential fish response to modification of nearshore habitat.<br><br>Extreme caution needed to ensure that projects do not increase predation or delay migration. | MCRFEG, 2013 | S8, S12<br><br>L22, L34, L35 |
| | | | | | | | | | | | |
| C | **Major Creek Basin** | Fish usage of habitat is unknown, but potentially significant. Density of spawners below the falls is relatively high. | RR,<br><br>SS, FC, WS(?) | S,R, MR<br><br>S,R,MA | Natural partial blockages occur in lower basin limiting access to habitat. | Natural falls and canyon areas may limit access to the stream. | B | Assess passage frequency, determine upstream extent of steelhead habitat, evaluate habitat conditions. | Very little is known about current fish usage above lower falls (between Old Highway 8 and Highway 14). Use of habitat upstream of the falls is unknown. | Unpublished Data, Yakama Nation and personal communication Carl Dugger, formerly of WDFW | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
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# Klickitat Lead Entity – WRIA 31, Rock-Glade Watershed Area
# Top Tier Actions and Areas
# (Only high priority areas are included in this matrix)

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | **Rock Creek Confluence to USACE Park (Slack water reach)** | Migratory corridor for all species | SS; FC; C | MA | Invasive species (veg & piscivorous species); High summer temps. | High predation rates by non-native fish; Invasive veg provides habitat for non-native fish | A | Non-native fish population mgt (support sportfishing regulation changes), invasive vegetation management, native riparian planting | Reduction of predation rates should improve smolt survival, riparian plantings mitigate high temperatures, provide shade cover | Eastern CD report-2015 | |
| | | | | | | | | | | | |
| A | **Rock Creek Mainstem (USACE Park to Bickleton Bridge** | High Steelhead spawner density and high potential for steelhead production | SS, C | S, R, MA, MR | Low summer instream flow and high summer water temps. Floodplain conditions, lack of in-stream connectivity, predation by non-piscine predators, invasive species, lack of shade cover, and LWD. | Lack of riparian veg, including recruitable wood. Intermittent stream connectivity, low flows. | A | Riparian veg planting; grazing mgt; fencing riparian areas<br><br>Dike removal/pull back<br>Biomimicry of beaver activity.<br>Restoration of natural sediment and water / drainage patterns<br>Beaver reintroduction & beaver dam analog in geomorphically appropriate settings. | Improving riparian and floodplain function will improve rearing habitat, increase quality and quantity of pools and reduce summer stream temps, increase flow duration, instream base flow protection | Glass 2009, Espirito (2009), Harvey (2014), Aspect and WPN (2004), Aspect (2005) Conley 2017 | S1, S5, S12<br><br>L22, L32 |
| | | | | | | | | | | | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
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| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | **Rock Creek Bickleton Bridge RM 19.4** | Low to moderate Steelhead spawner density and steelhead production | SS; RR | S, R, MA, MR | Low LWD abundance | Confined canyon reach, lack of watershed storage | A | Protection of existing habitat; Conservation easements, conservation acquisitions, or other management actions controlling potential future impacts of development | Protection of existing habitat and prevention of future degradation, increase flow duration, instream base flow protection | Glass 2009, Espirito (2009), Aspect and WPN (2004), Aspect (2005), Conley 2017 | |
| | | | | | | | | | | | |
| A | **Walaluuks Creek from the confluence with Rock Creek to White Creek** | High Steelhead spawner density and high potential for steelhead production, coho productivity high in some years | SS; RR, C | S, R, MA, MR | Low summer instream flow and high summer water temps, lack of in-stream connectivity, predation by non-piscine predators, cattle grazing | Lack of riparian veg, including recruitable wood, management of cattle grazing - may have impacted riparian veg and channel morphology . | A | Riparian veg planting; grazing mgt; fencing riparian areas<br><br>Enhanced pool habitat.<br><br>Removal of hydromodificatio ns, levees and dikes.<br><br>Biomimicry of beaver activity. Restoration of natural sediment and water / drainage patternsEnhance perennial pools with small diameter trees, tops, and /or limbs by hand and monitor | Improving riparian function will improve rearing habitat, increase quality and quantity of pools and reduce summer stream temps, increase flow duration, instream base flow protection | Glass 2009, Espirito (2009), Aspect and WPN (2004), Aspect (2005) Conley (2017)<br>Harvey (2014) | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | over-summer survival<br><br>Beaver reintroduction & beaver dam analog in geomorphically appropriate settings | | | |
