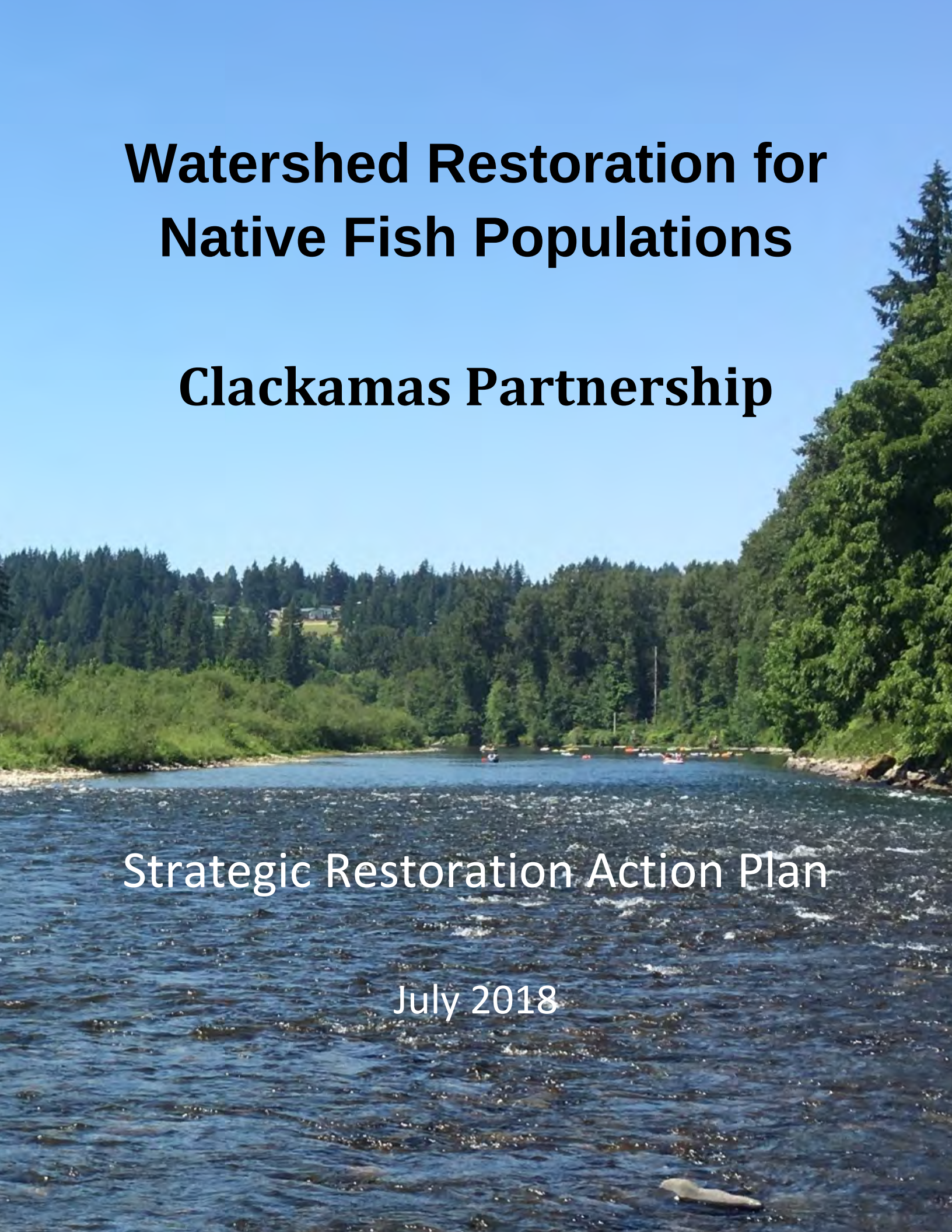
Watershed Restoration for Native Fish Populations

Clackamas Partnership



Strategic Restoration Action Plan

July 2018

Strategic Restoration Action Plan

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1. Introduction

Clackamas Partnership

The Clackamas Partnership is more than fifteen Portland metropolitan region organizations committed to working collaboratively to improve watershed health. For more than ten years, the Partnership's watershed councils, local, state, and federal agencies, tribes, and other Partner organizations have shared resources and collaboratively engaged in restoration projects, funding efforts, monitoring, and community outreach activities.

The Partnership developed this Strategic Restoration Action Plan (Strategic Plan) to guide restoration actions designed to improve river and stream habitat and the environment that sustains native fish populations. The Strategic Plan's large geographic area (Plan Area) encompasses the Clackamas River and all tributaries from its headwaters to the confluence with the Willamette River; a portion of the Willamette River and its floodplain; and watersheds flowing into the east side of the Willamette River, including Abernethy, Kellogg, and Johnson Creeks.

Historically, the Clackamas River and the other Portland metropolitan region tributaries supported some of the most diverse and productive fish populations in the Columbia River Basin. In 1877 Livingston Stone, employed by the US Commission of Fisheries to explore potential fish hatchery sites throughout the Columbia River Basin, declared about the Clackamas River:

> ***Probably no tributary of the Columbia has abounded so profusely with salmon in past years as this river*** **(the Clackamas).**
> (US Commission of Fish and Fisheries 1877, reported in Taylor 1999)

Today the Clackamas River and other area streams still support regionally significant fish runs. However, fish populations in the area have declined from historical levels, with some fish runs diminished to the point of being listed under the federal Endangered Species Act (ESA). Fish populations have declined, not only in the Clackamas River

Partners*
Clackamas County Water Environment Services
Clackamas River Basin Council
Clackamas River Water Providers
Clackamas Soil and Water Conservation District
Confederated Tribes of Warm Springs
Greater Oregon City Watershed Council
Johnson Creek Watershed Council
Metro
North Clackamas Parks & Recreation District
North Clackamas Urban Watersheds Council
Oregon Dept. of Environmental Quality
Oregon Dept. of Fish and Wildlife
Oregon Parks and Recreation Dept.
Portland General Electric
U.S. Forest Service, Mt. Hood National Forest, Clackamas River Ranger District

*Other organizations contributing to the Clackamas Partnership: Clackamas County Parks, Bureau of Land Management (BLM), Confederated Tribes of the Grande Ronde, and the Oregon Wildlife Foundation

Mission

The Clackamas Partnership collaborates on coordinated aquatic, riparian and floodplain restoration, conservation, and habitat protection actions to enhance watershed health, support the recovery and sustainability of native fish populations, and contribute to the region's economic and social vitality.

Basin and the Partnership's other focal watersheds but throughout the Pacific Northwest.


Clackamas River

Despite the region's dramatic growth and development, the Portland metropolitan region still supports a rich diversity of fish and wildlife habitats. Rivers and streams within the Partnership's Plan Area support some of the healthiest salmon, steelhead, Pacific lamprey and bull trout populations in the region. The Clackamas River Basin, for example, has the last wild late-winter coho salmon population in Columbia Basin. The Clackamas spring Chinook salmon and winter steelhead populations are trending in a positive direction.

While these trends are positive, substantially more habitat restoration is needed to recover and sustain the environment that supports native fish and wildlife populations. Guided by state and federal endangered and sensitive species recovery plans, local watershed assessments, and restoration action plans, the Clackamas Partnership has made substantial progress in addressing the key limiting factors and threats imperiling salmon, steelhead, Pacific lamprey, bull trout and other native fish populations. The Partnership has demonstrated the capacity, expertise, experience, and commitment necessary to coordinate actions across a diverse landscape and to implement a comprehensive portfolio of restoration activities and programs that collectively deliver watershed-scale results. Through collective and coordinated activities, the Partners have removed most of the high priority fish passage barriers, restored over a hundred miles of riparian habitat, enhanced stream habitats, and restored fish access to floodplains and side channels.

The Strategic Plan's comprehensive restoration and conservation approach will accelerate the implementation of actions designed to enhance stream, river, riparian, and floodplain habitats and provide the largest ecological benefits. Restoring and protecting riparian areas and floodplains enhances degraded habitat corridors, which provides a variety of ecosystem benefits, including enhancing connectivity between habitats for fish and wildlife. The Partnership's actions contribute to recovery of ESA-listed species and improve the environment that sustains fish and wildlife populations, water quality, and the region's quality of life.

The Strategic Plan describes the Clackamas Partnership's commitment to, and outlines the roadmap for, increasing the pace and scale of restoration through collaboration, focused investment, outreach, and sharing information and resources. To support the collaborative strategic planning effort and on-going restoration actions, the Partnership organizations (Partners) share staff resources, data, and information on the factors degrading watershed health and fish populations. Through coordination between the Partners, the Partnership has identified priority restoration areas and actions. The Strategic Plan describes restoration actions that address the limiting factors identified in state and federal recovery plans, outlines performance goals and objectives, and demonstrates the Partnership's capacity for phased restoration project implementation for recovery of native fish populations.

To facilitate the collaborative planning effort, the Partnership developed a shared project planning and performance measure tracking website, Clackamas Project Tracker: www.clackamaspartnership.org. The website is a framework for the Partnership to record and share restoration activities and anticipated ecological outputs through all stages of the restoration and conservation project planning and development lifecycle—proposal, project prioritization and selection, implementation, and post-implementation reporting[1]. The website, accessible to the public and funding partners, is an expression of the Partnership's commitment to a transparent and accountable approach to planning, managing, and protecting public investments.

Blue Heron with Pacific Lamprey in Abernethy Creek. Source: Patricia Ferrell-French, Abernethy Creek watershed resident

The Strategic Plan is a 16-year plan that describes Clackamas Partnership activities through 2025; the Strategic Plan will be adaptively managed and updated periodically based on new information and monitoring and evaluation results. The Clackamas Partnership's mission will be sustained for the long-term, addressing emerging threats to watershed health, water quality, and fish and wildlife populations. The Partnership will revise the Strategic Plan in 2026 to incorporate lessons learned over the previous implementation period and to address new priorities identified through the Lower Columbia Conservation and Recovery effort and other assessments.

Fish Populations and Geographic Focus

The Lower Columbia River Conservation and Recovery Plan ("*LCR Plan*") for Oregon Populations of Salmon and Steelhead (Oregon Department of Fish and Wildlife [ODFW] 2010) describes factors limiting the recovery of the ESA-listed Clackamas Population: Spring Chinook salmon, fall Chinook salmon, coho salmon, chum salmon, and winter steelhead populations. Restoration actions also emphasize Pacific lamprey (a state and federal sensitive species) and bull trout (an ESA-listed species that was historically present in the Clackamas River Basin and recently reintroduced). Collectively, the seven fish species are the "Clackamas Fish Populations" or the "focal fish populations." The Clackamas Fish Populations and the watersheds that sustain them are recognized by the Oregon Watershed Enhancement Board (OWEB) as the highest priority for native fish species restoration and recovery, based on State and Federal recovery plans.

The Clackamas salmon and steelhead populations are one of nine Oregon Lower Columbia independent populations. The Partnership's Plan Area encompasses the core of the Clackamas ESA-listed salmon and steelhead population area, as described in the *LCR Plan*. The area covers the Clackamas River Basin and

[1] Portland, Oregon-based Sitka Technology developed Clackamas Project Tracker with open-source software derived from the Tahoe Regional Planning Agency's Environmental Improvement Program (EIP) Project Tracker platform: https://eip.laketahoeinfo.org/.

other Portland metropolitan area watersheds with tributaries flowing into the east side of the Willamette River[2]: Abernethy, Kellogg-Mt. Scott, and Johnson Creek watersheds.

The Plan Area spans the Clackamas River mainstem, the river's floodplain, and all tributaries, and associated watersheds flowing into the Clackamas River (Figure 1). Major Clackamas River tributaries in the upper basin include the Collawash River, Oak Grove Fork, Fish Creek, and Roaring River, North Fork, and South Fork; the lower Clackamas River (below Rivermill Dam) tributaries include Eagle, Clear, Deep, and Rock creeks.

The Willamette River mainstem, floodplain, and east and west bank tributary confluence areas from Willamette Falls to, and inclusive of, the river's confluence with Johnson Creek is within the Plan Area. Willamette River tributaries flowing into this section of the river include Abernathy, Rinearson, Boardman, Kellogg-Mt. Scott, and Johnson Creeks.

It is important to underscore that the Clackamas and Willamette river channels and floodplain, a dynamic area with diverse and complex habitats, is key landscape feature. The floodplain areas include side channels, alcoves, wetlands, and other off-channel habitats and the lower portions of tributaries within the floodplain and tributary-river confluence areas. Floodplain habitats are a conservation priority for the region and the State of Oregon (ODFW 2018; Intertwine Alliance 2012a).

Collawash River in the upper Clackamas River Basin. Source: Cheryl McGinnis, Clackamas River Basin Council

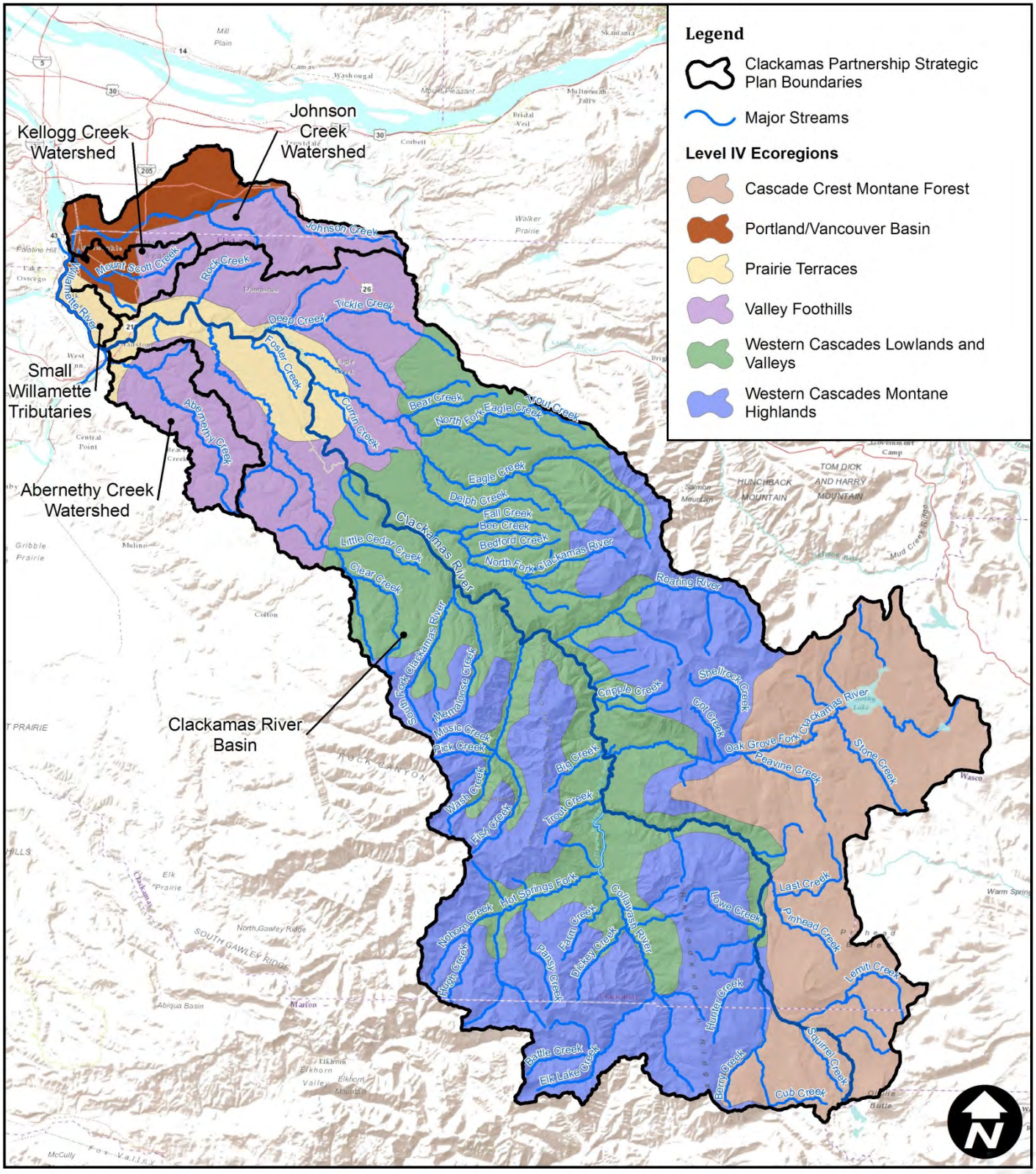
The Partnership's large and ecologically diverse landscape encompasses the Mt. Hood National Forest in the Cascade Mountains; private timber, agricultural and rural residential lands in the foothills and valley lowlands; and growing urban residential areas along Deep, Abernathy, Kellogg, and Johnson creeks and other tributaries. The map on the next page depicts the Partnership's Plan Area and diverse ecoregions.

The Partnership works in an equally complex and diverse social context. A large proportion of the Portland metropolitan region's 1.5 million people live, recreate, and benefit from the area's watersheds and natural resources. The Clackamas River provides high-quality drinking water to more than 300,000 people. The area's rivers, streams, parks, and natural areas support fishing, boating, hiking, and other recreational activities. With more than 500,000 visitors annually, Milo McIver State Park on the Clackamas River is one example of the increasing demands on regional parks and natural areas. The Partnership's restoration and habitat protection efforts sustain and enhance the area's environment, communities and economy. These actions

[2] The Partnership's Plan Area covers most of the geography defined in the *LCR Plan* as the Clackamas Fish Population area. The area does not include the following watersheds that are part of the *LCR Plan* Clackamas Fish Population area: Columbia Slough watershed or the watersheds encompassing Tryon and Lake Oswego creeks.

help ensure that all people who live, work, and recreate in the area's watersheds have an opportunity to share in a livable and prosperous region.

Figure 1. Clackamas Partnership Plan Area and Level IV Ecoregions



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Restoration and Conservation Emphasis

Interns from Wisdom of the Elders (Native American organization) staking willows along Johnson Creek. Source: Daniel Newberry, Johnson Creek Watershed Council

The Clackamas Partnership's restoration actions concentrate on restoring watershed processes and habitats that are limiting healthy native fish populations. In addition to restoration actions, the Partnership also works on habitat protection and community outreach to promote water quality best management practices (BMPs) and conservation activities designed to improve watershed health. The Partnership's restoration actions are designed to address the factors that are limiting Clackamas Fish Populations by improving habitat quality, capacity, and diversity for migrating and rearing adult and juvenile salmon, steelhead and other native fish. The Partnership has completed a large number of restoration projects, conservation activities, and habitat protection efforts.

Examples of the rich diversity and extent of Partner accomplishments include: **Metro** protecting and restoring of hundreds of acres of floodplain, riparian and channel habitats for the Willamette River, Clackamas River, Abernethy Creek and Johnson Creek watersheds through its Parks and Nature program; the **Johnson Creek Watershed Council** engaging industrial landowners in voluntary actions to improve stormwater quality and quantity; **Clackamas County Water Environment Services** enhancing and protecting tributary and Clackamas River floodplain habitats; the **Clackamas River Basin Council** restoring native riparian vegetation and shade to more than 30 miles of stream; and the **Clackamas Soil and Water Conservation District** surveying weeds on more than 230 properties totaling 3,809 acres in 2016-2017 as part of its WeedWise program. In addition to the lead organizations, a variety of other Clackamas Partners also participated in these efforts.

The Partnership's completed and planned habitat restoration, protection, and conservation efforts also build on Portland General Electric's (PGE) actions in the Clackamas River Basin. PGE's recent re-licensing agreement with the Federal Energy Regulatory Commission (FERC) required modifications to the Clackamas Basin hydropower facilities designed to enhance fish populations. These actions focus on improving upstream adult fish passage into the upper Clackamas River Basin and enhancing downstream fish passage for juveniles. PGE's actions have been mostly implemented and are successfully increasing adult spawning in the upper basin and dramatically improving the number of juvenile fish moving downstream. PGE's FERC license requires a 97% survival rate of juveniles through the hydropower facilities. All adult and juvenile fish passage conditions in the license have been met; PGE will continue to monitor fish passage for the life of the license. In addition to improving fish passage, PGE has improved water temperatures and flows in the Oak Grove Fork, enhanced fish spawning grounds and water temperatures by placing gravels in the lower Clackamas River, provided funding in support of Partner restoration projects, and completed other actions.

Restoration and conservation actions concentrate on addressing the primary limiting factor cited in the *LCR Plan*: enhancing and protecting habitat complexity and access to off-channel habitats. Additional limiting factors identified through the Partnership's planning process are also addressed – altered hydrology and water quality related to stormwater, for example. Access to off-channel habitats and impaired water quality are also key limiting factors for adult and juvenile Pacific lamprey (Poirier et al. 2017, Clemens et al. 2017).

