18 Little White Salmon Subbasin

Figure 18-1. Location of the Little White Salmon River Subbasin within the Lower Columbia River Basin.

18.1 Basin Overview

The Little White Salmon Subbasin encompasses approximately 136 square miles just east of the Cascade Crest. The river enters the Columbia River at Drano Lake at RM 162. Anadromous fish use is limited in this basin with only 500 feet of available habitat in the lower river.

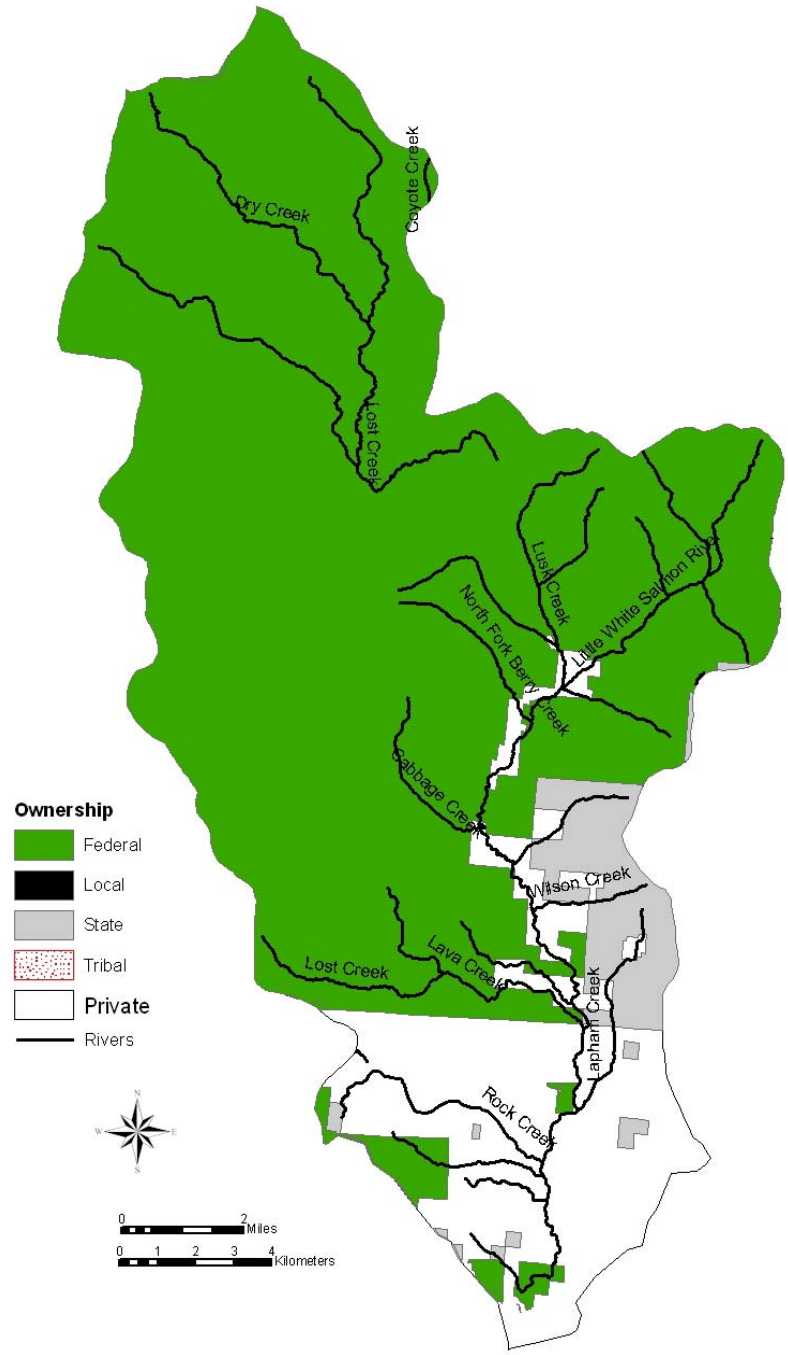
The Little White Salmon Subbasin will play a relatively minor role in the recovery of salmon and steelhead due to the very small amount of available habitat. The subbasin historically supported fall Chinook and chum but much of the habitat was lost with the construction of Bonneville Dam. Today, Chinook and chum are listed as threatened under the ESA. Little White Salmon Chinook and chum are affected by a variety of in-basin and out-of-basin factors including stream, Columbia River mainstem, estuary, and ocean habitat conditions; harvest; hatcheries; and ecological relationships with other species. Recovery will require action to reduce or eliminate all manageable factors or threats. The deterioration of habitat conditions in the Columbia River mainstem, estuary, and plume affect all anadromous salmonids within the Columbia Basin. Direct harvest of listed salmon and steelhead is prohibited but sport and commercial fisheries focusing on hatchery fish and other healthy wild populations, primarily in the mainstem Columbia and ocean, incidentally affect ESA-listed Little White Salmon fish. Discussions of out-of-basin factors, strategies, and measures common to all subbasins may be found in Volume I, Chapters 4 and 7. This subbasin chapter focuses on habitat and other factors of concern specific to the Little White Salmon Subbasin.