| | | | | | | | | | | | |
| B | **Walaluuks Creek upstream of White Creek and the Walaluuks Creek tributaries** | Negligible Steelhead spawner density and steelhead production | SS; RR | S, R, MA, MR | Low LWD abundance, Low summer instream flow, intermittent connectivity, cattle grazing | Low (no) summer instream flow and high summer water temps, , management of cattle grazing - may have impacted riparian veg and channel morphology | B | Protection of existing habitat; Conservation easements, conservation acquisitions, or other management actions controlling potential future impacts of development, instream base flow protection<br><br>Assess upper watershed conditions for opportunities to improve hydrologic conditions throughout the watershed. Implementation of actions to improve | Protection of existing habitat and prevention of future degradation, increase flow duration, instream base flow protection<br><br>Late season low flow conditions limit available habitat and carry capacity for juvenile saclmonids. | Glass 2009, Espirito (2009), Aspect and WPN (2004), Aspect (2005)<br>Harvey (2014) | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | hydrologic conditions. | | | |
| | | | | | | | | | | | |
| B | **Luna Gulch** | Occasional steelhead use; water quality and riparian conditions also affect lower mainstem Rock Creek | SS | S, R | Low summer instream flow and high summer water temps, intermittent connectivity | Lack of riparian veg, including recruitable wood. Grazing may have impacted riparian veg and channel morphology | A | Riparian veg planting; grazing mgt; fencing riparian areas | Improving riparian function will improve rearing habitat, increase quality and quantity of pools and reduce summer stream temps, increase flow duration, instream base flow protection | Glass 2009, Espirito ((2009) Harvey 2014) | |
| | | | | | | | | | | | |
| B | **Quartz Creek** | Water quality and riparian conditions also affect lower mainstem Rock Creek | SS, RR | S, R | Lack of suitable spawning gravels; low LWD abundance, Headwaters of Quartz Creek – culvert replacement (fish barrier and RR is present at location), stream downcutting erosion | Confined canyon reach | A | Protection of existing habitat; Conservation easements, conservation acquisitions, or other management actions controlling potential future impacts of development, instream base flow protection | Protection of existing habitat and prevention of future degradation<br><br>Late season low flow conditions limit available habitat and carry capacity for juvenile salmonids. | Glass 2009, Personal Communication (B. Allen) | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
RR = Resident Rainbow Trout (PS); CT = Cutthroat Trout (PS); CCT = Coastal Cutthroat Trout (PS); BT = Bull Trout (FT); BRT = Brook Trout; WF = Whitefish
Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Assess upper watershed conditions for opportunities to improve hydrologic conditions throughout the watershed. Implementation of actions to improve hydrologic conditions.<br><br>Add conservation here as well. A priority as well. | | | |
| | | | | | | | | | | | |
| B | **Rock Creek Headwaters Above RM 19.4 and Tributaries** | very low use by *O. mykiss*; Headwaters conditions affect downstream habitat | Steelhead habitat downstream; RR | S, R | High summer temps, low to no flows | Low summer instream flow, lack of watershed storage | B | Conservation easements, conservation acquisitions, or other management actions controlling potential future impacts of development<br><br>Assess upper watershed conditions for opportunities to improve hydrologic conditions throughout the watershed. Implementation of actions to | Protection of existing habitat and prevention of future degradation<br><br>RMZ protections for grazing and timber harvest operations | Glass (2009) | |