Much of the restoration emphasis is within the Clackamas and Willamette river corridors and associated floodplains and tributary junctions. This emphasis also includes the lower portions of Plan Area streams that are accessible to juvenile salmon and steelhead migrating through the river system. Other restoration activities improve watershed processes, habitat conditions, and water quality in tributaries to the Willamette and Clackamas Rivers that still support salmon, steelhead, and Pacific lamprey spawning and rearing and thus contribute to the population's productive capacity and diversity.

PGE's River Mill Dam floating surface water collector for juvenile salmon, steelhead, and Pacific lamprey out-migrants. Source: John Runyon, Cascade Environmental Group

The Partnership's restoration and conservation actions will improve habitat conditions for the Clackamas Fish Populations. Improving habitat and water quality in the Partnership's Plan Area will also benefit salmon, steelhead and Pacific lamprey populations that spawn above Willamette Falls in upper basin tributaries such as the Molalla, McKenzie, and Santiam rivers. Adult salmon and steelhead move through the lower Willamette River as they migrate to the upper basin; juveniles occupy the Willamette River, lower Clackamas River, and the lower portions tributary streams as they move downstream migration to the ocean. Juvenile fish, particularly Chinook salmon and Pacific lamprey, actively feed and grow in the river and off-channel areas (Clemens et al. 2017, Friesen 2005). Toxins, which are present in Willamette River sediments, may be particularly harmful to juvenile Pacific lamprey because larvae burrow and feed in mud and fine substrates where toxins accumulate (Clemens et al. 2017).

Adult and juvenile salmon, steelhead, and Pacific lamprey originating from upper Willamette Basin tributaries will benefit from the Partnership's restoration actions. During periods when water temperatures are high in the Willamette River, migrating adult salmon and steelhead will access and then rest in the Clackamas River, Johnson Creek and other tributaries with cooler water. The Partnership's actions will enhance cooler water tributaries and refugia areas. Juvenile fish migrating downstream from the upper Willamette Basin's spawning areas will also benefit from restoration actions designed to improve rearing habitat complexity and access to Willamette and Clackamas River floodplain and off-channel areas. Juvenile salmon, steelhead, and Pacific lamprey will also benefit from water quality enhancements designed to reduce toxic inputs (e.g., from stormwater) and improve water temperatures.

2. Ecological Outcomes: Restored Aquatic Habitat and Watershed Processes

Clackamas County Water Environment Services' Rock Creek Restoration Project at the confluence of Rock Creek and the lower Clackamas River. Source: Cheryl McGinnis, Clackamas River Basin Council

The Clackamas Partnership is engaged in restoring watershed processes and aquatic, riparian, and floodplain habitats necessary to recover and sustain Clackamas Fish Populations and support healthy watersheds. The *LCR Plan* describes recovery goals for nine lower Columbia River salmon and steelhead population areas, including the Clackamas Population Area. The Partnership designed its goals, objectives, and activities, outputs, and outcomes (Outlined in Section 10 of this Plan) to address the key limiting factors and threats outlined in the *LCR Plan* for the Clackamas steelhead and salmon populations.

The *LCR Plan* focuses on actions intended to address all habitats from the headwaters to the ocean and the diverse threats (e.g., dams and hatcheries) that also affect fish population recovery. The Partnership's emphasis is on tributary habitats, including the channel and floodplains of the Clackamas and Willamette Rivers. The Partnership's actions do not address fish habitat in areas beyond its Plan Area (e.g., the Columbia River Estuary) or threats implemented through other processes (e.g., harvest, predation, etc.).

The actions described in the Strategic Plan emphasize voluntary restoration activities. The Partnership's actions do not address activities required through existing permits or regulatory processes. Examples of activities outside the purview of the Partnership's strategy include hydropower operations regulated by FERC, municipal drinking water withdrawals, and those stormwater activities that are addressed by National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permits. While the Partnership's actions do not directly address these regulated activities, they do complement the intended environmental outcomes. For example, NPDES permit requirements to address municipal stormwater discharge. The Partnership's emphasis on outreach and voluntary actions with landowners, industrial operators, and others to improve stormwater quality and quantity complement the municipalities' regulated activities.

Tributary restoration and conservation actions and other activities will achieve specific outputs (e.g., acres of restored off-channel habitat access) and outcomes (e.g., increasing fish habitat capacity and productivity) necessary to achieve the *LCR Plan's* tributary habitat recovery goals for the Clackamas salmon and steelhead populations. Cumulatively, these actions will improve and increase habitat quantity, quality, and diversity for all life stages of spring and fall Chinook salmon, coho salmon, chum salmon and winter steelhead. While the emphasis is on salmon and steelhead populations,

comprehensively restoring watershed processes and habitats will also benefit the other focal fish populations – Pacific lamprey and bull trout – and help support the area's other native fish and wildlife species. The Partnership's timeline for achieving these goals aligns with the *LCR Plan's* target of reaching key outcomes that support recovery of Clackamas Fish Populations by 2025.

North Clackamas Urban Watersheds Council's Remove Kellogg Dam Celebration and duck race, July 16, 2017. Source: Andrew Collins-Anderson, North Clackamas Urban Watersheds Council

Table 1 below outlines the metrics for habitat restoration in support of the *LCR Plan*. The habitat restoration goals, developed by ODFW, are designed to provide river and stream habitats and ecological outcomes that will assist in the recovery of the Clackamas salmon and steelhead populations. The restoration metrics were developed in 2014 based on best available science and modeled threat reduction scenarios to reduce tributary habitat fish mortality to a level that is consistent with recovery plan mortality rates for each population under the delisting scenario.

The *LCR Plan* metrics address the key tributary limiting factors identified for the Clackamas Fish Populations: impaired habitat complexity and diversity, including access to off-channel habitats. The restoration actions improve floodplain wetland habitat and fish access, restore side channels, enhance riparian vegetation, and enhance habitat structure by placing large wood in channels and floodplains. It is important to note that the metrics emphasize improving tributary habitat in support of salmon and steelhead population recovery. Improving river and stream habitat is necessary but not sufficient to sustain long-term recovery because a comprehensive set of actions is required to support the Clackamas Fish Populations – addressing predation, hatcheries, and harvest, for example.

Table 1. Summary of the quantities of habitat restoration actions needed for listed salmon and steelhead species within the Clackamas Population Area of the Lower Columbia River Evolutionary Significant Unit (ESU) and associated restoration standards based upon the ESA delisting scenario analysis for the *LCR Plan*. The metrics are the approximate delisting goal targets based on ODFW projections to overcome mortality rates to achieve the delisting scenario. Source: ODFW 2014

Large Wood Placement (miles)	Side channel increase (miles)	Riparian Planting (miles)	Off-Channel Wetland Complex Increase (m^2)
62.5	64.6	34.8	19,780.3
Note: 20 m^3 of large wood/100m of stream		Note: 30 m width on each side of the stream channel	

As summarized below, the Partnership's restoration outcomes are designed to meet *LCR Plan* habitat metrics as well as other objectives (e.g., improving stormwater quality, enhancing wildlife habitat, outreach, etc.). Section 6, *Partnership Accomplishments*, describes the Partnership's progress toward meeting these objectives; Section 10, *Goals, Objectives, and Phasing*, describes specific restoration action locations and restoration outputs tied to the *LCR Plan* targets.

A large cedar tree that had recently fallen into Eagle Creek, a tributary to the lower Clackamas River. Source: Todd Alsbury, Oregon Department of Fish and Wildlife

2025: Targeted Restoration Outcomes

Ecological outcomes are the long-term ecological effects resulting from the Partnership's comprehensive restoration and conservation actions over time. The Partnership's restoration approach focuses on restoring river, stream, floodplain, and riparian habitat and watershed processes. The emphasis is on restoring habitat characteristics that support and sustain ecological processes for the long-term. In some instances, restoration restores habitat structure in the short-term while also taking actions that support the short- and long-term recovery of processes and habitats. Restoration actions, for example, include enhancing habitat complexity through structural actions, such as placing large wood in streams and floodplains. These actions, in conjunction with planting native trees and other vegetation to restore floodplain and riparian habitats, over time will promote the delivery of large wood to the system and other processes.

The Strategic Plan describes Clackamas Partnership activities through 2025. Over this period Partners will complete restoration activities designed to meet the *LCR Plan's* metrics for restored habitats needed for listed salmon and steelhead species within the Clackamas Fish Population Area based upon the ESA delisting scenario analysis. The habitat metrics (see Table 1) are the approximate delisting targets based on ODFW projections to overcome mortality rates to achieve the delisting scenario. The listed restoration quantities should be viewed with caution because there was limited information during plan development and uncertainty about the quality and functionality of restored habitat and fish response (ODFW 2014). The response of the fish populations over time will ultimately determine the quantity of habitat restoration required for recovery.

The Partnership is committed to a long-term shared vision. Recovery of the Clackamas Fish Populations and the dynamic ecosystem that supports them requires sustaining habitat restoration and protection activities over the long-term. Restoring watershed processes that support high-quality habitats takes time. It requires decades, for example, for trees planted in riparian areas reach a size that is sufficient to shade streams and provide other ecological processes such as large wood delivery to stream channels. Similarly, it will take decades for the Partnership to protect and restore the diverse and interconnected

network of river, stream, and floodplain habitats necessary support healthy and resilient native fish populations.

Taking into account the long time periods required to restore habitats and watershed processes, the *LCR Plan* modeled each fish population's risk of extinction along with habitat recovery scenarios over a 100-year period. As part of this long-term strategy, ODFW will update the 2010 *LCR Plan* in 2025 based on an evaluation of completed restoration activities and fish population status. The Partnership will work beyond 2025 to secure and maintain its investments in habitat restoration, monitor and evaluate the effectiveness of its actions, and address current and emerging challenges to fish populations and watershed health.

Clackamas River Basin Council's Shade Our Streams restoration site in the lower Clackamas River Basin. Source: Cheryl McGinnis, CRBC

By 2025 the Clackamas Partnership will achieve the following outcomes:

1. Restored River and Tributary Watershed Processes, Habitat Complexity, and Off-Channel Floodplain Access for Improved Habitat Quality, Capacity, and Diversity in Support of Clackamas Fish Populations

This outcome is the Partnership's highest priority because it addresses habitat complexity and off-channel habitats—the key limiting factor for the Clackamas Population of ESA-listed salmon and steelhead cited in the *LCR Plan*:

1-A. River and Floodplain Habitat Complexity and Off-Channel Habitat Access – Clackamas and Willamette River Floodplain and Lower Tributaries:
Restore floodplain processes, riparian vegetation, habitat complexity and off-channel access for 400 acres of floodplain; 16 miles river or side channel habitat, and 1 mile of lower tributary rearing habitat within the river floodplain areas.

1-B. Lower Clackamas Tributary Habitat Restoration – Deep, Clear, and Eagle Creek Watersheds:
Restore riparian processes, habitat complexity and off-channel access for 100 acres of riparian areas and floodplain and 10 miles stream or side channel habitat.

1-C. Urban Tributary Stream Habitat Restoration – Rock and Abernethy Creeks and Small Willamette Tributaries; Kellogg, and Johnson Creek Watersheds:
Restore riparian processes, habitat complexity and off-channel access for 80 acres of floodplain and riparian areas and 4 miles stream or side channel habitat.

2. Improved Water Quality and Quantity: Stormwater Hydrology and Water Quality, Elevated Water Temperatures, and Modified Sediment Regimes

2-A. Stormwater Hydrograph and Water Quality Improvements – Developing and Developed Watersheds: Restore areas to reduce effective impervious surface acres and treat impervious surfaces with appropriate Best Management Practices (BMPs), including installing stormwater retrofits where feasible.

2-B. Riparian and Floodplain Habitat Function and Shade Restoration – Developed and Developing Watersheds: Restore riparian function and shade by planting native species and controlling invasive vegetation for 20 miles of riparian areas.

2-C. Improve Undeveloped Road Sediment Generation and Delivery to Streams – Lower Clackamas Basin Tributaries and Upper Basin Roads on Mt. Hood National Forest lands:
Reduce road sediment generation by improving road drainage or decommissioning for 30 miles of roads.

3. Protected High-Quality Habitats in Support of Clackamas Fish Populations and Improved Water Quality

3-A. Protect High-Quality Riparian, Floodplain, and Off-Channel Habitats – Developed and Developing Watersheds:
Protect high-quality habitats – streams, riparian and floodplain areas, side channels, and off-channel wetlands through fee-simple acquisition or conservation easements with willing landowners.

4. Restored Fish Passage for Improved Habitat Capacity and Diversity in Support of Clackamas Fish Populations

4-A. Restore Fish Passage:
Restore fish passage for 20 miles of streams by improving culvers or other obstacles.

5. Landowners and Municipalities Applying Best Management Practices (BMPs) in Support of Improved Water Quality and Enhanced Riparian and Aquatic Habitats

5-A. Promote BMPs to Improve Water Quality, Sediment Inputs, and Habitats – Developed and Developing Watersheds:
Engage landowners and municipalities through education and outreach to promote the application of voluntary BMPs. (**Note**: WES and other municipalities in the area are required to comply with NPDES MS4 permits. The intent is to pursue actions outside of the MS4 permit requirement.)

6. Engaged Community

A. Engage Landowners and the Community to Promote Increased Awareness and Support for Restoration Activities – Developed and Developing Watersheds:
Engage landowners and other stakeholders for promoting awareness of, and support for, watershed restoration, conservation, and land protection to promote healthy watersheds, native fish recovery, and water quality improvements. A component of outreach focuses on recruiting landowners to implement voluntary restoration actions, commit to conservation easements and other land protection approaches, and integrate water quality BMPs into land management.

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3. Scope, Vision, and Guiding Principles

Geographic Scope

The Partnership's Plan Area covers **603,242 acres**, encompassing **39 watersheds** (6th-field HUCs)[3]. The watersheds drain into the Clackamas River or the east side of the lower Willamette River.

Greater Oregon City Watershed Council's SOLVe Earth Day clean up, Abernethy Creek Park, City of Oregon City. Source: Rita Baker, Greater Oregon City Watershed Council

The Plan Area includes more than **90 miles of river corridors**. The river corridors, which encompass the mainstem channel, side channels, and floodplain, provide key habitats and travel passageways for both fish and wildlife. The river corridors were delineated as four distinct river reaches based on geomorphic characteristics as follows:

- **Upper Clackamas River and Floodplain Reach** – Clackamas River headwaters downstream to Oak Grove Fork (31.7 miles)
- **Middle Clackamas River and Floodplain Reach** – Confluence of Oak Grove Fork downstream to River Mill dam (29.3 miles)
- **Lower Clackamas River and Floodplain Reach** – River Mill Dam downstream to the confluence of the Willamette River (23.3 miles)
- L**ower Willamette River and Floodplain Reach** – Willamette Falls downstream to and including the confluence of Johnson Creek (9.2 miles)

The four river reaches, and the 39 watersheds, are the Partnership's fundamental geographic scale for planning and implementing restoration actions, tracking outcomes, and reporting restoration accomplishments. Activities and outcomes are reported at the project, reach, watershed, and Partnership Plan Area scales.

The Clackamas Partnership selected this Plan Area because it a) encompasses the Clackamas River and a section of the lower Willamette River and most of the tributaries that support the Clackamas Fish Populations, as described in the *LCR Plan*, and b) spans municipalities, jurisdictions, organizations, and watershed councils that have long experience working in collaboration on watershed restoration. The Partnership's Plan Area is important because it encompasses the river, stream, riparian, and floodplain habitats that are essential for supporting salmon, steelhead, Pacific lamprey, bull trout and other native fish through their freshwater life cycle – adult migration and spawning; and juvenile rearing and outmigration.

[3] Hydrologic Unit Codes (HUC) is the national standard for delineating watersheds. The HUC system is hierarchical such that smaller 6th-field watersheds nest into larger watersheds (5th-field HUCs) and these nest into larger river basins (i.e., 4th- or 3rd-field HUCs). For example, within the Partnership's Plan Area, Clear Creek Watershed is a 5th-field HUC, which comprises three 6th-field HUCs. The Clackamas River Basin is a 4th-field HUC.

Clackamas River Basin Council's river clean-up on the lower Clackamas River. Source: Cheryl McGinnis, Clackamas River Basin Council

The Plan Area includes the following key habitat areas:

The entire length of the Clackamas River corridor and a key reach of the lower Willamette River. The river corridors span floodplain areas, tributary junctions, and the lower portions of tributaries that historically were highly productive rearing habitats for juvenile salmon, steelhead, and Pacific lamprey. The Willamette River reach includes the confluence of tributaries entering the east and west sides of the Willamette River. Key east side tributary streams – Abernethy, Kellogg-Mt Scott and Johnson Creeks – and numerous smaller tributaries (e.g., Rinearson Creek) join the river within this reach. Adult salmon and steelhead from the Clackamas ESA-listed Fish Population and Pacific lamprey migrate through the river corridors and juveniles rear in the rivers and lower sections of the tributaries as they move downstream to the Columbia River estuary.

Clackamas River Basin tributaries that support the healthiest salmon and steelhead populations. Historically and currently the Clackamas River and its tributaries provide the primary habitat capacity and productivity that supports the Clackamas Fish Population. Today the upper Clackamas River Basin, which is largely within Mt. Hood National Forest, has the highest-quality habitat in the Partnership's Plan Area and is the key habitat area anchoring anadromous salmon, steelhead, and Pacific lamprey populations. The upper Clackamas River and its cold tributaries also support a re-introduced bull trout population. The lower Clackamas Basin tributaries – particularly Eagle, Deep, and Clear creeks – are also important because these watersheds still retain productive salmon, steelhead, and Pacific lamprey habitat.

Abernethy, Kellogg-Mt. Scott, and Johnson Creeks. These urban tributaries historically and currently support salmon, steelhead, and Pacific lamprey populations that contribute to the overall diversity, spatial extent, and productivity of the Clackamas Fish Populations. These streams also play a role in supporting migrating adult and juvenile salmon and steelhead derived from other watersheds. Juveniles from Clackamas and upper Willamette Basin fish populations access the lower portions of these streams and associated floodplain habitats to rear during high-flow periods in the winter and spring when the Willamette River occupies the floodplain and lower tributary channels. Migrating adults access the lower portions of Johnson Creek and other tributaries during periods when Willamette River water temperatures are high.

Small urban tributaries that flow into the lower Clackamas River (e.g., Carli Creek) and lower Willamette River (e.g., Rinearson Creek). These urban tributaries did not historically support salmon and steelhead spawning, but provide important rearing habitat and cool water inputs at tributary junctions within the Clackamas or Willamette River floodplain. The urban tributaries are also where the emphasis is on improving water quality and hydrology issues, including addressing stormwater quality and quantity.

Land ownership in the Partnership's Plan Area is depicted on the map on the next page (Figure 2) and summarized in Table 2, below.