Nearly the entire basin is forested, with timber harvest being the primary land use. The northern three-quarters of the basin is within the Gifford Pinchot National Forest (GPNF). The southern portion is privately owned, with scattered rural residential development and small-scale agriculture. Approximately 20% of the basin is in early-seral vegetation.The major population centers are Willard, Cook, and Mill A. The year 2000 population, estimated at 513 persons, is forecasted to increase to 753 by 2020 (Greenberg and Callahan 2002). Population growth in the basin is not expected to be a major limiting factor affecting fish habitat in the next 20 years.

The greatest area of concern for anadromous fish is the lower mainstem. The historically limited amount of habitat accessible to anadromous fish in the lower mainstem has been further limited by Bonneville Dam and by the hatchery barrier dam.

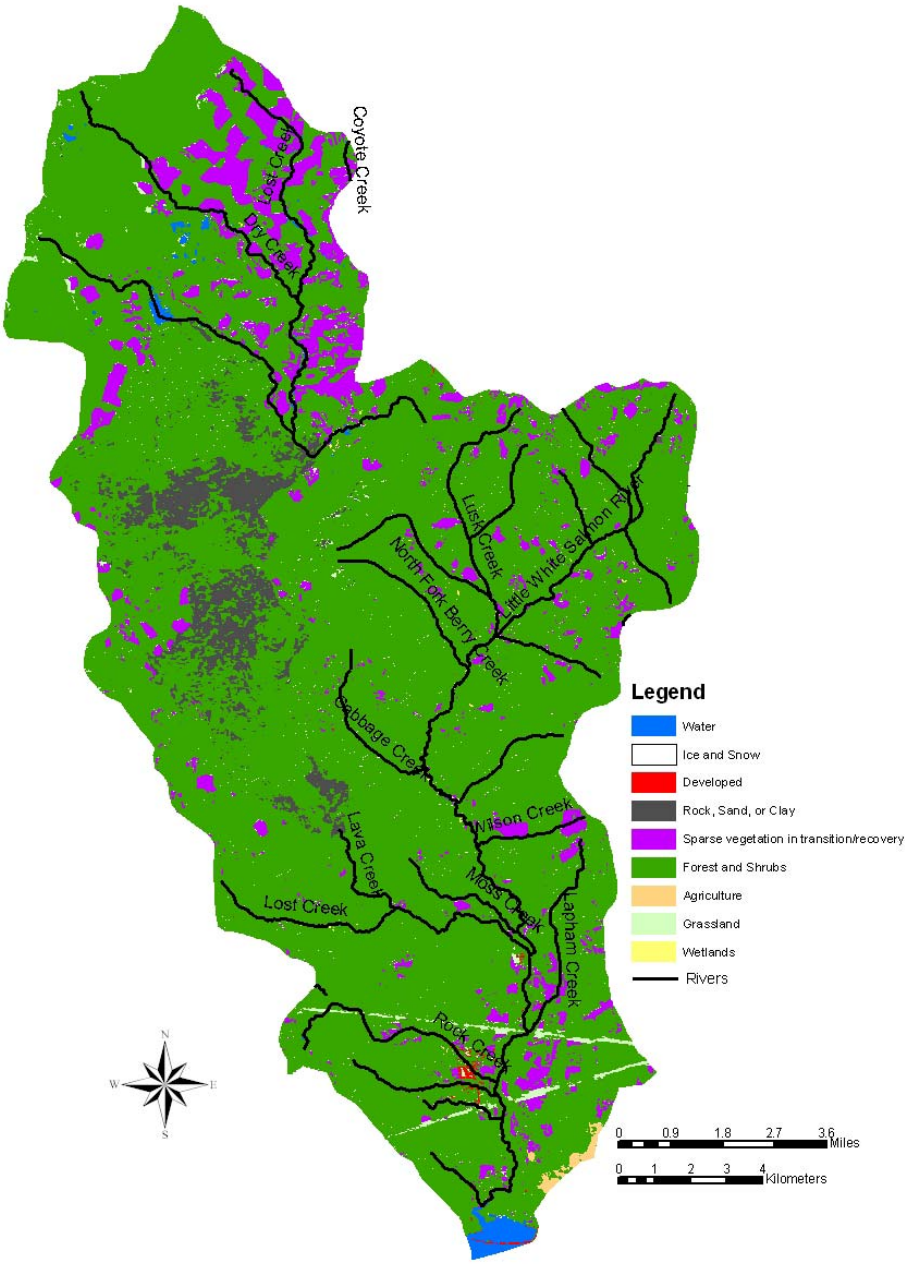
Land Ownership	
Private	22%
Federal	78%
State	0%
Other public	0%

Land Ownership



Vegetation Composition	
Late Seral	35%
Mid Seral	30%
Early Seral	20%
Non Forest	15%

Land Use / Cover



18.2 Species of Interest

Focal salmonid species in the Little White Salmon Subbasin include fall Chinook and chum. The health or viability of these populations is currently very low for chum and low for fall Chinook. Focal populations need to improve to a targeted level that contributes to recovery of the species (see Volume I, Chapter 6). Recovery goals call for restoring chum to a medium viability level, providing for 75-94% probability of persistence over 100 years, and maintaining fall Chinook at low viability levels, providing for a 40-74% probability of persistence over 100 years. Spawning habitat for salmon and other species of interest is limited with only 400 meters of spawning area between a natural anadromous blockage by a falls at RM 1.5 and Drano Lake (where the river mouth is inundated by Bonneville Reservoir).