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SUC = Summer Chinook (PS, FT – White Salmon); C = Coho (PS)
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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | improve hydrologic conditions. Assessment of headwater meadow conditions & upper watershed hydrology.<br><br>BMPs –riparian corridor concerning new WDFW acquisition for working lands | Late season low flow conditions limit available habitat and carry capacity for juvenile salmonids. | | |
| B | **Pine Creek Confluence** | Summer steelhead potential use and productivity | SS, RR | Potentially S, R, MR, MA | Fish passage barrier; HWY 14 Culverts (5) | Access to spawning and rearing areas is essential | A | Replace culverts with bridge or alternative fish passage means | Restore access to fish habitat | NMFS, 2009 | |
| | | | | | | | | | | | |
| C | **WRIA 31 Columbia River Tributaries; Chapman Cr., Old Lady Canyon, Wood Gulch, Six Prong Cr., Dead Canyon, Glade Cr., Bing Canyon,** | Summer steelhead potential use and productivity | SS, RR, potentially others | Potentially S, R, MR, MA | Likely temperature, base flows, barriers, sedimentation, potentially others (needs further assessment) | Probable lack of properly functioning condition due to multiple factors, needs further assessment | A | Assessment of potential habitat use and productivity | Potential productivity needs further assessment | Glass, 2009, NMFS, 2009 | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

| Tier | Reach/Basin | Rationale for Ranking of Reach/Basin | Species | Life History Significance | Limiting Habitat Features | Habitat Forming Processes | Action Priority | Actions | Rationale for Actions | Sources of Information | Community Interest |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Four Mile Canyon, Switzler Canyon, Juniper Canyon** | | | | | | | | | | |

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Life History: S = Spawning; R = Rearing; MR = Resident Migratory; MA = Anadromous Migratory

## 5.7 Encouraging Participation in Priority Actions

Project sponsors will be encouraged to participate in high priority actions by the following means:

- the Klickitat Lead Entity will recruit project sponsors for high priority actions;
- the *Klickitat Lead Entity Region Salmon Recovery Strategy* will be distributed to people and organizations with the capacity to play a primary or supporting role the implementation of priority actions;
- prospective project sponsors will be made aware that priority actions will be more competitive when projects are prioritized for funding; and
- the Klickitat Lead Entity will promote the activities and accomplishments of projects to the public and organizations in order to foster understanding of salmon recovery as a non-threatening change to established socio-economic values.

## 5.8 Project Ranking Process

The first step in the process for ranking projects is a meeting between prospective project sponsors and the Klickitat Technical Committee to review draft grant applications and visit project sites. Project sponsors may revise their applications based on information received during draft application review meeting. Submitting draft applications and attending the review meeting are not required, but project sponsors are strongly encouraged to take advantage of this opportunity to get a technical review that might improve their project's standing.

Approximately one month after the draft application review meeting, project sponsors present their final draft applications to the Klickitat Technical Committee, which evaluates the projects based on technical criteria (see Appendix A). A project list technical ranking recommendation is developed and provided to the Klickitat Citizens Review Committee along with a description of the considerations affecting the evaluation of each project. To ensure that the best possible projects are forwarded for consideration, project sponsors are allowed to revise their applications based on the Klickitat Technical Committee's evaluation.

Approximately one month after the Klickitat Technical Committee evaluates the projects, the sponsors present their projects to the Klickitat Citizens Review Committee for prioritization. Klickitat Citizens Review Committee members evaluate the projects based on the same twelve technical criteria utilized by the Klickitat Technical Committee plus two community interest criteria (see Appendix A). Input received from the Klickitat Technical Committee is considered. Following the project presentations, the Klickitat Citizens Review Committee discusses the proposed projects and each committee member scores the projects for each criterion and then totals the scores to determine the projects' rank order (first, second, third, etc.). The project ranking from all committee members are averaged to determine the apparent project list ranking. The apparent project list ranking is then discussed, as needed, until a point of consensus is reached on the prioritized project list that will be forwarded to the SRFB.

## 5.9 Projects Funded to Date

To date, thirty-nine projects in the Klickitat Lead Entity area have been funded through the SRFB process. These are listed in Table 3.