Community volunteers planting native vegetation along Johnson Creek. Source: Daniel Newberry, Johnson Creek Watershed Council

Table 2. Land ownership within the Plan Area

Partnership Watershed	Federal	State	Metro	Local	Tribal*	Private
Abernethy Creek Watershed	1.4%	<1%	2.1%	3.1%	0	93.5%
Clackamas River Basin	71.1%	<1%	<1%	<1%	2.8%	25.0%
Small Willamette Tributaries and Kellogg-Mt. Scott Creek Watersheds	<1%	<1%	2.2%	6.8%	0	87.7%
Johnson Creek Watershed	<1%	<1%	3.1%	8.5%	0	90.9%

*Confederated Tribes of Warm Springs

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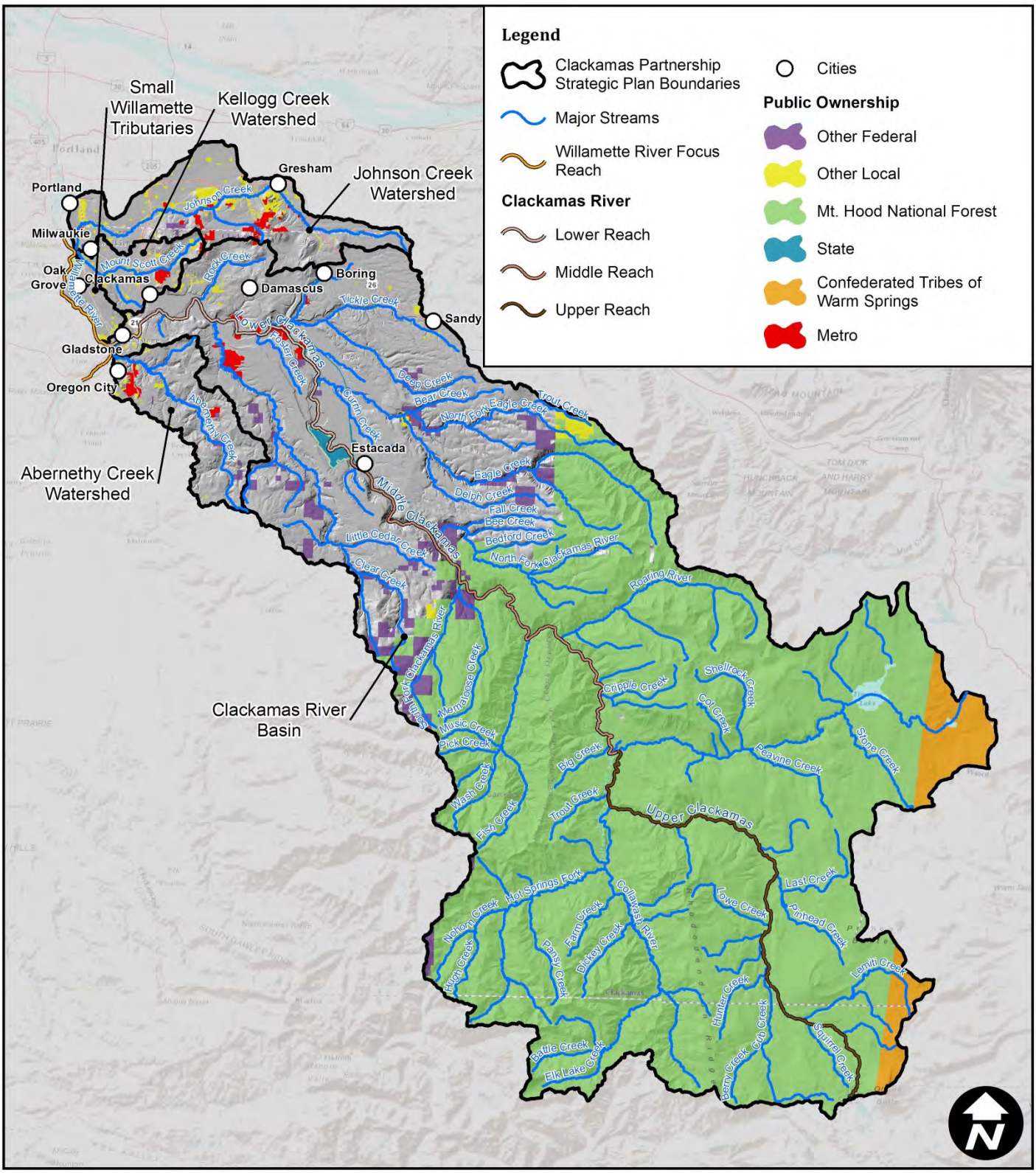
Figure 2. Clackamas Partnership Plan Area Land Ownership



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Partner Geographic Coverage

The Partners have complementary and overlapping geographic coverage within the Plan Area. Importantly, the Partnership's four watershed councils, which include broad and diverse stakeholder and landowner representation and involvement, cover the entire Plan Area:

- Clackamas River Basin Council: The Clackamas River basin
- Greater Oregon City Watershed Council: The Abernethy Creek Watershed
- North Clackamas Urban Watersheds Council: Kellogg and Mt. Scott Creek Watersheds and Urban Tributaries (e.g., Rinearson and Boardman creeks)
- Johnson Creek Watershed Council: Johnson Creek Watershed

Adult Pacific lamprey found during fish salvage for the Badger Creek culvert replacement project. Badger Creek is a tributary to Johnson Creek. Source: Daniel Newberry, Johnson Creek Watershed Council

Other Partners work in all or specific portions of the Plan Area. For example, Clackamas Soil and Water Conservation District activities cover most of the Plan Area. In contrast, Clackamas County Water Environment Services focuses on portions of lower Johnson, Rock, and Kellogg-Mt. Scott Creek watersheds.

The Partnership's planning process identified the lower Willamette River reach as an area with a fragmented approach to restoration without an overarching structure or lead entity tasked with identifying and coordinating restoration activities. The lower Willamette River reach is an important corridor for migrating adult and juvenile steelhead, salmon, and Pacific lamprey from both Lower Columbia River and Upper Willamette Basin stocks. Growing cities border this reach of the Willamette River – Oregon City, West Linn, Gladstone, Lake Oswego, and Milwaukie – that have parks and other infrastructure along the river and a growing interest in actions that improve habitat and water quality. The Partnership, through North Clackamas Parks & Recreation District, Johnson Creek Watershed Council, and North Clackamas Urban Watersheds Council has implemented restoration projects within this reach. The Partnership has identified additional Willamette River reach restoration projects and is engaging Willamette River Keeper, the cities and other stakeholders to explore restoration opportunities and coordinate activities.

Section 4, *Partnership Structure and Governance*, describes Partner organization geographic coverage and roles.

Clackamas Partnership's Vision

The Clackamas Partnership envisions healthy watersheds that sustain native fish and wildlife populations, diverse habitats, and thriving human communities.

Clackamas Partnership's Mission

The Clackamas Partnership collaborates on coordinated aquatic, riparian and floodplain restoration, conservation, and habitat protection actions to enhance watershed health, support the recovery and sustainability of native fish populations, and contribute to the region's economic and social vitality.

Guiding Principles

The following principles guide the Clackamas Partnership's organizational structure, planning process, and restoration and conservation activities:

Eagle Creek, a tributary to the lower Clackamas River. Source: Todd Alsbury, Oregon Department of Fish and Wildlife

Promote a Collaborative Approach

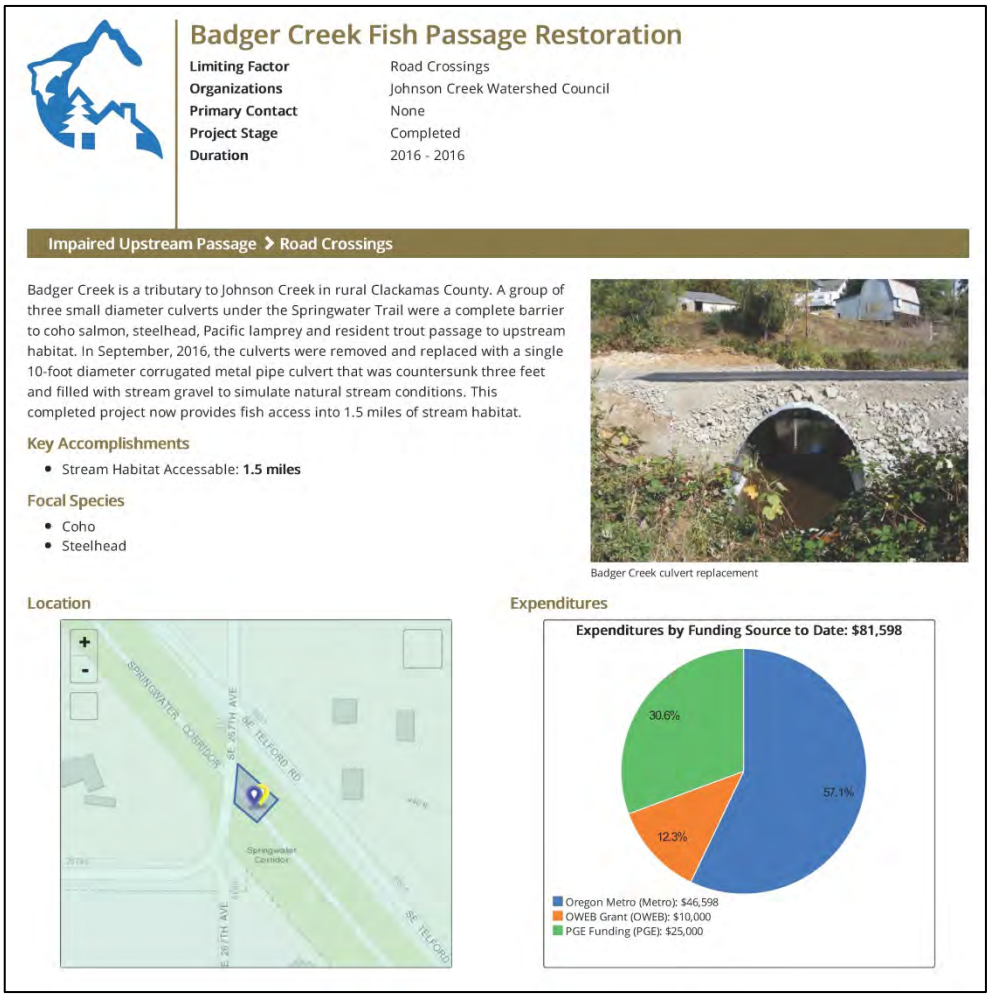
Through collaboration, coordination and a shared funding strategy, the Partnership builds on each Partner's strengths to effectively allocate resources and expertise. This approach achieves more than each organization working in isolation would be able to. Composed of Partners with varying experience, expertise, and organizational capacity, the Partnership's diversity, depth, and variety of funding sources is its key asset. The Partnership strives to allocate coordination and operational roles based on organizational capacity and skill sets. Each partner fills a unique niche with the specific and overlapping landowner and community connections. Over time, the Partnership will enhance its collective ability to increase the pace and effectiveness of restoration actions by strategically improving the expertise and experience of each organization, particularly the watershed councils.

Build Public Trust through Transparency

The Partnership's comprehensive restoration strategy is ambitious. It is important to maintain public and funding partner trust and support to ensure the continued success of the Partnership. The Clackamas Partnership's Project Tracker website offers the public, funding partners, and other interested parties a way to view planned and completed projects, funding sources, and performance measures. In the past, if a resident wanted to learn about a restoration project in their neighborhood, they had to make multiple calls or search a dozen different agency or watershed council websites. Clackamas Project Tracker conveys Partner project details in one easily searchable website.

Foster Technical Expertise

Rooted in long-term familiarity and engagement with the region's watersheds, rivers, and streams, the Partners possess deep knowledge of fish and wildlife populations and the habitats that sustain them. The Partnership shares knowledge of restoration best practices through its collaborative approach to restoration planning and implementation. The Partnership is committed to fostering and enhancing Partner staff technical skills and expertise. The Partnership is also engaged in sharing technical information on watershed conditions, fish population status, and restoration methods with landowners, the public, and other stakeholders.



Clackamas Project Tracker project summary sheet: Johnson Creek Watershed Council completed Badger Creek Fish Passage Restoration Project

Implement Restoration Actions Grounded on Sound Science

Science guides the Partnership's restoration planning and implementation. The Partnership is restoring watershed process and habitats in a manner that 1) targets the causes of ecosystem degradation; 2) tailors restoration actions to local geomorphic, channel, floodplain and riparian conditions; 3) matches the scale of restoration to the scale of the problem; and 4) is explicit about expected outcomes and timelines. As stated by Beechie et al. (2010): "Process-based restoration is a long-term endeavor, and there are often lag times between implementation and recovery." Restoration science and techniques will evolve, and the Partnership is committed to incorporating new scientific principles and techniques into its planning and actions.

Promote the Partnership's Long-Term Sustainability

The Partnership has the administrative processes, organizational capacity, and diversified funding necessary to ensure its long-term sustainability. Partners will have the resources necessary to meet evolving needs as its programs adapt to changing watershed conditions, shifting staff resources and capacity, and new funding sources. Sustaining the Partnership will entail periodically evaluating and improving organizational capacity where there are gaps and continuously refining a diversified funding

strategy. While the Strategic Plan emphasizes the current challenge of restoring native fish populations, the Partnership is planning for the long-term. Specific restoration needs and targets will change over time. The Partnership will tackle future challenges from climate change, the region's growing population, and other issues that will emerge that threaten watershed health.

Track Progress, Monitor Outcomes, Evaluate, and Adapt

The Clackamas Project Tracker website and on-line database provide a framework for collaborative project planning and for evaluating the Partnership's progress in meeting restoration outcomes. The Partnership is committed to long-term implementation and maintenance of this online database. This system provides a sophisticated and scientifically rigorous framework for tracking restoration outcomes, reporting achievements, and evaluating restoration actions at multiple scales – individual project, reach, watershed, and Plan Area. The Partnership will use information from the Clackamas Project Tracker database, on-the-ground monitoring, and annual project assessment reviews to assess restoration effectiveness and incorporate lessons learned into the planning and implementation of future restoration projects.

Engage the Community

The broader community, landowners, and diverse interests are involved in the Partnership's planning, restoration project implementation, and other activities. The outreach activities are designed to promote increased awareness of the Partnership's activities that address native fish recovery; identify and recruit landowners to participate in restoration, and generate the broad community support necessary for the Partnership to accomplish its restoration goals. The coordinated approach to outreach leverages each Partners' community network and current outreach activities to create a common message.

Advance Community Equity, Diversity and Inclusion

Everyone in the region should benefit equitably from clean water, a healthy environment, and employment opportunities generated through restoration activities. Equitable access to nature and the "restoration economy[4]" is the goal of all Partners and necessary to generate broad and sustainable support for the Partnership's mission. Partners have developed policies and approaches that promote equity, diversity, and inclusion. For example, as part of its equity and diversity strategy, the Johnson Creek Watershed Council trains interns from underserved communities to give them job skills in the natural resources field. The Partnership will build on the foundation developed by the Johnson Creek Watershed Council, Metro, and other Partners to develop a comprehensive strategy and implement actions that promote diversity and inclusion in all Partnership activities, including board composition, staff hiring, outreach, project selection, implementation, and contracting.

Practice and Promote Long-Term Stewardship

The Partnership is committed to maintaining the restoration projects it implements for the long-term. In cases of land acquisition, this means a commitment to steward the places entrusted to the Partnership responsibly. For restoration projects on private lands, the Partnership will engage the landowners and promote practices that ensure long-term stewardship.

[4] The Restoration Economy includes funding that supports restoration project implementation and all the associated economic activity such as contracting for services related to project engineer design and construction.

4. Partnership Governance and Structure

The Partners are all actively engaged in supporting restoration and conservation project planning, implementation, monitoring and reporting, and outreach. The Partnership strives to support all of its partner organizations with a collaborative approach that promotes coordinated planning and implementation, a common project accomplishment reporting framework, integrated funding strategies, and open communication. Rather than a competitive and territorial approach to restoration funding and implementation, the Partnership strives to share resources to ensure each organization's success. No Partner can be successful at the expense of another.

Kipling Rock along the lower Clackamas River. Source: Cheryl McGinnis, Clackamas River Basin Council

The Partnership's Clackamas Project Tracker website is a platform for collaboration. The website is a shared resource where the Partners can collectively develop and evaluate project proposals, and then track projects through the entire lifecycle of design, permitting, construction, post-project reporting, and monitoring. The website provides a structured and sophisticated platform for tracking project accomplishments and performance measures at a range of scales – reach, watershed, and entire Partnership Plan Area. Through the platform, the Partnership will compile accomplishments for all activities covered by the Strategic Plan. This shared project tracking platform creates a standardized and efficient framework for aggregating and reporting Partner accomplishments.

Governance

Most of the Partner organizations have worked together for more than ten years. Over this period, the Partnership has developed a successful collaborative approach to restoration and conservation planning and implementation. The Partnership developed a Memorandum of Understanding (MOU) for the strategic planning effort that outlined the organizational structure and core governance principles for decision-making and sharing resources. Based on the foundation developed through successful application of the strategic planning MOU, the Partnership is developing an MOU as a governance framework for restoration implementation and other activities. The implementation MOU will describe the mutual goals and vision, sharing of resources, responsibilities and roles, consensus-based decision-making, and the process and criteria for new Partners to join the Clackamas Partnership.

Partner Roles

All of the Partners bring substantial staff capacity, expertise, and resources to the Clackamas Partnership's activities. The Partnership has two categories of partner organizations based on responsibilities:

Core Partners

Core Partners lead restoration and conservation project implementation and reporting, participate in project prioritization and planning through the Technical Advisory Committee (TAC), and participate in the Partnership's governance and decision-making.

Clackamas Water and Environment Services' Rock Creek Restoration Project at the confluence of Rock Creek and the Clackamas River. Source: Gail Shaloum, Clackamas Water Environment Services

Supporting Partners

Supporting Partners provide technical support, participate in project prioritization and planning through the TAC, support implementation through funding, technical support and other means, and participate in the Partnership's governance and decision-making.

Decision-Making and Administrative Capacity

The Partners share integrated decision-making, restoration planning, and reporting, which supports accountability and enhanced learning across all of the Partnership organizations. The Partnership has developed the decision-making structure and the administrative capacity to support project planning, implementation, monitoring, and reporting. The TAC, which includes Partner technical staff, coordinates the development, prioritization, implementation of restoration projects, and other activities. The TAC, with leadership from ODFW, also oversees monitoring and evaluation activities. The collective Partnership (Core and Supporting Partners) establishes policy, guides the Partnership's strategic approach, and considers TAC recommendations for projects and other activities. All Partnership decisions are consensus-based.

The Clackamas Partnership elects a chair who functions as the Partnership's key leader. The Chair along with TAC leadership are responsible for leading the Partnership's on-going planning and evaluation; facilitating the decision-making process; convening meetings; contractor management; and overall reporting of Partnership activities and accomplishments. The four watershed councils – Clackamas River Basin, Greater Oregon City, North Clackamas Urban Watersheds, and Johnson Creek – provide resources and staffing for Partnership capacity functions, including maintaining the Project Tracker website and database. At this time, the Clackamas River Basin Council is the coordinating entity and administrator for funding directed to overall Partnership capacity, monitoring, and outreach. Other Core and Supporting Partners will assist with these tasks as necessary.

Tables 3 and 4 describe Core and Supporting Partner roles and geographic focus.

Table 3. Core Partner roles and geographic focus

Clackamas Partnership Core Partners	Roles / Geographic Focus
Clackamas River Basin Council	Role: Lead coordinating entity and capacity support for Partnership; planning support; participate in TAC and Partnership governance and decision-making; project implementation and reporting; outreach; soliciting project funding Geographic focus: Clackamas River Basin
Greater Oregon City Watershed Council	Role: Project implementation and reporting; reporting; planning support; participate in TAC and Partnership governance and decision-making; Partnership capacity support; outreach; soliciting project funding Geographic focus: Abernethy Creek Watershed
Johnson Creek Watershed Council	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; capacity support; outreach; soliciting project funding Geographic focus: Johnson Creek Watershed
North Clackamas Urban Watersheds Council	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; capacity support; outreach; soliciting project funding Geographic focus: Kellogg and Mt. Scott Creek Watersheds; Small Willamette Tributary Watersheds
Clackamas Soil and Water Conservation District	Role: Planning support; participate in TAC and Partnership governance and decision-making; outreach; promote water quality BMPs; reporting; establish and hold conservation easements; funding watershed council capacity and Partner projects; soliciting project funding Geographic focus: Watersheds within Clackamas County
Metro	Role: Project implementation and reporting; land acquisition; planning support; participate in TAC and Partnership governance and decision-making; outreach Geographic focus: mainstem Willamette River including Willamette Falls, lower Clackamas River and tributaries, Johnson Creek and Abernethy-Newell Creeks
Mt Hood National Forest, Clackamas RD	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; outreachGeographic focus: Upper Clackamas River Basin
Confederated Tribes of Warm Springs	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; outreach Geographic focus: Clackamas River Basin (Note: entire Partnership Plan Area is ceded lands for the Confederated Tribes of Grand Ronde)
North Clackamas Parks & Recreation District	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; outreach Geographic focus: Johnson Creek; Kellogg-Mt. Scott Creek; Small Willamette Tributaries; Willamette River; Deep Creek; Rock Creek Watersheds
Oregon Dept. of Fish and Wildlife	Role: Planning and design support; participate in TAC and Partnership governance and decision-making; lead and implement fish population and habitat monitoring; reporting; outreach Geographic focus: Entire Partnership Plan Area

Oregon Parks and Recreation Dept.	Role: Project implementation and reporting for projects on OPRD land; outreach; planning support; participate in Partnership governance and decision-making, Clackamas Scenic Waterways permitting Geographic focus: Lower Clackamas River Reach

Table 4. Supporting Partner roles and geographic focus

Clackamas Partnership Supporting Partners	Roles / Geographic Focus
Clackamas River Water Providers	Role: Planning support; landowner outreach; promote water quality BMPs; participate in Partnership governance and decision-making monitoring and reporting; funding for Clackamas River Basin Council activities; funding for monitoring and studies Geographic focus: Clackamas River Basin
Clackamas County Water Environment Services	Role: Project implementation and reporting; planning support; participate in TAC and Partnership governance and decision-making; outreach Geographic focus: Lower Johnson Creek; Kellogg-Mt. Scott Creek; Rock Creek; Lower Clackamas Tributaries
Portland General Electric	Role: Planning and design support; participate in TAC and Partnership governance and decision-making; monitoring fish populations and reporting; outreach; potential restoration project funding through Clackamas River Hydroelectric Project Mitigation Fund Geographic focus: Clackamas River Basin
Oregon Dept. of Environmental Quality	Role: Planning and design support; participate in TAC and Partnership governance and decision-making; monitoring; Pesticide Stewardship Program; reporting; outreach Geographic focus: Entire Partnership Plan Area

The primary restoration and conservation organizations operating within the Partnership's Plan Area are engaged as Partners. For the most part, conservation organizations that are not in the Partnership are represented through the Partners' overlapping network of collaborators and stakeholders. For example, Oak Lodge Water Services, which funds and implements restoration projects in Kellogg-Mt. Scott Creek and other Willamette River tributaries is a member of NCUWC.

