Draft

LOWER COLUMBIA RECOVERY/SUB-BASIN PLAN
Work Program

October 3, 2002 Draft

1. INTRODUCTION

This work program provides the framework for the preparation of a Lower Columbia salmon recovery and fish and wildlife sub-basin plan. This collaborative effort will involve federal, state, tribal, and local governments and will be coordinated and administered by the Lower Columbia Fish Recovery Board (LCFRB).

In the lower Columbia region of Washington, chinook and chum salmon, steelhead, and bull trout have been listed as threatened under the federal Endangered Species Act (ESA). Coho salmon are a candidate for listing. The loss of habitat resulting from land use and resource management practices has also adversely affected other fish and wildlife species in the region.

The fish and wildlife resources of the Pacific Northwest and the wild lands and ecosystems on which they depend are an integral part of the region's identity, culture, and quality of life. The protection and maintenance of these resources has become an issue of continuing debate as the region attempts to cope with increasing development pressure. Elected officials, agency directors, Indian nations, community and business leaders and concerned citizens are struggling to grapple with the question of whether the region's natural heritage can be protected in a way that will accommodate growth, allow for natural resource utilization, ensure regional and community economic vitality, and respect both cultural and property rights.

In an attempt to address these issues, NOAA Fisheries (NMFS) and the US Fish and Wildlife Service (USFWS) have been charged with the responsibility under the ESA to develop plans to recover listed species. The Northwest Power Planning Council (NWPPC) is responsible for the development of a plan to protect, mitigate, and enhance fish and wildlife adversely affected by the development and operation of the Federal Columbia River Power System. Tribal nations have exercised specific legal rights and responsibilities related to the use, management and stewardship of fish, wildlife, and cultural resources. State and local governments have been charged with specific responsibilities relating to the protection, restoration, and prudent management of fish and wildlife and the habitat upon which they depend.

The depth and breadth of issues surrounding the protection and enhancement of fish and wildlife resources is beyond the capability of any single program, agency, or organization. Success in maintaining the region's natural heritage

depends on cooperative and comprehensive effort by federal and state agencies, tribes, local governments, and citizens.

The purpose of this work program is to provide a framework through which governmental and non-governmental entities will collaborate to prepare and, ultimately, implement a regional plan for the restoration of listed salmonids as well as the enhancement of other focal fish and wildlife species. The planning effort will build upon existing assessments and planning efforts. The plan will provide common goals and a coordinated course of action that is scientifically sound, acceptable to the public, and economically sustainable. Protection, restoration and enhancement actions will be prioritized to provide maximum benefits and ensure the efficient use of resources.

2. PLANNING GOAL AND OBJECTIVES

a. Goal: The goal of this recovery/sub-basin planning initiative is to develop a scientifically credible, socially and culturally acceptable, and economically and politically sustainable plan to:

(1) Restore the region's four fish species listed as threatened under the federal Endangered Species Act (ESA) to healthy, harvestable levels; and
(2) Protect and enhance other fish and wildlife species that have been adversely affected by the development and operation of the Federal Columbia River Power System.

b. Objectives: The objectives of the planning initiative are to:

(1) Complete a recovery/sub-basin plan by May 2004 that will meet NOAA Fisheries (NMFS) and US Fish and Wildlife Service (USFWS) requirements for an ESA recovery plan and the Northwest Power Planning Council needs for sub-basin fish and wildlife plans;
(2) Promote continuity and consistency in policies, strategies, priorities, and actions and the efficient use of resources through the integration of recovery, sub-basin, and watershed planning initiatives.
(3) Develop a plan through an open collaborative partnership of federal, tribal, state, and local governments.
(4) Respect the authorities and responsibilities of federal, state, tribal, and local governments in the formulation of recovery strategies and actions.
(5) Actively involve the public throughout the planning process to build understanding and acceptance as well as to address local concerns and values.
(6) Ensure that the plan is based on and embodies sound scientific principles, methods, and data;
(7) Establish recovery and biological goals that are scientifically sound, and implementable.

(8) Using existing data and information, identify, assess, and address all critical environmental factors and management practices that affect listed species, species of concern, and species of interest to tribal governments in the lower Columbia. For ESA-listed salmonids, this includes both in-region and out-of region factors and management practices responsible for the decline or limiting recovery of species.
(9) Ensure that the burden of recovering ESA-listed salmonids is shared equitably by all affected interests.
(10) Focus on outcomes and allow implementing agencies the flexibility to craft innovative, yet scientifically sound, approaches that best fit local conditions and values.
(11) Manage the region's water resources to meet the needs of fish and people.
(12) Provide agencies a more flexible and expeditious path to achieve ESA compliance.

3. Planning Region

a. Overview

The 5,700 square mile planning area encompasses the Lower Columbia Salmon Recovery Region, with the exception of the White Salmon basin, which was omitted at the request of Klickitat County. It includes the Washington portion of the lower Columbia mainstem and estuary and 18 major and a number of lessor tributary basins. These include the Chinook, Grays, Skamokawa, Elochoman, Mill, Abernathy, Germany, Cowlitz, Coweeman, Kalama, Lewis, Lake, Washougal, Duncan, Hardy, Hamilton, Wind, and Little White Basins. In all, the tributaries total more than 1700 river miles. A map of the planning area is included as Attachment 1.

The planning area closely corresponds with those portions of the Lower Columbia Evolutionarily Significant Units (ESU) in Washington State. It includes eight full and three partial NWPPC sub-basins and four full and two partial state Water Resource Inventory Areas (WRIAs).

The population of the planning area is approximately 464,000. It includes all of Clark, Cowlitz, Skamania, and Wahkiakum counties and portions of Lewis and Pacific counties. There are 13 cities in the planning area and numerous unincorporated communities.

Clark is the most populous and urbanized county in the region and is among the fastest growing counties in the northwest. Cowlitz County is the second most populous county in the region. The Kelso/Longview area is the County's only urban center. The balance of the County is rural in nature with higher elevations comprised largely of commercial timberland

and national forest. Skamania, Wahkiakum and eastern Lewis are the least populous areas of the region and are largely rural in character, comprised of small cities and communities, and agricultural and forest lands. Eighty percent of Skamania County falls within the Gifford Pinchot National Forest.

Ceded lands and lands of interest to the Yakama Nation, include areas in Cowlitz, Lewis, Clark, and Skamania counties. In those areas, reserved fishing and hunting rights are exercised, natural resources are co-managed, and tribal trust lands are inhabited.

The Cowlitz and Chinook Tribes have lands of interest within the lower Columbia region.

b. Target Fish and Wildlife Species

(1) Salmonid Species: Four lower Columbia salmonid species are listed as threatened under the ESA. These are chinook and chum salmon, steelhead, and bull trout. Coho salmon are a candidate for ESA listing. Coastal cutthroat trout also inhabit the region. Eighty-five populations comprise these six salmonid species. Attachment 2 provides a listing of the populations and their condition by the natal watershed.

The lower Columbia mainstem and estuary are critical migratory routes and rearing areas for all Columbia Basin salmonid stocks.

(2) Other Focal Fish and Wildlife Species: Other fish and wildlife species to be addressed in the plan include: white sturgeon, smelt, northern pikeminnow, warmwater fishes, rainbow trout, pacific lamprey, Caspian terns, Columbia whitetail deer, western pond turtle, and selected neo-tropical birds.

c. Principle Watersheds

The following is general characterization of the principle watersheds of the region. A summary by watershed of factors limiting the recovery of salmonid stocks is provided as Attachment 3. It is based on an initial limiting factor analysis completed by the Lower Columbia Fish Recovery Board (LCFRB) and the Washington Conservation Commission in cooperation with state and federal resource agencies, local governments, and interested organizations and individuals.

(1) Chinook River: The Chinook River is a small salmon bearing stream in Southwest Washington that flows into the Columbia River estuary at approximately River Mile 6. It is the western most

salmon-bearing tributary of the Columbia River. The Chinook River drains a small watershed that encompasses approximately 13.60 square miles (~ 8,700 acres). Conifer forests dominate land cover in the upper watershed while grassland dominates the lower river. Elevations range from 0 to just under 1,400 feet above sea level but the vast majority of land area lies between 0 and 200 feet above sea level.

The upper watershed is primarily managed for Douglas fir and western hemlock species. This management strategy has, to a large degree, altered natural species composition of the forest that was dominated by Sitka spruce, hemlock, western red cedar, and other species. Land use activities in the lowlands have been almost exclusively related to agricultural activities. Construction of levees during the late 1800's and the subsequent placement of a tidegate at the river's mouth in 1929 have effectively eliminated tidal influence in the Chinook River estuary. Prior to this development the estuary encompassed approximately 1,500 acres – nearly 20 percent of the watershed's total area. Significant estuarine protection and restoration activities are underway in the basin. The Chinook River supports populations of fall chinook (*Oncorhynchus tshawtscha*), coho (*O. kisutch*), and chum salmon (*O. keta*) as well as steelhead (*O. mykiss*) and coastal cutthroat trout (*O. clarki*).

(2) Grays: The Grays River originates in Pacific County and flows generally southwest through Wahkiakum County to its confluence with the Columbia River at RM 21. The lower 6 miles of the river are a slough subject to tidal influence. The next six miles flow through a wide flat valley before entering steep foothills. The lower reaches of the river are characterized by unstable channel conditions. The lower floodplain was historically diked and drained for agricultural use. Efforts are underway to breach dikes and reestablish wetlands. The upper watershed is marked by rugged, steep terrain and unstable soils characteristic of soils that formed the Willapa Hills. The watershed encompasses 124 square miles. Grays River chum are one of only two distinct populations of Chum remaining in the Lower Columbia River ESU.

(3) Skamokawa Creek: Skamokawa Creek originates in the Willapa Hills and flows in a generally southwest direction meeting the Columbia River at RM 33.3. Major tributaries include Wilson, Falk, McDonald, and Standard Creeks, and the Left and West Forks. Forestry is the dominant land use in the upper watershed, and agriculture and rural residential development occur in the lower reaches.

(4) Elochoman River: Located in Wahkiakum County, the Elochoman River originates in the Willapa Hills, and flows in a generally southwest direction meeting the Columbia River at RM 38. Some of the major tributaries include Duck, Beaver, and Clear Creeks, and the West, East, and North Forks of the River. The upper basin is characterized by forestland. The middle and lower portion are in agriculture and rural residential use.

(5) Mill, Abernathy, and Germany Creeks: These small tributary basins are located largely in Cowlitz County with a small fraction of their area in Wahkiakum County. They are characterized by forestry in the steep upper reaches with scattered rural residential, agriculture, and forest uses in the lower reaches. Mill Creek enters the Columbia River at RM 53. The creek is approximately 6.0 miles long and covers about 19,000 acres. It enters the Columbia through a ¼ mile long slough. Germany Creek enters the Columbia River at RM 56. Germany Creek is 14 miles long, covers almost 14,000 acres, and has a moderate gradient in the lower reaches. Abernathy Creek enters the Columbia River at RM 54. The Abernathy Creek watershed covers approximately 18,594 acres. The stream flows through 13 miles of logged mountainous terrain.

(6) Cowlitz River: The Cowlitz basin is the largest watershed in the region encompassing some 2,480 square miles. The river originates in the Gifford Pinchot National Forest. The upper basin is primarily forestland. The middle portion of the basin has been extensively developed for hydroelectric generation. Three dams and their impoundments are located in this portion of the basin. Land use in the middle and lower portions of the basin includes rural residential, agriculture, and timber. The river flows through the Kelso/Longview urban area near its confluence with the Columbia. These lower reaches have been extensively diked. Key tributaries to the Cowlitz include Cispis, Tilton, Toutle, and Coweeman rivers. Other significant tributaries include Arkansas, Olequa, Lacamas, and Salmon Creeks. The Cowlitz basin is an area of interest to the Yakama Nation and the Cowlitz Tribe.

(7) Kalama River: The river's headwaters drain the southwest slope of Mt. Saint Helens and flows 44.5 miles west-southwest to enter the Columbia River at river mile (RM) 73.1 (WDW 1990). While the river's headwaters have their origins in Skamania County, 98.9 percent of the 205 square mile drainage area is within Cowlitz County. Topography is mountainous, averaging 1,880 feet, and reaches nearly 8,000 feet on Mt. Saint Helens.

The gradient of the Kalama River along the lower eight miles is flat to moderate. Tidal influences extend up to approximately Modrow Bridge at RM 2.8. At RM 10, the lower Kalama Falls blocked most anadromous passage other than summer steelhead until it was laddered in 1936 and then improved in the 1950s. A concrete barrier dam and fish ladder at the falls now traps most returning fish and only steelhead and excess spring chinook are passed above the lower falls by the WDFW. Above RM 10 the valley closes in and continues as a narrow V-shaped drainage. At RM 35 an impassable falls blocks all anadromous passage. Many of the tributaries to the Kalama have steep gradients, with only the lower portions of the streams accessible to anadromous fish.

Approximately 96 percent of the Kalama River Watershed is owned and managed by private timber companies. Most of the watershed was logged in the 1960s through the early 1980s; current timber harvest is minimal in comparison. An extensive road network (1,292 miles of roads) covers the forestry lands, with a road density of 5.75 miles/square mile of area.

(8) Lewis River: The Lewis River watershed flows into the Columbia River at RM 87. The Lewis River watershed is approximately 93 miles long, has a total fall of approximately 12,000 feet, and drains an area of about 1,050 square miles. The headwaters arise on the southern flanks of Mt. Saint Helens and Mt. Adams. The mainstem of the Lewis, also known as the North Fork, flows southwesterly from its source in Skamania County through three impoundments, Swift Reservoir (RM 47.9), Yale Reservoir (RM 34.2), and Merwin Lake (RM 19.5). The middle and lower sections of the North Fork Lewis form the boundary between Clark and Cowlitz Counties. The valley begins to narrow for the next 8 miles, eventually forming a canyon from the confluence of Cedar Creek (RM 15.7) to Merwin Dam (WDF, 1990). The 240 foot high Merwin Dam (RM 20) is a major feature on the river, blocking all upstream passage to 80% of the historical anadromous habitat. This is the first of three dams blocking passage on the Lewis River. The lower 12 miles of the mainstem and North Fork Lewis River flows through a wide flat valley, much of which is under cultivation and protected from flooding by dikes. The lower 11 miles are a tidally influenced backwater of the Columbia River.

A large portion of the North Fork Lewis River basin is managed as commercial forest and, as such, is undeveloped except for logging roads. However, recreational use and residential development demand has increased significantly. Road densities in the basin range from 4.96 miles/square mile in the lower North Fork below

Merwin Dam to as low as 2.01 miles/square mile in the upper portions of the watershed on Forest Service lands. Population densities are generally low within the basin. There is scattered residential development with only a few small communities (Cougar, Chelatchie, and Amboy) in the upper basin. The largest urban population center, the City of Woodland, lies near the mouth of the river. The major tributaries within the Lewis River system below Merwin Dam include the East Fork Lewis River, Johnson Creek, and Cedar Creek. Due to the three dams blocking anadromous passage to the upper river, Cedar Creek provides most of the productive tributary habitat for anadromous salmonids within the North Fork basin.

The East Fork watershed extends approximately 11 miles into Skamania County and the Gifford Pinchot National Forest near Green Lookout Mountain, and reaches an elevation of approximately 4,442 feet above sea level. It joins the North Fork of the Lewis River at RM 3.5. At its headwaters, the East Fork Lewis River generally flows through steep, mountainous terrain, restricted by narrow valley walls. In general, the upper portions of the watershed contain mainly large private and public holdings actively managed for timber production. Approximately 56 percent of the upper East Fork Watershed is owned and managed by private timber companies, 23 percent by the Washington State Department of Natural Resources (DNR), and 23 percent by the U.S. Forest Service. Despite extensive residential development, forestry and farming are still the predominate land-use even in the lower portions of the watershed. The Lewis River is an area of interest to the Yakama Nation and the Cowlitz Tribe.

(9) Salmon Creek: Salmon Creek is the largest watershed that flows into the Lake River Subbasin, and it contains some of the most productive habitat in the subbasin. Major tributaries include Rock, Curtain, Mill, Morgan, and Woodin Creeks. The Salmon Creek watershed covers approximately 90 square miles. It begins in the eastern portion of Clark County and flows generally west for approximately 26 miles to Lake River. Forestry and rural residential development are the main land uses in the upper watershed. The watershed has experienced significant population growth and suburban and rural development in the lower reaches over the last 10 years around the City of Battle Ground, and the unincorporated areas of Hazel Dell and Brush Prairie. Comprehensive stream surveys, which were conducted by the Clark County Conservation District (Harvester and Wille 1989) in 1988-89, provide a substantial amount of the data available on habitat limiting factors within Salmon Creek and its tributaries.

(10) Washougal River: The Washougal River Subbasin includes the Washougal River and its tributaries including the Little Washougal, West Fork Washougal, Lacamas Creek, Cougar Creek, Jones Creek, Boulder Creek, Dugan Creek, and a number of other productive streams. The Washougal River watershed encompasses about 240 square miles and flows southwesterly approximately 33 miles to its confluence with the Columbia River at RM 121 at the city of Camas. The lower two miles of the river are located within the Columbia River valley. A narrow, shallow valley characterizes the next eleven miles, and the upper reaches flow through a narrow deep canyon extending into the Yacolt Burn area. The cities of Washougal and Camas, located near the mouth of the Washougal River, and the surrounding rural areas have experienced rapid growth over the last 20 years. The resulting urban and rural residential development has contributed to significant habitat reduction within the basin. Two hatcheries are located in the Washougal basin.

The Washougal Hatchery, located 16 miles east of Camas on the mainstem Washougal, is a major producer of coho and chinook, whereas the Skamania Hatchery, located on the North Fork Washougal, raises both winter and summer steelhead. The Washougal supports runs of summer and winter steelhead, fall chinook, coho and coastal cutthroat trout. Historically, chum salmon spawned in the lower reaches of the Washougal and Lacamas Creek.

(11) Duncan, Hardy, and Hamilton Creek: The Bonneville Subbasin contains a number of short tributaries that drain into the Columbia River between RM 121 and 142.3 including: Gibbons, Lawton, Good Bear, Duncan, Woodward, Hardy, Hamilton, and Greenleaf Creeks. The gradient increases quickly in most of the streams within the Columbia River Gorge above the Columbia River floodplain. A number of the Bonneville Subbasin tributaries fall within the boundaries of the Columbia River Gorge National Scenic Area. Springs and seeps within the lower reaches of various streams in the subbasin provide critical spawning sites for "threatened" stocks of Columbia River chum. Steelhead, coho, and coastal cutthroat trout also utilize the streams.

(12) Wind River: The Wind River's headwaters are in McClellan Meadows, approximately 20 miles north of the town of Carson Washington. It flows in a southerly direction and enters the Columbia River at approximately RM 155, about two miles south of Carson. The River is approximately 31 miles in length and has a drainage area of 143,504 acres. Its major tributaries that support

anadromous fish are the Little Wind River, Trout Creek, Panther Creek, Trapper Creek, Dry Creek, and Paradise Creek. The Wind River is the first major anadromous stream in Washington upstream of Bonneville Dam, which is located approximately 10 miles downstream of the mouth of the river. Within its 225 square mile drainage area are 181 miles of fish bearing streams, 956 miles of non-fish bearing perennial and intermittent streams, and 293 acres of lakes and ponds.

The river supports winter steelhead, fall chinook, and possibly limited numbers of coho and bull trout/dolly varden (Weinheimer, 1999) in its lower reaches below Shipherd Falls (RM 2.1) and in the Little Wind River. Summer steelhead have been historically present throughout the system, and spring chinook have gained access to the upper watershed subsequent to the construction of a ladder on Shipherd Falls in 1956. Also present in the system are a number of native and non-native resident salmonid species.