## Table 3. Projects funded through the SRFB process to date.

| Project Number | Project Type | Project Name | Sponsor | Project Status | SRFB Funds | Sponsor Match | Project Total |
|---|---|---|---|---|---|---|---|
| 1999-1336 | Restoration | Swale Creek Riparian Restoration | Klickitat County of | Complete | $ 4,870 | $ 1,535 | $ 6,405 |
| 1999-1338 | Restoration | Little Klickitat River Restoration | Klickitat County of | Complete | $ 57,097 | $ 28,417 | $ 85,514 |
| 1999-1622 | Restoration | Klickitat River Meadows Restoration | Yakama Nation | Complete | $ 94,000 | $ 13,750 | $ 107,750 |
| 1999-1623 | Restoration | Snyder Creek Fish Passage (Mill #1) | Klickitat County of | Complete | $ 98,430 | $ 25,000 | $ 123,430 |
| 1999-1624 | Restoration | Little Klickitat Riparian Restoration | Klickitat County of | Complete | $ 24,534 | $ 17,296 | $ 41,830 |
| 1999-1625 | Restoration | Lacey In-Stream Project | Klickitat County of | Complete | $ 9,842 | $ 4,046 | $ 13,888 |
| 1999-1626 | Restoration | Rootwad Distribution & Storage | Klickitat County of | Complete | $ 14,858 | $ 3,012 | $ 17,870 |
| 1999-1737 | Restoration | Projects Maintenance | Klickitat County of | Complete | $ 22,418 | $ 1,394 | $ 23,812 |
| 1999-1738 | Restoration | Swale Creek Ponds | Klickitat County of | Complete | $ 17,970 | $ - | $ 17,970 |
| 1999-1739 | Restoration | Logging Camp Creek Fish Passage | Klickitat County of | Complete | $ 9,615 | $ 2,547 | $ 12,163 |
| 1999-1751 | Restoration | Diamond Fork Creek Meadows Restoration | Yakama Nation | Complete | $ 70,380 | $ 14,000 | $ 84,380 |
| 1999-1753 | Restoration | Surveyors Creek Passage Enhancement | Yakama Nation | Complete | $ 86,774 | $ 27,686 | $ 114,460 |
| 2000-1208 | Restoration | Klickitat Mill Restoration 2 | Fish & Wildlife Dept of | Complete | $ 462,461 | $ 118,427 | $ 580,888 |
| 2000-1674 | Planning | Swale Creek Restoration Assessment | Yakama Nation | Complete | $ 14,954 | $ 7,219 | $ 22,173 |
| 2000-1702 | Acquisition | Dillacort Canyon | Columbia Land Trust | Complete | $ 334,075 | $ 88,800 | $ 422,875 |
| 2001-1316 | Restoration | Trout Creek Fish Passage Improve- Plan B | Yakama Nation | Complete | $ 190,850 | $ 76,913 | $ 267,763 |

| Project Number | Project Type | Project Name | Sponsor | Project Status | SRFB Funds | Sponsor Match | Project Total |
|---|---|---|---|---|---|---|---|
| 2001-1353 | Acq. and Rest. | Logging Camp Canyon - Phase 1 | Columbia Land Trust | Complete | $ 393,439 | $ 70,693 | $ 464,132 |
| 2001-1359 | Planning | Klickitat River Fish Barriers Survey | Northwest Service Academy | Complete | $ 81,675 | $ 41,080 | $ 122,755 |
| 2002-1636 | Planning | Assessment of the White Salmon Watershed | Yakama Nation | Complete | $ 61,168 | $ 52,522 | $ 113,690 |
| 2004-1711 | Restoration | Lower Klickitat Riparian Re-Veg, Phase 1 | Mid-Columbia RFEG | Complete | $ 46,402 | $ 13,370 | $ 59,772 |
| 2004-1715 | Acq. and Rest. | Klickitat R. Conservation & Restoration | Columbia Land Trust | Complete | $ 577,981 | $ 102,000 | $ 679,981 |
| 2004-1716 | Restoration | Tepee Creek Fish Passage Restoration | Yakama Nation | Complete | $ 176,713 | $ 75,804 | $ 252,517 |
| 2005-1594 | Restoration | Klickitat Floodplain Restoration Phase 2 | Columbia Land Trust | Complete | $ 547,123 | $ 96,550 | $ 643,673 |
| 2005-1607 | Restoration | Tepee Creek -- IXL Meadows Restoration | Yakama Nation | Complete | $ 243,045 | $ 43,000 | $ 286,045 |
| 2006-2253 | Planning | Invasive Species Prevention Phase I | Underwood Conservation Dist | Complete | $ 131,704 | $ 23,250 | $ 154,954 |
| 2006-2277 | Restoration | Upper Klickitat R. Enhancement, Phase II | Yakama Nation | Complete | $ 246,250 | $ 461,953 | $ 708,203 |
| 2007-1722 | Restoration | Simmons Creek Restoration | Underwood Conservation Dist | Complete | $ 91,191 | $ 23,950 | $ 115,141 |
| 2007-1725 | Restoration | Upper Klickitat River - Phase 3 | Yakama Nation | Active | $ 345,602 | $ 143,000 | $ 488,602 |
| 2008-1874 | Planning | White Salmon Fish Passage Inventory | Underwood Conservation Dist | Complete | $ 97,150 | $ 23,277 | $ 120,427 |
| 2008-1913 | Acquisition | Klickitat River RM 12 Acquisition | Columbia Land Trust | Complete | $ 500,000 | $ 264,620 | $ 764,620 |
| 2008-1916 | Planning | Project Development White Salmon Tributaries | Mid-Columbia RFEG | Complete | $ 43,125 | $ 7,611 | $ 50,736 |
| 2008-1926 | Planning | Tepee Creek Restoration - Phase 2 Design | Yakama Nation | Complete | $ 105,000 | $ 18,600 | $ 123,600 |