Table 18-1. Current viability status of Little White Salmon populations and the biological objective status that is necessary to meet the recovery criteria for the Cascade strata and the lower Columbia ESU.

	ESA	Hatchery	Current		Objective	
Species	Status	Component	Viability	Numbers	Viability	Numbers
Fall Chinook	Threatened	Yes	Low	100-200	Low	na
Chum	Threatened	No	Very low	Very low	Medium	na

Fall Chinook– The historical Little White Salmon adult tule fall Chinook population is estimated from 4,000-5,000 fish. Current natural spawning returns are 100-200 fish. The Little White Salmon Hatchery produces URB fall Chinook which are not part of the lower Columbia ESU. Fall Chinook spawning occurs in a ¼ mile stretch of river downstream from the Little White Salmon Hatchery and Drano Lake. Spawning occurs from mid-September to mid-October. The URB fall Chinook from late October through November. Juvenile rearing occurs near and downstream of the spawning areas. Juveniles migrate from the Bonneville tributaries in the spring and early summer of their first year.

Chum– The historical size of the adult population is unknown, but historical accounts indicate there were chum present in the lower Little White Salmon. Current natural spawning returns are assumed to be very low or zero. Most of the chum habitat is inundated by Bonneville Reservoir.

18.3 Limiting Factors, Threats, and Measures

18.3.1 Hydropower Operation and Configuration

There are no hydro-electric dams in the Little White Salmon River Basin. However, Little White Salmon species are affected by mainstem Columbia hydro operations and flow regimes which affect habitat in migration corridors and in the estuary. Mainstem hydro factors and threats are addressed by regional strategies and measures identified in Volume I.

18.3.2 Harvest

Most harvest of Little White Salmon wild fall Chinook and chum occurs incidental to the harvest of hatchery fish and healthy wild stocks in the Columbia estuary, mainstem, and ocean. This mortality is very low for chum, but is more significant for fall Chinook. Little White Salmon fall Chinook are harvested in ocean and Columbia River commercial and sport fisheries, in-basin sport fisheries, and Columbia River treaty Indian fisheries. Non-Indian harvest is controlled by an ESA harvest limit associated with Coweeman natural fall Chinook. No harvest of chum occurs in ocean fisheries, there are no directed Columbia River commercial chum

fisheries and retention of chum is prohibited in Columbia River and tributary sport fisheries. Some chum can be impacted incidental to fisheries directed at coho and winter steelhead.

Measures to address harvest impacts are generally focused at a regional level to cover fishery impacts accrued to lower Columbia salmon as they migrate along the Pacific Coast and through the mainstem Columbia River. The regional measures cover species from multiple watersheds which share the same migration routes and timing, resulting in similar fishery exposure. Regional strategies and measures for harvest are detailed in Volume I, Chapter 7. A number of regional strategies for harvest involve implementation of measures within specific subbasins. In-basin fishery management is applicable to steelhead and salmon while regional management is more applicable to salmon.

18.3.3 Hatcheries

As noted in the regional strategies, hatcheries can adversely affect wild salmon and steelhead populations in several ways. These include domestication or the reduction in the fitness of wild fish due to interbreeding with hatchery fish, direct competition between wild and hatchery fish for habitat and nutrients, and the introduction of disease. Hatcheries can also assist in recovery efforts by providing fish needed to reestablish extirpated populations or to augment wild populations that have reached critically low levels.

The Little White National Fish Hatchery (since 1937) operates in the Little White Salmon at RM 1, and the Williard National Fish Hatchery is located at RM 5. These hatcheries coordinate production of coho, spring Chinook, and fall Chinook and are referred to as the Little White Salmon Hatchery Complex. The hatchery complex produces Carson stock spring Chinook, URB stock fall Chinook, and early stock coho for treaty Indian and non-Indian harvest. The main threats associated with the salmon hatchery programs are domestication of natural salmon populations and potential ecological interactions between hatchery and natural juveniles

Table 18-2. Little White Salmon Hatchery Production.

Hatchery	Release Location	Fall Chinook (URB Stock)	Early Coho	Spring Chinook
Little White Salmon Complex	Little White Salmon River	2,000,000	1,000,000	1,000,000

Regional hatchery strategies and measures are focused on evaluating and reducing biological risks and reducing the risks to natural populations. Artificial production programs within the Little White Salmon facilities will be evaluated in detail through the HGMP process. The resulting program specific actions will be developed, evaluated, and documented through the HGMP for public review and consideration by NOAA Fisheries (details in programs Technical Foundation, Volume IV). Regional hatchery measures identified in Volume I, Chapter 7 with potential applications at facilities within the Little White salmon subbasin are summarized in Table 18-3.