The Gifford Pinchot National Forest (GPNF) and other federal ownership accounts for 127,682 acres, or 89% of the watershed. The Washington Department of Natural resources owns 3757 acres (2%), private timber interests 8122 acres (6%), and 3943 acres or 3% are in other private ownership. Those lands outside the National Forest ownership are generally in the lower twelve miles of the watershed. Most of the first six miles of the river and its drainage are outside the GPNF, but a large portion of this area lies within the Columbia River Gorge National Scenic Area. The town of Carson is in this portion of the watershed. The Wind River is a part of the ceded lands of the Yakama Nation.

(13) Little White Salmon River: The Little White Salmon River is a small river system that flows southerly out of the Gifford Pinchot National Forest in Skamania and Klickitat Counties and into the Bonneville Pool. The river has limited habitat accessible to anadromous fish due to a 37-foot high impassable falls near the mouth. Approximately 500 feet of available habitat lies between the falls and the slack water at the mouth and is referred to as Drano Lake. The Little White Salmon River is part of the ceded lands of the Yakama Nation.

4. Planning Approach

a. Overview/Basic Assumptions

This portion of the work program describes the approach, organization, tasks, schedule and budget for achieving the program's goals and objectives. It is designed to deal with the significant challenges facing such a planning initiative, such as:

(1) The diversity of the region's geography, watersheds, land and resource uses, political jurisdictions, and social, cultural, and economic characteristics;
(2) The complexity of ecological relationships among habitats, listed fish species and other key fish and wildlife species;
(3) The need to coordinate ESA recovery efforts and mainstem and estuary sub-basin planning with Oregon jurisdictions;
(4) The variations in technical data availability and quality; and
(5) The lack of the structure and resources needed for federal, state, tribal, and local governments to effectively participate in and contribute to recovery/sub-basin planning.

The planning process will roll up eleven distinct sub-basin plans into a single comprehensive recovery/sub-basin plan. The integrated recovery/sub-basin plan will address the recovery of four ESA listed species (chinook, steelhead, chum and bull trout) within the context of the "4H's", habitat, hydroelectric, harvest and hatchery impacts. Beyond the four listed fish species, the plan will also address selected wildlife, resident fish and other anadromous fish species of interest under the sub-basin planning process. This approach shifts planning activities toward an ecosystem perspective by highlighting key relationships and interdependencies among species and their habitats. These additional focal species include coastal cutthroat, coho, white sturgeon, smelt, northern pikeminnow, warmwater fish, rainbow trout, pacific lamprey, Caspian terns, Columbia whitetail deer, western pond turtle and selected neo-tropical birds.

While the lower Columbia recovery/sub-basin planning effort will examine both listed and non-listed species, some species will not be examined to the depth or breadth of others. All species will be addressed in terms of their life histories, status trends and habitat limiting factors. Some species, such as ESA listed species, because of their relative significance to the ecological health of the watershed, will be addressed in greater depth than others.

The planning process will be based on information and data currently available. Given the variation in the availability, adequacy and quality of data across the region, it is recognized that planning will proceed with less

than the desired level of knowledge. Strategies and actions will be developed to the extent they can be supported by available data and informed professional judgement. The plan will identify areas where insufficient information exists and will provide strategies and priorities for filling data gaps.

Finally, the recovery/planning process is an iterative process. The initial recovery/sub-basin plan is expected to be revised periodically in order to update strategies, priorities and actions based on new data or information gathered and/or the results of progress monitoring.

A working outline of the recovery/sub-basin plan is provided as Attachment 4. The draft is based on NMFS guidance, the NWPPC sub-basin planning template, and the WDFW recovery plan model. It is also consistent with state guidance on assessments and planning.

b. Integration and Coordination

The planning initiative will integrate ESA recovery planning, NWPPC sub-basin planning, and state watershed planning into a single coordinated regional planning process. This approach will provide significant benefits, including:

(1) Ensuring consistency and compatibility of goals, objectives, strategies, priorities and actions.

(2) Eliminating redundancy in the collection and analysis of data.

(3) Establishing the framework for a federal, state, tribal and local government partnership under which agencies can effectively and efficiently coordinate planning and implementation efforts.

The integrated planning effort will be supported through establishing effective working relationships among the participating governments, agencies, and organizations. NMFS and USFWS are key partners given their federal statutory responsibility for recovery planning. Both agencies have been included on the Recovery Planning Steering Committee (RPSC) to ensure that planning work will result in a product meeting their requirements. Similarly, the NWPPC has been included on the RPSC to ensure that its sub-basin planning requirements are satisfied. The Governor's Salmon Recovery Office (GSRO) is a participant to coordinate state support for the recovery planning process and to help facilitate habitat elements of the plan as provided by state statute.

The NOAA Fisheries Technical Recovery Team (TRT) for the Willamette/Lower Columbia Domain is a critical player in the recovery/sub-basin planning process. It is charged with establishing recovery goals and

criteria for chinook, chum, and steelhead. The TRT also serves as a technical advisor for recovery planning. The LCFRB is coordinating with the TRT on the development of recovery goals and criteria. It is also partnering with the TRT to conduct a recovery planning case study on the Lewis River basin. The case study will help to define acceptable assessment and analytical approaches for recovery planning.

The Washington Department of Fish and Wildlife (WDFW) is both a technical resource and resource manager. Under the work program, LCFRB will contract with WDFW for technical and planning assistance in both recovery and sub-basin planning work. In addition to serving a central role in recovery planning for listed salmonids, the WDFW will play a lead role in planning for other focal fish and wildlife species.

The Yakama Nation, as a co-manager for several of the region's fish stocks, will serve as technical advisor, as well as assist in some public presentations. The LCFRB will contract with the Nation for their assistance particularly in planning for the Wind and Little White Salmon sub-basins.

Coordination with Oregon and federal agencies will be necessary since the Lower Columbia ESU and the Columbia Estuary, Lower Columbia, and Columbia Gorge Sub-basins encompass areas in both states. Coordination on these shared areas will be accomplished in two ways. First, the LCFRB, as a member of the Lower Columbia/ Willamette ESA Executive Committee, will work with federal, Oregon and Washington State agencies and tribes, to ensure that recovery planning in Washington complements and contributes to efforts to draft a recovery plan for the entire Willamette/Lower Columbia domain. The ESA Executive Committee was set up at the request of the Governors of Oregon and Washington and works with NMFS as the coordinating forum to develop the Willamette/Lower Columbia domain recovery plan. The Lower Columbia Recovery/Sub-basin Plan will be integrated into the larger domain plan.

Second, the LCFRB will coordinate and pursue contracting with the Lower Columbia River Estuary Partnership (LCREP) to carry out sub-basin planning efforts for the estuary and lower Columbia mainstem. LCREP members include federal, Oregon and Washington state agencies, local governments and local interests. It has been actively engaged in habitat and water quality issues in the estuary and coordinated the preparation of sub-basin summaries for the NWPPC.

As the Lead Agency for state-funded watershed planning in much of the region, the LCFRB will work with its watershed planning units to coordinate data collection and analysis and plan development. Currently, the watershed planning process is assessing stream flow and water

quality conditions. The results of this work will be integrated in the recovery plan. Habitat work being done to support the recovery plan and LCFRB's habitat restoration efforts will be integrated in the watershed plans. In later planning phases, goals and objectives, strategies, and priorities will be coordinated to ensure consistency and compatibility between the watershed management plans and the recovery/sub-basin plan.

Finally, it is expected that participating federal, tribal, and state entities other than those identified above along with local governments will assist in the development of recovery goals and the strategies and action plans needed to implement them. The planning initiative will allow agencies and local governments to coordinate their approaches and recovery activities.

c. Organization, Roles, and Responsibilities

(1) Overview

This section of the work program describes the planning initiatives central organization structure, as well as its roles and responsibilities and how it relates to participating agencies and the public. An organizational schematic is included as Attachment 4.

(2) Recovery Plan Steering Committee

Although the recovery/sub-basin plan will be a product of the LCFRB, it must meet the needs and be implemented through the actions of multiple entities. For these reasons, a steering committee has been convened to facilitate and oversee the plan's development. The Lower Columbia Recovery Planning Steering Committee (RPSC) is responsible for the overall direction and oversight of the recovery planning initiative. Each member is expected to represent the interests of their organizations and to ensure that decisions are properly communicated and supported within their organizations. The Committee will make decisions by consensus. <u>The adoption of the final plan will require the consensus of all organizations on the RSPC and the approval of the LCFRB</u>. To this end, the RPSC shall:

(a) Establish the goals and objectives of the recovery/sub-basin plan;
(b) Determine the scope and content of the recovery/sub-basin plan to ensure that it meets the plan's goals and objectives;
(c) Adopt and maintain a work plan and schedule for the planning initiative;
(d) Monitor progress of planning efforts and adjust scope and direction as necessary to achieve goals;
(e) Approve a funding/resource strategy for the planning initiative;

(f) Adopt and oversee implementation of a public education and outreach program;
(g) Address and resolve policy issues that arise during plan development;
(h) Coordinate planning efforts with other planning initiatives in the region, such as the efforts of ESA Executive Committee and NOAA Fisheries Technical Recovery Team; and
(i) Review, comment, and concur with plan elements as they are prepared and with the final draft plan, its goals, strategies, priorities, and implementing actions prior to its submission to the state, NOAA Fisheries, the US Fish and Wildlife Service, and Northwest Power Planning Council. Consensus of all organizations represented on the RPSC will be sought prior to final adoption by the LCFRB.

Current members of the RPSC include local government and citizen representatives from the LCFRB, NMFS, USFWS, NWPPC, LCREP, WDFW, the Governor's Salmon Recovery Office (GRSO), the Washington Departments of Agriculture and Ecology, the US Forest Service (USFS), the Cowlitz Tribe, the Yakama Nation, and the Chinook Tribe. A more detailed roster of RPSC members is included in Attachment 4. Membership of the RPSC may be expanded to include other key interests as the planning process progresses.

(3) Work Groups

Work Groups will be created by the RPSC from time to time to address specific issues and prepare recommendations or documents for RPSC review. The composition of a work group will depend on the issues to be addressed or the tasks to be undertaken. The use of Work Groups is intended to secure the expertise or knowledge needed to successfully complete the recovery/sub-basin plan as well as to broaden participation in the planning process. Members will be selected based on their knowledge or expertise. Work Groups may include members of the RSPC, appropriate representatives of their organizations, or outside persons possessing the desired knowledge or expertise.

The Working Groups will not make decisions on behalf of the RPSC, unless explicitly authorized by the RPSC to do so. The Working Groups may:

(a) Make recommendations to the RPSC on technical and programmatic issues associated with the recovery/sub-basin plan.
(b) Oversee and participate in the development of draft products for RPSC consideration, including the recovery plan outline, plan elements or sections, templates for actions and strategies,

analytical approaches and methods, public involvement plans, and monitoring procedures;
(c) Work with the TRT as needed to produce draft products and otherwise coordinate planning activities;
(d) Undertake specific tasks identified and assigned by the RSPC; and
(e) Identify issues that require the attention of the RPSC.

To date, three work groups have been organized. These are:

(a) Fish Work Group**.** This work group provides technical assistance and advice to the RPSC regarding the development of plan elements dealing with recovery goals and biological objectives and the status, life history and environmental needs of salmonids.
(b) Factors Limiting Recovery Work Group. This work group provides technical assistance and advice to the RPSC for developing plan elements dealing with factors limiting the recovery of salmonids and watershed assessment activities.
(c) Programs Work Group. This work group provides assistance and advice to the RPSC for developing a plan element that identifies, inventories, and characterizes programs that affect fish resources and their recovery.

A roster of work group members is included in Attachment 4.

(4) Lower Columbia Fish Recovery Board

The Lower Columbia Fish Recovery Board (LCFRB) has three recovery planning functions. These are:

(a) Coordination, Facilitation and Administration of the recovery/sub-basin planning initiative. In performing this function, the LCFRB will:

- Direct support for the planning effort through its staff, consultants, and loaned agency staff;
- Direct and manage the work program;
- Lead efforts to secure funding and other resources to support the planning effort;
- Draft a recovery/sub-basin plan consistent with the direction and policy set by the RPSC;
- Facilitate communication between the RPSC, work groups, and participating agencies, governments, and organizations;
- Coordinate and conduct public information and outreach efforts in concert with participating agencies;
- Identify and refer policy issues to the RPSC for resolution;
- Establish and consult work groups as necessary; and

- Manage administrative, contractual, and fiscal tasks for the planning initiative.

(b) Overseeing the development of the plan's habitat provisions. Pursuant to its enabling legislation (RCW 77.85.200), the LCFRB will take the lead in coordinating with federal and state agencies, tribes, and local governments to develop the goals, strategies, priorities and actions for the protection, enhancement, and restoration of salmonid habitat.

(c) Pursuant to its legislative charge and grant/contract obligations, the LCFRB will approve the final plan prior to its submission to NOAA Fisheries, USFWS, NPPC, and the state.

d. Planning Phases and Tasks

(1) Overview

The recovery/sub-basin planning process will be conducted in two phases. Phase 1 will answer two basic questions:

(a) Where are we now; and
(b) Where do we want go?

Phase 1 is comparable to the inventory and assessment elements of the NPPC sub-basin planning process. Building upon available information and past compilations of data, Phase I will examine the targeted fish and wildlife species, their life histories, current health, and environmental needs. It will further collect data pertaining to current environmental conditions and programs affecting their survival or recovery. During this phase, recovery ESU goals and population recovery criteria or guidelines will be produced in concert with the NMFS TRT for listed species. Biological objectives will be developed for the other targeted species. Although Phase 1 will be largely completed by early 2003, some additional inventory and assessment work will continue throughout 2003 to help fill critical data gaps and ensure that the final plan is as up-to-date as possible.

Phase 2 will answer the questions:

(a) How do we get to where we want to go; and
(b) How do we know when we get there?

This phase is comparable to the management planning element of the NPPC sub-basin planning process. It involves the development of specific regional and sub-basin recovery goals and objectives,

strategies, priorities and actions. It is a public policy process during which technical, social, cultural, and economic factors will be examined and melded into a sound and sustainable recovery program. A draft plan will be completed in early 2004 and, following a public review and comment process, a final plan will be issued in May 2004.

The public will be asked to participate throughout the planning process. First, they will be asked to help review and refine the technical information base and recovery goals. Second, the public will be asked to identify social, cultural, and economic factors that should be considered in developing the plan. Third, public participation will be sought in identifying and evaluating recovery scenarios. And, finally, the public will be provided the opportunity to participate in developing the plan's strategies and action plans.

(2) Phase 1 – Technical Planning Basis

(a) Overview

The goal of Phase 1 is to develop a credible, and understandable base of technical and programmatic information to support the development of regional recovery goals and biological objectives, strategies, and actions for species recovery or enhancement. As noted above it is comparable to the inventory and assessment elements of the NPPC sub-basin planning process. Phase I products will document and describe:

- The current condition and status of the four listed species, as well as other focal species;
- The environmental needs of the fish and wildlife species and factors or conditions affecting their recovery or well being;
- Government and non-government programs that affect the recovery or enhancement of the targeted species; and
- Recovery criteria for the four listed species and biological objectives for the enhancement of the other focal species. Recovery criteria are the rules or guidelines for achieving recovery on the ESU scale.

Phase 1 work is divided into two stages. Stage 1 involves the collection of available data and the assessment of its adequacy and quality. Stage 2 is the writing of the technical sections of the plan and the establishment of a readily accessible data repository. The overall completion of Phase 1, including both Stages 1 and 2, is scheduled for March 31, 2003. Some inventory and assessment

work will likely continue throughout the balance of 2003 to fill critical data gaps where possible.

(b) Stage 1

The objectives of Stage 1 are to:

- Develop an outline of the technical sections of the recovery plan;
- Identify the type of information needed on the targeted fish and wildlife species, and the environmental factors and management practices affecting recovery or survival;
- Collect available information and data and assess its adequacy and quality;
- Based on the available information develop a detailed specification for writing the technical sections; and
- Evaluate options for establishing a data repository that will provide participating organizations ready access to data.

To date a draft working outline of the recovery/sub-basin plan has been developed (see Attachment 5). The fish, factors limiting recovery and programs work groups have developed a work scope for Stage 1. A consultant has been retained to assist the working groups by collecting available data and evaluating its completeness, adequacy and quality and to develop detailed specifications for the drafting of the plan's technical sections or chapters. The consultant will also develop recommendations for establishing a data repository. The specifications for the plan's technical sections and the recommendations for establishing a data repository will be submitted by the working groups to RPSC for approval before Stage 2 work is initiated. Stage 1 will be completed by October 18, 2002.

(c) Stage 2

The objectives of Stage 2 are to:

- Using the data collected in Stage 1, assess the significance of environmental factors and management practices on the recovery or survival of targeted fish and wildlife species;
- Prepare initial drafts of the plan's technical sections. These sections will comprise chapters one through four of the draft working outline.
- Develop initial recovery criteria and biological objectives that will comprise chapter five of the draft working outline.

- Establish a data repository to support the Phase 2 planning activities.

The consultant in coordination with the working groups and the NOAA Fisheries TRT will develop the analytical methods to assess the impact of current environmental factors and management practices on the recovery of salmonids. The assessment will examine both sub-basin and out-of-sub-basin conditions. Such analytical methods may include the use of models such as EDT. The TRT/LCFRB Lewis River case study will assist in evaluating analytical approaches. The assessment will also be informed by the NOAA Fisheries/NWPPC out-of-basin assumptions, if available.

Watershed functions will be assessed on a sub-watershed level equivalent to the seventh field HUC or geographic units of 3,000 to 10,000 in size. Sub-watersheds will be prioritized based on their current or potential contribution to recovery.

The assessment of conditions affecting the survival or viability of other aquatic and terrestrial species will be will be coordinated with WDFW and Tribal co-managers. The NWPPC Integrated Biodiversity Information System will be consulted in conducting the assessment.

The Fish Work Group will coordinate with the Willamette/Lower Columbia TRT, NMFS, USFWS, WDFW, and the Yakama Nation to establish recovery criteria for ensuring ESU viability of the ESA listed species and biological objectives for the other targeted fish and wildlife species. The consulting team will assist the Fish Work in this effort.

The consultant in coordination with the work groups will prepare the initial draft of the plan's technical sections (Plan Chapters 1 through 5 – see Attachment 4). Upon acceptance by the work groups the plan elements will be forwarded to the RPSC for approval.

Depending on the data repository option selected, the consultant will assist in organizing data and placing it in the repository.

(3) Phase 2 – Goals, Objectives, Strategies, Priorities, and Actions

(a) Overview

Phase 2 will meld technical, social, cultural, and economic considerations to produce a recovery/sub-basin plan that is scientifically sound, acceptable to the public, and sustainable. It is

comparable to the management planning element of the NPPC sub-basin planning process. Early in Phase 2, scenarios defining regional and sub-basin recovery goals and biological objectives will be identified and evaluated, using the information and initial recovery ESU goals and criteria developed in Phase 1. A preferred scenario will be selected and strategies, priorities and actions for implementing the preferred scenario will be developed. A draft recovery/sub-basin plan will be completed by the end of 2003 and a final plan will be completed by May 2004.

(b) Evaluation of Recovery/Enhancement Scenarios

In cooperation with the TRT, the Fish Work group will develop action scenarios based on the ESU recovery goals, criteria and biological objectives developed in Phase 1. Scenarios will be evaluated using technical information collected in Phase 1 and analytical approaches to be developed in consultation with the Fish Work Group, the NMFS TRT, WDFW, and the Yakama Nation. For ESA listed fish species, the scenarios may be based on restoring different combinations of populations as well as combinations of habitat, hatchery, harvest and hydro actions. Scenarios for other targeted fish and wildlife species may be based on other combinations of habitat and management assumptions.