| Project Number | Project Type | Project Name | Sponsor | Project Status | SRFB Funds | Sponsor Match | Project Total |
|---|---|---|---|---|---|---|---|
| 2009-1452 | Acq. and Rest. | Klickitat RM 13 Floodplain Habitat Acquisition | Columbia Land Trust | Complete | $ 212,685 | $ 37,533 | $ 250,218 |
| 2009-1460 | Restoration | Upper Rattlesnake Creek Restoration | Mid-Columbia RFEG | Complete | $ 52,965 | $ 9,347 | $ 62,312 |
| 2009-1461 | Restoration | Tepee Creek Restoration - Phase 2 Construction | Yakama Nation | Complete | $ 382,610 | $ 85,800 | $ 468,410 |
| 2010-1734 | Restoration | Indian Creek Fish Passage Correction | Underwood Conservation Dist | Complete | $ 173,514 | $ 85,216 | $ 258,730 |
| 2010-1741 | Planning | Klickitat Trail - Inventory and Assessment | Yakama Nation | Complete | $ 46,750 | $ 8,250 | $ 55,000 |
| 2010-1742 | Restoration | Upper Klickitat R. Enhancement, Phase IV | Yakama Nation | Complete | $ 365,500 | $ 65,000 | $ 430,500 |
| 2010-1746 | Planning | Assess Potential Actions, Columbia River Mainstem | Mid-Columbia RFEG | Complete | $ 73,950 | $ 13,050 | $ 87,000 |
| 2011-1428 | Restoration | Klickitat Floodplain Restoration Phase 3 | Columbia Land Trust & YNFP | Complete | $ 520,000 | $ 92,175 | $ 612,175 |
| 2011-1344 | Planning | Rock Creek Assessment and Conceptual Design | EKCD & YNFP | Complete | $ 57,587 | 10,162 | 67,749 |
| 2011-1499 | Planning | Buck Creek Fish Passage and Irrigation Improvements | Underwood Conservation Dist | Complete | 167,356 | 31,941 | 199,297 |
| 2012-1644 | Restoration | Klickitat Floodplain Restoration Phase 4 | Columbia Land Trust and YNFP | Complete | 526,977 | 99,393 | 626,370 |
| 2012-1667 | Planning | Lower White Salmon R. Habitat Protection Planning | Mid-Columbia RFEG | Complete | 97,365 | 17,185 | 114,550 |
| 2012-1668 | Planning | White Salmon Basin Beaver Assessment | Mid-Columbia RFEG | Complete | 17,991 | 3,206 | 21,198 |
| 2013-1397 | Planning | Rock Creek Conservation Easement Assessment | Eastern Klickitat Conservation District | Complete | $ 35,500.00 | $ 6,265 | 41,765 |
| 2013-1401 | Restoration | Klickitat Floodplain Restoration Phase 5 | Columbia Land Trust | Complete | 536,650 | 94,700 | 631,350 |
| 2013-1403 | Planning | Prioritization of Actions on the Columbia Mainstem | Mid-Columbia RFEG ? | Application | $ 126,680.00 | $ 22,430.00 | $ 149,110.00 |
| 2013-1404 | Planning | Mill Creek Fish Passage Final Design | Underwood Conservation Dist | Complete | 54,999 | 49,999 | 104,997 |