Table 18-3. Regional hatchery measures from Volume I, Chapter 7 with potential implementation actions in the Little White Salmon River Subbasin.

Measure	Description	Comments
H.M23,41	Mass mark hatchery produced coho and spring Chinook.	Will enable out-of-basin selective fishing and accountability of hatchery fish spawning in the wild.
H.M6	Evaluate Little White Salmon Hatchery Complex facilities and operations	Evaluate through HGMP and APRE processes to assess need for facility and operational changes to reduce impacts to wild salmonids.
H.M22	Juvenile release strategies to minimize impacts to naturally-spawning populations.	Release strategies would be aimed at minimizing interactions between hatchery released spring Chinook smolts and wild fall Chinook and chum.
H.M8	Adaptively manage hatchery programs to further protect and enhance natural populations and improve operational efficiencies.	Appropriate research, monitoring, and evaluation programs along with guidance from regional hatchery evaluations will be utilized to improve the survival and contribution of hatchery fish, reduce impacts to natural fish, and increase benefits to natural fish.

18.3.4 Ecological Interactions

Ecological interactions focus on how salmon and steelhead, other fish species, and wildlife interact with each other and the subbasin ecosystem. Little White Salmon River salmon are affected throughout their lifecycle by ecological interactions with non-native species, food web components, and predators. Interactions are similar for Little White Salmon populations to those of most other subbasin salmonid populations. Ecological Interactions are addressed by regional strategies and measures identified in Volume I.

18.3.5 Habitat – Estuary and Lower Columbia Mainstem

Conditions in the Columbia River mainstem, estuary, and plume affect all anadromous salmonid populations within the Columbia Basin. A variety of human activities in the mainstem and estuary have decreased both the quantity and quality of habitat used by juvenile salmonids. These include floodplain development; loss of side channel habitat, wetlands and marshes; and alteration of flows due to upstream hydro operations and irrigation withdrawals. Effects are similar for Little White Salmon populations to those of most other subbasin salmonid populations. Effects are likely to be great for chum and fall Chinook. Estuary and mainstem effects on Little White Salmon salmon populations are addressed by regional strategies and measures identified in Volume I and the Columbia Mainstem and Estuary Subbasin sections of Volume II.

18.3.6 Habitat – Subbasin Streams and Watersheds

Decades of human activity have significantly altered watershed processes and reduced both the quality and quantity of habitat needed to sustain viable populations of salmon and steelhead. There is currently very little habitat available to anadromous fish in the Little White Salmon Subbasin. Historically, anadromous fish could ascend only as far as RM 3, where a barrier falls (Spirit Falls) blocked upstream passage. Approximately 1 mile of this historically available habitat was impounded by Bonneville Dam and is now Drano Lake. The remaining two miles are currently blocked by the barrier dam at the Little White Salmon National Fish Hatchery. No fish are passed above the barrier dam due to limited available habitat and a concern of the effects of naturally-spawning fish introducing pathogens to the hatchery.

Due to the small amount of available habitat and the low potential contribution of Little White Salmon fish populations to regional recovery objectives, the Little White Salmon

populations have not been analyzed using the EDT model and reaches have not been prioritized. Nevertheless, the lowest reach of the mainstem between the barrier dam and the barrier falls provides potential habitat for anadromous fish and the remainder of the basin contains abundant habitat for resident fish and wildlife. The limiting factors and threats that are listed in this chapter were obtained primarily through consideration of the USFS Little White Salmon Watershed Analysis (USFS 1995) and the Washington Conservation Commission Limiting Factors Analysis (WCC 1999). A summary of the primary habitat limiting factors and threats are presented in Table 18-4. Habitat measures and related information are presented in Table 18-5. Results of IWA watershed process modeling are depicted for subwatersheds in Figure 18-2.

The areas with the greatest potential production of anadromous salmonid populations in the Little White Salmon basin are the following:

- Lower mainstem – from Drano Lake to the barrier falls (RM 3)

While reach level habitat conditions often result from local factors, they are also affected or shaped by systemic watershed processes. Limiting factors such as temperature, high and low flows, sediment input and large woody debris recruitment are often affected by or result from upstream conditions and degraded watershed processes. Access to key reaches may also be affected by barriers that occur downstream of a reach. Accordingly, restoration of a priority reach may require action outside the targeted reach. The IWA analysis was used to identify potential upstream watershed areas that could influence reach level habitat attributes.