Once technically sound scenarios have been identified, they will be reviewed and evaluated for their social, cultural, and economic implications. This evaluation will be accomplished through a facilitated public policy dialogue involving the participating agencies and governments and the public. The RPSC will coordinate this effort and work groups will provide technical assistance.

Based on evaluation results, the RPSC will select a preferred scenario further defining regional and sub-basin recovery goals upon which implementation strategies, priorities and actions will be based.

(c) Development of Strategies, Priorities, and Actions.

Work groups will develop implementation strategies, priorities and actions for the preferred scenario. Both regional and sub-basin/watershed specific strategies, priorities, and actions will be developed. Implementation responsibilities will be determined along with an implementation schedule and cost estimates.

Monitoring and adaptive management strategies and processes will be established.

The RSPC will approve the strategies, priorities and actions for implementing the preferred scenario.

(d) Completion of Recovery/Sub-basin Plan

The products of Phase 1 and Phase 2 will be combined to produce a draft recovery/sub-basin plan by January 31, 2004. Participating governments and agencies and the public will then review the plan. The RPSC will make revisions to the plan based on comments received and forward it to the LCFRB for approval. Following LCFRB approval, the plan will be submitted NMFS, USFWS, NWPPC, and the state. This is scheduled to occur by May 2004.

e. Public Outreach and Involvement

(1) Overview

Public outreach and involvement is key to the success of the recovery/sub-basin planning process. Without public acceptance and support of the plan, implementation is unlikely to be successful or sustainable over the long-term. For this reason, the public will be an integral partner in the development of the Lower Columbia Recovery/Sub-basin Plan.

Public outreach efforts will focus on two areas:

(a) Providing the public with the information needed to understand the issues and decisions; and
(b) Providing the public with opportunities to participate in the decision making process.

Outreach efforts will be coordinated with those of participating agencies and governments to promote consistency and efficiency. The LCFRB will coordinate its efforts with those of the ESA Executive Committee to develop public information strategies that describe how the recovery/sub-basin planning effort relates to the development of the Willamette/Lower Columbia domain recovery plan. In planning for the estuary and lower Columbia mainstem, public outreach strategies will be developed in coordination with the LCREP and Oregon agencies and local governments.

(2) Phase 1

In early 2003, public workshops will be held throughout the region to allow the public to review the Phase 1 products. The goals of this process will be to:

(a) Promote public understanding of current conditions and the proposed recovery goals;
(b) Solicit their comments and questions on the information; and
(c) Solicit their thoughts on what social, cultural and economic factors should be considered in identifying and selecting scenarios for achieving recovery goals and biological objectives

A feedback mechanism will advise the public as to how the input was used or addressed.

(3) Phase 2

Public involvement during Phase 2 will be an iterative process as scenarios are evaluated and implementation measures are developed. The public will be invited to review and comment on products as they are developed and revised. This will be accomplished on both the regional and watershed levels. Watershed advisory groups will be established to assist in developing outreach measures best suited to individual watersheds. Feedback processes will be used to ensure the public knows how its input was used or addressed.

ATTACHMENTS:

A. Regional Map
B. Salmonid Stock Status
   - B.1 Salmonid Stock Status
   - B.2 Definitions
   - B.3 Salmon Stock Tiering Priorities
C. Limiting Factors by Watersheds
   - C.1 Bonneville
   - C.2 Chinook
   - C.3 Cispus
   - C.4 Coweeman
   - C.5 East Fork Lewis River
   - C.6 Elochoman-Skamokawa
   - C.7 Grays
   - C.8 Kalama
   - C.9 Lake
   - C.10 Lewis
   - C.11 Mill-Abernathy-Germany

- C.12 Riffe
- C.13 Tilton-Mayfield
- C.14 Toutle
- C.15 Upper Cowlitz
- C.16 Washougal
- C.17 Wind

D. Working Draft of Plan Outline

E. Organization
- E.1 Organization Chart
- E.2 Recovery Plan Steering Committee Membership
- E.3 Working Groups Memberships
- E.4 Lower Columbia Fish Recovery Board Membership

F Schedule

G Budget

Attachment A

Lower Columbia Salmon Recovery Region

Lower Columbia Salmon and Steelhead Stock Status
By Basin

BASIN	STOCK	PRIORITY TIER NUMBER	STOCK ORIGIN	PRODUCTION TYPE	1992 STOCK STATUS	UPDATED STOCK STATUS	ESA STATUS
Chinook River		*					
Grays River	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Chum - Fall	1	Native	Wild	Depressed	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Depressed	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Skamokawa Creek	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Unknown	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Elochomon	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Depressed	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Mill Creek	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Depressed	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Abernathy Creek	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Depressed	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Germany Creek	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	4	Native	Wild	Depressed	NC	Not Listed
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed

Lower Columbia Salmon and Steelhead Stock Status By Basin

BASIN	STOCK	PRIORITY TIER NUMBER	STOCK ORIGIN	PRODUCTION TYPE	1992 STOCK STATUS	UPDATED STOCK STATUS	ESA STATUS
Cowlitz	Chinook - Spring	2	Mixed	Composite	Healthy	Depressed[2]	Threatened
	Chinook - Fall	2	Mixed	Composite	Healthy	Depressed[2]	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	1	Mixed	Wild	Depressed	NC[3]	Threatened
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Coweeman	Chinook - Fall	2	Mixed	Composite	Healthy	Depressed[2]	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Toutle	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Candidate
Mainstem/North Fork	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
South Fork	Chinook - Fall	2	Unknown	Composite	Depressed	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	1	Native	Wild	Healthy	Depressed[3]	Threatened
Green	Chinook - Fall	2	Unknown	Composite	Depressed	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
Kalama	Chinook - Spring	2	Mixed	Composite	Healthy	NC	Threatened
	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Summer	1	Mixed	Wild	Depressed	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Healthy	NC	Threatened
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Lewis	Chinook - Spring	2	Mixed	Composite	Healthy	NC	Threatened
	Chinook - Fall	1	Native	Wild	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
	Bull Trout	1	Native	Wild	NA	Depressed[4]	Threatened[1]

Lower Columbia Salmon and Steelhead Stock Status
By Basin

BASIN	STOCK	PRIORITY TIER NUMBER	STOCK ORIGIN	PRODUCTION TYPE	1992 STOCK STATUS	UPDATED STOCK STATUS	ESA STATUS
Lewis (con't)							
North Fork	Steelhead - Summer	1	Native	Wild	Depressed	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
East Fork Lewis	Chinook - Fall	1	Native	Wild	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Summer	1	Native	Wild	Unknown	Depressed[3]	Threatened
	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
Salmon Creek	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Steelhead - Winter	1	Native	Wild	Depressed	NC	Threatened
	Coastal Cutthroat	4	Native	Wild	NA	Depressed[1]	Not Listed
Washougal River	Chinook - Fall	2	Mixed	Composite	Healthy	NC	Threatened
	Coho	3	Mixed	Composite	Depressed	NC	Candidate
	Coastal Cutthroat	4	Native	Composite	NA	Unknown[1]	Not Listed
Mainstem	Steelhead - Summer	1	Native	Wild	Unknown	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Unknown	NC	Threatened
West Fork (North Fork)	Steelhead - Summer	1	Native	Wild	Unknown	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Unknown	NC	Threatened
Bonnevile Tributaries	Coho	3	Mixed	Composite	Depressed	NC	Candidate
Hardy Creek	Chum - Fall	1	Native	Wild	Healthy	NC	Threatened
Hamilton Creek	Chum - Fall	1	Native	Wild	Depressed	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Unknown	NC	Threatened
Wind River	Chinook - Spring	2	Non-Native	Composite	Depressed	NC	Not Listed
	Chinook - Fall/Tule	2	Mixed	Composite	Depressed	NC	Threatened
	Chinook - Fall/Bright	2	Unknown	Composite	Healthy	NC	Threatened
	Steelhead - Winter	1	Native	Wild	Unknown	NC	Threatened
Mainstem	Steelhead - Summer	1	Native	Wild	Depressed	Critical[5]	Threatened
Panther Creek	Steelhead - Summer	1	Native	Wild	Depressed	Critical[5]	Threatened
Trout Creek	Steelhead - Summer	1	Native	Wild	Depressed	Critical[5]	Threatened
White Salmon River	Chinook - Fall/Tule	2	Mixed	Composite	Depressed	NC	Threatened
	Chinook - Fall/Bright	2	Mixed	Composite	Healthy	NC	Threatened
	Steelhead - Summer	1	Unknown	Wild	Depressed	NC	Threatened[6]
	Steelhead - Winter	1	Unknown	Wild	Unknown	NC	Threatened[6]

ATTACHMENT 1 DEFINITIONS

*Chinook River is not included at this time due to a lack of information. Data will be added asap.

Notes:

[1] SaSI 2000 - Coastal Cutthroat

[2] WRIA 26 LFA (G. Wade) - Tipping 2000 personal communications

[3] LCSCI 1997

[4] SaSI 1998 - Bull Trout/Dolly Varden

[5] WRIA 29 LFA (B. Cowan)/LCSCI 1997

[6] Listed as part of the Middle Columbia ESU

SaSI Definitions

Native: An indigenous stock of fish that has not been substantially impacted by genetic interactions with non-native stocks, or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exitst

Non-native: A stock that has been established outside of its original range.

Mixed: A stock whose individuals originated from commingled native and non-native parents, and/or by mating between native and non-native fish (hybridization); or a previously native stock that has undergone substantial genetic alteration.

Wild: A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (includes native).

Cultured: A stock that depends upon spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility.

Composite: A stock sustained by both wide and artificial production.

Healthy: A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

Depressed: A stock of fish whose production is below expected levels based on available habitat and natural variations in survivial rates, but above the level where permanent damage to the stock is likely.

Critical: A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

Unknown: There is insufficient information to rate stock status.

LCSCI Stream Tiering Criteria:

TIER 1: (first level of priority for action) - Criteria: those stocks that are "healthy" and "critical."

TIER 2: (second level of priority for action) - Criteria: the remaining summer-run stocks; summer-run have been identified by WDFW and NMFS as needing urgent atten due to their depressed status, limited distribution, and life history.

TIER 3: (third level of priority for action) - Criteria: greater multispecies benefits (shum, chinook and cutthroat) and, of the remaining depressed stocks in the LCSCI area, stocks that are most healthy, and those that are least healthy.

TIER 4: (fourth level of priority for action) - Criteria: stocks in the LCSCI area represented by smaller populations at intermediate risk, or those that are strongly affected by hydro/dams/FERC projects and process (and thus actions would be more long-te

TIER 5: (lowest level of priority for action) - Criteria: the remainder of stocks in the LCSCI area, outside the ESU proposed for listing.

BONNEVILLE TRIBUTARIES SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	**Priority**	**Other Anadromous Salmonids Present in the Sub-basin (LFA)**
Hardy Creek Chum Salmon (SASSI)	Tier 1	Fall Chinook
Hamilton Creek Chum Salmon (SASSI)	Tier 1	Coastal Cutthroat Trout
Hamilton Creek Steelhead (LCSCI)	Tier 1	
Bonneville Tributaries Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	***Priority Rating***	***Potential Restoration Actions***	***Preservation Actions***
Fish Passage	**Medium/High:** 13.7% of the historic habitat is blocked. High priority in Gibbons Creek; medium priority in other streams.	• Two culverts on Gibbons Creek (Hans Nagel Rd. and upstream a private culvert block 1.4 miles for steelhead, coho, cutthroat). • Hardy Creek railroad culvert (0.9 miles blocked for steelhead, coho, cutthroat) • A series of culverts on Campen Creek block 1.0 mile for steelhead, coho, and cutthroat. • Assess the potential impacts to Western Pond Turtles if Greenia Creek pond is opened to fish passage (potentially high quality rearing habitat opened).	None
Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect floodplain habitat in the lower end of Gibbons Creek and on the Columbia River floodplain at Steigerwald Refuge. • Reconnect floodplain habitat in the lower mile of Hardy Creek, and open Greenia Creek and associated wetlands to fish. • Reconnect lower Woodward Creek to its floodplain. • Reconnect lower Hamilton Creek to its floodplain.	Reconnect and preserve off-channel and side channel habitat and associated wetlands wherever they occur. Lower Gibbons Creek, Steigerwald Refuge, Frans Lake, and Greenia Creek wetlands are priorities.

Sediment	**High:** Sediment fines and/or excessive bedload deposition are significant problems in a number of streams	• Reduce fine sediment inputs from roads, riparian loss, and stormwater in Gibbons, Campen, Hardy, Woodward, and Duncan Creeks (affects steelhead, coho, chum, and cutthroat). • Reduce excessive bedload deposition in Hamilton, Good Bear, Lawton, and Indian Mary Creeks by improving sediment transport through railroad and SR 14 culverts and by reducing land use activities that affect stream bank and channel stability (affects steelhead, coho, chum)	Protect and enhance riparian corridors, especially in the upper watersheds of the Bonneville Tributaries Sub-basin
Channel/LWD Conditions	**Medium:** LWD levels and pool habitat are "poor" throughout the sub-basin	• Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (though recruitment potential is low for most streams). Many of the gorge tributaries are extremely high-energy systems where LWD placement may fail if improperly place and/or designed. • Placement of LWD structures in the new Hardy Creek spawning channel could provide multiple benefits without the problems found in other high-energy stream systems.	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" almost throughout the sub-basin	• Target riparian restoration efforts along the most productive and/or degraded streams including the lower reaches of Hardy, Hamilton, Lawton, and Woodward Creeks and Gibbons above SR 14.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries, especially in Hardy, Hamilton, and Greenleaf Creeks.
Water Quality	**Medium/High:** High Priority to address significant water quality problems that occur in Gibbons and Campen Creeks. Data is generally lacking for other streams (Medium Priority).	• Restore riparian cover for all streams within the sub-basin, especially along Campen and Gibbons Creeks. • Reduce livestock access to streams and riparian corridors. • Restore and enhance wetlands. • Reduce stormwater impacts on water quality, especially in Gibbons, Campen, and Hamilton Creeks	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.

Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Reduce stormwater impacts in the Gibbons Creek watershed and downstream of North Bonneville. • Restore unimpeded sediment transport through railroad and SR 14 culverts to reduce bedload deposition that often leads to subsurface flows during dry months. • Monitor the operation of Duncan Creek Dam and its effects on aquatic and fish assemblages.	Protect the supply of water to springs that provide critical chum spawning sites in Duncan, Hardy, and Hamilton Creeks.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Invasive species reduce riparian function.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Remove invasive, non-native vegetation and replace it with native species, especially along lower Hardy, Lawton, Gibbons, Campen, Duncan, and Hamilton Creeks. • Monitor the operation of Duncan Creek Dam and its effects on the aquatic community.	Preserve riparian corridors and wetlands with native vegetation

* Restoration and preservation actions by limiting factor were identified based upon the Limiting Factors Report and will be circulated to TAG members for their review.

“Poor”, “Fair” and “Good” comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

LAKE RIVER SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Salmon Creek Winter Steelhead (LCSCI)	Tier 1	
Salmon Creek Coastal Cutthroat (SaSI)	Tier 4	
Salmon Creek Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium/High:** Medium priority to address the 4.7% of the historic habitat in the sub basin that is blocked. A dam on Baker Creek is a high priority.	• Baker Creek dam blocks approximately 1 mile of coho and steelhead habitat. • Private culverts on upper Rock Creek may block passage and need assessment. • Possible culvert barriers on Morgan Creek above 179th St. need assessment and repair. • Culverts on Burnt Bridge Creek at Royal Oaks golf course block passage for cutthroat and coho. • Passage conditions in the flushing channel into Vancouver Lake may inhibit juvenile fish use and may even trap juveniles. The flushing channel needs assessment and potentially repairs. • Passage is limited to many small Columbia Slope tributaries by culverts under the railroad and roads. Passage barriers need assessment in this area.	None
Floodplain Conditions	**High:** Very limited floodplain habitat	• Restore floodplain connectivity wherever possible in the Columbia River lowlands around Vancouver Lake and Lake River.	Preserve off-channel and side channel habitat and associated

Floodplain Conditions (Con't)	available with numerous modifications.	This area provides rearing habitat for mainstem Columbia River migrants, as well as local stocks. • Studies have determined that lack of suitable rearing habitat likely limits productivity in the Salmon Creek watershed. Increase floodplain and off-channel rearing habitat in lower Salmon Creek below I-5, between 72nd and 182nd Avenues, and in Mill, and Curtin Creeks. • Restore floodplain and wetland connections in Whipple, and Burnt Bridge Creeks.	wetlands wherever they occur. The lower reaches of Salmon, Whipple, and Burnt Bridge Creeks are priorities.
Sediment	**High:** Sediment fines are significant problems in almost all streams in the sub basin.	• Reduce impacts from stormwater and erosion that occurs in rapidly developing basins like Salmon, Whipple, and Burnt Bridge Creeks. • Fence livestock from streams and restore riparian corridors along Mill, Woodin, Morgan, Baker, Rock, Whipple, and upper Salmon Creeks. • Address bank erosion problems on Salmon Creek between I-5 and 182nd, by Pleasant Valley School, and in areas of Mill, Rock, Morgan and Whipple Creeks. • Identify and repair roads that are contributing excessive fine sediments to streams in the sub-basin.	Protect existing quality riparian corridors from additional development along all anadromous streams within the sub basin. Preserve vegetation and limit development in areas with steep, unstable slopes.

Channel/LWD Conditions	**Medium:** LWD levels and pool habitats are very limited throughout the sub basin.	• Increase functional LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (though recruitment potential is low for most streams). Areas to focus include upper Salmon and Rock Creeks where a majority of the steelhead and coho spawning occurs. • Encourage beaver activity wherever possible.	Protect existing mature riparian vegetation for LWD recruitment, especially along the upper reaches of Salmon, Morgan, and Rock Creeks. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" almost throughout the sub-basin.	• Target riparian restoration efforts along the most productive and/or degraded streams including upper Salmon and Rock Creeks. • Support ongoing efforts by CPU to identify priority riparian projects, educate property owners, and provide support for riparian restoration. • Restore riparian corridors along the County's Park properties in lower Salmon and Whipple Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub basins tributaries, focusing first on upper Salmon, Morgan and Rock Creeks.
Water Quality	**High:** Water quality is a significant problem in almost all watersheds of the sub basin.	• Restore degraded riparian cover for all streams within the sub basin, especially along Salmon, Whipple and Burnt Bridge Creeks. • Reduce livestock access to streams, notably in Salmon, Mill, Morgan, and Mud Creeks. • Protect and restore wetlands, springs, and seeps in the sub basin. • Reduce stormwater impacts on water quality in all urbanized portions of the sub basin. • Identify and eliminate failing septic tanks and drain fields in the sub basin.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and enhance wetlands and spring fed sources of cool water wherever encountered in the sub basin.