| Project Number | Project Type | Project Name | Sponsor | Project Status | SRFB Funds | Sponsor Match | Project Total |
|---|---|---|---|---|---|---|---|
| 2013-1409 | Planning | Rattlesnake Creek LWD Project Development | Underwood Conservation Dist. | Complete | $ 80,000.00 | $ - | $ 80,000.00 |
| 2014-1860 | Restoration | Klickitat River Floodplain Restoration Phase 6 | Columbia Land Trust | Active | 539,076.00 | 95,132.00 | 634,208.00 |
| 2015-1258 | Restoration | Mill Creek Fish Passage Construction | Underwood Conservation Dist | Complete | 425,136 | 78,697 | 503,833 |
| 2015-1296 | Monitoring | Assess Salmonid Recolonization - White Salmon Rvr | Mid Columbia RFEG | Complete | 66,494 | 11,735 | 78,229 |
| 2016-2111 | Monitoring | Assess Salmonid Recolonization 2017 WS River | Mid Columbia RFEG | Complete | 48,020 | 16,812 | 64,832 |
| | | | | | | | |
| | | | | | | | |
| | | | | **Total** | **$ 9,808,501** | **$ 2,825,350** | **$ 12,633,851** |

Table 4 summarizes SRFB projects to date based on type of project.

**Table 4. Project Type Summary**

| Project Type | Number of Projects | SRFB Funds | Sponsor Match | Project Total |
|---|---|---|---|---|
| Restoration | 28 | $ 5,359,667 | $ 1,711,021 | $ 7,079,688 |
| Acquisition | 2 | $ 834,075 | $ 353,420 | $ 1,187,495 |
| Planning | 17 | $ 1,279,056 | $ 306,410 | $ 1,585,467 |
| Combination Acquisition and Restoration | 3 | $ 1,184,105 | $ 210,226 | $ 1,394,331 |
| Total | 50 | $ 8,656,903 | $ 2,581,077 | $11,246,981 |

# 6 KLICKITAT LEAD ENTITY ORGANIZATION

Klickitat County was established as the lead entity 1999 pursuant to chapter 77.85 of the Revised Code of Washington (RCW) for the geographic area composed of WRIA 30, 31 and the area of WRIA 29B extending from the White Salmon River east, inclusive. As the Klickitat Lead Entity, Klickitat County established the Klickitat Citizens Review Committee in 1999 and the Klickitat Technical Committee in 2004.

## 6.1 Klickitat Citizens Review Committee

The Klickitat Citizens Review Committee (CRC) fulfills the citizens committee functions prescribed in chapter 77.85 RCW, which are as follows:

- evaluate projects proposed to promote salmon habitat (RCW 77.85.050(1)(b));
- compile a list of habitat projects, establish priorities for individual projects, define the sequence for project implementation, and submit these activities as the habitat project list (RCW 77.85.050(1)(c));
- identify potential federal, state, local, and private funding sources (RCW 77.85.050(1)(c));
- describe the adaptive management strategy (RCW 77.85.060(2)(e));
- develop and implement habitat project lists that maximize the benefits from project mitigation while reducing project design and permitting costs(RCW 77.85.100(1)); and
- coordinate voluntary collaborative efforts between habitat project proponents and mitigation project proponents (RCW 77.85.100(4)).

The Klickitat Citizens Review Committee seeks to increase community support for the salmon recovery process. It provides guidance and leadership to the community in accomplishing salmon recovery, with positive benefits to the participating landowners and the community at large.

## 6.2 Klickitat Citizens Review Committee Mission Statement

The Klickitat Citizen's Review Committee will support salmon recovery by identifying credible and fundable habitat protection and enhancement projects. This process will support related programs and activities that produce sustainable and measurable benefits for fish and fish habitat.

## 6.3 Klickitat Citizens Review Committee Bylaws

***Name***

The name of the committee shall be the "Klickitat Citizens Review Committee."