There is very little habitat available to anadromous fish in the Little White Salmon Subbasin. The reach with the greatest potential to support natural spawning is the 400-500 meter reach between the hatchery barrier dam and the hatchery water intake (RM 1.5, measured from the Hwy 14 Bridge). There is additional potential habitat above the intake up to the barrier falls at RM 3 but this stretch of river is confined within a steep canyon and spawning habitat is likely limited. The lower reach (barrier dam to intake) is in relatively good condition though past forest practices (log flumes) and the current hatchery complex have impacted floodplain function and riparian vegetation. Re-introduction of naturally-spawning fish above the barrier dam warrants further investigation and may be reasonable if fish health concerns can be adequately addressed. At a minimum, existing habitat quality should be protected. If fish passage is provided, this reach may present opportunities for riparian and floodplain restoration. Within and downstream of the hatchery complex, there may also be potential sites for creation of new habitats (i.e., spawning channels) to compensate for lost or currently inaccessible habitat.

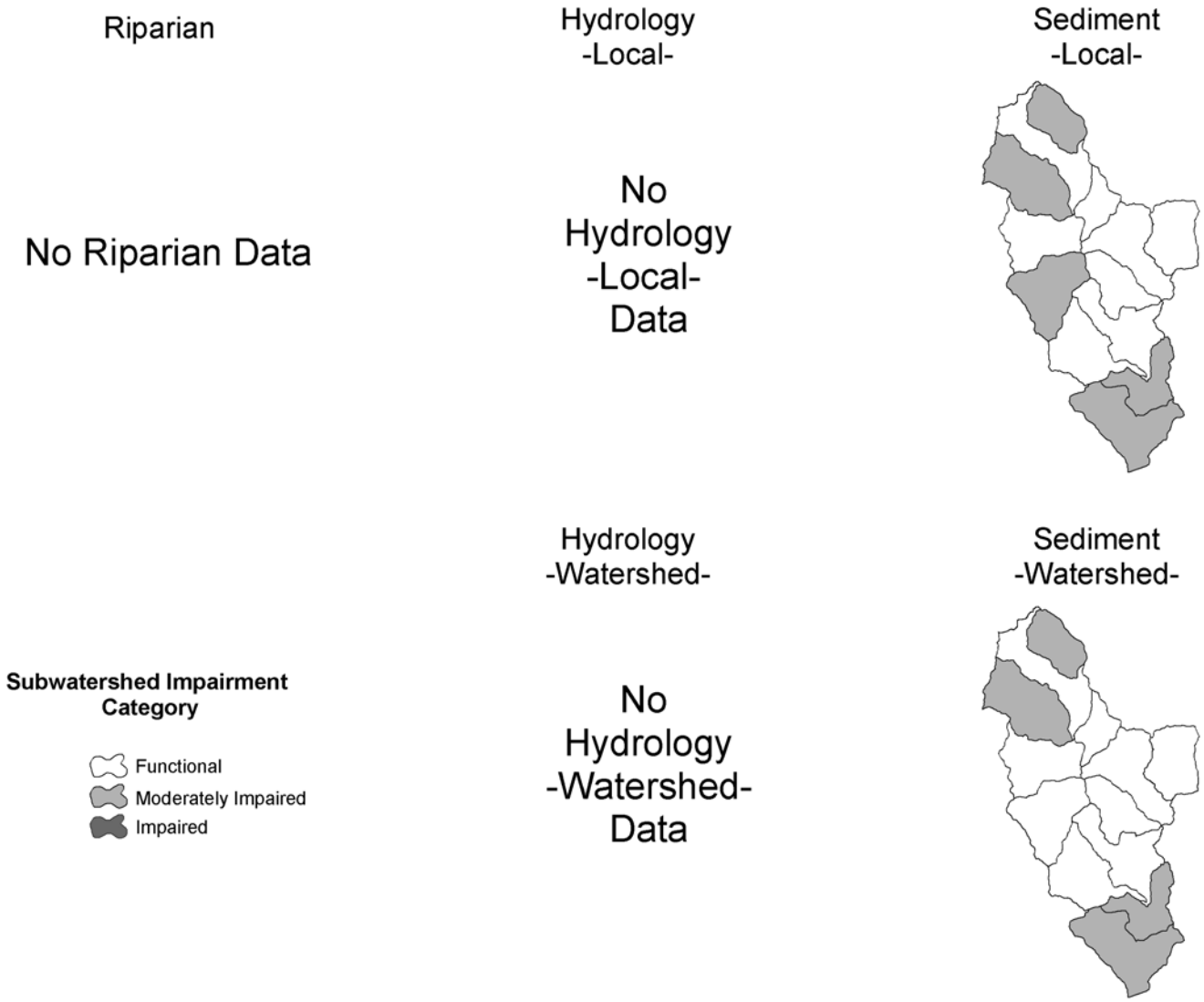


Figure 18-2. IWA subwatershed impairment ratings by category for the Little White Salmon Basin. Watershed process impairment ratings are based on landscape conditions that influence the hydrologic regime, the sediment regime, and riparian function. See Volume II and Volume V of the Recovery Plan Technical Foundation for additional information.

Table 18-4. Salmonid habitat limiting factors and threats in priority areas. Priority areas include the lower mainstem (LM). Linkages between each threat and limiting factor are not displayed – each threat directly and indirectly affects a variety of habitat factors.