Water Quality (Con't)		• Reduce direct runoff from roads to streams. • Enhance pool habitat to provide thermal refuge for salmonids rearing in the watersheds.	
Water Quantity	**High:** Both elevated peak and low flows present problems in the sub-basin.	• Reduce impervious surfaces and develop stormwater facilities that will promote groundwater recharge, reduce peak flows, and potentially enhance low summer flows. • Reduce water withdrawals from areas that might reduce summer flows. • Identify unauthorized private diversions within the sub basin and work with landowners on alternative sources of water. • Explore opportunities for water reuse where it could supplement instream flows (one source could be treated wastewater from the City of Battle Ground).	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuge for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Low/Medium:** Escapement is well below historic levels and a lack of nutrients may be limiting (Medium Priority). Invasive species reduce riparian function (Low Priority)	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Along riparian corridors and wetlands, remove invasive, non-native vegetation and replace it with native species. • Assess and identify possible remedies to predation in Lake River and lower Salmon Creek.	Preserve natural vegetation along riparian corridors and within wetlands.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

CISPUS RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Cowlitz Winter Steelhead (LCSCI)	Tier 1	
Cowlitz Spring Chinook	Tier 2	
Cowlitz Coastal Cutthroat (SaSI)	Tier 4	
Cowlitz Coho (SASSI)	Tier 3	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium/High:** Passage issues involving the dams are a high priority. Medium priority to collect data on other passage barriers, and fix the one identified barrier (Barriers block 1.5%of the available habitat)	• Reintroduction efforts of anadromous salmonids in the subbasin are dependent on the success of smolt collection efficiency at Cowlitz Falls Dam. Continue to monitor and improve collection efficiencies at the Cowlitz Fall Dam. • A complete barrier assessment is needed within the subbasin. • Assess subsurface, low flow passage issues on Copper, Crystal, and Camp Creeks, and identify solutions to the problem. • Repair the blocking culvert in the upper reaches of Woods Creek that blocks approximately 1 mile of potential habitat.	None
Floodplain Conditions	**Medium:** Limited floodplain habitat available with numerous modifications.	• Numerous stream adjacent roads reduce floodplain connectivity in the subbasin. Stream adjacent roads, stream crossings, and other floodplain constrictions should be assessed and if possible improved to provide additional side-channel and off-channel habitat. Areas to focus include the mainstem Cispus between Quartz and Iron Creeks, Yellowjacket Creek, and along the alluvial fan of Camp Creek.	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. The mainstem Cispus between Iron Creek (RM 8.2) and the North Fork Cispus (RM 19.9) has high quality side-channel and off-channel habitat that should be protected and enhanced.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Sediment	**High:** Sediment fines are a significant problem in the subbasin.	• Roads and timber harvests have increased peak flows and slope failures in the subbasin, contributing excessive sediment to stream channels. Reduce road densities where possible and reduce fine sediment delivery from roads to streams with sediment traps, filters, erosion control blankets, and by minimizing the use of fine materials in constructing stream crossings. • Stabilize mass wasting areas in the Camp Creek watershed. • Stabilize landslides that have occurred along the 26 Road that parallels Quartz Creek. • Plant riparian vegetation along the braided section of the Cispus River between RM 17.4 and RM 25. • Continue to evaluate dispersed and developed recreation sites for excessive use and sediment delivery. • Reconstruct or relocate trails and trail crossings over streams. •	The North Fork Cispus provides some of the best functional habitat in the subbasin and protection of this watershed is the highest priority in the subbasin. Yellowjacket Creek provides a substantial amount of the tributary habitat in the basin and the watershed should be protected and enhanced. Woods, Orr, and Iron Creeks also provide high quality spawning and rearing habitat.
Channel Conditions/ LWD	**Medium:** LWD levels and pool quantities are generally “poor” throughout the sub-basin.	• LWD is lacking in all anadromous streams in this subbasin due to channel cleaning and timber harvest. Increase functioning LWD structures, or similar natural structures, in the North Fork Cispus, and Yellowjacket, Wood, and Ames Creeks. Utilize LWD that collects at Mossyrock Dam for LWD projects with the subbasin. • Decommission and improve roads, and plant riparian areas in side channel areas of the Cispus from Iron Creek to Blue Lake Creek to reduce sediment delivery and channel instability. • LWD placement projects in the lower Cispus, near the head of Lake Scanewa, would help attract juveniles to the area and move them away from the Dam where they might be flushed into Riffe Lake during frequent drawdowns. • Incorporate new road construction techniques that allow the passage of LWD and sediments. • The North Fork Cispus lacks adequate rearing habitat for coho. Increase and/or enhance side-channel habitat.	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Riparian	**Medium:** Riparian conditions are generally "fair" to "poor" throughout the sub-basin	• Manage early- and mid-seral stage riparian vegetation within riparian reserves to develop late-seral characteristics. • Plant trees along the braided section of the Cispus River Between RM 17.4 and RM 25 to increase riparian function and promote channel stability. • Increase riparian shading with pre-commercial thinning, planting, and under planting in the Cispus, and East Canyon, and Chambers Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries.
Water Quality	**Low/Medium:** Water temperatures are generally within historic ranges in most of the subbasin. Medium priority to address streams with elevated temperatures	• Maintain and restore riparian cover for all streams within the sub-basin, focusing first along the mainstem Cispus, and Woods and East Canyon Creeks.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin. Dams alter the hydrology of the lower Cispus and Cowlitz.	• Juveniles are often flushed over the Cowlitz Falls Dam or stranded due to frequent drawdowns during high flows. The flow thresholds should be reevaluated to protect fisheries, and if possible thresholds should be increased. • Decommission and/or improve roads to increase infiltration and reduce the overall drainage network. • Assess and, if possible, decrease excessive sediment accumulations in Copper, Crystal, and Camp Creeks to maintain surface flows year round.	Maintain adequate mature forest cover to prevent a substantial increase in peak flows.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Increase contribution of marine–derived nutrients through increased use of carcasses.	Preserve existing native vegetation along riparian corridors and within wetlands.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

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COWEEMAN RIVER SUB-BASIN
(INCLUDING THE LOWER 20 MILES OF THE COWLITZ RIVER)
STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Coweeman Winter Steelhead (LCSCI)	Tier 1	Chum Salmon
Coweeman Fall Chinook (SASSI)	Tier 2	
Coweeman Coastal Cutthroat (SaSI)	Tier 4	
Coweeman Coho (SASSI)	Tier 3	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** 9.2% of the historic habitat is blocked.	• Repair of the culvert on Turner Creek at Rose Valley Road that blocks approximately 2.4 miles of habitat for coho, winter steelhead, and cutthroat is the highest priority access problem. The habitat upstream of this culvert needs assessment since other upstream private culverts may block access to habitat. • A number of unnamed tributaries to the lower Cowlitz have barriers that need assessment and repair. • Upper Baird Creek has a remnant splash dam that needs assessment and repair. • A box culvert on Ostrander Creek was considered a partial barrier and needs assessment and repair. • There are a number of culverts identified in this subbasin that may be passage barriers. The Cowlitz Conservation District is conducting culvert inventories on the Coweeman and this list should be updated as better information becomes available.	None
Floodplain Conditions	**High:** Very limited floodplain habitat available in the lower Cowlitz and Coweeman River, with numerous modifications.	• Restore and enhance floodplain habitats and associated wetlands on the Coweeman River between RM 4 and RM 7.5. • Abandoned gravel pits near RM 7 could provide additional rearing and overwintering habitat along the lower Coweeman. Assess and identify potential restoration and enhancement opportunities in this area. • Identify and restore floodplain habitat along Ostrander Creek where the railroad	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. A high priority is some of the only remaining unconfined rearing habitat in the lower Coweeman that occurs between RM 4 and RM 7.4.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Floodplain Conditions (Con't)		limits floodplain development.	Floodplain habitat is extremely limited in the lower Cowlitz River and functional floodplain habitat should be identified and protected from further development. The Sandy Bend area is the only remaining unconfined floodplain habitat on the lower Cowlitz.
Sediment	**High:** Excessive sediment fines is a significant problem in a number of streams in the sub-basin	• Road densities are very high in the sub-basin (over 6.5 miles/square mile) and roads have often contributed to slope failures. Assess and then abandon or repair roads that are contributing excessive fine sediment to streams and/or in areas prone to slope failures. • Rose Valley Road contributes approximately 11% of the estimated fine sediment inputs from all roads in the upper watershed. Maintain and repair the road to reduce chronic sediment inputs. • The 1600 and 1640 Roads also contribute excessive fine sediments, and they need assessment and repair to reduce sediment inputs. • Fence cattle away from riparian areas and restore vegetation in the agricultural zone on the Coweeman between RM 4 to RM 7.5. • Restore riparian vegetation along stream reaches, starting with areas with unstable soils.	The Coweeman supports a run of wild fall Chinook and critical spawning habitat needs protection between RM 11.4 and RM 25.9. Protect and enhance riparian corridors, especially in the most productive tributaries (Mulholland, Baird, and Goble Creeks) and along unstable reaches in the upper watershed.
LWD	**Medium:** LWD levels and pool habitat are "poor" throughout the sub-basin.	• Most of the fish bearing channels in the upper Coweeman would respond well to increased loading of LWD. Increase LWD levels or similar natural pool forming structures in appropriate stream reaches through LWD placement projects and/or through recruitment (though recruitment potential is low for most streams). Many of the larger tributaries and the mainstem Cowlitz and Coweeman are high-energy systems where LWD placement may fail if improperly place and/or designed. • Restore riparian vegetation to provide future supplies of LWD.	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" throughout the	• Increase riparian function along developed reaches of the lower Cowlitz and Coweeman wherever possible. • Restore riparian functions along the numerous valley bottom roads wherever	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries, especially

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Riparian (Con't)	sub-basin	possible. • Target riparian restoration efforts along the most productive and/or degraded streams including Mulholland, Baird, and Goble Creeks.	along the Coweeman between RM 11 and RM 25, and on Mulholland, Baird, and Goble Creeks.
Water Quality	**High:** High Priority to address significant water quality problems that occur in the Coweeman.	• Maintain and restore riparian cover for all streams within the sub-basin, especially along the Coweeman River, and Baird, Mulholland, and Goble Creeks, which are all listed on the 303d list for temperature. • Reduce livestock access to streams and riparian corridors. • Restore and enhance wetlands. • Reduce stormwater impacts from industrial and residential development along the lower Cowlitz and Coweeman Rivers.	Protect functional riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Low flows potentially affects production in both Salmon and Ostrander Creeks. Identify opportunities to augment flows and enhance rearing habitat in these systems. • Data is lacking for low conditions on most other streams. • Reduce impervious surfaces, road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuges for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Carcass placement projects are not yet occurring in the Coweeman River. Sites and project sponsors need to be identified to begin nutrient enhancement projects in the sub-basin.	Preserve riparian corridors and wetlands with intact native vegetation.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

EAST FORK LEWIS SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	**Priority**	**Other Anadromous Salmonids Present in the Sub-basin (LFA)**
East Fork Lewis Summer Steelhead (LCSCI)	Tier 1	Chum Salmon
East Fork Lewis Winter Steelhead	Tier 1	
East Fork Lewis Fall Chinook	Tier 1	
Lewis River Coastal Cutthroat (SaSI)	Tier 4	
Lewis River Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	***Priority Rating***	***Potential Restoration Actions***	***Preservation Actions***
Fish Passage	**High:** 16.5% of the historic habitat in the subbasin is blocked (22.8 miles).	• A culvert near the mouth of Brezee Creek blocks 5.7 miles of potentially productive habitat for winter steelhead, cutthroat, coho. Other barriers on Brezee include a dam 500 feet upstream of the first culvert, another culvert at 359th St., and another culvert on a major tributary, which blocks 1.8 miles of habitat. • A partial to total culvert passage barrier on McCormick Creek blocks 2.3 of potential habitat for steelhead, coho, and cutthroat. • A series of culverts need assessment and likely repair on Mason Creek. • A private culvert near the mouth of Dean Creek is likely a passage barrier with 2.2 miles of potential habitat upstream.	None
Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect and enhance off-channel and floodplain habitats along the lower 10 miles of the East Fork to help increase rearing habitat for juvenile salmonids. • Reconnect and enhance side channels and areas with upwelling that could provide chum spawning sites in the lower East Fork.	Preserve off-channel and side channel habitat and associated wetlands wherever they occur in the East Fork and its tributaries. The lower reaches of the East Fork from RM 2 to RM 10 are especially important.

Sediment	**Medium:** Data is lacking for many areas in the subbasin. Sediment fines rated "poor" to "fair" in the LFA for most streams in the subbasin.	• Assess and stabilize excessive erosion and mass wasting on the East Fork between RM 6 to RM 11. • Identify and repair roads that are contributing excessive fine sediments to streams in the subbasin. Reduce fine sediment inputs from heavily traveled gravel roads into the Larch Mountain Corrections Facility. • Assess and, if possible, stabilize mass wasting and bank erosion problems on Mason Creek near Anderson Road, on lower Rock Creek near Rock Creek Rd., and on upper Rock Creek near Dole Valley Rd. • Fence livestock away from streams and riparian corridors. • Reduce turbidity generated during gravel processing on the lower East Fork.	Protect existing quality riparian corridors from additional development along all anadromous streams within the subbasin. Protect critical spawning habitat for wild fall chinook, coho, chum, and steelhead between RM 6.2 and RM 15 on the mainstem East Fork Preserve vegetation and limit development in areas with steep, unstable slopes.
Channel/LWD Conditions	**Medium:** LWD levels and pool habitats are generally limited throughout the sub-basin.	• Increase functional LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (though recruitment potential is low for most streams). Areas to focus include appropriate sites within the upper East Fork, in lower and upper Rock Creeks, and in Cedar Creek.	Protect existing mature riparian vegetation for LWD recruitment, especially along the upper reaches of the mainstem East Fork, and Breeze, Rock, Cedar, Riley, Mason, and Dean Creeks. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**Medium:** Riparian conditions are "poor" almost throughout the sub-basin.	• Target riparian restoration efforts along the most productive and/or degraded streams including the lower reaches of the mainstem East Fork, and Upper Rock Creek. • Continue efforts to restore riparian corridors and forested wetlands along Clark County's open space lands along the lower East Fork Lewis.	Preserve healthy riparian corridors in the headwaters of all the sub-basin's tributaries, focusing first on productive areas like Upper Rock Creek and the upper reaches of the East Fork Lewis.
Water Quality	**High:** Water quality is a significant problem, especially in the lower reaches and tributaries of the East Fork.	• Restore riparian cover for all streams within the sub-basin, especially along degraded reaches of tributaries to the lower East Fork. • Reduce livestock access to streams, notably in McCormick, Lockwood, Dean, Lower Rock Creek, and Yacolt Creeks. • Restore and enhance wetlands, springs, and seeps in the subbasin. • Reduce direct runoff from roads to streams, especially from heavily traveled gravel roads in the upper watershed. • Enhance pool habitat to provide thermal refuge for salmonids rearing or holding in the watersheds.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and enhance wetlands and spring fed sources of cool water wherever encountered in the subbasin.

Water Quality (Con't)		• Assess and identify actions to reduce the impacts of farming activities on water quality in Lower Rock and Yacolt Creeks. • Reduce water quality impacts from gravel processing activities on Dean Creek and the lower East Fork. • Assess and identify actions to reduce the impacts to water quality (temperature) from the avulsion of the East Fork into the Ridgefield Pits (RM 8)	
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Reduce impervious surfaces, road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows. • Identify unauthorized private diversions and/or withdrawals within the subbasin and work with landowners on alternative water sources.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuge for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and a lack of nutrients may be limiting. Invasive species reduce riparian functions.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Along riparian corridors and wetlands, remove invasive, non-native vegetation and replace it with native species. The floodplains in the lower reaches of the East Fork and tributaries have some of the most significant problems with invasive species. • Assess and identify possible remedies to predation in the Ridgefield Pits and lower East Fork.	Preserve existing natural vegetation along riparian corridors and within wetlands.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

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ELOCHOMAN/SKAMOKAWA SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Skamokawa Fall Chinook (SASSI)	Tier 2	Chum Salmon
Skamokawa Coastal Cutthroat (SaSi)	Tier 4	
Skamokawa Coho (SASSI)	Tier 3	
Skamokawa Winter Steelhead (LCSCI)	Tier 4	
Elochoman Fall Chinook (SASSI)	Tier 2	
Elochoman Coastal Cutthroat (SaSI)	Tier 4	
Elochoman Coho (SASSI)	Tier 3	
Elochoman Winter Steelhead (LCSCI)	Tier 4	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** There were a number of passage barriers identified in the subbasin	• Cowlitz/Wahkiakum Conservation District is currently conducting a culvert inventory for these watersheds that should provide more accurate data in the near future on passage problems. • Dead Slough has a tide gate at the lower end (RM .2) and a gate valve on the upper end (RM 1.7) that blocks 2.3 miles of low gradient habitat. Any alterations to the existing tidegates could potentially impact water quality in Skamokawa Creek and will require careful consideration before any modifications are proposed (TAG). • The pump station at the wildlife refuge blocks access to approximately 1.44 miles of habitat in Risk Creek. • The tide gate on Alger Creek needs to be assessed along with two culverts near State Highway #4. • Eggman Creek culvert, RM 2.1, has an outfall drop of three feet that blocks .4 miles of habitat. • Kelly Creek, RM 0.1, and its Unnamed Creek have culverts that	None

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage (Continued)		are barriers. TAG indicated that the upper watershed is in good timbered condition and supports natural wetlands that may be important habitat. • Several unnamed tributaries to Standard Creek have passage culvert problems that need repair. • Beaver Dam Creek (Kelly Creek on USGS 7.5-minute maps) culvert located under State Route 4 in West Valley may impair passage to 1-2 miles of habitat. • Several passage barriers have been repaired on Birnie Creek; however, the fish screens near the mouth may block passage and need assessment and repair. • A culvert on Nelson Creek, RM 2.0, blocks access to approximately 1.6 miles of habitat. • Although the Beaver Creek Hatchery, RM 5, is no longer in operation, the intake dam may be a barrier, blocking 2.6 miles of habitat, and it needs assessment and repair. • Four culverts on Duck Creek, RM 0.1 to 1.7, have outfall and gradient problems. • Clear Creek, RM 9, culvert and the hatchery's water intake are concerns that need assessment. • A culvert under old railroad grade and county road on Rock Creek at RM 11 blocks almost .8 miles of habitat.	
Floodplain Conditions	**High:** Data is generally lacking on the condition of floodplain habitat in the subbasin	• Dikes, numerous stream adjacent roads, and a railroad grade reduce floodplain connectivity along the Elochoman River and its tributaries. These floodplain constrictions should be assessed and improved to provide additional floodplain and off-channel habitat. • Dikes and entrenchment also limit floodplain connections to most of the low gradient habitat in the Skamokawa Creek watershed including the mainstem Skamokawa, the West Fork Skamokawa, and Wilson, Falk, Pollard, and Bell	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Side channels that exist in the upper segments of Wilson, Falk, and Left Fork Skamokawa Creeks need

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Floodplain Conditions (Continued)		Canyon Creeks. Where possible, restore floodplain access and connectivity. • The Columbia Land Trust was recently awarded a grant to open up floodplain habitat adjacent to Alger Creek. Where possible, build on these restoration efforts.	protection and enhancement.
Sediment	**High:** Sediment fines are a significant problem in the subbasin. Numerous mass-wasting events occur in both the Elochoman and Skamokawa watersheds.	• Forest practices and roads have contributed substantially to mass-wasting events in the Elochoman watershed. Prioritize identification of and avoidance of unstable slopes, and decommission or repair roads that are contributing excessive sediments to streambeds. TAG members noted that the West Fork Elochoman had some of the worst mass wasting, bank instability, and fine sediment problems. Avoid development on unstable slopes, repair or decommission roads and road crossings, and restore riparian vegetation, starting in areas where slope stability is a problem. • The Wilson Creek sub-watershed had by far the highest number of mass failures/square mile of the 13 watersheds assessed by Waterstrat (1994) in Wahkiakum County. • Jim Crow Creek watershed has very high road densities and a high rate of mass wasting that needs attention. • Bank stability problems were noted along Skamokawa and Wilson Creeks, especially along the agricultural reaches. Eliminate livestock access and restore riparian vegetation along streams in the subbasin.	Protect and enhance functional riparian corridors to reduce sediment delivery to streams. Identify and protect limited chum spawning sites in the subbasin. Crippen and Standard Creeks are productive habitats for steelhead.
Channel/LWD Conditions	**Medium:** LWD levels and pool habitat are generally "poor" throughout the sub-basin	• LWD is the principle pool-forming agent in many of the stream systems within this subbasin. Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (although recruitment potential is low for most streams). Wilson Creek, the mainstem Skamokawa above	Protect existing mature riparian vegetation for LWD recruitment. Standard and McDonald Creeks were in the best condition for existing LWD in the Skamokawa Creek watershed.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Channel/LWD Conditions (Continued)		tidewater, and Left Fork Skamokawa would respond well to LWD placement. Riparian vegetation in these areas will likely not be able to provide for long term LWD recruitment. • LWD is almost non-existent in the lower reaches of the Elochoman River. Most LWD is quickly washed out of the system during high flows. In the mainstem Elochoman, pool habitats are now formed mainly by channel processes. • The lack of quality pool habitat combined with low summer flows and high water temperatures limits rearing habitat in the subbasin. Develop and enhance pool habitat in the subbasin focusing on Bell Canyon, Pollard, and Crippen Creeks.	Riparian vegetation along these creeks should provide both near and long-term LWD recruitment. In the West Fork Elochoman there were some large pools with extensive cove habitat associated with logjams in the main channel. These logjams were anchored by old growth LWD with recently recruited alder LWD contributing to these formations. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are generally "poor" throughout the sub-basin. Deciduous species dominate many of the riparian corridors.	• Agricultural activities have reduced or eliminated riparian cover along the lower reaches of many streams within the subbasin. Eliminate livestock access and restore riparian vegetation wherever possible. • Target riparian restoration efforts along the most productive and/or degraded streams including the Middle Valley Skamokawa from RM 2.2-6.6, lower Wilson Creek, the lower 3 miles of Wilson Creek, all of Bell Canyon, Quarry, and Skamokawa Creeks, the lower reaches of Nelson Creek, the lower 3 miles of the West Fork Elochoman, and the mainstem Elochoman above the West Fork confluence. • Deciduous species dominate riparian corridors along a number of streams in the sub-basin. Manage riparian	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries. Protect and enhance functional riparian corridors along Standard Creek (some of the best riparian habitat in the sub-basin).