Other organizations participating in Clackamas Partnership activities include Clackamas County Parks, Bureau of Land Management, the Confederated Tribes of the Grande Ronde, and the Oregon Wildlife Foundation. The Partnership is exploring Supporting Partner status for the Confederated Tribes of the Grande Ronde and the Oregon Wildlife Foundation. Both organizations have stated that they see value in collaborating as a Partner. As stated above, the Partnership's MOU outlines the process and criteria for bringing on new Partners.

Partner organizations also collaborate on regional initiatives, notably the Clackamas Stewardship Partners (CSP), Clackamas River Invasive Species Partnership (CRISP), the Clackamas Technical Work Group (CTWG), and the Clackamas Pesticide Stewardship Partners (Clackamas PSP).

CSP is a group of diverse stakeholders formed as a forest stewardship collaborative dedicated to habitat restoration in the Clackamas River Basin while benefiting local economies. Since 2009, CSP has

recommended funding for over $825,000 worth of restoration projects. Funding is generated from USFS retained receipts from commercial timber harvest on second-growth forest stands within the Mt. Hood National Forest, Clackamas Ranger District. Funded projects to date included improving and expanding habitat for salmon and other aquatic species, road repair and decommissioning, addressing fish passage barriers and habitat restoration for areas damaged by inappropriate off-highway vehicle recreation. In addition to the US Forest Service, Mt. Hood National Forest, partners participating in CSP includes Clackamas Soil and Water Conservation District, Clackamas River Basin Council, Clackamas County, Clackamas River Water Providers, and the Oregon Departments of Environmental Quality and Fish and Wildlife.

CRISP was formed to improve the management of invasive species within the Clackamas River Basin. In 2016, the CRISP secured $431,250 through PGE's Clackamas River Hydroelectric Project Mitigation and Enhancement Fund to support implementation over five years. Several CRISP partners also committed resources to support this effort. Clackamas Soil and Water Conservation District provided $300,000 in cash and in-kind services, Clackamas River Basin Council provided $292,500 of in-kind services, and Metro provided $145,000 in cash and in-kind services. In addition to the organizations listed above, other CRISP participants include Clackamas County, North Clackamas Parks & Recreation District, Oregon Parks and Recreation Department, the Mt. Hood National Forest, Bureau of Land Management, Clackamas County Service District No. 1, Natural Resource Conservation Service, and the Oregon Department of Agriculture.

CTWG and PSP emphasize water sampling for a variety of water quality parameters, including pesticides. A key part of the effort is promoting voluntary pesticide reduction efforts designed to protect water quality important to aquatic species and drinking water supplies. CTWG and PSP members include Clackamas River Water Providers, Clackamas Soil and Water Conservation District, Clackamas County Development and Transportation Department, Clackamas Water Environment Services, Oregon Department of Environmental Quality, local nurseries, municipalities, Oregon Department of Agriculture, Oregon Environmental Council, and Oregon State University Extension Services.

The Partnership is committed to a high-level of sustained, long-term investment. A subset of both Core and Supporting Partners have resources and capacity for funding all or a portion of the restoration projects implemented by their organizations, as well as other related activities (e.g., monitoring), and regional initiatives. A group of Partners also provides watershed councils and other Partner organizations with funding support focused on staff capacity, restoration project implementation, and regional initiatives.

Table 5 describes Partner funding in support of Partnership activities.

Table 5. Partner organization funding in support of Partnership activities

Partnership Organization	Description of Funding Support
Metro	Through funding from two voter-approved bond measures and tax levies, Metro supports land acquisition, restoration, and long-term stewardship for Metro natural areas. Metro provides funding through grants and other support for local partnerships to restore and improve habitat and involve the community.
Mt Hood National Forest, Clackamas RD	Funding through CSP. The funding is for National Forest and Partner restoration projects in the Clackamas River Basin, on and off of National Forest lands, and within the Willamette River reach.
Clackamas County WES	Funding for WES restoration projects, monitoring, outreach, and other activities comes from surface water fees paid by property owners within the WES service area. Activities focus on compliance with the MS4 permit. WES provides restoration grants through the RiverHealth Stewardship Grant Program for restoration within the natural areas it owns and for other restoration projects within its service area.
Clackamas SWCD	With funding from a local tax base, Clackamas SWCD works with landowners to promote stewardship, BMPs, outreach, and other actions. The SWCD also provides capacity and restoration project match funding for the four Partnership watershed councils and other organizations. Clackamas SWCD also provides funding and in-kind support for CRISP.
Clackamas River Water Providers	Clackamas River Water Providers (CRWP), a coalition of the municipal water providers that obtain drinking water from the Clackamas River, funds efforts regarding source water protection and public outreach, including water quality monitoring and other studies. CRWP also provides capacity support funding to the Clackamas River Basin Council.
Portland General Electric	Through the Clackamas River Hydroelectric Project Mitigation and Enhancement Fund, PGE provides potential funding to Partners and others for habitat restoration projects and monitoring within the Clackamas River Basin. The total funding obligation, which began in 2008 and ends in 2026, is $8 million. PGE funding, for example, supports a portion of Clackamas Water Environment's Carli Creek project. PGE funded CRBC's Shade Our Streams riparian restoration program; PGE is also is providing funding for CRISP.

5. Relationship to Other Regional Conservation Strategies

The Clackamas Partnership's restoration approach, which builds on the *LCR Plan,* is grounded on Partner organization habitat assessments, action plans, and other studies. The Partnership's restoration approach also integrates two key conservation strategies, the *Oregon Conservation Strategy* and the *Intertwine Regional Conservation Strategy.* The Partnership incorporates these regional initiatives into its restoration and conservation planning and development of project priorities.

A retaining wall along upper Johnson Creek on Metro's Ambleside property. Planned restoration will remove the streamside walls, demolish a concrete weir, and add large wood jams throughout the reach to improve channel and floodplain function. Source: Brian Vaughn, Metro

Oregon Conservation Strategy

The *Oregon Conservation Strategy* provides information on at-risk fish and wildlife species, identifies key issues that are affecting habitats, and recommends conservation actions (ODFW 2018). The Conservation Strategy is not a regulatory framework; the recommendations emphasize voluntary actions to improve the effectiveness of conservation.

The *Conservation Strategy* identifies Conservation Opportunity Areas (COAs) – priority locations where broad fish and wildlife conservation goals can best be met. The COAs focus investments in prioritized areas, which increases the likelihood of long-term success, maximize the effectiveness over larger landscapes, improves funding efficiency and promotes cooperative efforts across ownership boundaries. The COAs are developed to guide voluntary conservation actions; there is no intent that land use or other activities within these areas will be subject to any new regulations.

The *Conservation Strategy* identifies three COAs that are within the Partnership's Plan Area. The following describes these COAs and the recommended conservation actions.

Lower Willamette River and Floodplain COA

This Conservation Opportunity Area concentrates on the Willamette River mainstem, floodplains, and adjacent uplands from the confluence with the Columbia River (RM 0) upstream to Willamette Falls in Oregon City (RM26), including the confluence with the Clackamas River. The lower Willamette River is an important corridor for migratory and resident fish and wildlife. Restoration of the river and associated floodplain and uplands has important implications not only for fish and wildlife but also for the social and economic factors resulting from restoring ecological functions such as flood control and water quality.

The *Conservation Strategy* recommends the following conservation actions for the Lower Willamette River COA: Improve aquatic and riparian habitat complexity and diversity; Improve riparian buffers; maintain and enhance isolated wetlands to provide habitat for amphibians and turtles; maintain and

expand Oregon white oak habitat; protect and improve water quality; protect and restore shallow water and off-channel habitats; remove fish and wildlife passage barriers; restore floodplain function and connectivity; and restore riparian and wetland plant communities.

Clackamas River and Tributaries COA

This Conservation Opportunity Area encompasses the Clackamas River, its floodplain, and associated uplands from the Willamette River COA upstream to Estacada, including all of McIver State Park State Park. The area also includes most of the Clear Creek Watershed and portions of the lower Eagle Creek watershed. The recommended strategies for the Lower Clackamas River and Tributaries COA include: Improve aquatic and riparian habitat complexity and diversity; improve riparian buffers; maintain and enhance isolated wetlands to provide habitat for amphibians and turtles; maintain and expand Oregon white oak habitat; protect and improve water quality; protect and restore shallow water and off-channel habitats; remove fish and wildlife passage barriers; restore floodplain function and connectivity; and restore riparian and wetland plant communities.

Bull of the Woods, North COA

This Conservation Opportunity area is within the upper Clackamas River headwaters on lands managed by the Mt. Hood National Forest. The area is north of the Bull of the Woods Wilderness Area and covers portions of the Collawash River, East Fork, Hot Springs Fork, and Farm Creek. The COA includes the river, tributaries, floodplains, riparian areas, and associated upland habitats.

The *Conservation Strategy* recommends the following conservation actions for the Bull of the Woods, North COA: Create quality rearing habitats for salmonids; decommission unnecessary roads; improve and maintain forest health (use prescribed fire to attain desired future condition); improve in-stream habitat complexity; manage recreational uses to protect fish and wildlife habitat and protect water quality; protect and improve headwater stream habitats; protect and restore riparian habitat; protect wetland habitats; and replace culverts that impede amphibian passage.

Intertwine Alliance Regional Conservation Strategy

The Intertwine Alliance is a coalition of 150+ public, private and nonprofit organizations (including most of the Clackamas Partnership organizations) working to integrate nature more deeply into the Portland-Vancouver metropolitan region. The mission of The Intertwine Alliance is to leverage investments in nature to create positive environmental, transportation, education, recreation, health, economic and social outcomes for the community. The Alliance does this by building connections across sectors, geographies, disciplines and racial divides, deepening the partnerships and collaborations necessary to accomplish large-scale change. The Alliance's broad-based and collaborative process works to create, care for and promote a world-class network of natural areas, parks, and trails.

The Intertwine Alliance's *Regional Conservation Strategy* builds on the *Oregon Conservation Strategy* by providing more detail and finer-scale resolution on habitat characteristics and regional conservation approaches and priorities. The Alliance's strategy complements efforts by local government, watershed councils, non-profits, and other organizations by identifying shared needs, filling information gaps, recommending strategies, and encouraging collaboration and coordination among the entities involved in

local conservation initiatives (The Intertwine Alliance 2012a). The desired outcomes of the Intertwine vision are as follows:

- Ensure that the diversity of habitat types is protected, conserved, and restored across the region's urban and rural landscapes
- Acquire, protect, conserve, and manage functional habitat connectivity for wildlife and create connections between habitat areas
- Control invasive plant, animal, and aquatic species and reestablish native species
- Create a healthy urban forest canopy that contributes to improvements in stormwater management and air quality
- Maintain the long-term ecological integrity of streams, wetlands, rivers, and floodplains, including their biological and social values

The Alliance developed a land cover map and a data-driven model of regional conservation priorities (The Intertwine Alliance 2012b). The approach used to determine the conservation value of habitats consisted of developing two separate models: One for all important habitats across the region (the high-value habitat model) and a model for riparian/floodplain areas (the riparian habitat model). For each model, the modeling team developed spatial data sets that represent criteria for calculating the value of habitat.

The high-value habitat model took into account the size of interior habitat, the influence of roads, habitat patch size, patch connectivity, wetland indicators, and the presence of high-value habitats. Based on this analysis, the identified highest value habitats within the Partnership's Plan Area include upland habitats in the Johnson Creek watershed (e.g., Powell Butte); upper Kellogg-Mt. Scott Creek watershed (e.g., headwaters near Happy Valley); lower Abernethy Creek watershed, including Newell and Holcomb-Potter creeks; upper Abernethy Creek watershed; and extensive high-value habitats within the lower Clackamas River floodplain, tributaries, and upland areas.

The riparian habitat model's spatial extent was determined by the location of the region's water features and an appropriate buffer around them. Buffers for major streams and water bodies were calculated using a variable model that assigned buffer widths to stream reaches by considering each reach's attributes, such as streamflow, stream volume, surrounding land cover, and the presence of salmonids. Pixel scores for the riparian habitat model were assigned by considering 1) the infiltration potential of a riparian area based on its land cover type; and 2) the distance of the riparian vegetation from various bodies of water, including wetlands, streams, floodplains, and other streams and river edges. High-value riparian habitats are scattered along Johnson, Kellogg-Mt. Scott, and Abernethy creeks; extensive high-value riparian habitats are identified within the lower Clackamas River floodplain and tributaries, including Eagle, Clear, and Deep Creeks.

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6. Partnership Accomplishments

Working in collaboration since 2010, the Partners have made significant contributions to habitat restoration and conservation within the Plan Area. The Partnership's accomplishments contribute to substantial progress in addressing the *LCR Plan* habitat restoration targets (Table 6). The Partners have implemented a large number of restoration and conservation actions designed to address the key limiting factor cited in the *LCR Plan* – inadequate aquatic habitat complexity, including access to off-channel habitats – and other limiting factors, including stormwater quantity and quality, and riparian shade to improve water temperatures.

Metro's River Island Natural Area – 240 acres of protected and restored habitat on the lower Clackamas River. Source: Metro

By 2017, the Partnership had nearly met the riparian planting goal (94.4%) based on delisting scenarios developed by ODFW for the Clackamas ESA-listed salmon and steelhead populations. The Partnership has also made significant progress (38%) toward meeting off-channel wetland complex restoration and access goal. Substantially more work, however, is needed to meet the large wood placement, off-channel wetland, and side channel increase targets.

Table 6. Summary of the quantities of restoration actions needed for listed salmon and steelhead species within the Clackamas Population area and the 2017 Clackamas Partnership accomplishments in meeting the restoration targets. Source: ODFW 2010; Jim Brick, ODFW, 2017.

Goal: Delisting	Large Wood Placement (miles)	Side Channel Increase (miles)	Riparian Planting (miles)	Off-Channel Wetland Complex Increase (m^2)
Delisting Goal	**62.5**	**64.6**	**34.8**	**19,780.3**
Accomplishments (2010 - 2016)	15.8	0.9	33.2	7,524.0
% of Delisting Goal	25.3%	1.4%	95.4%	38.0%

Note: 20 m^3 of large wood/100m of stream

Note: 30 m width on each side of the stream channel

It is important to note that a substantial portion of the accomplishments towards meeting *LCR Plan* targets is an outcome of restoration projects implemented within the lower reach of the Clackamas River and the Willamette River reach. The rivers are large and dynamic and restoring habitats within the river channel, adjacent floodplain, and off-channel areas is a complex technical and social undertaking. This restoration is successful in large part due to the Partnership's collaborative framework and landowner relationships. The river and floodplain restoration projects are accomplished through contributions of expertise and funding from a large number of Partners, including the following: Clackamas River Basin Council, Metro, ODFW, Oregon Parks and Recreation, PGE, Clackamas County WES, North Clackamas Parks & Recreation Department, Johnson Creek Watershed Council, North Clackamas Urban Watersheds Council, and the Mt. Hood National Forest. Work of similar complexity and scope has been completed in other portions of the Partnership's Plan Area.

Core Partner Accomplishments

Clackamas River Basin Council (CRBC)

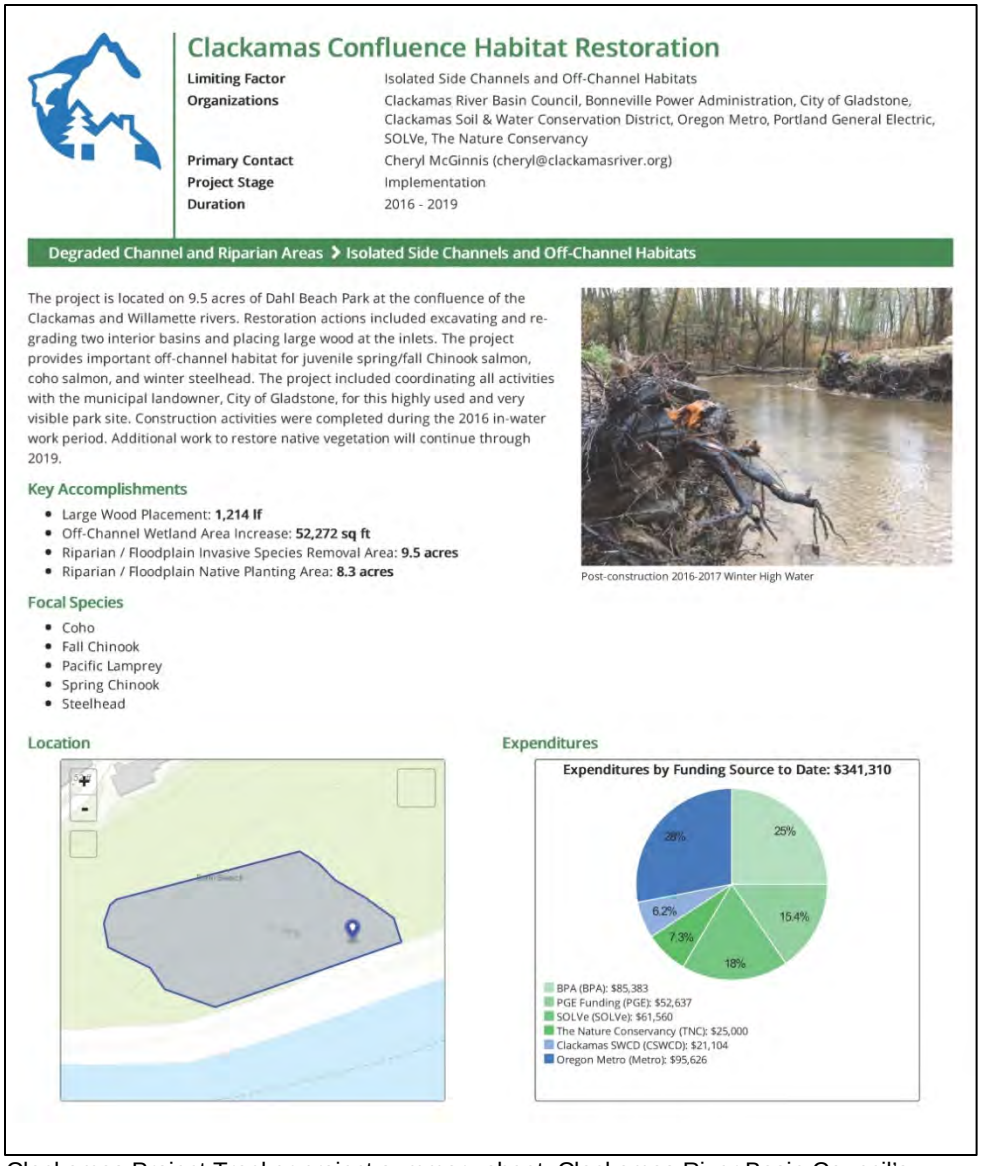
The Clackamas River Basin Council coordinates and implements restoration actions, monitoring, outreach, and local partnerships. CRBC recently accomplished a restoration milestone: 30 miles of 50-foot wide riparian corridor restoration completed with funding from PGE, a program now well known in the region as Shade Our Streams. In addition to large-scale riparian planting, CRBC has implemented the following tributary restoration work:

- Addressed most of the high priority fish passage barriers in Clear Creek, Deep Creek, and Eagle Creek watersheds;
- Instream habitat enhancement and native vegetation restoration in lower Clear Creek, including on the Metro property;
- Mattoon Road fish habitat restoration with a large homeowners association and a County roads project in middle Clear Creek and Spring Creek;
- Large wood structures installed in a half-mile stretch of upper Clear Creek where ODFW spawning surveys found prolific spawning activity every year following the installations in 2010;
- Large wood habitat enhancement projects implemented in Eagle Creek with a private landowner and with a corporate timber company; and
- Partners in restoration with Naas Elementary where bioswale enhancement involved students, teachers, and parent groups.

CRBC has completed the following restoration accomplishments within the Clackamas River corridor:

- Creation of complex, off-channel habitat at Clackamas Confluence;
- Carver Park riparian restoration;
- native vegetation planning and invasive species control along newly enhanced channels at Milo McIver State Park;
- Fishers Bend Phase I & II: alcove and side channel;
- North Logan native vegetation restoration;
- River Island native vegetation restoration; and
- Rock Creek Confluence instream and habitat restoration.

CRBC's monitoring activities include inventories of invasive species for active management, water quality grab samples as part of the State's Clackamas Pesticide Stewardship Partners (DEQ and ODA leadership) and channel characteristics baseline and monitoring. The CRBC participates in voluntary pesticide reduction campaigns, funded by the Clackamas River Water Providers for over ten years. CRBC is active in a number of basin-wide collaborative initiatives and partnerships to improve watershed conditions: Clackamas Stewardship Partners; Clackamas Technical Working Group (CTWG), which coordinates water quality sampling and actions to improve water quality; and the Clackamas River Invasive Species Partnership involving 14 partners focused on taming the spread of invasive plants with particular emphasis on early detection rapid response to control weeds. All of these efforts require outreach and stakeholder engagement, which is ongoing via multiple media (social media, print, video, local broadcast) as well as targeted and personalized messaging to landowners and others.