Limiting Factors	LM	Threats	LM
Habitat connectivity		***Forest practices***	
Blockages to channel habitats	✓	Timber harvests –sediment supply impacts	✓
Habitat diversity		Forest roads – impacts to sediment supply	✓
Lack of stable instream woody debris	✓	***Channel manipulations***	
Altered habitat unit composition	✓	Blockages to channel habitat	✓
Loss of off-channel and/or side-channel habitats	✓	***Hatchery complex development***	
Riparian function		Floodplain filling	✓
Reduced stream canopy cover	✓	Clearing of vegetation	✓
Reduced wood recruitment	✓	Barrier Dam	✓
Floodplain function			
Altered nutrient exchange processes	✓		
Reduced flood flow dampening	✓		
Restricted channel migration	✓		
Disrupted hyporheic processes	✓		
Substrate and sediment			
Excessive fine sediment	✓		
Embedded substrates	✓		

Table 18-5. Habitat measures in priority areas, with reference to the limiting factors addressed, threats addressed, target species, and estimated time until benefits would be realized (Time). Reaches not included in the table are considered secondary priority.

Location	Limiting Factors Addressed	Threats Addressed	Target Species	Time	Discussion
1. Evaluate issues related to providing fish passage above the hatchery barrier dam					
Lower mainstem	• Blockages to channel habitats	• Hatchery Barrier Dam	• Spring Chinook • Coho	1-5 years	Fish are not passed above the barrier dam due to hatchery fish health concerns. Two miles of potentially productive habitat exists above the dam if fish health concerns can be adequately addressed.
2. Evaluate opportunities for channel, riparian, and floodplain restoration if passage is provided above the hatchery barrier dam					
Lower mainstem	• Lack of woody debris • Altered habitat unit composition • Loss off-channels or side channels • Reduced stream canopy cover • Reduced wood recruitment	• Floodplain filling • Clearing of vegetation (past logging practices and hatchery complex development)	• Spring Chinook • Coho	2-50 years	The riparian zone and floodplain in the 400-500 meter reach upstream of the barrier dam is moderately degraded. If fish are re-introduced to this reach, there may be some potential for riparian, channel, and floodplain restoration; including reforestation, large wood supplementation, and off-channel/side-channel creation. The lower mainstem is the highest priority for stream corridor restoration, however, stream corridor restoration and preservation should occur throughout the basin to benefit resident fish, wildlife, and anadromous fish in downstream reaches.
3. Protect and restore natural sediment supply processes ***A. Address forest road related sources*** ***B. Address timber harvest related sources***					
Entire basin	• Excessive fine sediment • Embedded substrates	• Timber harvest – impacts to sediment supply • Forest roads – impacts to sediment supply	• All species	5-50 years	High potential benefit due to sediment effects on egg incubation and early rearing. Improvements are expected on timber lands due to requirements under the new FPRs, the USFS Northwest Forest Plan, and forest land HCPs. Use IWA impairment ratings to identify restoration and preservation opportunities.
4. Protect and restore runoff processes ***A. Address forest road impacts*** ***B. Address timber harvest impacts***					
Entire basin	• Stream flow – altered magnitude, duration, or	• Timber harvest – impacts to runoff	• All species	5-50 years	High potential benefit due to flow effects on habitat formation, redd scour, and early

Location	Limiting Factors Addressed	Threats Addressed	Target Species	Time	Discussion
	rate of change of flows	• Forest roads – impacts to runoff			rearing. Improvements are expected on timber lands due to requirements under the new FPRs, the USFS Northwest Forest Plan, and forest land HCPs. Use IWA impairment ratings to identify restoration and preservation opportunities.
5. Protect and restore instream flows ***A. Water rights closures*** ***B. Purchase or lease existing water rights*** ***C. Relinquishment of existing unused water rights*** ***D. Enforce water withdrawal regulations*** ***E. Implement water conservation, use efficiency, and water re-use measures to decrease consumption***					
Entire basin	• Stream flow – altered magnitude, duration, or rate of change of flows	• Water withdrawals	• All species	1-5 years	Instream flow management strategies for the Little White Salmon Basin have been identified as part of Watershed Planning for WRIA 29. Strategies will need to include water rights closures, setting of minimum flows, and drought management policies.
6. Protect and restore water quality ***A. Restore the natural stream temperature regime***					
Entire basin	• Altered stream temperature regime	• Riparian harvests	• All species	1-50 years	Primary emphasis for restoration should be placed on stream segments that are listed on the 2004 303(d) list.
7. Protect habitat conditions and watershed functions through land-use planning that guides population growth and development ***A. Plan growth and development to avoid sensitive areas (e.g. wetlands, riparian zones, floodplains, unstable geology)*** ***B. Encourage the use of low-impact development methods and materials*** ***C. Apply mitigation measures to off-set potential impacts***					
Privately owned portions of the basin	***Preservation Measure*** – addresses many potential limiting factors and threats		• All species	5-50 years	The focus should be on management of land-use conversion and managing continued development in sensitive areas (e.g., wetlands, stream corridors, unstable slopes). Critical areas regulations do not have a mechanism for restoring existing degraded areas, only for preventing additional degradation. Legal and/or voluntary mechanisms need to be put in place to restore currently degraded habitats.
8. Protect habitat conditions and watershed functions through land acquisition or easements where existing policy does not provide adequate protection ***A. Purchase properties outright through fee acquisition and manage for resource protection*** ***B. Purchase easements to protect critical areas and to limit potentially harmful uses***					