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Riparian (Continued)		corridors to increase the percentage of conifers in riparian corridors.	
Water Quality	**High:** Significant water quality problems occur in the Elochoman River and Skamokawa Creek and their tributaries	• Maintain and restore riparian cover for all streams within the sub-basin, especially along lower Wilson Creek where temperatures are considerably higher than found in the upper reaches. • Reduce livestock access to streams and riparian corridors. • Water quality monitoring found elevated fecal coliform and nitrate levels, thought to originate from septic systems and agricultural activities, in surface and shallow groundwater in Skamokawa watershed. Identify sources of these water pollutants and reduce inputs to stream systems. • Improve water quality and rearing conditions in Bell Canyon, Pollard, and Crippen Creeks.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and restore wetlands. Identify and protect cooler water refuges such as Falk Creek.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• By July median flows in the Elochoman dip below 40 cfs, which is less than 50% of optimal flows for steelhead and salmon spawning and rearing. Identify ways to augment low summer flows and enhance rearing habitat in the Elochoman River and other low flow limited habitats. • Assess potential impacts on low flows in the Elochoman River from the City of Cathlamet's water withdrawals. • Reduce road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows. • Restore and enhance off-channel rearing habitats that can provide refuge for juveniles during peak flows.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuges for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • There have been reports of invasive aquatic plants in the lower reaches of streams in the sub-basin. Expand monitoring for invasive aquatic plants into the Elochoman River, Skamokawa Creek, Grays River and slough on Puget Island.	Preserve riparian corridors and wetlands with native vegetation.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

“Poor”, “Fair” and “Good” comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

GRAYS RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Grays River Chum	Tier 1	
Grays River Fall Chinook (SASSI)	Tier 2	
Grays River Coho	Tier 3	
Grays River Coastal Cutthroat (SaSI)	Tier 4	
Grays Winter Steelhead (LCSCI)	Tier 4	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium:** A few culverts and tidegates restrict access to habitat in the Grays sub basin.	• Impie Creek has a tidegate in the lower reaches that may block fish passage to 1.7 miles of habitat and it needs assessment and repair. • A bedrock cascading falls on Hull Creek (RM 3) was retrofitted by WDFW with a fishway. This fishway has not been maintained and it has subsequently failed, blocking 1 mile of potential habitat (TAG). • Blocking culverts on Nikka and Thadbar Creeks are scheduled for repair this year. • Fish passage may be a problem through the Seal River system during certain flows, and this area needs assessment and possibly channel restoration.	None
Floodplain Conditions	**High:** Floodplain connectivity is generally poor in most areas.	• The lower reaches of Deep River (RM 0 to 3.9) have been diked eliminating floodplain connections and interactions. Restore floodplain connectivity wherever possible, first focusing on areas in the lower river that might be used	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Protection of upstream riparian areas and

Floodplain Conditions (Con't)		by both in and out of basin stocks. • Crooked Creek has been channelized throughout the lower 2 miles and is considered highly entrenched. Restore floodplain connectivity where possible. • The mainstem Grays River is diked to the Altoona Bridge. In conjunction with diking efforts, a large portion of the mainstem Grays River was armored. Restore off-channel and side-channel habitat wherever possible in the lower Grays. • Many of the tributary streams to the Grays have been channelized and rerouted along the toe of the surrounding hillslopes. Streams were also entrenched and sub-surface drainage systems installed. Managed tributaries include Impie Creek, Thadbar Creek, Nikka Creek, and Seal River. Where possible, restore natural stream meander patterns and reconnect off-channel and side-channel habitats. • Columbia Land Trust (2000) is working on acquisition and restoration projects near the mouth of Grays River that will serve to restore floodplain connectivity. Overall, the project will preserve over 500 acres and restore tidal function to 200 acres of the Gray River estuary.	overall forest cover will be needed to protect critical downstream reaches in the Grays and Fossil Creek. Protect and enhance functional estuarine and floodplain habitat in the lower river, especially in areas that will benefit both in basin and out of basin stocks.

Sediment	**High:** Sediment fines and bedload deposition are significant problems in the sub basin. The upper watershed has extensive slope instability problems.	• Aggrading streambeds in the Grays River near Gorley Springs and the lower reaches of Fossil Creek are critical spawning areas for chum. These areas have experienced major channel changes and need a geomorphological assessment to determine the best course of action to preserve and enhance critical spawning habitat in the area. • Roads, timber harvests have contributed to increased peak flows and numerous slope failures in the sub basin, leading to aggrading stream channels and excessive fine sediments in many areas. Restore riparian cover, reduce road densities where possible (especially in areas with unstable slopes), and reduce fine sediment delivery from roads to streams with sediment traps, filters, erosion control blankets, and by minimizing the use of fine materials in constructing stream crossings. Areas to first focus efforts include the Mitchell Creek WAU that has very high road densities, and numerous stream adjacent roads and stream crossings. • Two very large slides were noted on Mitchell Creek near the 7250 Road that need assessment and potentially stabilization. • A large area 12,000 feet above confluence with Grays River was highly unstable and the major source of turbidity in the South Fork. This area needs assessment and stabilization. • Numerous mass wasting events in the West Fork need assessment and stabilization if possible. • A tributary to Klints Creek contributes excessive fine sediment to the Grays River system every time it rains heavily and it needs assessment and attention.	The lower West Fork Grays provides critical spawning habitat for both chum and chinook. The mainstem Grays River and the lower reaches of its tributaries near Gorley Springs provide excellent spawning habitat for chum salmon and need protection and enhancement. Mitchell Creek and the East Fork Grays provide high priority steelhead habitat.

Channel Conditions/LWD	**Medium:** LWD levels and pool frequencies are generally "poor" throughout the sub-basin.	• LWD is lacking in all anadromous streams in this sub basin due to channel cleaning, splash damming, and timber harvest. Increase functioning LWD structures, or similar natural structures to reduce stream energy and bank erosion and to increase pool habitat. Careful assessment and design is needed for any LWD project in these high-energy systems. • Assess and reduce slope failures in the upper watershed that increase sediment loads, reduce bank stability, and fill pools in downstream reaches. • Restore degraded riparian corridors to reduce slope instability and provide future LWD recruitment.	Protect existing mature riparian vegetation for LWD recruitment and to provide bank stability. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement. Protect fully forested and unroaded areas in the upper Grays River watershed from further degradation to reduce peak flows and sediment inputs to downstream habitats.
Riparian	**High:** Riparian conditions are generally "poor" throughout the sub-basin	• Restore riparian cover and increase the percentage of conifers in the riparian zones along the lower reaches of the South Fork Grays and Blaney Creek. • TAG members noted that Alder and Johnson Creeks' riparian zones were harvested recently, and that Mitchell Creek experienced two fires in 1978. These areas need assessment and riparian restoration. • Most of the surveyed reaches of the West Fork need riparian restoration. The lower reaches provide critical chum and chinook spawning habitat. • Livestock had access to streams and riparian zones in many of the agricultural areas along King, Klints, and Fossil Creeks, degrading riparian habitat. Agricultural activities also limit riparian cover along the lower mainstem Grays River. Look for opportunities to work with landowners to fence livestock from streams and restore riparian cover.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries. The majority of surveyed reaches along both the East Fork Grays and Cabin Creek had "fair" to "good" riparian conditions that should be protected and enhanced.

Water Quality	**Medium:** Water temperature and turbidity are considered problems in a number of stream systems.	• Restore riparian cover for all streams within the sub-basin, focusing along degraded reaches in the West Fork, South Fork, and mainstem Grays. • Fence livestock away from streams and riparian corridors across the sub basin. • While data is lacking, TAG members thought that water temperatures were elevated in the South Fork Grays River. They also indicated that the South Fork is responsible for a majority of the turbidity observed in the Grays River during winter storm events. The source of this turbidity is thought to be a large active soil failure at approximately RM 3 (TAG). Restore riparian cover along the South Fork and its tributaries and assess and stabilize slope failures in the system.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and enhance wetland habitats in the sub basin. Protect the springs and seeps that chum salmon target for spawning in the Grays River and in the lower reaches of its tributaries.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• In the Grays River, salmonid spawning is potentially severely compromised the first of October when flow conditions are near 50 cfs. by the end of November, median flows of 500 cfs. are near optimal for salmonid spawning. Juvenile rearing conditions in July through September are compromised by median low flows of 30-60 cfs. Optimum rearing flows for salmon and steelhead are 140 cfs. in this river. Identify opportunities to augment low summer flows in the Grays River system. • Assess ad restore flow to King Creek caused by a diversion in the upper watershed. • All WAUs within the Grays River sub basin were considered hydrological immature, except for the South Fork WAU, and all WAUs had road densities >3 miles/square mile. Decommission and/or improve roads and road crossings to increase infiltration and reduce the overall drainage network.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuges for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity. Protect the flow of water to springs that provide critical chum spawning habitat.

Water Quantity (Con't)		Maintain and restore riparian and overall forest cover to increase hydrologic maturity.	
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Data on invasive species is lacking for the estuary.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Assess and identify alterations in the aquatic communities in the Grays Bay estuary.	Preserve riparian corridors and wetlands with intact native vegetation.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

KALAMA RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Kalama River Summer Steelhead (LCSCI)	Tier 1	Chum Salmon
Kalama River Winter Steelhead (LCSCI)	Tier 1	
Kalama River Fall Chinook (SASSI)	Tier 2	
Kalama River Spring Chinook (SASSI)	Tier 2	
Kalama River Coastal Cutthroat (SaSI)	Tier 4	
Kalama River Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium:** 5.5% of the historic habitat in the sub basin is blocked (5.1miles).	• Assess and if possible address potential low flow passage problems at the mouth of the Kalama that have been exacerbated by various alterations in channel characteristics. • Look for solutions to excessive sediment deposition at the mouth of Langdon, North Fork Kalama, and Jacks Creeks that leads to subsurface flows during summer months. • Address passage problems during low flow periods at the hatchery on Hatchery Creek. • Schoolhouse and Bybee Creeks have culverts that block passage to 3.2 miles and 1 mile of habitat respectively. The quality of the habitat above these blockages is unknown. • Culverts also block passage to portions of Bear Creek, upper Wild horse Creek, and an unnamed tributary to Wild horse Creek.	None

Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect and enhance off-channel and floodplain habitats along the reaches of the lower Kalama River (below RM 10) and its tributaries to help increase rearing habitat for juvenile salmonids.	Preserve off-channel and side channel habitat and associated wetlands wherever they occur in the Kalama and its tributaries. The lower reaches of the Kalama below RM 10 are especially important.
Sediment	**High:** Data is lacking for most streams. However, LFA TAG members considered excessive sediment fines a major problem in many of the streams within the sub basin.	• Identify and repair roads that are contributing excessive fine sediments to streams in the sub basin. The Kalama Sub basin has very high road densities and numerous stream crossings that increase fine sediment inputs to streams. • Assess and, if possible, stabilize mass wasting and bank erosion problems on the North Fork Kalama, and Spencer, Hatchery, Wild horse, Gobar, Lakeview Peak, and Langdon Creeks. • Restore native riparian vegetation along the tributaries to the upper Kalama that have been logged down to the stream channel. Riparian areas with mostly deciduous vegetation may require thinning and under planting to restore a high percentage of conifers.	Protect existing quality riparian corridors from additional development along all anadromous streams within the sub basin. Protect critical spawning habitat for fall chinook, chum and, coho between RM 10 and RM 2.4 on the mainstem Kalama, and for winter steelhead in from RM 10 upstream. The North Fork Kalama, and Gobar, Wild horse, Langdon, and Lakeview Peak Creeks provide critical spawning habitat for summer steelhead. Preserve vegetation and limit development in areas with steep, unstable slopes.
LWD	**Medium:** LWD supplies are very limited in the sub-basin.	• Increase functional LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment. Very limited mature riparian vegetation is left for	Protect existing mature riparian vegetation wherever found within the sub basin for LWD recruitment.

LWD (Con't)		recruitment of LWD along some of the most productive steelhead streams (North Fork Kalama, and Wild horse, Gobar, Lakeview Peak, and Arnold Creeks). • Speed recruitment of conifers within degraded riparian corridors to provide a future supply of LWD.	Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" almost throughout the sub-basin and some of the most productive tribs. have almost no mature conifers.	• Target riparian restoration efforts along the most productive and/or degraded streams including the anadromous reaches of the North Fork Kalama, and Wild horse, Gobar, Lakeview Peak, and Arnold Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basin's tributaries, focusing first on productive areas like the North Fork Kalama, and Wild horse, Gobar, Lakeview Peak, and Arnold Creeks.
Water Quality	**Medium:** Data is lacking for most streams in the basin. The lower River and Hatchery Creek are on 303d list.	• Restore degraded riparian cover for all streams within the sub-basin, especially along degraded reaches of tributaries to the upper Kalama. • Protect and restore wetlands, springs, and seeps in the subbasin. • Reduce direct runoff from roads to streams, especially from heavily traveled gravel roads in the upper watershed. • Enhance pool habitat to provide thermal refuge for salmonids rearing or holding in the watersheds.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and enhance wetlands and spring fed sources of cool water.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Reduce impervious surfaces, road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows. • Look for solutions to excessive coarse sediment deposits in the lower reaches of the North Fork Kalama, and Langdon, Jacks, and Wold Creeks that result in subsurface flow during summer months.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats, and the mass-wasting potential, and to provide refuge for salmonids from elevated stream temperatures.

			Preserve floodplain connections and associated wetlands to provide off-channel refuge during high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and a lack of nutrients may be limiting.	• Assess the need to increase the contribution of marine–derived nutrients through increased use of carcasses or pass additional spawning fish above the falls.	None

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CHINOOK RIVER SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	**Priority**	**Other Anadromous Salmonids Present in the Sub-basin (LFA)**
Grays River Chum Salmon (reintroduction program)	Tier 1	Fall Chinook
		Coastal Cutthroat
		Coho
		Winter Steelhead

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Activities*

Limiting Factor	***Priority Rating***	***Potential Restoration Actions***	***Preservation Actions***
Fish Passage	**Medium//High:** High Priority to address tide gate passage problems in the lower Chinook River. Medium priority to address passage problems in the smaller Columbia River tributaries and in Freshwater Creek.	• The tidegates on the Chinook River under Highway 101 likely restrict passage during certain flows. These tidegates alter water exchange rates and tidal influences that may create thermal and dissolved oxygen barriers under certain conditions. Remove or replace the existing tidegates at the mouth of the Chinook to reduce fish passage problems, and manage tidegates to restore tidal flushing in the Chinook River estuary. • Tidegates on the Wallicut River under Stringtown Road may block passage at certain flows. These potential barriers need assessment and repair. • The City water supply dam also restricts passage on Freshwater Creek, blocking approximately ½ mile of potential anadromous habitat. • Sea Resources places a weir in to restrict passage of hatchery fish into upstream habitats from mid-September to late November. Randomly selected hatchery and native brood stock from the hatchery, and a mix of natural and hatchery fish are passed above the hatchery. After late November, all fish have unlimited access to upstream habitats. • Some of the smaller tributaries to the Columbia in WRIA 28 upstream of the Chinook River may provide potential spawning and rearing habitat. However, there is limited information on passage and habitat conditions.	None
Floodplain Conditions	**High:** Where surveys have been completed streams are	• Dikes, dredging, the removal of logjams, and tidegates have altered floodplain connectivity along almost all lower reaches of the Chinook River. Continue efforts to identify and restore	Protect and enhance the Chinook River Estuary. The ongoing restorations efforts by Sea Resources and its