Clackamas Project Tracker project summary sheet: Clackamas River Basin Council's completed Clackamas Confluence Restoration Project. The project created off-channel floodplain habitats near the confluence of the Clackamas and Willamette rivers

Greater Oregon City Watershed Council (GOCWC)

The Greater Oregon City Watershed Council implements restoration actions, monitoring, assessment, outreach, and local partnerships in Abernethy and Beaver Creek Watersheds. GOCWC's accomplishments in Abernethy Creek Watershed: Potter Creek fish passage barrier improvements; Abernethy Creek riparian restoration; Newell Creek invasive removal and revegetation (in cooperation with Metro); and Abernethy Creek stream habitat inventories and water temperature monitoring.

Johnson Creek Watershed Council (JCWC)

Johnson Creek Watershed Council coordinates and implements restoration actions, monitoring, outreach, and local partnerships. Recent accomplishments: Badger and North Fork culvert replacements; Badger Creek-Mystic Woods restoration; Tacoma MAX riparian reforestation; Garlic mustard and other invasive control; Springwater wetland habitat enhancement; Johnson Creek Canyon riparian restoration; Upper Johnson Creek Watershed riparian habitat enhancement; Willamette River and Johnson Creek Confluence salmon habitat improvement; Johnson Creek Watershed riparian corridor restoration; Errol Creek confluence fish habitat restoration. JCWC works with Depave and companies in the watershed to reduce the amount of impervious pavement and treat stormwater.

Construction in 2017 to replace a North Fork Johnson Creek culvert under the Springwater Trail. This is the lowest downstream location of 7 culverts being replaced, removed or retrofitted to provide fish passage on this tributary. Construction activities are phased over a three year period, 2016-2019. Source: Daniel Newberry, Johnson Creek Watershed Council

North Clackamas Urban Watersheds Council (NCUWC)

North Clackamas Urban Watersheds Council coordinates and implements restoration actions, monitoring, outreach, and local partnerships. NCUWC's Streamside Stewards Program (SSP) is the organization's keystone effort. NCUWC works primarily with private property owners along Mt Scott, Kellogg-Mt. Scott, River Forest, Boardman and Rinearson creeks and their tributaries. Through the program, NCUWC works with landowners without charge to survey site conditions, identify existing plants and habitat, and develop a restoration plan for the site.

Clackamas Soil and Water Conservation District (CSWCD)

Clackamas Soil and Water Conservation District staff work with landowners across a wide variety of land uses and conservation issues – urban homes, rural residential properties, and full-scale agriculture – to provide technical resources to help landowners make informed decisions about managing their land. An example of the District's services is assistance to irrigators. In 2016-2017, CSWCD helped five growers convert to more efficient drip irrigation systems on a total of 229 acres of hazelnuts, nursery stock, and berries.

CSWCD has expanded its urban conservation efforts, including the popular Backyard Habitat Certification Program. This program assists urban residents in restoring native wildlife habitat by address five issues which reflect District concerns and values: Invasive weeds; native Plants; pesticide reduction; stormwater management; and wildlife stewardship.

The WeedWise program emphasizes the active management of priority invasive weeds and assisting Clackamas County residents. In 2016-2017 the WeedWise program has:

- Evaluated and updated the Clackamas Weed List with 217 weeds and 90 priority weeds;
- Assisted 2,888 residents;

- Surveyed 230 properties totaling 3,809 acres; and
- Carried out 287 weed treatments on 283 infested acres.

In 2016-2017 CSWCD's Conservation Planning Program provided:

- Technical resources and assistance to 207 landowners;
- Visited with landowners on 124 properties;
- Prepared 23 conservation plans to help guide land management; and
- Implemented 14 conservation projects.

CSWCD provides watershed council support grants. In 2016-2017, CSWCD awarded a total of $95,000 to nine watershed councils, including the four Partner watershed councils and five other Clackamas County watershed councils.

Metro

Metro's Parks and Nature program provides the region with clean water and healthy fish and wildlife habitat. These parks and natural areas also provide opportunities for access to nature for recreation and education purposes. Four times during the last two decades, voters across the greater Portland region approved funding for investments in a network of regional parks, trails and natural areas: A $136 million bond measure in 1995 to protect natural areas and complete missing pieces of trails; a $227 million bond measure in 2006 to continue protecting water quality, wildlife habitat and outdoor recreation opportunities; a 2013 five-year local option levy that raises $8 to $10 million per year to restore habitat, improve existing parks, open additional sites to the public; and renewal of the operating levy in 2016 for an additional five years.

Metro focuses on natural areas protection and ecosystem conservation in an urban and near urban context. The top priority is protecting sensitive habitat before it is developed or rises dramatically in price. Metro can acquire and provide access to large sites that typically are beyond the reach of local jurisdictions, but closer to population centers than those managed by state and federal providers. A significant portion of Metro's funding goes toward restoration and maintenance of acquired lands: controlling invasive weeds, planting native plants and improving habitat for fish and wildlife.

Metro leads science-based restoration activities, provides nature education and volunteer programs, invests in community nature projects and plays a key role in convening local, regional, state and federal partners. Metro's work is deeply connected to the Clackamas Partnership and the broader community. Metro works closely with the Partners on restoration planning and project implementation. Finally, Metro's resources support the work of the Partnership and other regional organizations through grants and other funding.

Metro protects and restores important river, stream and floodplain habitats in the Partnership's Plan Area watersheds and throughout the region. In the lower Clackamas River Basin Metro has protected more than 1,600 acres. The River Island Natural Area property provides 240 acres of fish and wildlife habitat, including salmon, steelhead, and Pacific lamprey, native turtles and migratory birds. Other Metro properties are located along Deep Creek and Clear Creek, including a recent acquisition along North Fork

Deep Creek. These properties offer regionally important opportunities to aid in native fish recovery through in-stream, floodplain and riparian enhancements.

Metro is also protecting and restoring significant habitats in the Johnson Creek and Kellogg-Mt. Scott watersheds. For example, Ambleside Natural Area is a 26-acre parcel along Johnson Creek in the City of Gresham. The property is bordered by the Springwater Corridor Trail on the north and rural farms and homes on the south and west. The long-term goal for the property is to improve and protect water quality in Johnson Creek by stabilizing stream function, restoring floodplain function, and improving wildlife habitat.

Metro has protected 330 acres of land along Newell Creek, a tributary to lower Abernethy Creek. More recently, efforts expanded to Abernethy Creek. Despite nearby development, this is the largest undeveloped natural area on the region's south side. Restoration of the area includes riparian planting, invasive weed removal, and planned in-channel large wood placement to improve stream habitat complexity. Metro also manages a 107-acre property along two small streams in upper Abernethy Creek watershed. This property includes a relatively large, intact forested area adjacent to the streams, which protects water quality and fish habitat.

USDA Forest Service (USFS), Mt Hood National Forest, Clackamas River Ranger District

The Mt. Hood National Forest's Clackamas River Ranger District encompasses most of the upper Clackamas River Basin. The USFS has completed a large number of aquatic and riparian habitat management projects in the recent past, including constructing side channels along the Clackamas River, placing large wood in the river and streams to enhance habitat, restoring areas affected by unauthorized off-highway vehicle use and other recreational impacts, and planting in riparian areas.

In addition to stream and riparian habitat restoration, the USFS has also completed a variety of road treatments to improve water quality (i.e., sediment delivery and preventing landslides) and fish access. Road treatments focus on culvert replacements to enhance fish passage, storm-proofing, and closure and decommissioning.

The USFS is currently planning additional restoration actions in areas where stream function or riparian processes are impaired. These actions include adding large wood to stream channels to improve habitat complexity, replacing or repairing culverts that impede fish passage, restoring riparian areas impacted by dispersed camping, and road treatments and decommissioning.

Confederated Tribes of Warm Springs (CTWS)

Confederated Tribes of Warm Springs is an active natural resource management partner in the Willamette Basin. Since 2012, CTWS has acquired three properties totaling over 600 acres (Yamhill, Marion, and Clackamas Counties) and partner on other acquisitions. CTWS is active in the Willamette Wildlife Mitigation Program, Meyer Memorial Trusts Willamette Report Card and numerous other action planning and conservation efforts for Willamette Basin. In 2017 CTWS acquired the Austin Hot Springs property in the upper Clackamas River Basin and is in the process of writing the management plan for restoration and long-term stewardship of the area. The property spans 151 acres of upper Clackamas River channel,

degraded floodplain, and off-channel habitats. Restoration will include river and side channel habitat improvement which will address floodplain connectivity, off-channel habitats, and riparian vegetation.

North Clackamas Parks & Recreation District (NCPRD)

North Clackamas Parks & Recreation District is a service district of Clackamas County dedicated to providing exceptional parks and recreation programs, facilities, and services. Voters approved the formation of the District in 1990 because they saw the need for greater parks and recreation services in the north end of the county. NCPRD – which serves more than 122,000 residents in a 36-square mile area – includes the cities of Happy Valley, Milwaukie and a large area of unincorporated Clackamas County. NCPD offers more than 39 parks, 25 natural areas, and 15 miles of trails.

NCPRD parks span an array of natural features such as wetlands, riparian zones, salmon-bearing creeks, healthy stands of Oregon White Oak, terrestrial habitats and a diversity of plant and animal species. By enhancing and restoring natural ecosystems, NCP&RD improves fish and wildlife habitat and water quality for both people and wildlife and enhances the livability and natural beauty of our neighborhoods. NCP&RD's largest natural areas are Mount Talbert Nature Park (224 acres) and the North Clackamas Park (47 acres), both located in the Kellogg-Mt. Scott Creek watershed.

NCPRD recently completed restoration actions in Spring Creek Natural Area, located along the lower Willamette River near the City of Milwaukie. The Natural Area contains some of the only off-channel habitats and functioning floodplain remaining in this section of the Willamette River. The restoration actions centered on enhancing alcove habitat, installing five large wood habitat structures in a side channel, planting native riparian vegetation, and controlling invasive weeds. The Natural Area includes hiking trails and interpretive signage.

Oregon Department of Fish and Wildlife (ODFW)

ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. ODFW has multiple staff that works within the Clackamas Fish Population area. ODFW staff coordinate with the Clackamas Partnership and Partners as well as all entities and landowners within the area. ODFW, through the Partnership's TAC, has a lead role in advising on restoration priorities, assisting with project design, and helping with fish salvage and other activities during project construction. ODFW's staff also focus on the Clackamas Hatchery; the Clackamas Hydroelectric project; habitat protection; predation management; fisheries management; monitoring of fish populations; and implementation coordination of the *LCR Plan*. ODFW comments on proposed actions that could negatively affect fish populations and aquatic habitat, with suggestions to minimize or mitigate negative effects through appropriate land and water management strategies. ODFW has collaborated on multiple restoration projects in every watershed within the Partnership's area.

Oregon Parks and Recreation Department (OPRD)

Oregon Parks and Recreation Department manages three sites within the Clackamas River Basin: Milo McIver State Park (952 acres on the mainstem Clackamas River), Bonnie Lure State Recreation Area (94 acres, located at the confluence of Eagle Creek), and the Cazadero Trail (148 acres). To improve park resources and contribute to watershed health, OPRD has invested in extensive invasive species control at Milo McIver State Park from 2011 to the present.. Floodplain reforestation at Bonnie Lure is a newer

project starting in 2018 in partnership with CRBC. Milo McIver State Park is an ideal location for public outreach: approximately 500,000 visitors enjoy watersports and other recreational activities there annually.

Supporting Partner Accomplishments

Clackamas River Water Providers (CRWP)

Clackamas River Water Providers is a coalition of water providers that obtain their drinking water from the Clackamas River, which combined provide drinking water to over 300,000 people in Clackamas and Washington Counties. The organization is made up of representatives from the cities of Estacada, Lake Oswego, and Tigard; Clackamas River Water (District); the North Clackamas County Water Commission (Oak Lodge Water Services, City of Gladstone); South Fork Water Board (City of Oregon City, City of West Linn); and Sunrise Water Authority (City of Happy Valley and the Damascus area). The purpose of CRWP is to collectively fund and coordinate source water protection and public outreach and education efforts around watershed issues, drinking water, and water conservation to preserve the Clackamas River as a high-quality drinking water source and to minimize future drinking water treatment costs.

CRWP implements a variety of Source Water Protection Programs which include funding three USGS water quality monitors on the Clackamas River – Carter Bridge, Estacada and Oregon City – macro-invertebrate and toxic blue-green algae monitoring, Clackamas Basin studies, pesticide reduction, septic system financial assistance, hazardous material spill prevention. CRWP works with the USFS and recreational river users to reduce impacts on drinking water sources.

CRWP has been selected as the recipient of the *2018 Exemplary Source Water Protection Award for Large Source Water Systems* by the American Water Works Association. CRWP's latest annual report is available on CRWP's website.

Clackamas County Water Environment Services (WES)

Clackamas County Water Environment Services' service district for watershed protection activities includes tributaries in the lower Clackamas River Basin (Cow, Carli, Sieben, and Rock Creeks), the Kellogg-Mt. Scott Creek watershed, and a small portion of Johnson Creek watershed, and a small portion of the lower Tualatin River basin, all of which drain to the Willamette. WES supports habitat restoration and water quality improvement projects in its service district, in conjunction with the RiverHealth Stewardship Grant Program, on the natural areas it owns, and on other site-specific restoration projects. The grants vary from year to year but frequently involve riparian planting and invasive control. For example, in the 2017-2018 fiscal year, the RiverHealth Stewardship Program funded 14 projects that are treating weeds and planting vegetation on approximately 25 acres, along approximately 11,000 linear feet of streams.

One WES-led project of note is the 15-acre Carli Creek restoration project, a constructed wetland in the Clackamas River Floodplain. The restoration project improves habitat in lower Carli Creek, and the constructed wetland improves both habitat and stormwater treatment. Other recent in-stream restoration projects include North Clackamas Park, Happy Valley Park, Cedar Way, and Rock Creek Confluence. Restoration is planned for Oak Bluff reach of Mt. Scott Creek. WES collaborates with local

Partner watershed councils on almost every in-stream project and works with numerous nonprofits through its grant program.

WES conducts activities aimed at improving water quality in compliance with its NPDES MS4 permit. A summary of these activities is described in the annual report posted online each fall at on WES's website. WES activities fall into six categories of required measures:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction runoff control
- Pollution prevention

Portland General Electric (PGE)

Under the terms of the Clackamas River Hydroelectric Project (the Project) license issued in 2010, Portland General Electric has made major improvements to the upstream and downstream fish passage facilities and modified the Project operations to enhance fish passage and rearing conditions significantly. Upstream passage improvements have included modifications to the 1.9-mile fish ladder, a water-to-water transfer facility to sort out hatchery salmon, and increasing flows in the reaches downstream of the diversion dams to facilitate passage and improve rearing habitat. Downstream fish passage improvements have included two new juvenile salmonid surface collectors, the extension of the juvenile migrant pipeline up to the collection facilities at North Fork Reservoir, and a new downstream migrant sampling system on the migrant pipeline. Downstream passage through the Project – which previously took 1 to 2 weeks – is being completed in only 2 or 3 hours, with nearly 100% survival. As a result of improved survival through the juvenile collection systems, in combination with increased smolt production upstream of the Project within Mt. Hood National Forest lands, PGE is documenting coho, Chinook, and steelhead juveniles moving past the Project at 2 to 8 times the rate before the license. PGE has also implemented actions that improve upstream passage of adult Pacific lamprey; the floating surface water collection facilities are also helping juvenile Pacific lamprey larvae out-migrants.

PGE has also implemented major habitat improvement projects since the issuance of the FERC license. These include gravel augmentation, in-channel and floodplain log structures, and side channel expansions in the Oak Grove Fork. The Oak Grove Fork is now producing significant numbers of salmon from this sub-basin for the first time since 1923. PGE has also channelized Faraday Lake to reduce Clackamas River water temperatures in the summer; constructed major projects in Milo McIver State Park and Metro's River Island Natural Area; implemented large-scale and long-term gravel augmentation downstream of River Mill Dam; and implemented riparian shading program for the Clackamas River tributaries downstream of River Mill Dam in partnership with Clackamas River Basin Council.

Finally, as outlined in the license, PGE has also established a Clackamas Habitat Fund that will invest $8 million in projects proposed and implemented by stakeholders in the basin. To date, more than $3.5 million have been distributed for controlling invasive plant species, replacing fish-blocking culverts,

implementing engineered large wood projects, and supporting the recent reintroduction of Bull Trout to the watershed. PGE has future grant cycles planned for 2019, 2023, and 2029.

Overall, PGE has, and will continue to make, significant investments in the Clackamas River Basin to restore native fish runs, and enhance river processes and habitat function.

Oregon Department of Environmental Quality (DEQ)

The Oregon Department of Environmental Quality has worked collaboratively with the Clackamas Partnership organizations for many years to support water quality protection and restoration. Since 2008, DEQ staff have worked with partners to implement the 2006 Willamette and Clackamas River Total Maximum Daily Loads for temperature, bacteria, and mercury. DEQ helps cities and counties meet their pollution reduction and reporting responsibilities under the TMDLs. DEQ frequently works with Clackamas County Code Compliance, Code Enforcement and Transportation and Development Departments to respond to water quality complaints. DEQ also works closely with Portland General Electric to oversee the water quality aspects of implementing PGE's federal license for its Clackamas hydroelectric operations. In recent years, DEQ has provided input and guidance on PGE projects to deepen the Faraday Lake channel and reduce summer temperatures, augment gravel downstream of River Mill dam to improve aquatic habitat and rebuild the Faraday Lake powerhouse.

In the last ten years, DEQ has worked closely with Clackamas River Basin Council through the technical workgroup. DEQ began a Pesticide Stewardship Partnership (PSP) monitoring and outreach program about ten years ago which grew into a partnership among CRBC, the OR Dept. of Agriculture, OSU Extension, Clackamas Drinking Water Providers and Oregon Environmental Council. In recent years, CRBC staff have performed the field sampling, ODA provides funding, and DEQ provides laboratory analysis, data interpretation, and technical assistance. DEQ's Source Water Protection program has worked on several projects in recent years with the CSWCD and CRWP to coordinate pesticide collection events and on-site septic system workshops. A State Revolving Fund loan awarded through DEQ to the CSWCD in the late 2000s continues to provide funding for erosion prevention, vegetation restoration, and septic system repair.

Since the mid-2000s, DEQ has provided EPA water quality grant (Section 319) funding to several Partners including Metro, the CSWCD, Clackamas County WES, CRWP, and CRBC. Projects funded through these grants include mapping riparian shade in Deep Creek; macroinvertebrate sampling; measuring stream channel characteristics and sediment transport; bacteria source tracking; a hydrologic model to size stormwater facilities; and erosion prevention on rural lands.

DEQ works with the CSWCD and the Oregon Department of Agriculture to implement the Agricultural Water Quality Management Plan in the Clackamas and Willamette basins. DEQ comments biannually on ODA's water quality management plan and most recently participated in spring 2017. Several programs fulfill DEQ's regulatory responsibilities in the Clackamas Subbasin through permits, enforcement and mutual agreements and orders. Permit programs include municipal stormwater, construction and industrial stormwater, and industrial and domestic wastewater. DEQ's 401 water quality certification program provides review and certification of in-water projects requiring a U.S. Army Corps of Engineers Section 404 permit.

7. Context: Profile of the Plan Area

The Partnership's Plan Area spans a complex and variable landscape – a mix of urban and rural land uses, developed lands and natural areas, and high-functioning habitats. The area's diverse landscape, geologic setting, land uses, and climate drive watershed processes and conditions that shape river and stream habitats. Similarly, restoration opportunities and approaches vary depending on watershed location and associated process drivers.

This section describes the landscape, watershed, and stream characteristics that set the context for the Partnership's habitat restoration strategy, approach, and priorities.

Metro's River Island Natural Area before (top photo) and after (bottom photo) restoration. Years of gravel mining and record flooding in 1996 altered the area's landscape and changed the Clackamas River's path. Restoration is improving floodplain vegetation and function and creating sustainable habitats. Source: Brian Vaughn, Metro

Overview

The Clackamas Partnership's Plan Area spans more than 800 miles of fish-bearing streams and nearly 400 miles of streams accessible to anadromous fish – salmon, steelhead and Pacific lamprey (Figure 3). Understanding the area's diverse ecoregions, land ownership patterns, and changes in aquatic habitat over time is important for assessing the factors that influence stream flows and fish habitat.