Location	Limiting Factors Addressed	Threats Addressed	Target Species	Time	Discussion
C. Lease properties or rights to protect resources for a limited period					
Privately owned portions of the basin	***Preservation Measure*** – addresses many potential limiting factors and threats		• All species	5-50 years	Land acquisition and conservation easements in riparian areas, floodplains, and wetlands have a high potential benefit. These programs are under-funded and have low landowner participation.

18.4 Program Gap and Sufficiency Analysis

The Little White Basin (~136 sq mi) is located in Skamania and Klickitat Counties. Approximately 75% of the land lies within the Gifford Pinchot National Forest. Forestry land uses dominate the subbasin.

- Gifford Pinchot Forest lands comprise approximately 106 square miles of the Little White Basin;
- Department of Natural Resources public lands are estimated at 8 square miles;
- Private lands along the Little White mainstem are estimated at 22 square miles;
- Skamania and Klickitat County has regulatory authority for private lands within the Basin;
- Willard and Cook are unincorporated communities within the Basin;
- Population growth is expected to remain stable over the next 20 years.

Protection Programs

Protection programs in the Little White Basin are implemented by the Gifford Pinchot NF, the Department of Natural Resources, Skamania County, and other regulatory agencies. Protection programs in this analysis include programs that protect habitat conditions or watershed functions through management policies and programs, regulatory measures, and fee title acquisition or the purchase of easements. Major programs implementing protection measures are identified below.

Federal Protection Programs

- ***Gifford Pinchot National Forest*:**
  - The Gifford Pinchot NF Plan provides high levels of protection for riparian areas and forest stands within the Little White Basin; [M.3A; M.3B; M.4A; M.4B; M.6A]
    - ✓ Riparian buffers in all areas of the Gifford Pinchot NF are at least 300';
    - ✓ A significant portion of the Little White Basin is "Matrix," (managed for multiple objectives);

- ***U.S. Army Corps of Engineers***

  - Administers the Section 10 (Rivers and Harbor Act) and Section 404 (Clean Water Act) permit processes. Section 10 requires approval of any activity in, above, or below a navigable river, which affects course, location, condition, or capacity of navigable waters. Section 404 requires prior approval of dredging, filling, grading, clearing, and bank hardening. In waters used by listed fish species, the permits are subject to ESA Section 7 consultation with NOAA Fisheries to ensure that any approved action is adequately protective of the fish; [M.1; M2]

State Protection Programs

- ***Department of Natural Resources***

  - State Forest Land HCP:

    State forest lands are managed under the provisions of a Habitat Conservation Plan (HCP). The Habitat Conservation Plan protects riparian areas through the use of buffers, mitigates impacts on watershed processes through harvest restrictions and new road

construction standards that are more stringent than Forest Practices Rules. [M.3A; M.3B; M.4A; M.4B; M.6A]

- State Forest Practices:

  Riparian zones and harvest restrictions represent significant protections under the State of Washington Forest Practices Rules, including the Forest and Fish Module. These rules also establish standards for new road construction. [M.3A; M.3B; M.4A; M.4B; M.6A]

➢ ***Washington Department of Fish and Wildlife***

- Washington State Hydraulic Code

  The Washington State Hydraulic Code is administered through the Washington Department of Fish and Wildlife. The purpose of this program is to protect stream conditions and habitat. The regulations apply to such activities as stream bank protection, instream construction, culvert installation, channel changes or realignments, debris removal, and water diversion facilities. Those proposing such actions must obtain a Hydraulic Project Approval (HPA) permit; [M.1; M2]

Local Government Protection Programs

➢ ***Skamania County***

- Comprehensive Planning and Land Use Regulation: Skamania County is required by state law to have a critical areas ordinance. It is not otherwise required to plan in accordance with the Washington Growth Management Act (GMA). The County's land use controls provide only fair protection of watershed processes and habitat. Wetland and stream setbacks range from 25 to 200 feet depending on the class designation. The County shoreline management ordinance provisions for the Little White protect the shorelines from substantial development or extensive timber harvest within a 200-foot buffer. [M.7A; M.7B; M.7C]
- Road and Parks Programs: The County Road and Parks and Recreation programs have implemented management practices to deal with environmental issues. [M.6A]

Restoration Programs

Restoration programs in the Little White Basin are implemented by a variety of agencies, organizations, and private interests. Major programs implementing protection measures are identified below:

Federal Restoration Programs

➢ ***Gifford Pinchot National Forest***

- The Little White Basin is not a priority restoration area in the Gifford Pinchot NF; [M.3A; M.3B; M.4A; M.4B; M.6A]