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Floodplain Conditions (Con't)	often incised and floodplain connectivity is generally "poor" in the sub-basin.	floodplain and estuarine habitat in the lower Chinook River. • Above tidal influence (RM 2.5) to the hatchery (RM 4), diking occurs along approximately 1/3 of the channel length. Some of the stream channel within this reach is also incised. From the hatchery intake to the headwaters, approximately 40% of the channel is noticeably incised within a wide valley. Identify and restore off-channel and side channel habitats along these reaches.	numerous partners to restore estuarine function to over 80% of the historic estuary is the largest restoration effort planned in the Columbia River basin. This effort should be fully supported. Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Survey stream channels near the hatchery on the Chinook River to determine if there are potential sites to restore off-channel habitat to provide refuge for juvenile salmonids. Determine how chinook and other salmon from the Chinook River and from upstream areas of the Columbia River are using the Chinook River Estuary to better target restoration efforts.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Sediment	**Medium:** Data is lacking on substrate conditions for most stream reaches; however, excessive sediment fines are considered a problem in some stream reaches within the sub-basin.	• In the 1970's, an extensive road network was built in the upper basin and most of the watershed was logged. Over 30 large landslides and debris torrents are evident in 1974 aerial photos. These moved a tremendous amount of sediment into the stream channels and estuary (Dewberry 1997). TAG members noted that debris torrents and road culvert failures are still contributing to sediment loads in the basin, but that the extent of these problems is unknown and needs assessment. Assess and repair or decommission roads in the Chinook watershed that can contribute chronic fine sediments or may fail and lead to mass wasting and debris flows.	From the Sea Resources Hatchery to the forks are the major spawning grounds for most anadromous salmonids in the Chinook River watershed. Salmon recovery efforts in the Chinook River hinge on protection and enhancement of these productive spawning grounds. Above the tidal reaches (RM 2.5 to the hatchery (RM 4), TAG members noted that excessive substrate fines are likely a continuing problem. Chum spawning occurs in this area, and the area needs protection and enhancement. Protect and enhance functional riparian corridors and identify and protect unstable slopes to reduce sediment delivery to streams. Refuge areas should be established in the basin to protect critical spawning areas by establishing a more natural regime of sediment and organic matter dynamics within the Chinook River watershed.
Channel/LWD Conditions	**High:** LWD levels and pool habitat are generally "poor" throughout the sub-basin. LWD recruitment potential is also low.	• Construct log jams in the lower Chinook to increase habitat diversity for rearing salmonids and to provide benefits for other species such as herring. • LWD is the principle pool-forming agent in many of the stream systems within this subbasin. Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (although recruitment potential is low for most streams). • The lack of quality pool habitat combined with low summer flows and high water temperatures likely limits	The same reach (RM 5 to Forks) that provides critical spawning habitat for most salmon in the Chinook River also provides critical rearing habitat for most salmonids using the watershed. Protect and enhance existing instream LWD and quality pool habitat. Protect existing mature riparian vegetation for LWD recruitment.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Channel/LWD Conditions (Con't)		available rearing habitat in the subbasin. Develop and enhance pool habitat in appropriate reaches.	LWD is often cleared from streams to reduce potential erosion. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are generally "poor" throughout the sub-basin. Deciduous species and reed canary grass dominate many of the riparian corridors.	• Agricultural land uses have reduced or eliminated riparian cover along the lower reaches of the Chinook River. Eliminate livestock access and restore and maintain native riparian vegetation wherever possible. • Target riparian restoration efforts along the most productive and/or degraded streams starting with the valley bottom and along critical spawning grounds above the hatchery. • Deciduous species and reed canary grass dominate riparian corridors along many reaches of the Chinook. Manage riparian corridors to eliminate non-native species and increase the percentage of conifers in riparian corridors.	Preserve healthy riparian corridors wherever encountered in the subbasin, starting with the valley floor and along the productive spawning reaches.
Water Quality	**Medium:** Water Quality data is lacking for the Chinook River and other Columbia River tributaries.	• Maintain and restore riparian cover for all streams within the sub-basin, starting degraded reaches between RM 2.5 and 4.0. • Increase water quality monitoring in the Chinook watershed to provide better guidance for restoration efforts.	Protect functional riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and restore wetlands and their sources of water. Identify and protect cooler water refuges in the subbasin.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Hydrologic maturity should be improving for the Chinook River system with the re-growth of the forest after extensive logging in the 1970's. However, the high road density and loss of forest cover is likely increasing peak flows above historic levels. Reduce road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows and sediment delivery to downstream habitats and provide refuges for salmonids from elevated stream temperatures. Preserve floodplain

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Water Quantity (Con't)		• Low flows are a natural condition for the rain and groundwater fed streams within WRIA 24. Streams, such as the Wallacut River, have minimal flow during summer months. Diversions at the Sea Resources Hatchery and from Freshwater Creek for the City of Chinook reduce flows and may reduce available rearing habitat. The impact of these diversions should be assessed and if needed adjustments in withdrawals made. • Restore and enhance off-channel rearing habitats that can provide refuge for juveniles during peak flows, and pool habitats that can support rearing fish until water levels reconnect isolated habitats.	connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Invasive species limits native riparian restoration.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Encourage beaver activity in the lower Chinook River. The activity of beaver will rapidly reconnect the stream channel with the valley floor, restoring considerable freshwater habitat. According to Dewberry (1997), this single action may have the greatest short-term benefit on juvenile fish production in the basin. • Remove reed canary grass from riparian corridors and reestablish native vegetation.	Preserve riparian corridors and wetlands with native vegetation.

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WIND RIVER SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Wind Winter Steelhead (LCSCI)	Tier 1	Coastal Cutthroat (likely only in the lower watershed)
Wind (mainstem) Summer Steelhead (LCSCI)	Tier 1	Coho (only in the lower watershed)
Panther Creek Summer Steelhead (LCSCI)	Tier 1	Chum (historically present but few chum now move above Bonneville Dam)
Trout Creek Summer Steelhead (LCSCI)	Tier 1	
Wind Fall/Bright Chinook	Tier 2	
Wind Fall/Tule Chinook	Tier 2	
Wind Spring Chinook (introduced stock)	Tier 2	

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** Hemlock Dam and a number of culverts reduce access to critical upstream spawning habitat and downstream migration.	• Several obstacles at Hemlock Dam affect juvenile downstream migration and adult migration to the most productive habitat in the Wind River watershed for a summer steelhead stock considered in "critical" condition. This was the highest priority limiting factor identified in the WRIA 29 LFA. • Culverts on Youngman and Oldman Creeks are considered passage barriers that need repair or replacement (these blockages fell into a lower priority category in the LFA). • The Carson National Fish Hatchery uses Tyee Creek as a water source and it blocks all passage into the creek. Opening this creek could provide 0.75 miles of steelhead and chinook spawning and rearing habitat.	None
Floodplain Conditions	**Medium:** Floodplain connectivity is reduced in some areas by roads, dikes, and incised channels.	• Stream adjacent roads, stream crossings, and other floodplain constrictions should be assessed and if possible improved to provide additional side-channel and off-channel habitat. • High flows and a lack of instream structure (LWD) have lead to channel downcutting and disconnected floodplains in reaches of Trout Creek. Restore riparian vegetation and LWD in appropriate reaches.	Preserve and enhance off-channel and side-channel habitat and associated wetlands wherever they occur. Protection of upstream riparian areas and overall forest cover will be needed to protect critical downstream reaches.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Sediment	**High:** Sediment fines are a significant problem in the subbasin.	• Roads, timber harvests, and the loss of instream structure have increased peak flows and slope failures in the subbasin, contributing excessive sediment to stream channels. Reduce road densities where possible and reduce fine sediment delivery from roads to streams with sediment traps, filters, erosion control blankets, and by minimizing the use of fine materials in constructing stream crossings. Restore instream structure where appropriate. • Bank erosion contributes excessive fine sediments to Trout, Compass, Crater, and Layout Creeks. It is a high priority to restore riparian vegetation and appropriate levels of LWD in the Trout Creek watershed. • From the mouth of Youngman Creek to RM 1.7 fine sediments are excessive. Restore riparian corridors and reduce inputs from roads in the watershed. • The Wind River Watershed Council has identified a number of erosion control/ slope stabilization projects that would benefit the middle and lower Wind River, and a road decommissioning project for Indian Cabin Rd. on the lower Wind. • Loss of riparian function and LWD removal in Dry Creek has lead to excessive bedload deposition in the low gradient reaches. • Excessive fine sediments have accumulated in the Little Wind River due to slope failures along the gas pipeline and timber harvest in the lower reaches. • The lower Wind receives large sediment loads from upstream sources and from four landslides below Shipherd Falls, and this sediment accumulates where the river meets the Bonneville Pool. Restore upstream watershed processes and address slope instability problems.	The Trout Creek flats (between Road 43 Bridge and Road 33 Bridge) and the mainstem Wind River between Stabler (RM 14) and Paradise Creek (RM 25) provide critical spawning and rearing habitat for summer steelhead and protection and enhancement of these areas is a high priority in the subbasin. The lower reaches of tributaries to the Wind and Trout Creek, including Trapper, Paradise, Layout, Crater, and Panther Creeks are also important spawning and rearing areas for summer steelhead.
Channel Conditions/LWD	**Medium:** LWD levels and pool frequencies are “poor” throughout the sub-basin. Bank instability and high width/depth ratios are also considered problems in the subbasin.	• LWD is lacking in all anadromous streams in this subbasin due to channel cleaning and timber harvest. Increase functioning LWD structures, or similar natural structures to reduce stream energy and bank erosion and to increase pool habitat. Focus first on appropriate reaches in the Trout Creek watershed. • Look for solutions to channel constrictions at Government Springs that have increased stream energy downstream and bank instability.	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Riparian	**High:** Riparian conditions are generally "poor" throughout the sub-basin	• Manage early- and mid-seral stage riparian vegetation within riparian reserves to develop late-seral characteristics. • Restore native riparian vegetation, starting with Trout, Layout, Compass, and Crater Creeks, upper Wind, middle Wind, and Dry, Youngman, and Oldman Creeks (in order of priority).	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries.
Water Quality	**High:** Very high water temperatures occur in the Trout Creek watershed (>80° F near Hemlock Dam). Bear and Eightmile Creeks are on the 303d list of impaired waters.	• Maintain and restore riparian cover for all streams within the sub-basin, focusing first along Trout Creek and its major tributaries. Bear and Eightmile Creeks should also be priorities. • Identify options to reduce the impacts to water quality at Hemlock Dam. • Excessive sediment inputs have resulted in high width to depth ratios that contribute to elevated water temperatures in the Trout Creek watershed. Reduce sediment inputs from the road network and restore channel conditions that will more effectively route sediments on through the system.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Timber harvest and road networks have increased peak flows in the subbasin over historic conditions. Decommission and/or improve roads to increase infiltration and reduce the overall drainage network, and restore native vegetation within riparian corridors.	Protect fully forested and unroaded areas in the upper watershed from further degradation to reduce peak flows to downstream habitats and provide refuge for salmonids from elevated stream temperatures.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Increase contribution of marine–derived nutrients through increased use of carcasses.	None

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

LOWER COWLITZ SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Cowlitz Winter Steelhead (LCSCI)	Tier 1	Chum Salmon
Cowlitz Fall Chinook (SASSI)	Tier 2	
Cowlitz Spring Chinook (SASSI)	Tier 2	
Cowlitz Coastal Cutthroat (SaSI)	Tier 4	
Cowlitz Coho (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** 10.2% (17.3 miles) of the historic habitat is blocked.	• Mayfield Dam, at the upper extent of this sub basin, blocks access to 80% of the historic habitat in the Cowlitz River. • There are a number of significant culvert barriers on tributary streams that need assessment and repair including Tucker, Leckler, Whittle, Skook, Ferrier, Foster, Baxter, and Mill Creeks, and an unnamed tributary to Stillwater Creek.	None
Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect disconnected floodplains where possible in Westover, McCorkle Creeks, the lower 2 miles of Leckler Creek, and the lower reaches of Arkansas, Delameter, Whittle, Olequa, and Salmon Creeks. • Restore and enhance off-channel and side-channel on the mainstem Cowlitz between RM 20 and RM 49 for fall chinook and steelhead spawning and rearing.	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Functioning side-channels, located in the mainstem Cowlitz between RM 20 and 49, are critical fall chinook and steelhead spawning and rearing areas.

Sediment	**High:** Sediment fines and/or the lack of spawning sediments are significant problems in the sub basin.	• Eliminate livestock access and restore riparian vegetation along streams in the sub basin, focusing first on Delameter Creek below Cline Road, in Arkansas Creek from the mouth to Baxter Creek, in the agricultural areas of Leckler Creek, and in Whittle Creek from 3,500 to 7,000 feet above the mouth. • The dams have severely reduced gravel recruitment to downstream habitats. This will likely require gravel supplementation in strategic areas to provide productive spawning sites. • Road densities exceed 4.9 miles/square mile with numerous stream adjacent roads. Where possible reduce road densities and their fine sediment contribution to streams.	Protect and enhance functional riparian corridors, especially along Monahan, upper Delameter, and upper Olequa Creeks. Protect critical spawning sites in Monahan, and the upper reaches of Olequa and Delameter Creeks. Protect chum salmon spawning sites in upper Lacamas Creek.
Channel/LWD Conditions	**Medium:** LWD levels and pool habitat are "poor" throughout the sub-basin	• LWD is the principle pool-forming agent in many of the stream systems within this sub basin. Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (although recruitment potential is low for most streams). • Restore riparian vegetation to increase future LWD recruitment potential.	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" throughout the sub-basin	• Target riparian restoration efforts along the most productive streams including Monahan, upper Delameter, and upper Olequa Creeks. • Streams with degraded riparian corridors that need intensive restoration include Arkansas, Leckler, Whittle, Stillwater, and Lacamas Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries.
Water Quality	**Medium/High:** Water quality in the mainstem Cowlitz is generally "good" (Medium Priority). High Priority to address	• Maintain and restore riparian cover for all streams within the sub-basin, especially along Delameter, Leckler, Lacamas, and Arkansas Creeks.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to

Water Quality (Con't)	significant water quality problems that occur in Arkansas, Olequa Lacamas, Leckler, and Delameter Creeks.	• Reduce livestock access to streams and address failing septic tanks in Delameter, Tucker, and Monahan Creeks. • Provide education and enforcement of regulations regarding the application of pesticides by tree farmers in the Olequa watershed. • Identify and remove unauthorized diversions that impact water quality and quantity.	critical downstream spawning and rearing areas. Protect and enhance wetland habitats in the sub basin.
Water Quantity	**Medium:** Altered hydraulic regime from the operation of the dams. Both elevated peak and low flows present problems in the tributaries.	• Low flows are far below optimal conditions for spawning and rearing in Leckler, Olequa, Lacamas, and Salmon Creeks. Identify opportunities to augment low flows and enhance rearing habitat during the summer and early fall. • Encourage wetland development in upper Arkansas and Whittle Creeks to enhance overwintering habitat and increase floodplain capacity. • Continue to assess the impacts to all anadromous species from alterations in the hydraulic regime caused by the operation of the dams, and practice adaptive management to minimize any impacts.	Maintain adequate flows in the Cowlitz River to protect habitat conditions for all salmonids and for the aquatic community on which they depend.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Diseases from hatchery operations have also reduced productivity in the watershed.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Continue to assess and reduce the impacts to wild fish from competitive interactions and disease transmission with hatchery fish.	Preserve native vegetation along riparian corridors and within wetlands.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

MILL/ABERNATHY/GERMANY SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Mill Fall Chinook (SASSI)	Tier 2	Chum Salmon
Mill Coastal Cutthroat (SaSI)	Tier 4	
Mill Coho (SASSI)	Tier 3	
Mill Winter Steelhead (LCSCI)	Tier 4	
Abernathy Fall Chinook (SASSI)	Tier 2	
Abernathy Coastal Cutthroat (SaSI)	Tier 4	
Abernathy Coho (SASSI)	Tier 3	
Abernathy Winter Steelhead (LCSCI)	Tier 4	
Germany Fall Chinook (SASSI)	Tier 2	
Germany Coastal Cutthroat (SaSI)	Tier 4	
Germany Coho (SASSI)	Tier 3	
Germany Winter Steelhead (LCSCI)	Tier 4	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium/High:** High Priority to address passage problems in Germany and Coal Creeks where 30% and 34% of the habitat is blocked. Medium priority to assess and repair passage problems in Mill and Abernathy Creeks.	• A culvert on an unnamed tributary to Mill Creek blocks access to approximately 1.7 miles of habitat. • Low flow passage problems on the mainstem of Mill Creek need assessment. • TAG members identified culverts on Wiest Creek, Midway Creek, and an unnamed tributary to Abernathy Creek that need assessment and potentially repair. • A culvert near the upper end of anadromous distribution may block access to almost a mile of habitat on Erick Creek and it needs assessment. • Seven unnamed tributaries in the upper reaches of Germany Creek have culverts near their mouths that block between 0.2 and 1.7 miles of habitat. • Stream surveys identified a fish ladder on Cameron Creek consisting of a 5-step weir/pool facility. Stream surveyors indicated that the pools	None

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage (Con't)		were full of cobble and gravel and they do not appear to be maintained on a regular basis. Stream surveyors also identified juvenile salmonids in Cameron Creek in pools immediately below the fish ladder. This fish ladder could use additional assessment for passage issues and habitat condition above the fish ladder. • Over 4 miles of potential habitat is blocked by a culvert on Clark Creek. • A culvert on Coal Creek blocks access to approximately 0.6 miles of habitat. • A mile of habitat is blocked by a culvert on Stewart Creek.	
Floodplain Conditions	**High:** Where surveys have been completed streams are often incised and floodplain connectivity is generally "poor" in the sub-basin.	• Floodplain connectivity throughout lower Mill Creek has been impaired by past practices. Splash damming has resulted in an incised and scoured channel along most of the lower 1.5 miles. Extreme flood events are contained with the channel. Look for opportunities to reconnect off-channel and side channel habitat in Mill Creek. • Between the mouth and RM 5.5 Abernathy Creek is confined by stream adjacent roads and/or incised in many areas. Identify opportunities to reconnect floodplain, off-channel, and side channel habitat in this reach. • From RM 1.9 to 5.7 Germany Creek flows through agricultural land where the stream is slightly entrenched. Work with landowners to identify and reconnect productive floodplain and off channel habitat. • Debris jams were forcing the return to a multi-thread channel in the lower 3000 feet of Germany Creek. However, removal of debris jams by local residents is serving to return Germany Creek to a single thread. Work with landowners to identify and maintain key log jams in the lower creek. • An abandoned railroad grade that runs along the valley bottom of Abernathy Creek reduces floodplain connectivity and it needs assessment and likely decommissioning. • Look for opportunities to reconnect floodplain habitat in the Coal and Clark Creek watersheds.	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. From RM 10 to RM 12 Mill Creek flows through a series of wetlands where side channel availability and floodplain connectivity improves. This area could provide excellent habitat for a number of anadromous species. The upper reaches of Abernathy Creek are also largely unconfined with good floodplain connectivity and need protection and enhancement. Preserve and enhance floodplain connectivity in lower Germany Creek.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Sediment	**High:** Sediment fines and excessive bedload deposition are major problems in the some systems within the subbasin. In other streams splash damming scoured stream reaches to bedrock and areas lack suitable spawning substrates.	• Past splash damming has scoured many of the streams in this subbasin to bedrock, leaving incised channels with limited spawning gravels. Identify areas where channel modifications (LWD or large rocks) could help slow flows, capture scarce spawning gravels, and serve to reconnect floodplain habitat. Focus first on Mill and Abernathy Creeks. • On Germany Creek between RM 1.9 and 5.7, lower gradient reaches with poor riparian conditions and adjacent to agriculture lands had excessive percentages of fine sediments. Encourage the establishment and retention of riparian vegetation and the development of BMP's within the agriculture and residential land-use areas. • Upper Germany watershed was logged heavily in 1970-80's. Subsequent mass wasting delivered large volumes of material to the stream. Current monitoring by Department of Ecology (Schuett-Hammes, 2000) indicates that the upper watershed is recovering. However, this large amount of material has moved to lower reaches where channel conditions are responding to increased bedload. Assess mass wasting in the watershed with specific emphasis on identifying sensitive areas, causal mechanisms, alternative management scenarios, and effects on stream channel and habitat. • Although the upper watershed shows significant recovery from elevated sediment load, fine sediment from recent mass wasting was observed. Mass wasting may continue to be a major source of fines in Germany Creek (Schuett -Hammes, 2000). Identify unstable slopes and develop plans to avoid these areas and stabilize existing problem sites wherever possible.	Protect and enhance functional riparian corridors and identify and protect unstable slopes to reduce sediment delivery to streams. Identify and protect limited chum spawning sites in the subbasin. WDFW used to monitor and index area on Abernathy between tidewater and Slide Creek. Chum salmon were identified as using this area.
Channel/LWD Conditions	**High:** LWD levels and pool habitat are generally "poor" throughout the sub-basin.	• LWD is the principle pool-forming agent in many of the stream systems within this subbasin. With a general lack of instream structural elements and elevated peak flows, streams are incised to bedrock and spawning gravels are lacking. Increase functioning LWD structures, or	Protect existing mature riparian vegetation for LWD recruitment. LWD is often cleared from streams to reduce potential erosion. Maintain current

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Channel/LWD Conditions (Con't)		similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (although recruitment potential is low for most streams). Areas to focus efforts include appropriate reaches of Mill Creek (from the 2nd county bridge up to the wetlands), upper Germany Creek, and on Abernathy Creek above the hatchery. Riparian vegetation in most areas will likely not be able to provide for long term LWD recruitment. • The lack of quality pool habitat combined with low summer flows and high water temperatures limits rearing habitat in the subbasin. Develop and enhance pool habitat in appropriate reaches.	appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are generally "poor" throughout the sub-basin. Deciduous species dominate many of the riparian corridors.	• Agricultural and residential land uses have reduced or eliminated riparian cover along the lower reaches of many streams within the subbasin. Eliminate livestock access and restore and maintain riparian vegetation wherever possible. • Target riparian restoration efforts along the most productive and/or degraded streams including the agricultural areas (generally lower and middle reaches) of Germany and Abernathy Creeks, and the residential areas of Mill Creek. • Deciduous species dominate riparian corridors along a number of streams in the sub-basin. Manage riparian corridors to increase the percentage of conifers in riparian corridors.	Preserve healthy riparian corridors wherever encountered in the subbasin, especially along areas with unstable slopes.
Water Quality	**High:** Significant water quality problems occur in Abernathy and Germany Creeks. What data exists for Mill and Coal Creeks suggests water quality problems also exist there.	• Maintain and restore riparian cover for all streams within the sub-basin, especially along Abernathy and Germany Creeks, which were identified on the Department of Ecology's 303(d) list (1998a) of impaired water bodies due to temperature excursions beyond state standards. • Reduce livestock access to streams and riparian corridors. • Address water quality problems in the Longview Ditches through the TMDL process.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and restore wetlands and their sources of water. Identify and protect cooler water refuges in the subbasin.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• September, October, and November spot flow measurements for Coal, Germany, and Mill Creeks indicated flow levels that were significantly less than optimal for spawning and rearing. Identify ways to augment low summer flows and enhance rearing habitat in theses stream systems and other low flow limited habitats. • Reduce road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows. • Restore and enhance off-channel rearing habitats that can provide refuge for juveniles during peak flows, and pool habitats that can support rearing fish until water levels reconnect isolated habitats.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuges for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Increase contribution of marine–derived nutrients through increased use of carcasses.	Preserve riparian corridors and wetlands with native vegetation.