The Clackamas River begins in the high Cascade Mountains near Olallie Butte and enters the tidally-influenced lower Willamette River at approximately river mile (RM) 25. The high mountain snowpack and cold spring-fed tributaries in the upper basin influence the Clackamas River's hydrology and water quality. The snowpack and springs contribute to relatively good water quality and higher summer base flows (Grant 1997).

The lower Clackamas River, while warmer than historical conditions, still provides important cold water refugia for salmon and steelhead migrating to the upper Willamette Basin. During the late spring and summer, when water temperatures can reach levels that severely stress fish, migratory salmon and steelhead will move from the Willamette River into the cooler Clackamas River and tributaries to rest.

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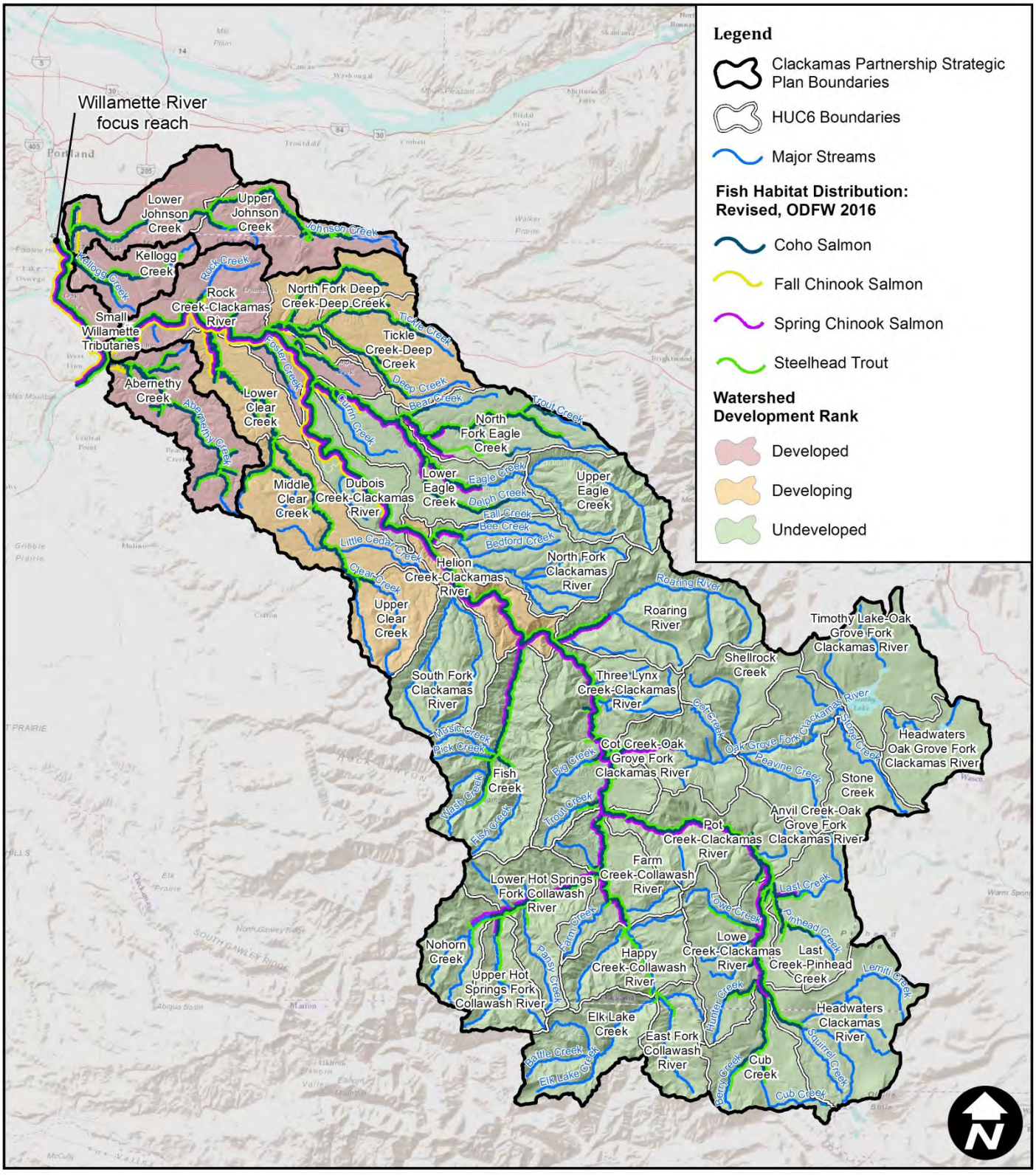
Figure 3. Plan Area Watershed Development Categories and Salmon and Steelhead Distribution



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The lower Clackamas River Basin watersheds (e.g., Clear and Deep Creek), Abernethy Creek, Kellogg-Mt. Scott Creek, Johnson Creek, and the other Willamette River tributaries begin in the low elevation portions of the Cascade foothills or Willamette Valley lowlands where there are no high elevation areas to capture winter snowpack. Consequently, most precipitation comes from rainfall. The largest quantities of rainfall occur between October and May; very little precipitation occurs during the summer and early fall when stream flows are at their lowest, and there is no snowpack available to sustain water flows and create cool water for fish. Rinearson Creek, North Fork Johnson Creek, Crystal Springs Creek, a tributary to lower Johnson Creek, and a few other low elevation tributaries entering the east side of the Willamette River are the exception because springs provide consistent cool water flow throughout the year. These cool tributaries provide summer cold water refuge for fish, including fish migrating or residing in the Willamette River.

The Plan Area's range of land development patterns influence watershed processes and alter habitat at the landscape scale. Generally, there is a gradation of land use patterns as the landscape transitions from the mountainous areas where primarily National Forest and private timberlands are present; the Cascade foothills and valleys with agricultural and rural residential areas; and the lowlands where cities and suburban areas are concentrated. The area's highest population density, with associated roads, housing, and urban development, is concentrated in the lower Clackamas River watersheds (particularly Cow, Carli, Sieben, Rock and Deep Creek), Abernethy, Kellogg-Mt. Scott, and Johnson Creek watersheds and the other Willamette River tributaries.

The following sections characterize the status of the Plan Area's river and stream health and relationship to the primary and secondary limiting factors for the Clackamas salmon and steelhead populations identified in the *LCR Plan*.

Degraded Aquatic, Floodplain, and Riparian Habitats

***LCR Plan* Limiting Factors:**

- **Physical habitat quality** – impaired habitat complexity and diversity, including access to off-channel habitats (Primary Limiting Factor)
- **Water quality** (elevated water temperature) – Due to land uses that impair riparian condition (Secondary Limiting Factor)

Impairment and fragmentation of the Plan Area habitats and the associated loss of ecological processes have altered the connectivity and function of aquatic, floodplain, and riparian habitats. The area's streams, floodplains, and riparian vegetation have been significantly degraded by a variety of land use activities, including timber harvest, urban and rural development, clearing for agriculture, construction of dams, channelization, and flood control levees, and removal of wood in stream and river channels. Historical and current land uses have impaired aquatic habitat diversity and complexity.

According to the *LCR Plan,* degraded habitat complexity and impaired fish access to floodplain habitats is the primary tributary factor limiting Clackamas salmon and steelhead populations. A secondary limiting factor is elevated water temperatures from land uses that have reduced the extent and composition of

riparian vegetation and shade levels over streams. The sections below characterize the Plan Area's aquatic, floodplain, and riparian habitats.

Upper Clackamas River Basin

The highest quality floodplain and aquatic habitats within the Partnership's area are within the upper Clackamas Basin (above Rivermill Dam). The Mt. Hood National Forest manages most of the upper basin; another large tract of land in the upper basin is part of the Confederated Tribes of the Warm Springs Indian Reservation. The upper Clackamas Basin includes large areas of wilderness, and portions of the Clackamas River and other streams are federally designated as wild and scenic. The designated portion of the Clackamas River, which is 47 miles in length, runs from Big Spring (headwaters area) to Big Cliff, just south of Estacada. Sections of the Collawash River, Roaring River, Fish Creek, the South Fork, and Eagle Creek also have wild and scenic designations.

The upper Clackamas River and tributaries provide some of the best habitats for salmon, steelhead and other fish species found in the Pacific Northwest (Taylor 1999; Willamette Restoration Initiative 2004). An Ecosystem Diagnosis and Treatment (EDT) model assessment of habitat conditions and fish populations in the Clackamas River concluded that overall the upper basin, except the reaches inundated by the PGE dams and localized habitat impairment, provides high-quality habitat for salmon and steelhead (Mobrand Biometrics 2004).

There are notable exceptions to the assessment of good habitat quality in the upper Clackamas River Basin. Key challenges in the upper basin are associated primarily with the legacy effects of past land management practices on stream channels, floodplain habitats, and riparian areas (WPN 2005). Roads confining channels, riparian harvest, upland roads, recreational uses, and hydropower impacts degrade areas along the Clackamas River and tributaries. PGE's hydropower operations modified the Oak Grove Fork's flows and limited wood in the channel, which is addressed through PGE's FERC agreement. Forest Road 46 was realigned in the 1950s, which confined the Clackamas River and isolated the channel from a portion of the floodplain (Taylor 1999). Logging of streamside trees and landslides generated by massive road failures during the 1996 flood contributed to habitat degradation and high water temperatures in Fish Creek (Taylor 1999, DEQ 2006). Fish Creek is listed on DEQ's 303(d) list for water temperatures that exceed criteria (64^0 F) for salmonid migration and rearing (DEQ 2006). Some roads in the upper basin are at risk for erosion and landslides (WPN 2005). There are also opportunities for restoration within the Bull of the Woods, North COA (ODFW 2018).

Despite localized habitat impairment, which is addressed through PGE, USFS, and other ongoing restoration actions by the Partnership, the EDT assessment concluded that the upper Clackamas Basin should continue in a mostly protected status because this area provides high-quality habitats that anchor salmon and steelhead production.

Lower Clackamas River and Floodplain Reach

The EDT analysis and other assessments have concluded that constraints on salmon, steelhead and other fish populations in the Clackamas Basin are most severe in the lower basin below the PGE dams (Mobrand Biometrics 2004; WPN 2005). As a result, most of the restoration opportunities in the Clackamas Basin are in the lower reach of the river and lower basin tributary streams.

The lower Clackamas River opens up into a wide floodplain near Milo McIver State Park. Historically, the river meandered through the floodplain, creating multiple channels, off-channel wetlands, and other diverse habitats. Over time, confinement of the lower Clackamas River channel by roads and flood control structures, removal of large wood, reduced recruitment of gravels resulting from the dams, gravel mining, and loss of trees and other floodplain vegetation have contributed to fragmented habitats and reduction in the extent and quality of river, floodplain, and off-channel areas. Large sections of the river are disconnected from the floodplain, including limited connectivity to side channels and off-channel wetlands (The Intertwine Alliance 2012b; WPN 2005).

Lower Clackamas River. Source: Bill Monroe, Clackamas River Basin Council

Channelization, flood control levees, altered sediment transport regimes as a result of upstream dams and other factors have contributed to reduced floodwater access to the Clackamas River's floodplain during peak flow events (Inter-Fluve, Inc. 2014). Alteration of the floodplain has modified the frequency and magnitude of surface water connections between the mainstem channel and off-channel habitats. The flux of water throughout the floodplain creates and maintains habitats and also affects a variety of water quality parameters. Reduced water movement during flood events through the floodplain and hyporheic zones limits water flux and recharge of the floodplain aquifer. Reduced floodplain flooding results in less cool water released by the floodplain aquifer into the channel during summer base flow periods when water temperatures are most limiting to fish (Jones et al. 2008). These changes in floodplain function, in combination with upstream reservoirs and other factors, contribute to warming in the Clackamas River. The lower Clackamas River (river mile 0 to 22.9) is on DEQ's 303(d) list for water temperatures that exceed criteria (64^0 F) for salmonid migration and rearing (DEQ 2006). Water movement through floodplain vegetation, wetlands, and associated hyporheic zone and aquifer also sorts and cleans river sediments and absorbs contaminants derived from stormwater our other sources (Maltby and Acreman 2011).

The reduction in the extent of floodplain vegetation, limited access to off-channel habitats, and reduced large wood in the channel and floodplain have degraded the complexity of floodplain and river habitats. These changes have dramatically reduced the extent and quality of floodplain and off-channel habitats that support juvenile salmon, steelhead, and Pacific lamprey. Loss of floodplain habitats also affects

wildlife populations. For example, the western painted turtle and the western pond turtle are both listed as "critical" on Oregon's State Sensitive Species List. Both species, which require permanent and seasonal water bodies that are slow moving, have declined along with the loss of floodplain habitats (The Intertwine Alliance 2012b).

Despite the extensive degradation of habitats, high-quality floodplain and river habitats are still present. The lower Clackamas River corridor retains some of the largest intact areas of functioning floodplain areas and vegetation in the region (ODFW 2018, Intertwine Alliance 2012a and 2012b).

Lower Clackamas Basin Tributaries: Eagle, Deep, Clear, Foster, Rock, Richardson Creeks

The Lower Clackamas River Basin, which is mostly in private ownership, spans agricultural, forest, rural residential, suburban and urban land uses. The lower basin tributaries, particularly the Deep, Rock and Richardson Creek watersheds, have the highest human population density and are experiencing rapid population growth. The key impairments in these tributaries are degraded water quality – particularly nutrients, bacteria, pesticides, and high water temperatures – fragmented riparian and wetland habitats, and loss of complex stream and floodplain habitats (WPN 2005). There is very little wood in channels (ODFW 2017a). Area covered by roads, commercial and industrial land uses, and homes have increased impervious surfaces and altered hydrologic processes.

Eagle and Clear Creek watersheds contain some of the highest quality stream, riparian and floodplain habitats in the lower Clackamas River Basin (WPN 2005, The Intertwine Alliance 2012b, ODFW 2018). Both watersheds have substantial areas in forest management land uses with minimal development: Eagle Creek begins in the Mt. National Forest; both watersheds include large areas managed as industrial timberland. As a consequence, water temperatures and other water quality parameters in the Eagle and Clear Creek are less impaired than the more developed tributaries. For the most part, impaired stream and riparian habitats are concentrated in the lower watershed where rural residential land uses dominate (WPN 2005, 2002). There are limited quantities of wood in lower Eagle and Clear Creeks (ODFW 2018). There are also substantial areas, particularly in lower Clear Creek, where bank protection and other actions have disconnected the channel from the floodplain and riparian areas are narrow and fragmented from vegetation clearing and weeds (WPN 2002).

The Clackamas Basin EDT analysis concluded that the lower basin tributaries, particularly Eagle, Deep, and Clear creeks, are important for maintaining the Clackamas salmon and steelhead population's productive habitat capacity and life history diversity (Mobrand Biometrics 2004). The quality of habitat in the lower Clackamas tributaries has declined primarily as a result of reduced habitat diversity and complexity, increased sediment, and warm water temperatures. Habitat diversity has declined because of limited wood in streams and channel simplification due to roads, and other land uses that are confining channels. Summer water temperatures limit summer juvenile rearing in all lower Clackamas tributaries, especially in Deep Creek. The EDT analysis concluded that Clear Creek has the greatest current habitat potential (therefore greatest habitat protection value), followed by Eagle and North Fork Eagle creeks

Willamette River Tributaries: Abernethy, Kellogg-Mt. Scott and Johnson Creek and other Urban Tributaries

Within the Partnership's Plan Area, Abernethy, Kellogg-Mt. Scott, Johnson Creek watersheds and other urban tributaries (e.g., Rinearson Creek) have the highest human population density. The upper portion of Johnson Creek watershed is predominantly rural residential and agricultural land uses, while the residential, commercial, and industrial areas dominate land uses in the lower watershed (The Intertwine Alliance 2012a). Rural residential and agricultural land uses, interspersed with industrial forest lands, characterizes the upper Abernethy Creek watershed; the lower watershed is in primarily rural residential and residential and commercial land uses associated with Oregon City (ICF 2010). Land uses in the Kellogg-Mt. Scott Creek watershed from Interstate 205 west includes commercial and industrial areas, along with large areas of older residential construction; land use east of I-205 is primarily newer residential development (Brown and Caldwell 2009).

Side channels, alcoves, and backwater areas are present in some reaches of Abernethy, Kellogg-Mt. Scott, and Johnson creeks, but extensive bank hardening, channel alterations, and areas where streams have been routed through underground pipes have greatly reduced the number, quality, and accessibility of off-channel habitats. Habitat conditions in the Johnson Creek watershed are an example the impaired watershed processes and habitat impacts that have reduced channel complexity and access to off-channel areas. The lower and middle portions of Johnson Creek are lined with Works Progress Administration (WPA) tiles (JCWC 2012, Willamette Restoration Initiative 2004). The WPA tiles have significantly altered natural hydraulic processes and constrain stream flows into the main channel. Limited large wood in Johnson Creek and its tributaries has also impaired habitat complexity (JCWC 2012). Similarly, Abernethy and Kellogg-Mt. Scott creeks are highly channelized with limited wood in the channel and disconnected from historical floodplain wetlands (ICF 2010, Brown and Caldwell 2009).

Riparian vegetation in the Abernethy, Kellogg-Mt. Scott and Johnson Creek watersheds have been degraded through land development and the spread of weeds (ICF 2010, Brown and Caldwell 2009, JCWC 2012). Impaired riparian areas contribute to reduced large wood in stream channels and limited overhanging vegetation. Reduced shade from riparian vegetation contributes to warm stream temperatures.

Two large artificial lakes, which have extensive surface areas that act as heat sinks, also contribute to high water temperatures: Kellogg Lake near the confluence of Kellogg Creek and the Willamette River and Beaver Lake in upper Abernethy Creek (Cascade Environmental Group 2018, Brown and Caldwell 2009). The dams associated with these impoundments also impair fish passage (addressed in the Fish Passage section below) and impact the quality of stream habitat. The artificial lake behind Kellogg Dam inundates more than 14 acres of historical stream, floodplain, and wetland habitats. Contaminated sediments from surrounding and upstream land uses have also accumulated in the lake bed (DEQ 2017). Historically the area now occupied by the lake was utilized for disposal of solid waste products from a variety of activities. Restoring habitats in the area now occupied by the lake will require addressing the contaminated sediments and other waste materials.

Beaver Lake impairs downstream habitats in Abernethy Creek because of the dam, and associated impoundment, are trapping sediments and other stream substrates. The dam reduces the transport of coarse bed-load material into Abernethy Creek, contributing to channel incision, impairing the formation of pools, and limiting accumulations of gravels and cobbles that create suitable spawning areas (Cascade Environmental Group 2018).

An EDT analysis of Johnson Creek watershed concluded that lack of habitat diversity, including access to off-channel habitats, and minimal large wood limit coho salmon and steelhead productivity (Willamette Restoration Initiative 2004). High sediment loading during storm flows, warm stream temperatures in the summer, and poor channel stability also limit the potential productivity of the system.

Despite extensive habitat alteration and impaired watershed processes, Abernethy, Kellogg-Mt. Scott and Johnson Creek watersheds still retain high-quality habitats. Based on the EDT analysis, the upper Johnson Creek has the largest area of high-quality habitats in the Johnson Creek watershed. A section of Johnson Creek upstream of Regner Road in Gresham has intact riparian forest canopy, as does the riparian corridor between Powell Butte and Leach Botanical Garden (The Intertwine Alliance 2012a). Two key tributaries – Kelley Creek and Mitchell Creek – retain large forested areas in the headwaters and provide relatively cool water to Johnson Creek (The Intertwine Alliance 2012a; JCWC 2012).

Newell Creek and Holcomb-Potter Creek in the Abernethy Creek watershed are in relatively good condition. Newell Creek, a tributary to lower Abernethy Creek, retains large areas of high-quality habitat. Sections of the stream have deep pools and large wood providing complex habitat and cover for fish (ICF 2010). Newell Creek also supports significant native populations of fish, including coho salmon, cutthroat trout, and steelhead. Metro has protected 300 acres of undeveloped lands along Newell Creek within Oregon City. The Holcomb-Potter Creek system includes relative cools stream segments with intact riparian vegetation (Cascade Environmental Group 2018).

Willamette River and Floodplain Reach

The Partnership's Willamette River reach, which extends from Willamette Falls at river mile (RM 26) to the confluence of Johnson Creek (RM 18.5), is within a highly urbanized part of the Portland metropolitan region. Historical gravel mining, wood removal from the channel, dredging, and construction of Willamette Basin dams has dramatically modified this section of the Willamette River. Ongoing development, roads, and other activities continue to degrade habitats along the river.

Historically, the area around the confluence of the Willamette and Clackamas Rivers (RM 24.7) was a dynamic environment with a shifting mosaic of channels, gravel bars, and cottonwood forests. Cobble, gravel, and sand delivered from the Clackamas River created a large depositional area and braided channels where the higher gradient Clackamas River transitioned to the lower gradient and tidally influenced Willamette River (Waterways Consulting 2016). The disparities in the gradients of these two large river systems resulted in the formation of a tributary alluvial fan at the mouth of the Clackamas River as coarse bed material emanating from the higher energy Clackamas River is deposited in the lower energy Willamette River confluence area. Coarse bedload deposition at the mouth had a significant influence on the bed elevations and morphology of the Willamette River for thousands of feet upstream

and downstream of the confluence. The bed of the Willamette River, adjacent to the Clackamas River, was on the order of 10 to 20 feet higher in elevation than the present day bed elevation.