***Geographic Area of Concern***

The Committee's geographic area of concern is Water Resource Inventory Area 30, 31 and Water Resource Inventory Area 29-B in Klickitat, Skamania, Benton and Yakima Counties containing salmonid species.

***Purpose***

The purpose of the Committee is to fulfill the requirements of the citizens committee pursuant to Chapter 77.85 RCW (ESHB 2496 Salmon Habitat Recovery Funding Act). Specifically, this includes establishing and prioritizing projects on or within the Klickitat salmon recovery region and the development and adoption of "Klickitat Salmon Recovery Region Strategy."

***Nature of the Organization***

The function of the Committee is to serve as an advisory committee to the Salmon Recovery Funding Board. The Committee shall be staffed and administered by the Klickitat Lead Entity, which is Klickitat County.

***Duration***

The Committee shall continue its work until dissolved by any of the following: the Legislature, SRFB, WDFW, the Governor, or the Klickitat Lead Entity.

***Committee Membership***

The Committee shall consist of twelve voting members (identified by Klickitat Lead Entity) unless changed by the Klickitat Lead entity. Committee members shall serve three-year terms. The Committee may submit to the Klickitat Lead Entity nominations for appointment to the Committee. Previous members may serve at the Lead Entity's discretion.

***Meetings***

Meetings shall be open to the public and advertised to the extent practicable. The regular meeting schedule shall be the first Thursday of each month. Meeting frequency, time and location shall be at the discretion of the Committee. Meeting minutes will be recorded and distributed to all Committee members prior to the next meeting.

***Absentee Policy***

A Committee member seat (as represented by the primary or alternate appointee) that misses three consecutive meetings or four meetings in a 12-month period may forfeit his/her position on the Committee membership. The Lead Entity is responsible for Committee member appointments.

***Quorum***

A quorum shall consist of a majority of filled seats on the Committee at that time. A quorum is required for holding an official meeting. Meetings will occur when there is not a quorum though no decisions will be made.

***Methods of Reaching Decisions***

Consensus shall be the preferred method of decision-making. If consensus cannot be reached on any matter, then a vote will be called and must receive a majority to pass.

***Conflict of Interest***

Committee members shall recuse themselves if they are employed by the project sponsor or a co-sponsor, or the land owner, or otherwise have a vested interest in the proposed site or project actions.

***Bylaws***

Committee members shall operate with written ground rules that specify its mission and operating procedures. Ground rules may be altered by Lead Entity with recommendations from Committee members.

## 6.4 Klickitat Technical Committee

The role of the Klickitat Technical Committee is to provide technical advice to the Klickitat Citizens Review Committee on the identification, sequencing and prioritization of stream reaches and projects for salmonid recovery and the evaluation of the technical merits of candidate projects submitted to the Klickitat Citizens Review Committee.

The Klickitat Technical Committee was officially established by the Lead Entity in July, 2004. Previously, the group functioned in an unofficial capacity as the Lead Entity's technical committee and was known as the Klickitat Technical Advisory Group.

### Klickitat Technical Committee Bylaws

***Name***

The name of the technical committee shall be the "Klickitat Technical Committee" (TC).

***Geographic Area of Concern***

The TC's geographic area of concern encompasses WRIA 30, 31, and the area of WRIA 29B extending from the White Salmon River east, inclusive. The Klickitat River drains

approximately 1,350 square miles of Klickitat and Yakima Counties and enters the Bonneville Pool of the Columbia River at river mile (RM) 180.4. That portion of WRIA 29 that is within the Klickitat Lead Entity's geographic area includes the White Salmon River basins and several tributaries that flow directly into the Columbia River, including Catherine, Jewett, and Major Creeks. The White Salmon River drains approximately 386 square miles of Yakima, Skamania, and Klickitat Counties and enters the Bonneville Pool of the Columbia River at RM 167. WRIA 31 contains approximately 1,654 square miles in Klickitat, Yakima, and Benton Counties. Within WRIA 31, Rock Creek is the primary basin of concern for salmon habitat.