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RIFFE LAKE RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Cowlitz Coastal Cutthroat (SaSI) (only resident trout present)	Tier 4	

Not all stocks are present in all parts of the subbasin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** Passage issues at the dams and reservoirs restrict access to all anadromous species.	• Until problems with downstream migration through Riffe Lake are solved and capture efficiencies at the dams are increased, reintroductions of anadromous fish into the basin will be unsuccessful. Therefore it is unlikely that anytime in the near future that Riffe Lake will be anything other than a resident fishery	None
Floodplain Conditions	**Medium:** Floodplain connectivity is generally "poor" or the data is lacking for most streams.	None	None
Sediment	**Medium:** Sediment fines are a significant problem in Rainey Creek.	None	None
Channel Conditions/LWD	**Low:** LWD levels and recruitment potential are low through most of the sub-basin. Data on pool habitat and bank stability is lacking.	None	None
Riparian	**Medium:** Riparian conditions are generally "poor" along Rainey Creek.	None	None

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Water Quality	**High:** Significant water quality problems in Riffe Lake and Rainey Creek.	None	None
Water Quantity	**High:** Altered hydrology due to the operation of the Dams.	None	None
Biological Processes	**Medium:** No anadromous fish are released into the subbasin. Invasive species are present.	None	None

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TILTON/MAYFIELD SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Cowlitz Winter Steelhead (LCSCI)	Tier 1	
Cowlitz Coastal Cutthroat (SaSI)	Tier 4	
Cowlitz Coho (SASSI)	Tier 3	

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**Medium:** Data is lacking on passage barriers in this watershed. Mayfield Dam blocks access to all habitat and passage into the watershed is artificial.	• A complete barrier assessment is needed within the subbasin. • Reintroduction efforts in the subbasin are dependent upon successful downstream migration. Continue to assess and improve passage conditions for downstream migrants at Mayfield Dam.	None
Floodplain Conditions	**Medium/High:** Data is generally lacking on the condition of floodplain habitat in the subbasin. A lack of adequate rearing habitat likely limits rearing success in the subbasin.	• Numerous stream adjacent roads reduce floodplain connectivity in the subbasin. Stream adjacent roads, stream crossings, and other floodplain constrictions should be assessed and if possible improved to provide additional floodplain habitat. • Restore and enhance off-channel and side-channel habitat to provide refuge during high flows.	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Side channel habitat on the Tilton below Morton and on the lower West Fork Tilton provides important refuge areas for juvenile salmonids.
Sediment	**High:** Embedded substrates are a significant problem in the South Fork, Connelly Creek, Winston Creek, and Lake Creek.	• Decommission roads identified in the USFS Travel and Management Plan for areas of the Tilton River within the Gifford Pinchot Forest. • Road densities exceed 4.8-miles/square mile in the subbasin with numerous stream adjacent roads. Where possible reduce road densities and their fine sediment contribution to streams. Focus first on road drainage problems along Connelly Creek and in the South Fork Tilton.	Protect and enhance functional riparian corridors, especially along the South Fork Tilton, the mainstem Tilton from RM 22.9 to RM 25, the West Fork Tilton, and in Coon, Snow, and Trout Creeks where some of the best habitat exists for steelhead and cutthroat.
LWD	**Medium:** LWD levels and pool habitat are "poor" throughout the sub-basin	• LWD is the principle pool-forming agent in many of the stream systems within this subbasin. Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
LWD (Con't)		(although recruitment potential is low for most streams). LWD supplementation should be carefully placed and engineered to withstand the elevated peak flows that occur throughout the subbasin.	LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" throughout the sub-basin	• Target riparian restoration efforts along degraded streams identified in the West Fork/Nineteen Creek and East Fork Tilton Watershed Analysis. • Restore riparian vegetation along the East and North Forks of the Tilton, and in Winston Creek to help stabilize eroding streambanks and increase riparian functions. • Fence livestock away from streams and riparian areas.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries, especially in the Wallanding and Tumble Creek watersheds.
Water Quality	**Medium/High:** High Priority to address significant water quality problems that occur in the Tilton River, and in Winston, and Connelly Creeks. Data is generally lacking for other streams.	• Turbidity and elevated water temperatures were considered significant problems in the subbasin. Reduce road densities, upgrade stream crossings, and restore riparian cover for all streams within the sub-basin. • Reduce livestock access to streams. • Protect and restore wetlands. • Fish farming in the subbasin may negatively impact water quality and these operations should be closely monitored.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and restore wetlands.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Elevated peak flows in the Tilton and many of its major tributaries have scoured out spawning substrates, and reduced juvenile rearing success. Reduce road densities and/or upgrade road systems to increase infiltration and reduce the amount of water delivered directly to streams. • Low flows reduce the available spawning and rearing habitat in all major tributaries to the Tilton and in Winston Creek. Identify actions that will help augment flows and/or increase the available habitat during low flow periods.	
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Data is lacking on impacts to salmonids from predation in Mayfield Lake.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • As part of the reintroduction efforts, the effects of predation on juvenile salmonids in Mayfield Lake should be monitored and potential solutions developed if needed. • The importation of Atlantic salmon for fish farms raises the risk of disease exposure and other potential impacts to wild fish that should be closely monitored.	Preserve riparian corridors and wetlands with native vegetation. Manage fisheries and aquatic habitats to the benefit of native species.

*Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.
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TOUTLE RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	Priority	Other Anadromous Salmonids Present in the Sub-basin (LFA)
Toutle (mainstem) Winter Steelhead (LCSCI)	Tier 1	Chum
South Fork Toutle Winter steelhead LCSCI)	Tier 1	
Green (Toutle) Winter Steelhead (LCSCI)	Tier 1	
South Fork Toutle Fall Chinook (SASSI)	Tier 2	
Green (Toutle) Fall Chinook (SASSI)	Tier 2	
Toutle (mainstem) Coho (SASSI)	Tier 3	
South Fork Toutle Coho (SASSI)	Tier 3	
Green (Toutle) Coho (SASSI)	Tier 3	
Toutle Coastal Cutthroat (SaSI)	Tier 4	

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** Access to 9.2% (24.4 miles) of the habitat is blocked by dams or culverts. This figure does not include habitat affected by access problems at the North Fork Fish Trap and above the Silver Lake Dam.	• The fish trap on the Sediment Retention Structure (SRS) on the North Fork Toutle cannot operate effectively when frequent heavy sediment loads enter the facility, reducing or even restricting fish passage. Resolving this problem is one of the highest priorities in the subbasin. The fish trap also blocks access to approximately two miles of habitat downstream of the SRS. • A barrier assessment is scheduled for the near future that should provide additional data on passage problems in the subbasin. • The dam on Silver Lake restricts or delays passage into approximately 15 miles of upstream habitat. • A number of barriers on smaller tributaries were identified in the LFA. The culvert on the North Fork Wyant Creek at the 4531 Road crossing is one of the most significant to repair or replace.	None
Floodplain Conditions	**Medium:** Floodplain Connectivity is generally “poor” in the subbasin with numerous modifications	• Placement of dredge spoils on floodplains and wetlands substantially reduced connections to most floodplain habitat in the lower Toutle River. Wherever possible restore and enhance floodplain habitat and associated wetlands. • Dredge spoils placement has also reduced access to floodplain habitat in the lower South Fork Toutle and restoration is needed. • Numerous stream adjacent roads likely reduce floodplain connectivity in the subbasin. Stream adjacent roads, stream	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur (especially in areas where cover is available).

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Floodplain Conditions (Con't)		crossings, and other floodplain constrictions should be assessed and if possible improved to increase limited floodplain habitat.	
Sediment	**High:** Sediment fines are still a major limiting factor in the sub-basin. Spawning substrates are lacking in the Silver Creek watershed.	• TAG members stated that sediment fines and suspended sediments were still the major limiting factors in the North Fork and mainstem Toutle River systems. The Sediment Retention Structure on the North Fork is the source of most of this sediment and the major obstacle in the way of natural recovery after the eruption. • Road densities exceed 4.6 miles/square mile with numerous stream adjacent roads. Where possible reduce road densities and their fine sediment contribution to streams, focusing first on lower Green River, the South Fork Toutle, and the Silver Lake watershed. • Many of the roads in the South Fork Toutle watershed are now inaccessible and likely need maintenance, repair, or decommissioning. • Eliminate livestock access and restore riparian vegetation along streams in the subbasin. • LWD placement or additional structural elements are needed to capture scarce spawning gravels in the Silver Lake watershed. • Restore riparian vegetation along the major stream systems in the upper watershed to reduce bank erosion and mass wasting.	Protect and enhance functional riparian corridors and critical spawning habitat in the most productive systems including the South and Green Fork Toutle, and Elk, Deer, Hoffstadt, Alder, and Wyant Creeks.
LWD	**Medium:** Streams within the subbasin are slowly recovering from the effects of the eruption. LWD levels and pool habitat are still "poor" throughout the sub-basin.	• LWD is the principle pool-forming agent in many of the stream systems within this subbasin. Increase functioning LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (although recruitment potential is very low for most streams).	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are "poor" almost throughout the sub-basin	• Target riparian restoration efforts along the most productive and/or degraded streams including South and Green Fork Toutle, and Elk, Deer, Hoffstadt, Alder, and Wyant Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries, especially in South Fork Toutle, and Elk, Deer, Hoffstadt, Alder, and Wyant Creeks.

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Water Quality	**High:** High Priority to address significant water quality problems that occur in many of the stream systems affected by the eruption of St. Helens and in the Silver Lake watershed.	• Maintain and restore riparian cover for all streams within the sub-basin, especially along South and Green Forks, and the Silver Lake watershed. • Reduce suspended sediment loads and turbidity in the North Fork and mainstem Toutle Rivers. The Sediment Retention Structure is the major chronic source of sediment to downstream habitats. • Reduce livestock access to streams and riparian corridors. • Protect and restore wetlands. • Work with landowners to reduce fertilizer applications and identify failing septic systems in the Silver Creek watershed that elevate nitrogen and phosphorus concentrations in Silver Lake.	Protect and enhance riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.
Water Quantity	**Medium:** The Toutle watershed is recovering from the effects of the St. Helens eruption; however, both elevated peak and low flows present problems in the sub-basin.	• Reduce road densities and/or upgrade road systems to increase infiltration and reduce the amount of water delivered directly to streams. Roads have increased the stream network in the upper Toutle by approximately 370 miles. • Low to non-existent flows, combined with high stream temperatures, creates rearing conditions that are unfavorable or lethal to juveniles in the Outlet Creek. Look for opportunities to augment flows in the stream during the summer and early fall.	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream habitats and provide refuge for salmonids. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting. Invasive species increase competition and predation in the Silver Lake watershed.	• Increase contribution of marine–derived nutrients through increased use of carcasses. • Assess the level of predation on native salmonids in the Silver Creek watershed and look for ways to reduce impacts.	Preserve riparian corridors and wetlands with native vegetation

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

“Poor”, “Fair” and “Good” comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

UPPER COWLITZ RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Cowlitz Winter Steelhead (LCSCI)	Tier 1	
Cowlitz Spring Chinook	Tier 2	
Cowlitz Coastal Cutthroat (SaSI)	Tier 4	
Cowlitz Coho (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** Passage issues at the dams, numerous low flow passage problems, and culverts are all high priorities.	• Reintroduction efforts of anadromous salmonids in the sub basin are dependent on the success of smolt collection efficiency at Cowlitz Falls Dam. Continue to monitor and improve collection efficiencies at the Cowlitz Fall Dam. • Aggrading streambeds have created low flow passage problems near the mouths of many upper Cowlitz River tributaries. Assessment of these stream systems is needed to determine specific land-use activities that have contributed to aggradations and subsurface flows and to identify potential solutions to this problem. • A number of artificial barriers need assessment and repair including culverts on Siler, Willame, and Lambert Creeks, ponds on Siler Creek at Mt. Adams logging mill, a water diversion structure on Johnson Creek, and channelization of lower Smith Creek.	None

Floodplain Conditions	**High:** Floodplain connectivity is generally "poor" or the data is lacking for most streams.	• Lake Scanewa inundated 11 miles of braided and floodplain habitat in the upper Cowlitz, and the lower reaches of most tributaries have been diked, channelized, and/or filled. Reconnect and/or enhance floodplain and off-channel habitat wherever possible, especially within the lower reaches of the tributaries. • Stream channels have been channelized and hardened along private properties along Kiona Creek. Work with landowners to increase and enhance floodplain habitat within the watershed.	Preserve and enhance off-channel and side channel habitat and associated wetlands wherever they occur. Focus first on the lower gradient reaches of tributaries to the upper Cowlitz.
Sediment	**High:** Sediment fines are a significant problem in the sub basin.	• Various land use activities and channel modifications have increased sediment loading to the upper Cowlitz and its tributaries. Work with landowners to restore natural stream channel characteristics in the tributaries and to develop "Best Management Practices" for their activities. • Fence livestock out of riparian areas and reestablish native riparian vegetation to increase bank stability and reduce sediment inputs.	The lower reaches of the Ohanapecosh, Clear Fork, and Muddy Fork have some of the most pristine spawning and rearing habitats remaining in the subbasin and need protection. Protect and enhance any remaining low gradient spawning habitat in the tributaries to the upper Cowlitz. Skate, Johnson, and Silver Creeks provide productive spawning areas and need protection. Protect and enhance functional riparian corridors throughout the sub basin.

Channel/LWD Conditions	**High:** LWD levels are "poor" throughout the sub-basin. Data on pool habitat and bank stability is often lacking; however, TAG members generally rated these "fair" or "poor".	• LWD is lacking in all anadromous streams in this sub basin due to channel cleaning and timber harvest. Increase functioning LWD structures, or similar natural structures, focusing first in the alluvial reaches of the anadromous tributaries to the upper Cowlitz. TAG members considered the supplementation of LWD a priority. Utilize LWD that collects at Mossyrock Dam for LWD projects with the sub basin. • Work with landowners to identify areas where alternative materials could replace existing bank stabilization materials, and where diked and channelized streams could be restored to a more natural state. • LWD placement projects in the lower Cispus, near the head of Lake Scanewa, would help attract juveniles to the area and move them away from the Dam where they might be flushed into Riffe Lake during frequent drawdowns. • Incorporate new road construction techniques that allow the passage of LWD and sediments. • Fence livestock away from riparian areas and replant degraded riparian corridors. • Bank instability has been noted along the Cowlitz River near RM 115, and in Davis, Silver, Garret, Skate, Kiona, Oliver, and Peters Creeks. Assess, and if possible address conditions that are contributing to bank instability in these areas. • Pool habitat is generally lacking in the upper Cowlitz and its tributaries. Excessive	Protect existing mature riparian vegetation for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.

Channel/LWD Conditions (Con't)		sediment inputs and the lack of LWD are often cited as the problem. Decrease sediment inputs to stream systems through the reestablishment of riparian corridors, improving roads, and developing BMPs for agricultural activities.	
Riparian	**High:** Riparian conditions are generally "poor" except in the very upper reaches of the sub-basin	• Various land use activities along the most productive low gradient reaches of the mainstem Cowlitz and its tributaries have degraded riparian corridors. Fence livestock away from streams and increase riparian cover, starting with some of the most productive tributaries including Skate, Johnson, Silver, and Kiona Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries.
Water Quality	**High:** There are two streams listed on the 303d list for temperature and other streams where temperatures are considered excessive.	• Poor riparian conditions contribute to excessive water temperatures in a number of streams in the subbasin. Maintain and restore riparian cover for all streams within the sub-basin, focusing first along some of the most productive and/or degraded tributaries.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin.	• Juveniles are often flushed over the Cowlitz Falls Dam or stranded due to frequent drawdowns during high flows. The flow thresholds should be reevaluated to protect fisheries, and if possible thresholds should be increased. • Decommission and/or improve roads to increase infiltration and reduce the overall drainage network. • Assess and, if possible, decrease excessive sediment	Maintain adequate mature forest cover to prevent increased peak flows.

Water Quantity (Con't)		accumulations in Copper, Crystal, and Camp Creeks to maintain surface flows year round.	
Biological Processes	**Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting.	• Increase contribution of marine–derived nutrients through increased use of carcasses.	None

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

"Poor", "Fair" and "Good" comments refer to habitat criteria developed by the Conservation Commission for the Habitat Limiting Factors Analysis Reports.