Historically, the Willamette River was much shallower and wider with extensive gravel bars that were scoured annually and were free of vegetation. The construction of Willamette Basin flood control dams reduced the magnitude and frequency of floods. The loss of periodic scouring floods converted the once bare gravel bars to vegetated islands and river margins with higher resistance to flow, causing further incision of the channel. The overall results of these management activities have been a deeper river, wider low flow channel, steeper banks, and less habitat complexity (Waterways Consulting 2016).

On January 3, 2017, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision for the Selected Remedy for the Portland Harbor Superfund Site in the Willamette River. The Superfund Site extends from RM 1.9 to RM 11.8. In addition to the Superfund Site, the DEQ has conducted multiple contaminated sediments and toxic chemical source investigations in the Downtown Portland Reach (RM 11.8 to RM 16.6) and identified several sources for further evaluation and cleanup.

Contaminated sediment and toxic chemical source Investigations in the Upriver Reach (RM 16.6 to Willamette Falls), which roughly corresponds to the Partnership's Willamette Reach, have been more limited than in the Downtown and Superfund Site reaches (DEQ 2017). Because sample data are sparse in this reach, DEQ is focusing on identifying potential sources of contaminants that could negatively impact the success of the EPA's Portland Harbor cleanup or the overall health of the lower Willamette River. Based on a preliminary analysis of current data, DEQ noted that elevated levels of polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane, and break-down compounds (DDx) were detected in fine sediments. The report noted that Johnson and Kellogg Creek have potential sources of or pathways for contamination, such as outfalls and DEQ cleanup sites. The report described prioritized areas for further evaluation of fine sediment contamination. The prioritized sampling locations include the river's confluence with Abernethy Creek, Clackamas River, Kellogg-Mt. Scott Creek, and Johnson Creek (DEQ 2017).

The ETD analysis of the lower Willamette River demonstrates the importance of this river corridor to salmon and steelhead populations. The EDT assessment showed that conditions in the lower Willamette could contribute significantly to the potential biological performance of fish from both the Clackamas Population and upper Willamette populations. Based on the EDT analysis, it is apparent that the Clackamas River and the lower Willamette River form a contiguous habitat unit for migrating and rearing Clackamas steelhead and salmon populations (Willamette Restoration Initiative 2004).

Under a restored condition, the lower Willamette would add considerable rearing habitat, particularly for juvenile fall and spring Chinook. The EDT analysis showed that the greatest habitat restoration value for spring Chinook in the Clackamas was in the lower Clackamas River mainstem, followed by the lower Willamette River (inclusive of the area downstream to the Columbia River). The high restoration value of these lower reaches in part reflects the benefits afforded by improving conditions for adult and juvenile migrants that pass through the lower Willamette and lower Clackamas reaches. In the lower Willamette reach, the EDT analysis concluded that chemicals (pollutants), habitat diversity, and river and floodplain

habitat complexity were the key limiting conditions for Clackamas salmon and steelhead, with the largest impact on juvenile spring Chinook (Willamette Restoration Initiative 2004).

Fish Passage Barriers

***LCR Plan* Limiting Factor:**

- **Habitat access** (impaired upstream passage) – Small dams, and diversions (Secondary Limiting Factor)
- **Habitat access** (impaired upstream passage) – Road Crossings (Secondary Limiting Factor)

The recent PGE Project fish passage enhancements, which dramatically improved upstream and downstream passage for salmon, steelhead, and Pacific lamprey, addressed the most significant fish passage issue in the Clackamas River Basin. In the upper basin, the USFS has systematically addressed fish passage issues in tributary streams related to road crossing culverts. While some fish passage problems remain on the extensive network of national forest roads, most of the significant fish passage barriers for salmon, steelhead and bull trout have been addressed.

In the lower Clackamas River Basin, CRBC completed fish passage barrier assessments in Clear and Foster Creeks in 2003, and Deep, Goose, and Eagle creeks in 2005 (Watersheds Northwest Inc. 2003, WPN 2005). The assessments prioritized and ranked fish passage at culverts and small dams to be addressed through replacement or retrofits. Most of the high priority fish passage barriers in these watersheds have been addressed.

Dams and road crossings are the primary fish passage issues in Abernethy Creek. The GOCWC, in collaboration with Clackamas County, has improved fish passage in Holcomb Creek by replacing culverts with new structures that meet fish passage criteria (ICF 2010). There are more road crossing barriers in the Abernethy Creek system that need to be evaluated. GOCWC will continue to work in partnership with the County and others to prioritize and address barriers.

The Beaver Lake dam on upper Abernethy Creek has a fish ladder in place. Although fish passage at this ladder has not been studied, evidence indicated that it impedes adult coho and steelhead movement into spawning and rearing streams above the lake (ICF 2010). Recent improvements to the fish ladder appear to enhance fish passage (Dave Stewart, ODFW, personal comm. 2018). Recent observations of steelhead and coho salmon spawning in Abernethy Creek above the dam are evidence that the ladder is passing at least some fish (Cascade Environmental Group 2018).

The most significant fish passage issue, and the primary limiting factor, in the Kellogg-Mt. Scott Creek watershed is Kellogg Dam. Kellogg Dam was originally constructed to power a grist mill in 1858 and has been reinforced several times since then. While some coho salmon and steelhead successfully navigate passage, the current fish passage facilities at the dam severely restrict passage. Removing the dam and its impoundment would open up fish access to 9 miles of Kellogg-Mt. Scott Creek and increase the availability of shallow water and off-channel habitat (Portland Harbor Natural Resource Trustee Council 2012). Management of contaminated sediments in the artificial lake could decrease risks to fish and wildlife and improve overall water quality. Habitat enhancements within the lake bed would provide cold-

water rearing and refuge areas for juvenile coho and spring Chinook and would create new floodplain capacity.

In 2013-14, JCWC partnered with Portland State University to survey hundreds of culverts and dams in our watershed. Of the 273 surveyed culverts and dams, 70% were found to be full or partial barriers. The identified barriers were prioritized for restoration using an optimization model based on maximizing habitat gain for least cost. Using this tool, fifteen fish passage barriers were identified that would open up 7 miles of habitat in key tributaries. Fish passage is a key limiting factor in the Johnson Creek watershed because barriers have blocked salmon, steelhead and Pacific lamprey access into productive cool water tributaries. JCWC, in collaboration with its partners, is systematically addressing the prioritized barriers as funding allows.

Roads

***LCR Plan* Limiting Factor:**

- **Physical habitat quality** (excessive fine sediment) – Rural and forestry roads (Secondary Limiting Factor)

Unpaved roads can generate sediment that impairs stream habitats and water quality. On-going road erosion and road-caused landslides drive the delivery of sediment into streams from roads. Most of the unimproved rural and forestry gravel roads in the Plan Area are in the Clackamas River Basin and upper Abernethy Creek watershed. In the Clackamas River Basin unimproved roads are concentrated on industrial timberlands in the lower basin (e.g., upper Clear Creek watershed) and the upper basin on Mt. Hood National Forest lands. Actions to address sediment from roads include increased road maintenance, storm-proofing (e.g., replacing undersized culverts that can wash out in flood events), decommissioning, and road upgrades.

Many of the roads on industrial timberland have been upgraded with improved drainage and culvert replacements. In the upper Clackamas River Basin, more than 190 miles of National Forest system roads have been decommissioned and are no longer part of the National Forest's transportation system (USFS 2017).

Industrial timber landowners and the USFS continue to systematically identify roads that are a high risk of causing sedimentation in streams and upgrading roads through improved drainage and other actions. The USFS is decommissioning high priority roads as funding is available.

Impervious Surfaces

***LCR Plan* Limiting Factors:**

- **Hydrograph/water quantity** (altered hydrology) – Upslope land uses, including stormwater, flashy flows, and altered groundwater recharge (Primary Limiting Factor)
- **Water quality** (toxins) – Urban and industrial practices, including stormwater (Primary Limiting Factor)

Watershed urbanization has altered watershed processes and degraded habitats within the Partnership's Plan Area. Typical suburban development in the Pacific Northwest is estimated to have 90% less storage capacity than under naturally forested conditions (May et al. 1997). The increase in runoff rates and decreased rainwater infiltration drive physical, chemical, and biological changes that impact stream geomorphology, water quality, and summer base flows. Increasing percent Total Impervious Area (%TIA) is directly correlated with negative changes in stream habitat and fish populations (May et al. 1997, Booth and Jackson 1997, Wang et al. 2001) and macroinvertebrate populations (Utz et al. 2009).

Recent research by the National Marine Fisheries Service (NMFS) and others has shown that common stormwater contaminants can impair salmon and steelhead health in a variety of ways (NMFS 2016). For example, petroleum-derived compounds suppress the immune system, rendering fish more vulnerable to pathogens that cause lethal diseases. Certain metals are toxic to the salmon nervous system, thereby disrupting feeding and predator avoidance. Dissolved copper is a particularly pervasive contaminant in stormwater that threatens salmon and steelhead survival. Copper in stormwater can come from a variety of sources; one significant source is vehicle exhaust and brake pads. Copper, like many other metals, is toxic to the sensory systems of fish. In addition to sub-lethal effects, stormwater has been documented to cause mortality in migratory adult coho salmon, which appear to be more sensitive to the stormwater contaminates than other salmon or steelhead species (Feist et al. 2017).

Negative watershed impacts increase as %TIA increases. Percent impervious surface levels between 8% and 12% appears to represent a threshold where minor increases in %TIA can result in changes in stream condition (Wang et al. 2001, Booth and Jackson 1997, May et al. 1997). These thresholds, and associated changes in hydrology, stream habitat water quality and fish population response, range from the following: undeveloped watersheds (%TIA < 5%) with no detectable watershed response; suburban watersheds (%TIA = 25% to 35%) with substantially impaired conditions but also potentially areas of good quality habitat and water quality, particularly where there are extensive intact riparian corridors; to highly urbanized watersheds (TIA > 45%) with substantial and irreversible changes in stream habitat and water quality (May et al. 1997, Wang et al. 2001).

Based on the scientific evidence, percent TIA (%TIA) is a landscape-scale indicator of the extent to which stormwater inputs and limited infiltration has altered hydrology, other watershed processes and stream habitat within the Partnership's Plan Area. A standard method was applied to estimate %TIA for each subwatershed (USGS 2014). Watershed %TIA values range from 0% TIA on most National Forest Lands to 47% TIA in the highly urbanized Kellogg-Mt. Scott Creek subwatershed. Lower Clackamas River Basin watersheds range from 12% TIA in the Clear Creek Watershed to 38% TIA in the Rock Creek watershed. The Deep Creek watershed, which is undergoing rapid development, is 28% TIA. Other regional assessments support the watershed %TIA conclusions. The %TIA for the watersheds within the Plan Area roughly correlates with the Intertwine Alliance's urbanized land cover classification.

Plan Area watersheds grouped into the following three urban development categories based on %TIA thresholds cited in scientific literature:
Developed: %TIA > 30%
Developing: %TIA = 8% - 30%

Undeveloped: %TIA < 8%

Figure 3 illustrates the Plan Area watershed development categories and salmon and steelhead distribution.

The development categories cited above are consistent with field observations of water quality and habitat characteristics for the watersheds. In comparison to the undeveloped watersheds, the developed watersheds have the poorest water quality and a greater extent of impaired stream habitat as measured by key indicators such percent pools and levels of large wood in the channels (ODFW 2017, JCWC 2012, ICF 2010, Brown and Caldwell 2009, WPN 2005). In contrast, the undeveloped watersheds, which are primarily within the Mt. Hood National Forest, have the highest levels of aquatic habitat condition and water quality (WPN 2005). The developing watersheds contain streams or river reaches with good water quality and habitat, but there are also streams or reaches with degraded habitat and water quality (WPN 2005, ODFW 2017a, ODA 2017).

Actions can be taken to minimize effective impervious area. For example, hydrological impacts can be reduced to some degree by treating stormwater at the site (e.g., a housing development) in a manner that allows stormwater infiltration (May et al. 1997, Wang et al. 2001).

Stream Habitat Quality: High Intrinsic Habitat Potential (IP)

The *LCR Plan* evaluated stream habitat quality through an evaluation of aquatic habitat inventory data and an assessment of stream intrinsic potential. High intrinsic potential (IP) is an assessment of stream reach habitat quality through modeling of a combination of channel gradient, mean annual stream flow, and valley constraint that result in conditions that, in the absence of human disturbance, have the highest potential for the creation of high quality habitat for salmon and steelhead juveniles. Because optimal juvenile habitat conditions vary by species, high IP is determined specifically for coho, spring Chinook, fall Chinook, and steelhead. High IP is a measure of historical habitat potential and does not assess current habitat quality. Essentially, because high IP reaches can serve as a gauge of habitat improvements that can be potentially achieved through restoration actions, it can serve as a way to evaluate restoration potential and priority locations at watershed and reach scales.

Based on ODFW's aquatic inventory habitat information, spawning data, fish distribution patterns, and professional judgment, ODFW and Partnership technical staff evaluated high IP habitat mapping for the Plan Area. Based on this evaluation, IP habitat mapping was adjusted to reflect habitat potential better. For example, fall Chinook high IP habitat was substantially overestimated; the resulting adjustments better reflect the real potential for restoring areas that historically were high IP habitats.

Figure 4 illustrates high IP habitat mapping for coho, spring Chinook, fall Chinook, and steelhead.

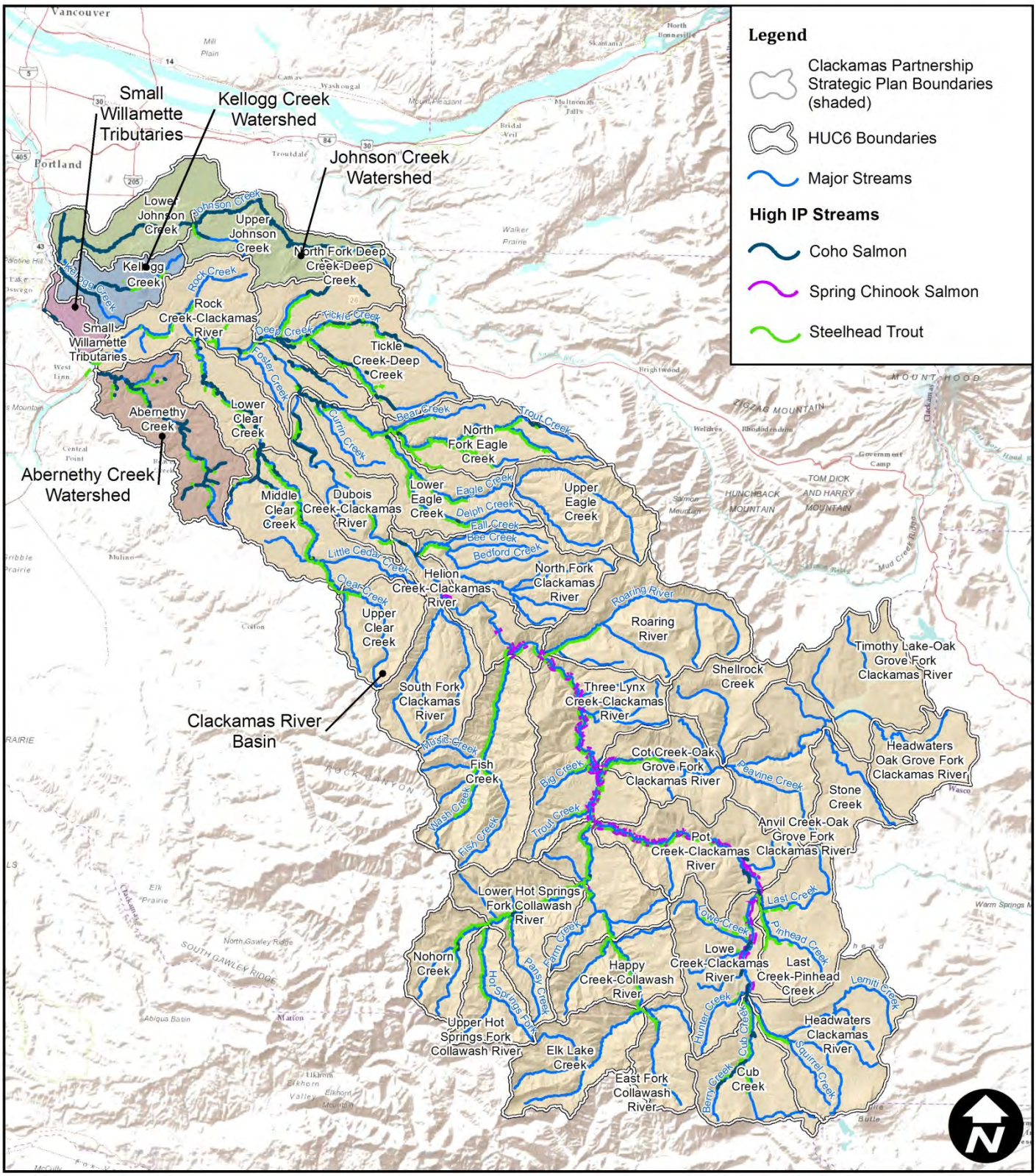
Human Population and Local Economy

The Partnership's Plan Area, which is largely within Clackamas County, encompasses a large proportion of the Portland metropolitan region's human population. The County's population, which is estimated to be 409,688 in 2017, is forecast to increase by more than 107,000 over the next 18 years (2017-2035) and by

more than 267,900 over the entire 50 year forecast period (2017-2067; PSU 2017). The city of Sandy, of which a portion is within the Clackamas River Watershed, is forecast to be one the most rapidly increasing of county's sub-areas outside of the Portland metropolitan urban growth boundary. Sandy's Urban Growth Area (UGB) is estimated at 11,346 in 2017, and forecast to increase to 18,700 by 2035 and to 34,695 in 2067.

Clackamas County's economy is diverse with a range of industries and service sectors. In addition to manufacturing, transportation and shipping, government and service industries, agriculture plays a major role in the local economy. Clackamas County's agricultural industry is ranked fourth in the state in all farm sales, with $343 million in annual revenue (ODA 2017). Clackamas County is ranked second in Oregon for nursery and greenhouse sales (ODA 2017). Recreation, including fishing and guide services, also plays a major role in the local economy. At one site alone, Milo McIver State Park along the Clackamas River, annual visitation is half a million people. Importantly, the Clackamas River provides drinking water for the area's growing population. Currently, more than 300,000 people use water from the Clackamas River Basin.

Figure 4. High Intrinsic Potential (IP) Habitat Mapping for Coho, Spring Chinook, and Steelhead



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8. Conservation and Restoration Need

Species Benefiting from Restoration

A tour of the Clackamas River Basin Council's Clackamas Confluence Restoration Project. Source, Cheryl McGinnis, Clackamas River Basin Council

The *LCR Plan* emphasizes actions necessary for the recovery of ESA-listed Clackamas Fish Populations: Spring Chinook salmon, fall Chinook salmon, coho salmon, chum salmon, and winter steelhead populations. Chum salmon are functionally extirpated from all the lower Columbia population areas, including the Clackamas River and tributaries.

Because the Plan Area supports relatively strong populations of lower Columbia River coho, spring Chinook[5], Pacific lamprey, and bull trout it plays an important role in anchoring population recovery for these populations. The primary focus of the Partnership's restoration effort is on juvenile spring Chinook, coho, steelhead, and Pacific lamprey juvenile rearing habitat because rearing habitat is the key tributary factor affecting these populations. Fall Chinook salmon populations are severely depressed, but their life history is such that juveniles move quickly out of the Plan Area as they migrate downstream. As a result, there are few actions that the Partnership can take to restore fall Chinook juvenile rearing habitat. The Partnership will continue to identify fall Chinook restoration opportunities, but the emphasis will be on the other species.

The Partnership is concentrating on restoration for salmon and steelhead populations with the assumption that comprehensive habitat improvements will also benefit Pacific lamprey, bull trout, and other fish and wildlife populations. ODFW, Tribes, PGE, and others are collecting data on Pacific lamprey migration and spawning and evaluating the factors limiting the population. The Partnership will track these efforts and identify projects that specifically target Pacific lamprey. Efforts to assess the effectiveness of bull trout reintroduction are also underway, including evaluating spawning and rearing success. The Partnership will evaluate bull trout restoration actions as more information is available on the status of the population and factors that may be constraining the success of the fish populations.