***Purposes and Functions***

The TC purpose is to fulfill the functions of a technical sub-committee (TC) of the CRC pursuant to 77.85.050, and 77.85,060 RCW. These functions are as follows:

Forward technical project comments and recommendations, with supporting rationale, to the CRC in support of the CRC developing habitat project lists;

Provide the CRC with credible scientific advice in support of the CRC establishing priorities for individual projects and defining the sequence for project implementation;

Provide the CRC with credible scientific advice in support of the CRC developing, maintaining, and implementing the "Klickitat Salmon Recovery Region Strategy" and habitat work schedule;

Provide credible scientific advice to the CRC regarding such salmonid recovery matters as the CRC may forward to the TC; and

As may be constrained from time to time by the availability of TC resources or other reasons, provide outreach and other "Klickitat Salmon Recovery Region Strategy" implementation assistance requested by the CRC or Klickitat Lead Entity.

***Duration***

The TC shall fulfill its TC purpose and functions so long as it is enfranchised by the Klickitat Lead Entity.

***Committee Membership***

To fulfill its TC functions, the TC shall have a number of voting seats for which primary and alternate members shall be appointed by the Klickitat County Board of County Commissioners in its role as the Klickitat Lead Entity. The Board of County Commissioners may appoint any number of ex-officio members. Members shall serve three-year terms. The TC may recommend candidates for TC membership to the CRC, which advises the Klickitat Lead Entity. Previous TC members may serve at the discretion of the Klickitat Lead Entity.

Ex-officio members may participate in all discussions and deliberations, but shall have no vote on matters before the TC.

The TC membership should represent a broad range of expertise, including (but not limited to) the following: fish and habitat biology; hydrology; geomorphology; forestry; agriculture; soils; civil engineering; and other environmental issues or topics relating to fish recovery.

***TC Executive Committee***

The TC shall have an executive committee composed of a Chair and Vice-chair to assist with carrying out the TC's various roles and responsibilities. Executive Committee members shall serve for 1-year terms. Responsibilities of the Chair shall include facilitating meetings and representing the TC before the Citizens Review Committee, and other entities as necessary. Responsibilities of the Vice-chair include serving as pro-tem in the Chair's absence. If the Chair and Vice-chair are both absent, the Chair shall designate another member of the TC to serve as Acting Chair prior to the meeting.

***Meetings***

Meetings shall be open to the public and advertised to the extent practicable in accordance with CRW 40.30. The TC's regular meetings shall be held starting at 9:00 A.M. on the third Thursday of each month as needed. If any regular meeting falls on a holiday, such regular meeting shall be held on the next business day. The TC shall conduct meetings in accordance with the Open Public Meetings Act. A copy of approved meeting minutes shall be provided to the CRC.

***Absentee Policy***

A TC member seat (as represented by the primary or alternate appointee) that misses three consecutive meetings or four meetings in a 12-month period may forfeit his/her position on the TC membership. If any seat is vacant for three consecutive meetings or four meetings in a 12-month period, then, until the member seat establishes acceptable attendance for a 12 month period, the number of members needed to achieve a simple majority of members may be reduced by one whenever that seat is vacant.

***Quorum***

A quorum for the transaction of business exists when a simple majority of voting members is in attendance at any meeting. The number of voting members needed to achieve a simple majority may be reduced in accordance with the Attendance Policy. Meetings may occur when there is not a quorum though no decisions will be made.

***Passing Vote***

Consensus shall be the preferred method of decision-making. Consensus shall be defined as general agreement between and among TC members with no member opposed. If consensus cannot be reached on any matter, then a vote will be called and must receive a majority to pass. A minority opinion report may be submitted by any voting member of the TC with the recommendation report of the full TC.

***Conflict of Interest***

TC members shall not use their position on the TC for personal gain. Even where no conflict of interest exists under the law, TC members are encouraged to disclose ex parte contacts or exposure they have had regarding a matter before the TC. TC members shall be allowed to participate in discussion, ranking, and comment on all projects including any that they have a

potential conflict of interest. TC members are required to clearly disclose any known or potential conflicts of interest in their ranking forms.

***Bylaws***

TC members shall operate with written ground rules that specify its mission and operating procedures. Ground rules pertaining to TC functions may be altered by the CRC with recommendations from the TC.

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