WASHOUGAL RIVER SUB BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Washougal Summer Steelhead (LCSCI)	Tier 1	Chum Salmon
Washougal Winter Steelhead (LCSCI)	Tier 1	
WF Washougal Summer Steelhead (LCSCI)	Tier 1	
West Fork Washougal Winter Steelhead (LCSCI)	Tier 1	
Washougal Fall Chinook Salmon (SASSI)	Tier 2	
Washougal Coastal Cutthroat (SaSI)	Tier 4	
Washougal Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** 2.5% of the historic habitat in the sub basin is blocked. Wild Boy Dam removal is a High priority	• Wild Boy Creek Dam blocks 1.7 miles of good quality habitat for winter and summer steelhead, coho, and cutthroat. • Larson Creek culvert blocks approx. 0.4 miles of potential rearing habitat for winter steelhead, coho, and cutthroat trout. • Jones Creek culvert, under Boulder Creek Road, needs passage assessment and possibly a retrofit. • Numerous smaller tributaries to the Little Washougal have blocking culverts near their mouths and need assessment and repair. • Large cemented log jams on Silver and Bluebird Creeks may block passage for summer steelhead and need assessment. • Hatchery weirs and intake structures block habitat at various times of the year into the upper Washougal, West Fork Washougal, and Vogel Creek.	None

Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect floodplain habitat in appropriate areas to provide additional rearing and overwintering habitat. Areas to focus include the lower mainstem Washougal, the north shore of the Washougal upstream of the 17th St. Bridge, the Little Washougal system, and Slough and Schoolhouse Creeks. • With restoration, abandoned gravel pits in the lower river might provide good rearing and overwintering habitat. This area needs assessment and if appropriate enhancement.	Preserve off-channel and side channel habitat and associated wetlands wherever they occur. The lower reaches of the mainstem and Little Washougal are priorities.
Sediment	**High:** Sediment fines are significant problems in a number of streams. Lack of spawning gravels also reduces productivity in the Washougal and many of its tributaries.	• Identify and repair or decommission roads that are contributing excessive fine sediments to streams in the sub basin, focusing first on the upper Washougal and its tributaries, and the Little Washougal and its tributaries. • Restrict livestock access to streams and moto-cross activities in critical areas of Winkler and Jones Creek watersheds, and along the power line corridors. • Reduce development on steep unstable slopes. • Reduce impacts from stormwater and erosion that occurs in rapidly developing basins like the Little Washougal, Lacamas Creek, and the lower mainstem Washougal. • Address bank erosion on the Little Washougal near Stauffer Rd, and a major slide on the Washougal near the Vernon Road Bridge. • Increase LWD and other structural elements that can help capture scarce spawning gravels.	Protect existing quality riparian corridors from additional development along all anadromous streams within the sub basin. Protect areas with steep unstable slopes, starting with the major slide near the Vernon Road Bridge.
Channel/LWD Conditions	**High:** LWD levels and pool habitat are generally "poor"	• Increase functional LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (though recruitment potential is low	Protect existing mature riparian vegetation for LWD recruitment, especially along the upper reaches of the

Channel/LWD Conditions (con't)	throughout the sub basin.	for most streams). Areas to focus include the Little Washougal, E.F. Little Washougal, middle and upper mainstem Washougal and its tributaries, and in Jones, Boulder, Winkler Creeks. • Encourage beaver activity wherever possible.	mainstem Washougal and its tributaries, and the Little Washougal. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**Medium:** Riparian conditions are "poor" almost throughout the sub-basin.	• Target riparian restoration efforts along the most productive and/or degraded streams including the lower reaches of the Little Washougal and Winkler Creek. • Reduce, where possible, the impacts to riparian corridors of numerous stream adjacent roads in the upper Washougal and Little Washougal watershed. • Eliminate vehicle access to riparian areas along the lower Washougal, and motorcycle access to Winkler and Jones Creeks.	Preserve healthy riparian corridors in the headwaters of all the sub-basins tributaries, especially in the upper Washougal and its tributaries, and the Little and North Fork Washougal Rivers.
Water Quality	**Medium/High:** High Priority water quality problems in Lacamas Creek, main Washougal, and West Fork. For other areas data is lacking.	• Restore degraded riparian cover for all streams within the sub basin, especially along the lower mainstem Washougal and Little Washougal, and Lacamas Creek. • Fence livestock away from streams and riparian corridors, especially along impacted areas of Winkler Creek. • Protect and restore wetlands, springs, and seeps in the sub basin. • Reduce stormwater impacts on water quality, especially along the Lower Washougal, Little Washougal, and Lacamas Creek.	Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Preserve wetlands, springs, and seeps.
Water Quantity	**Medium/High:** Both elevated peak and low flows present problems in the sub-basin.	• Reduce stormwater impacts in the Lower Washougal, Little Washougal, and Lacamas Creek watersheds. • Water withdrawals further reduce	Protect fully forested and unroaded areas in the upper watershed from further development to reduce peak flows to downstream

Water Quantity (Con't)	High Priority to address water withdrawals from Jones and Boulder Creeks	already low flows on Boulder, Jones, and Lacamas Creeks. Develop alternative water sources that reduce impacts on low summer flows. • Identify unauthorized private diversions within the sub basin and work with landowners on alternatives.	habitats. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.
Biological Processes	**Low/Medium:** Escapement is well below historic levels and the lack of nutrients may be limiting (Medium Priority). Invasive species reduce riparian functions and potentially increase predation in the lower river (Low Priority)	• Decrease impacts to summer steelhead holding in pools within the middle and upper Washougal River from recreational activities. • Increase contribution of marine–derived nutrients through increased use of carcasses. • Remove invasive, non-native vegetation and replace it with native species, especially along the lower mainstem and Little Washougal Rivers. • Assess and identify possible remedies to predation in the lower Washougal River and Camas Slough.	Preserve natural vegetation along riparian corridors and within wetlands.

* Restoration and Preservation Actions by Limiting Factor were prioritized based upon the Limiting Factors Report and will be circulated to TAG members for their approval.

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LEWIS RIVER SUB-BASIN STOCK SUMMARY AND HABITAT PRIORITIES

Stocks and Priorities

SASSI and LCSCI Stocks	*Priority*	*Other Anadromous Salmonids Present in the Sub-basin (LFA)*
Lewis River Summer Steelhead (LCSCI)	Tier 1	Chum Salmon
Lewis River Winter Steelhead	Tier 1	
Lewis River Fall Chinook	Tier 1	
Lewis River Bull Trout	Tier 1	
Lewis River Spring Chinook	Tier 2	
Lewis River Coastal Cutthroat (SaSI)	Tier 4	
Lewis River Coho Salmon (SASSI)	Tier 3	

Not all stocks are present in all parts of the sub basin. Use LFA maps or contact Gary Wade at the LCFRB for specific site information.

Prioritization of Limiting Factors and Identification of Potential Restoration and Preservation Needs*

Limiting Factor	*Priority Rating*	*Potential Restoration Actions*	*Preservation Actions*
Fish Passage	**High:** Dams block approximately 113 miles (80%) of the historic anadromous habitat in the subbasin. Culverts block another 7.6 miles of habitat in streams below the dams.	• Provide both upstream and downstream passage through the dams on the main stem Lewis. • Assess and repair the highest priority culvert passage problems on Ross, Johnson, Colvin, Cedar, Beaver, John, Brush Creeks and an unnamed tributary to Cedar Creek.	None
Floodplain Conditions	**High:** Very limited floodplain habitat available with numerous modifications.	• Reconnect and enhance off-channel and floodplain habitats along the lower reaches of the mainstem Lewis River where diking and development have eliminated most historic floodplain habitat. • Enhance floodplain and side channel habitat around Eagle Island for rearing fall chinook juveniles and other salmonids.	Preserve off-channel and side channel habitat and associated wetlands wherever they occur in the lower Lewis River. Side channel and off channel habitat near Eagle Island are critical habitat for juvenile wild fall chinook rearing. Wetland complexes in the lower 2 miles of the South Fork Chelatchie Creek provide important low gradient rearing habitat in the Cedar Creek watershed.

Sediment	**Low/High:** Spawning gravels are in generally good condition in the mainstem Lewis below the dams (Low Priority). Substrate fines in the Cedar Creek system were rated "poor" and considered a major limiting factor by TAG members (High Priority).	• Identify and repair roads that are contributing excessive fine sediments to streams in the sub basin, especially within the Cedar Creek watershed where spawning sediments are often embedded with fines. Under Forest and Fish rules, the WDNR and forest landowners are identifying roads that need either repair or decommissioning. • Assess and, if possible, stabilize mass wasting and bank erosion problems along Colvin Creek, and Cedar Creek from RM 9.3 to just above Amboy. • Restore degraded riparian conditions along the tributaries to the lower Lewis River, especially along Robinson, Johnson, and Ross Creeks, and on Cedar Creek between RM 9 to RM 11.2 and in the lower reaches of South Fork Chelatchie Creek. • Exclude livestock from streams and riparian zones, focusing first along the middle reaches of Cedar Creek (RM 4.4 to RM 11.2) and lower South Fork Chelatchie Creek. • Continue to monitor sediment conditions below the dams on the Lewis River. • Identify sources and reduce inputs of fine sediments found in the Cedar Creek watershed.	Protect existing quality riparian corridors from additional development along all anadromous streams within the sub basin. Protect critical spawning habitat for wild fall chinook in the mainstem between Cedar Creek and Merwin Dam. Protect all backwater sloughs above the Lewis River Fish Hatchery that provide limited spawning habitat for the few remaining chum that return to the Lewis. Protect and enhance quality spawning sites in the Cedar Creek watershed. Protect and enhance all streams within the upper watershed that support bull trout including Pine, Rush, and Cougar Creeks.

Channel/LWD Conditions	**Medium:** LWD supplies and quality pool habitat are very limited in the sub basin.	• Increase functional LWD structures, or similar natural structures, in appropriate stream reaches through LWD placement projects and/or through recruitment (though LWD recruitment potential is very limited in most streams). • The dams on the Lewis River stop all LWD recruitment from upstream areas. LWD that is collected at the dams could be used to supplement LWD in areas downstream of the dams. • Speed recruitment of conifers within degraded riparian corridors to provide a future supply of LWD. • Enhance pool habitat and instream complexity, focusing first on the Cedar Creek watershed.	Protect existing mature riparian vegetation wherever found within the sub basin for LWD recruitment. Maintain current appropriate pieces of LWD, and other natural structures, through increased education and enforcement.
Riparian	**High:** Riparian conditions are “poor” almost throughout the sub-basin.	• Target riparian restoration efforts along the most productive and/or degraded streams including the anadromous reaches of all tributaries to the lower Lewis River. • Fence livestock away from streams and restore riparian vegetation. Areas to focus on first include Cedar Creek between Pup and Chelatchie Creeks. • Develop alternatives to the elimination of riparian vegetation along dikes in the lower Lewis River. • Restore native riparian vegetation along Eagle Island and its floodplain wetlands.	Preserve healthy riparian corridors in the headwaters of all the sub basin’s tributaries, focusing first on productive anadromous areas like Cedar Creek and its tributaries.

Water Quality	**Low/High:** Low Priority in the mainstem where water quality is generally "good". High priority in Cedar Creek where elevated water temperatures present significant problems. Data gaps in other streams.	• Restore degraded riparian cover for all streams within the sub basin, especially along degraded reaches of Cedar Creek and its tributaries. • Restore and enhance wetlands, springs, and seeps in the sub basin. • Reduce direct runoff from roads to streams, especially from heavily traveled gravel roads in the upper Cedar Creek watershed. • Enhance pool habitat to provide thermal refuge for salmonids rearing or holding in the watersheds. • Exclude livestock from streams and riparian areas along Cedar Creek and its tributaries.	Protect riparian corridors in all headwater areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas. Protect and enhance wetlands and spring fed sources of cool water, focusing first on wetland complexes in the upper reaches of the North Fork Chelatchie Creek.
Water Quantity	**Medium:** Both elevated peak and low flows present problems in the sub-basin. Dams have altered the hydrology of the Lewis River basin.	• Reduce impervious surfaces, road densities, and the direct connections between road drainage ditches and streams to reduce peak flows, promote groundwater recharge, and potentially enhance low summer flows. • Identify contributing causes and develop potential solutions to low summer flows in Cedar Creek and other tributaries. Low flows limit juvenile rearing capacity from June to October (Caldwell et al, 1999). • Identify and remove unauthorized diversions in the Cedar Creek basin that may affect streamflow.	Protect fully forested and unroaded areas in the upper Cedar Creek watershed from further development to reduce peak flows to downstream habitats, and to provide refuges for salmonids from elevated stream temperatures. Preserve floodplain connections and associated wetlands to provide off-channel refuge from high flows and additional flood capacity.

Biological Processes	**Medium:** Escapement is well below historic levels and a lack of nutrients may be limiting production.	• Assess the need to increase the contribution of marine–derived nutrients through increased use of carcasses. • Along riparian corridors and wetlands, remove invasive, non-native vegetation and replace it with native species.	Maintain native vegetation along stream corridors and wetlands.

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Lower Columbia Fish Recovery Board

2002 Board Members

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Technical Advisory Committee Chair
Clark County Citizen Designee

Randy Sweet, Treasurer
Cowlitz County Designee
Private Property Representative
TAC Member

Dave Andrew
Cowlitz PUD
Hydro-Electric Representative

John Barnett
Chairman, Cowlitz Indian Tribe

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Wahkiakum County Commissioner

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Lower Columbia Fish Recovery Board

“Phase II” Salmon Recovery Plan

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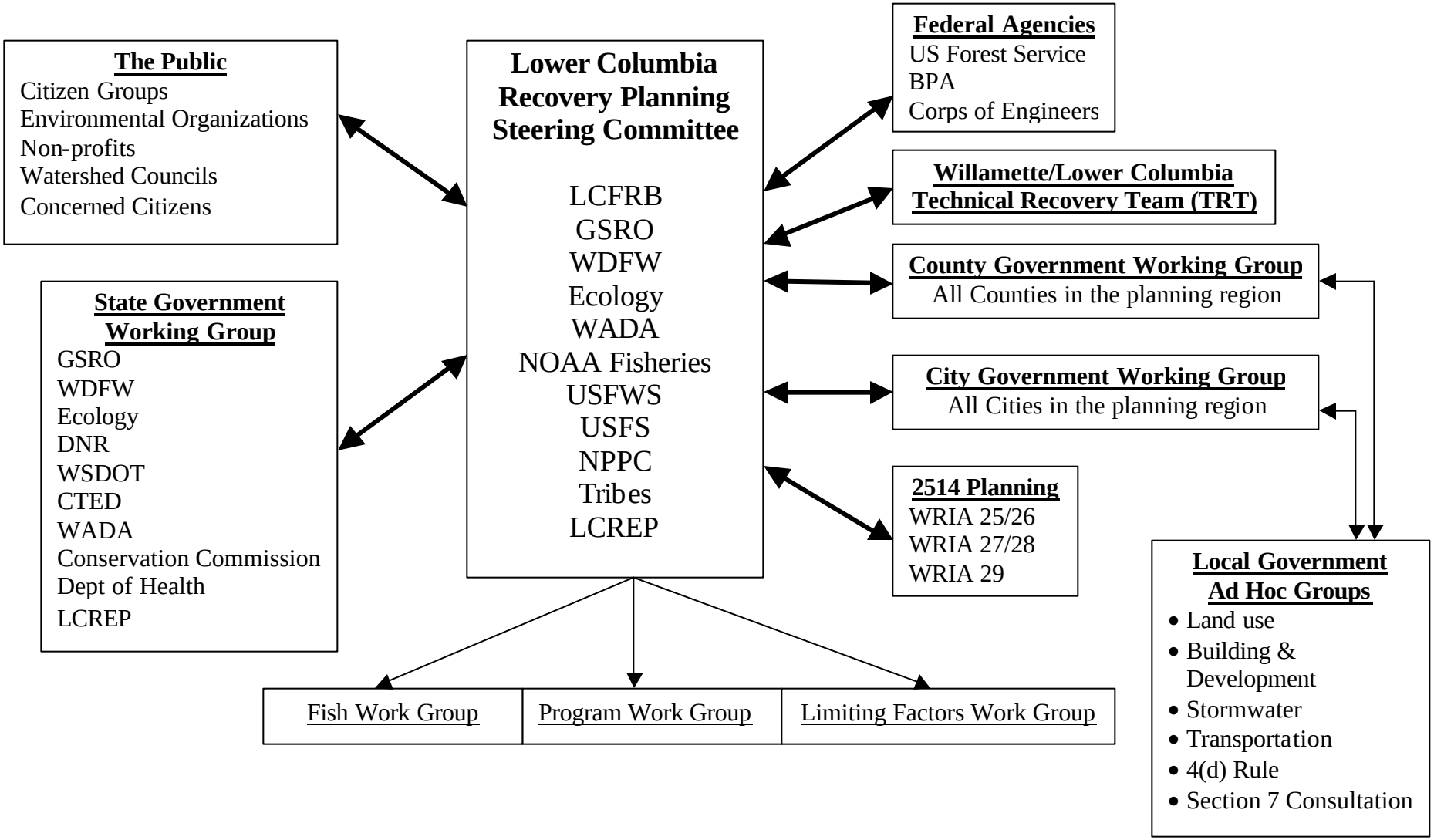
LOWER COLUMBIA RECOVERY PLANNING ORGANIZATIONAL STRUCTURE



LOWER COLUMBIA RECOVERY PLANNING STEERING COMMITTEE

Name	Representing	Alternate
Betty Sue Morris	LCFRB, County Commissioner	Joel Rupley
Bill Dygert	LCFRB, Citizen Designee	
John Barnett	LCFRB, Tribal Representative	
Dean Dossett	LCFRB, City Representative	
Randy Sweet	LCFRB, Citizen/Private Property Designee	
Patty Dornbusch	NOAA-Fisheries	
Vicky Finn	US Fish and Wildlife Service	
Phil Miller	Governor's Salmon Recovery Office	
Lee Van Tussenbrook	WDFW	Craig Burley
Debra Marriott	LCREP	Bruce Sutherland
Linda Crerar	WADA	Lynn Briscoe
Tom Loranger	Ecology	
Claire Lavendal	USFS	
Tony Grover	NPPC	Lynn Palensky
Paul Ward	Yakama Nation	
TBD	Chinook Tribe	

LOWER COLUMBIA RECOVERY PLANNING
FISH WORK GROUP

Name	Representing
Craig Busack	Fish & Wildlife/TRT
Dan Rawding	Fish & Wildlife/TRT
Patty Dornbusch	NOAA-Fisheries
Paul McElhany	NOAA Fisheries/TRT
Rich Turner	NOAA Fisheries-Sustainable Fisheries
Lance Kruzic	NOAA-Fisheries
Mark Fritsch	US Fish and Wildlife Service
Jim Fisher	Fisher and Associates
Paul Ward	Yakama Nation
Sam Lohr	US Fish & Wildlife
Ron Rhew	US Fish & Wildlife
TBD	Chinook Tribe
Frank Shrier	Pacific Corp
Mike Kohn	BPA/Pacific Corp
Mark LaRiviere	Tacoma Power

LOWER COLUMBIA RECOVERY PLANNING
LIMITING FACTORS WORK GROUP

Name	Representing
Steve Manlow	Fish and Wildlife
JoAnne Schuett-Hames	Ecology
Mike Kuttle Jr	Conservation Commission
Patty Dornbusch	NOAA-Fisheries
Mike Parton	NOAA-Fisheries
Paul McElhany	NOAA Fisheries/TRT
Russ Lawrence	US Fish and Wildlife Service
Dave Howe	Clark County
Peter Paquet	NPPC
Gary Wade	LCFRB
Paul Ward	Yakama Nation
John Barnett	Cowlitz Tribe
TBD	Chinook Tribe
Sam Lohr	USFWS
Ron Rhew	USFWS
Brian Bair	USFS
Kirk Willis	Natural Resources
TBD	Transportation
Frank Shrier	Pacific Corp
Bruce Sutherland	LCREP
Jim Fisher	Fisher and Associates
Brian Fransen	Weyerhauser

LOWER COLUMBIA RECOVERY PLANNING PROGRAM WORK GROUP

Name	Representing
Lee Van Tussenbrook	Fish and Wildlife
Tom Loranger	Ecology
Tom Salzer	Conservation Commission
Patty Dornbusch	NOAA-Fisheries
Paul McElhany	NOAA Fisheries/TRT
Mike Parton	NOAA-Fisheries
Charly Boyd	US Fish and Wildlife Service
Joel Rupley	Clark County
Pete Ringen	Lewis County Public Works
Vicki Ridge-Cooney	City of Vancouver
Bob Gregory	Longview
Lynn Palensky	NPPC
Paul Ward	Yakama Nation
TBD	Cowlitz Tribe
TBD	Chinook Tribe
Dianna Perez	USFS
Bob Willis	Army Corps
Joe Shramek	Natural Resources
Phil Miller	GSRO
Vicky Finn	USFWS
Lynn Briscoe	Dept of Agriculture

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Lower Columbia Fish Recovery Board

“Phase I” Salmon Recovery Plan

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[1] Although Part I (Chapters One and Two) is part of Phase I, they will be developed later in the planning process.

Part II: Description of the Resources, Environmental Conditions and Programs Affecting Salmon .....

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Lower Columbia Recovery Planning Work Schedule