State Restoration Programs

➢ ***Department of Natural Resources***

- State Forest Land Habitat Conservation Plan (HCP): The Department manages state forest lands pursuant to a Habitat Conservation Plan (HCP). The HCP road maintenance and restoration objectives require barrier upgrades and road abandonment and/or other improvements. [M.3A; M.3B; M.4A; M.4B; M.6A]

- State Forest Practices Act:
  - Industrial forests within the lower NF Lewis Basin are governed by Forest and Fish regulations and have rigid schedules for maintaining and improving roads and removing barriers. Industrial landowners have 15 years to bring roads and barriers into compliance with regulations [M.3A; M.3B; M.4A; M.4B; M.6A]
  - Small private forest owners are governed by Forest and Fish regulations; however their road and barrier maintenance and improvement programs are tied to state funding. In the State 2003-05 Biennial Budget, 2 million dollars was allocated statewide to support small private forest owners [M.3A; M.3B; M.4A; M.4B; M.6A].

➢ ***Department of Fish and Wildlife***

- Habitat Program: The Department provides advice and assistance to local governments and landowners interested in measures to restore habitat. [M.1; M.2; M.5A; M.5B; M.5C; M.5D; M.6A; M.7A; M.7B; M.7C]

Local Government Restoration Programs

No Active Programs.

Community Restoration Programs

No active programs

Gap Analysis

Forest-related Programs: In the Little White Basin, forestry-related programs, particularly the Gifford Pinchot National Forest Plan, have an important role in protecting and restoring watershed functions and habitat conditions at levels supporting recovery goals. Certainty of forestry-related protection and restoration programs is relatively high because programs are being implemented and funded. Program areas of concern include the continued potential for hydrologic impacts caused by past harvest practices. Monitoring of watershed processes and habitat conditions will be required to confirm the effectiveness of these measures.

Protection-related Programs: Watershed processes and habitat in the Little White Basin have limited protection through Skamania County's land use regulations. Skamania County's comprehensive plan and land use ordinances have good levels of protection; however, Best Available Science updates would improve their Critical Area Ordinances and Shoreline Master Program. In addition, as in all lower Columbia subbasins, there are very limited protection mechanisms for agricultural practices relative to riparian areas and hydrologic impairment.

Restoration-related Programs: Passive restoration in the forests of the Little White Basin will accrue over time as a result of improved forest management practices that are already in place. The Hatchery barrier dam limits the upstream migration of salmonids to approximately two additional miles of habitat.

Table 18-6. Program Actions to Address Gaps

Action #	Lead Agency	Proposed Action
L-WHITE.1	Skamania County, Willard, Cook	Develop and implement controls to adequately protect riparian areas to maintain currently functional and restored habitat around rivers, estuaries, streams, lakes, deepwater habitats, and intermittent streams. Require mitigation, where necessary, to offset unavoidable damage to habitat conditions in riparian management areas
L-WHITE	Skamania County; Willard, Cook	Development and implement controls to protect historic stream meander patterns and channel migration zones and avoid hardening stream banks and shorelines
L-WHITE	Skamania County, Willard, Cook	Development and implement controls and development standards to adequately protect wetlands, wetland buffers, and wetland function.
L-WHITE	Skamania County, Willard, Cook	Develop and implement controls to address erosion and sediment run-off during (and after) construction to prevent sediment and pollutant discharge to streams, wetlands and other water bodies
L-WHITE	Skamania County, Willard, Cook	Apply land use and resource protection code enforcement across jurisdictions in a consistent manner, using appropriate funding levels and application
L-WHITE	LCFRB, WDNR. WSDOT, WDFW Counties, private property owners.	Develop and implement a coordinated and strategic barrier removal program based on watershed fish priorities and ensuring an effective and efficient sequencing of barrier removal work.
L-WHITE	Skamania County, Underwood Conservation District	Utilize a combination of public outreach/education and, incentives, and to promote (1) stewardship practices for protecting habitat and water quality and (2) landowner support of and participation in habitat restoration efforts.
L-WHITE	State of Washington (DOE, DFW)	Close the Little White Basin to further surface water withdrawals, including groundwater in connectivity with surface waters; curtail unauthorized withdrawals
L-WHITE	LCFRB, WDFW, Skamania County, Underwood CD, LCFEG	Build capacity (e.g. technical and administrative skills, personnel and fiscal resources) needed to allow agencies and organizations to undertake protection and restoration projects, including noxious weed control in a reasonable period time.
L-WHITE	SRFB, BPA, NOAA, USFWS, DOE, ACOE	Increase available funding for projects that implement measures and address underlying threats
L-WHITE	State of Washington (Dept of Agriculture, and Department of Ecology)	Develop and implement agricultural practices and regulations to protect riparian conditions and water quality
L-WHITE	Underwood CD	Expand landowner incentive (e.g. CREP) and education plans to promote further habitat protection and restoration.
L-WHITE	LCFRB, Underwood CD, Skamania County	Address threats proactively by building agreement on priorities among the various program implementers
L-WHITE	FEMA	Update floodplain maps using Best Available Science