Where appropriate, the Partnership's habitat restoration actions will also incorporate approaches designed to benefit native wildlife species and rare habitats. For example, Metro's River Island Natural Area along the lower Clackamas River includes restoring and maintaining high-quality Oregon white oak

[5] The Clackamas spring Chinook population is not part of the Lower Columbia River Chinook ESU, but is listed under the federal ESA as part of the Upper Willamette River Chinook ESU.

savanna habitat and preserving and enhancing selected areas where native turtle use has been identified, including foraging, nesting and basking areas.

Clackamas Fish Population Status

This strategy is designed to improve habitat for the following populations: Spring Chinook, fall Chinook, coho, winter steelhead, Pacific lamprey, and bull trout (Table 7). While chum salmon are a focal species, the strategy does not explicitly consider chum salmon at this time. ODFW is developing a strategy for the reintroduction of chum that will emphasize the Clatskanie and other Coastal Strata populations originating from watersheds draining into the Columbia River Estuary. It is not known when chum reintroduction will begin in the Clackamas Partnership's area. As a result, the Partnership has not prioritized habitat restoration in advance of chum reintroduction. The Partnership will continue to work with ODFW to track the chum reintroduction efforts and will prioritize chum habitat restoration when there is a better sense for when reintroduction will occur in the Cascade stratum, which includes the Partnership's Plan Area.

Table 7. The fish populations addressed through the Clackamas Partnership's habitat strategy and actions. The Partnership will address chum salmon when ODFW develops the strategy for chum reintroduction to the Clackamas system.

Common Name (Population Segment)	Scientific Name	Life-History Forms	Federal / State Endangered Species Status
Chinook Salmon (Lower Columbia River)	*Oncorhynchus tschawytscha*	Anadromous Fall run	Threatened / Critical
Chinook Salmon (Upper Willamette River)	*Oncorhynchus tschawytscha*	Anadromous Spring run	Threatened / Critical
Coho Salmon (Lower Columbia River)	*Oncorhynchus kisutch*	Anadromous	Threatened / Endangered
Steelhead / Rainbow Trout (Lower Columbia River)	*Oncorhynchus mykiss*	Anadromous: winter steelhead Resident: rainbow	Threatened / Critical (Steelhead)
Chum Salmon (Lower Columbia River)	*Oncorhynchus keta*	Anadromous	Threatened / Critical
Pacific Lamprey	*Lampetra tridentanta*	Anadromous	No status / Vulnerable
Bull trout	*Salvelinus confluentus*	Fluvial, resident	Threatened / Critical

The following sections describe the focal fish population's historical habitat and current abundance and trends. Chum salmon, which are functionally extirpated from the area, are not addressed at this time.

Spring Chinook salmon

LCR Plan Clackamas Population Extinction Risk Status: *Moderate*

Historically, spring Chinook spawned in the Clackamas River and its tributaries. Of the 12 historical naturally reproducing Chinook populations in Oregon's portion of the lower Columbia, naturally producing early "tule" fall chinook in are present in Youngs Bay, Big Creek, the Clackamas River, Sandy River and possibly the Hood (low levels). Spring Chinook populations are found only in the Sandy and Clackamas rivers. The Clackamas River spring Chinook population, which is part of the Upper Willamette River Chinook ESU, and the McKenzie population are the healthiest populations in the ESU. The Clackamas River population is classified as a moderate extinction risk; the McKenzie River population is a low extinction risk.

In the Clackamas River Basin, adult spring Chinook passage at PGE's facilities begins in early March and ends around mid-October; the majority of fish migrate into the upper basin from mid-April to August (PGE 2018). The adults hold in deep pools in the river and tributaries through the summer. Spawning usually takes place from late August through October. Juvenile Chinook, which can rear in fresh water for a year or more, may be present in the Clackamas River any time of year. The peak period for juvenile passage through the PGE projects is during October, November, and December.

The Clackamas spring Chinook population trends are encouraging. Recent adult counts are well above the annual *LCR Plan* abundance goal for the population (ODFW 2017b). Based on PGE's counts, the wild adult Chinook return in 2017 (3,586 fish) is almost double the 10-year average of 1,834 fish. In 2017, PGE's North Fork facility recorded 43,888 juvenile out-migrants during March, which is the highest count over the period of record, 1959-2017 for that month (Garth Wyatt, PGE, e-mail comm., November 1, 2017). The previous record was 17,000 fish in 2014; the average over this 57-year period is 1,399 fish. The positive trend in the number of juvenile out-migrants continues. In April 2018 a record number of Chinook out-migrants passed through the River Mill Dam surface collector: 16,323 fish. The previous record for April (2013-2018) was 8,056 fish (Garth Wyatt, PGE, e-mail comm., May 1, 2018).

Fall Chinook salmon

LCR Plan Clackamas Population Extinction Risk Status: *Very High*

Fall Chinook salmon were native to the Clackamas River Basin, lower Johnson Creek, and lower Abernethy Creek. These historical runs are essentially extinct. Fall Chinook have not been stocked in the Clackamas since 1971 (PGE 2018).

Present-day fall Chinook runs are believed to be hatchery fish of the tule strain (PGE 2018). Fall Chinook enter the Clackamas in August and September. The majority of the spawning is in the lower river downstream of River Mill Dam. Fall Chinook spawn from August through December, with peak spawning from mid-August through September. Spawning in the Clackamas River is usually delayed until October by

high water temperatures and low flow conditions (ODFW 2017b). After emergence, Juveniles move quickly downstream into the Columbia River estuary.

Fall Chinook abundance surveys began for the Clackamas population in 2012. To date, there are not sufficient yearly abundance estimates to produce annual abundance goals in which interim measurable criteria for biological viability can be assessed (ODFW 2017b). Since 2012, the Clackamas fall Chinook population has varied from 130 to 700 adults.

Coho salmon

LCR Plan Clackamas Population Extinction Risk Status: *Moderate*

Historically and today, coho salmon spawned in the Clackamas River and its tributaries, and the Abernethy, Kellogg-Mt. Scott and Johnson creek watersheds.

All Columbia basin coho populations upstream of Hood River have been extirpated. Of the 24 historical populations that comprised the Lower Columbia River coho ESU, only in Clackamas and Sandy is there direct evidence of persistence during the adverse environmental conditions of the 1990s.

The Clackamas has two stocks of coho salmon: An early- and a late-run. The introduced early-run fish begin to enter the river in August, spawning in October and early November. There is good natural reproduction in lower river tributaries and the upper Clackamas upstream North Fork Dam (PGE 2018).

The late-run coho population is the Clackamas River's endemic stock. While most of them spawn above North Fork Dam, there is some reproduction in the lower river. They enter the Clackamas from November through January and spawn from January to April. Juvenile coho will rear in the river and tributaries for a year before out-migrating to the lower Columbia.

Since 2000, the numbers of wild coho have increased in both the Clackamas and Sandy basins. Based on PGE counts, the Clackamas River 2017 early-run coho return was 6,050 fish, which is nearly triple the 10-year average of 2,179 fish (early-run only). The 2017 late-run coho return was 1,026 fish, which exceeded the benchmark for 7,000 wild coho for the second time in four years (PGE 2018). Despite the promising abundance trends, under the interim criteria for biological viability, the Clackamas population does not pass the spatial structure criteria (ODFW 2017b).

Winter Steelhead

LCR Plan Clackamas Population Extinction Risk Status: *Moderate*

Historically and today, winter steelhead spawned in the Clackamas River and its tributaries, and the Abernethy, Kellogg-Mt. Scott and Johnson creek watersheds.

Although wild steelhead in Oregon's portion of the Lower Columbia winter steelhead Distinct Population Segment is depressed relative to historical levels, no population extirpations have occurred. However, current extinction risk estimates for these populations are large enough that they all are classified as being at moderate risk or higher.

There are two stocks of winter steelhead in the Clackamas, an early- and late-run. Hatchery releases by the U.S. Fish and Wildlife Service's Eagle Creek Fish Hatchery support the early-run steelhead population. These fish are released below River Mill Dam so as not to interfere with the native winter steelhead that spawn mainly above North Fork Dam (PGE 2018). Early-run winter fish begin to enter the Clackamas in November with most of them spawning in tributaries below River Mill Dam in January and February. There is some natural reproduction, particularly in Clear Creek, Eagle Creek, and Deep Creek.
The late-run of wild steelhead begins to enter the river in January, with peak numbers generally observed in March. Migration over North Fork Dam is mostly in April and May, with fish spawning from late March to mid-June. Through support by PGE, a wild broodstock program was initiated, so this stock now provides expanded fishing opportunities in the lower river (PGE 2018). The Clackamas winter steelhead adult abundance has increased every year since 2013 (ODFW 2017b).

Pacific lamprey

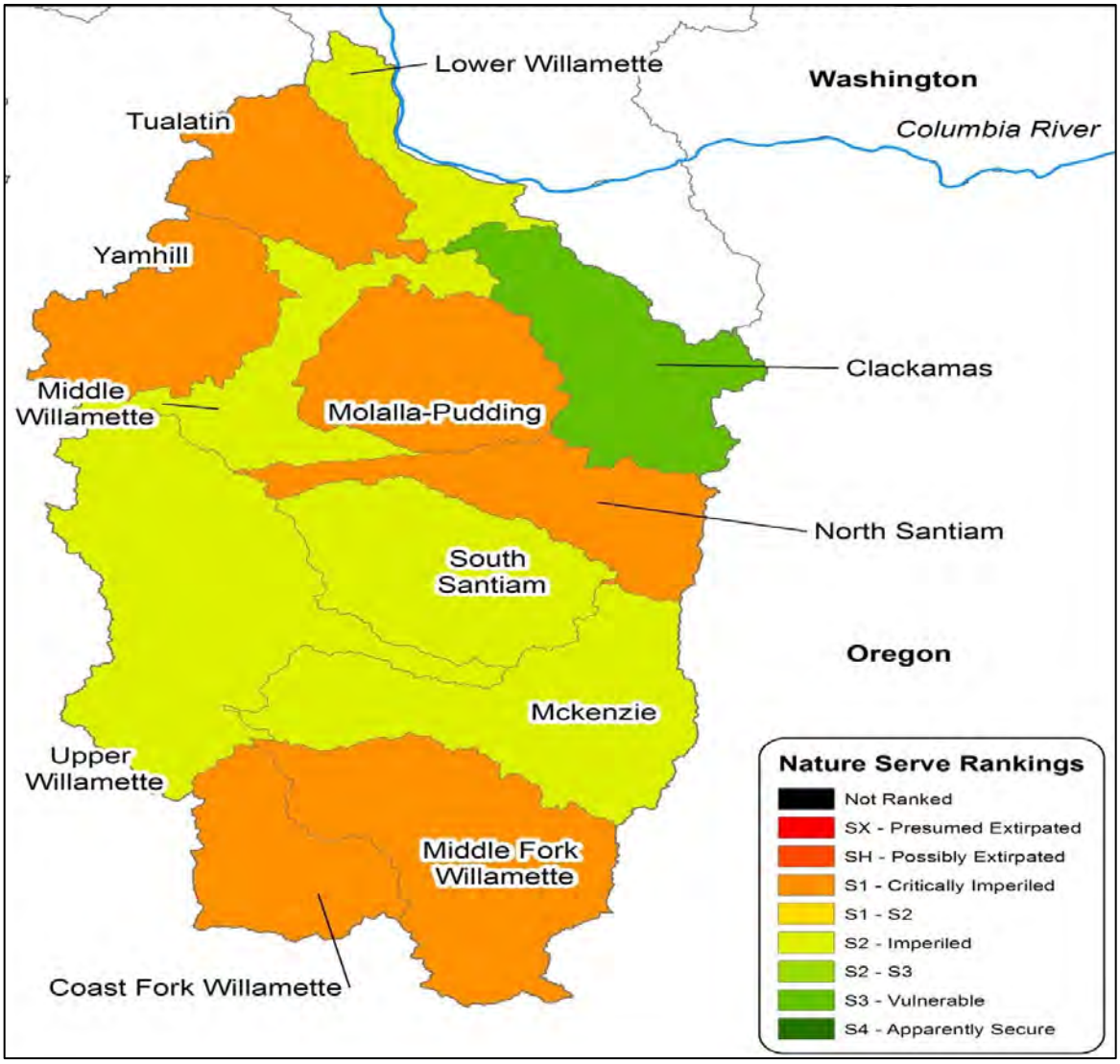
Because serious declines in abundance have been documented since the 1950s, Pacific lamprey populations are listed as a "vulnerable" by the State of Oregon (Kostow 2002). Columbia River Pacific lamprey runs in above Bonneville dam are almost extinct. The Willamette Basin is the most important remaining Pacific lamprey production area in the Columbia Basin (Clemens et al. 2017).

Tribal fishers from the Warm Springs, Yakama, and Umatilla tribes harvest lamprey at Willamette Falls (Falls), one of the last major Pacific lamprey Native American harvest sites left in the Columbia River Basin. Since 2010, the Confederated Tribes of Warm Springs Reservation have collected information to estimate the abundance of Pacific lamprey adults at the Falls and the number passing through the fishways to spawn in upper Willamette Basin tributaries. On average, 172,718 Pacific lamprey adults migrate to Falls and 60,689 move through the fishway (Pirier et al. 2017). Of the 112,029 Pacific lamprey adults that enter the lower Willamette River but do not ascend the Falls, it is estimated that roughly half (56,015) move into the Clackamas River and the other portion enters lower Willamette tributaries (e.g., Abernethy and Johnson Creek) for spawning (Baker and McVay 2016).

Significant numbers of Pacific lamprey adults have been observed spawning in Abernethy Creek, the lower Clackamas River and Clear Creek (Cascade Environmental Group, WPN 2005). Adult and juvenile Pacific lamprey have also been observed in Johnson Creek (Daniel Newberry, JCWC, personal comm.). More information on Pacific lamprey population abundance and trends for the Plan Area will be available soon because ODFW is counting Pacific lamprey redds as part of steelhead spawning surveys. Pacific lamprey spawning occurs from March to July, which roughly corresponds to winter steelhead spawning periods. Pacific lamprey redds are usually constructed in pool tailouts dominated by gravel, similar to habitat used by spawning steelhead (Mayfield 2014).

Pacific Lamprey extinction risks have been evaluated for Willamette Basin watersheds based on current threats and population status (Poirier et al. 2017). Based on this evaluation, the Clackamas Pacific lamprey population is "vulnerable," the lowest extinction risk rating for Willamette Basin watersheds (Figure 5). All other Pacific lamprey populations in the Willamette Basin are assessed to be "critically imperiled" or "imperiled." The Lower Willamette River Pacific lamprey population area has an imperiled ranking.

Figure 5. NatureServe Model Risk Assessment for Willamette Basin Pacific Lamprey Populations. Parameters Assessed Include Occupancy (current and historical); Adult Population Size; Short-term Population Trend (~30 years); and Threats – The Most Significant for Scope and Severity (Poirier et al. 2017)



The *Pacific Lamprey 2017 Regional Implementation Plan for the Lower Columbia/Willamette Regional Management Unit, Willamette Sub-Unit* describes the factors limiting Willamette Basin Pacific lamprey populations. The factors limiting Willamette Basin Pacific lamprey populations are similar to the factors affecting salmon and steelhead populations: degraded floodplain habitat, changes in stream hydrology, water quality and passage barriers (Poirier et al. 2017). Because lamprey ammocoetes burrow into fine sediments to grow and live as filter feeders for 3 to 7 years, they are particularly vulnerable to toxins in the water, contaminated sediments and rapid changes in streamflow or channel de-watering. Due to the difference in swimming behaviors between Pacific lamprey and salmonids, the characteristics that provide fish passage through culverts and fishways (i.e., velocity, lack of attachment surfaces) create barriers or impediments to upstream lamprey migration (Pacific Lamprey Technical Workgroup 2017).

Bull Trout

Bull trout require cold water temperatures – temperatures above 59° F. is believed to limit bull trout; clean stream substrates for spawning and rearing; complex habitats, including streams with riffles and deep pools, side channels, undercut banks, and plentiful instream large wood for shelter and foraging; and habitats that connect to headwater streams for annual spawning and feeding migrations (USFWS 2004).

Pinhead Creek in the upper Clackamas River Basin provides high quality bull trout habitat. Source: USFS

Historically the Clackamas Basin, with its cold spring-fed tributaries and variety of complex and interconnected river and stream habitats, provided ideal bull trout habitat. Bull trout were abundant and widely distributed in the Clackamas River Basin but were extirpated from the basin by the 1960s due to migration barriers from hydroelectric and diversion dams, direct and incidental harvest in the sport and commercial fisheries, targeted eradication with bounty fisheries, and habitat and water quality degradation from forest management and agricultural activities (Shively et al. 2007). The assessment of bull trout reintroduction to the Clackamas River concluded that the historical factors that contributed to the loss of bull trout are believed to be sufficiently remedied and will not impede the success of a reintroduction attempt (Shively et al. 2007).

The implementation plan for bull trout reintroduction set the goal of establishing a self-sustaining population of 300-500 adults in the upper Clackamas River Basin (ODFW 2016). Phase one of the project (2011-2016) involved translocating 2,868 bull trout (80% at age-1 and 2) from the Metolius River Basin, tagging each with a passive integrated transponder (PIT tag), releasing them in the upper Clackamas River Basin, and monitoring the population using a variety of methods. Monitoring methods included census redd counts and detection of PIT-tagged bull trout at a PIT detection site in Pinhead Creek. The number of redds observed and adult PIT-tagged bull trout (defined as age-5 and older) detected have steadily increased from 18 redds and 15 adults in 2013 to 68 redds and 72 adults in 2016 (ODFW 2016).

PGE's Actions

The success of PGE's efforts to improve their facilities for upstream and downstream fish passage in the Clackamas River Basin is an important aspect of the Partnership's proposed restoration and conservation actions. Due to fish ladder and other infrastructure improvements, more salmon, steelhead, and Pacific lamprey are accessing spawning areas in the upper Clackamas River Basin. Due in large part to the installation of floating surface collectors and a pipeline bypass system, PGE has achieved the goal of more than a 97% survival rate overall for migrating juveniles. Current collection and passage efficiencies for

juveniles at the River Mill dam facility are as follows: 98.9% for coho, 98.3% for Chinook, and 96.9% for steelhead. More habitat capacity in the lower Clackamas and Willamette rivers will help support the increasing numbers of migrating and rearing juveniles.

PGE has also improved passage for adult and juvenile Pacific lamprey (Poirier et al. 2017). PGE installed three lamprey passage structures at Willamette Falls Hydroelectric Project (Lower Willamette River), rebuilt the existing fish ladder at River Mill Dam on the Clackamas River and made modifications to the fishway that traverses the Faraday and North Fork Dams on the Clackamas to improve upstream passage of adult Pacific lamprey. PGE is also monitoring the downstream migration of juvenile lamprey with two, new surface collectors at River Mill and North Fork Dams. These facilities are collecting and enumerating lamprey out-migrants. The collection efficiency of the downstream passage structures is unknown, but thousands of juvenile lamprey (ammocoetes and macropthalmia) have been collected each year since construction. PGE is also translocating adult Pacific lamprey into the Clackamas River above North Fork Dam to increase larval production (and the pheromones they produce) in the upper basin in efforts to increase attraction to this area for spawning adults. In the future, PGE will perform a multi-year radio telemetry study that will assess migration and passage success of adult Pacific lamprey through the fish ladder at North Fork Dam (Poirier et al. 2017).

A key part of the Partnership's restoration efforts is designed to complement PGE's actions and address tributary factors that are limiting juvenile salmon, steelhead, and Pacific lamprey.

Limiting Factors

The *LCR Plan* identifies primary and secondary limiting factors for each salmon and steelhead population area, including the Clackamas Population area. The limiting factors fall into six broad threat categories: tributary habitat, estuary habitat, hydropower, harvest, hatchery fish, and predation. The Partnership's focus is on addressing limiting factors for tributary habitat. Limiting factors related to hydropower are not directly tied to the Partnership's activities because they are addressed through PGE's FERC licensing obligations.

The *LCR Plan* identifies tributary limiting factors for steelhead and salmon at the geographic scale of the entire Clackamas Population. At the scale of the Clackamas Population, which closely corresponds to the Partnership's Plan Area, the primary limiting factor identified by the *LCR Plan* is "physical habitat quality related to habitat complexity and diversity, including off-channel habitat access due to land use practices." In addition to this primary limiting factor, the *LCR Plan* identified four tributary habitat secondary limiting factors for the Clackamas salmon and steelhead population:

- Impaired upstream passage due to road crossings
- Altered hydrology due to upslope land uses
- Excessive fine sediment due to rural roads
- Elevated water temperatures due to land uses that impair riparian condition

To provide a finer spatial scale for evaluating the limiting factors specific to the Clackamas salmon and steelhead populations, the Partnership evaluated and identified primary and secondary limiting factors for the Plan Area's 39 6th-field watersheds and four river reaches. The factors limiting each life state (e.g.,

adult migration, juvenile rearing, etc.) were assessed with an emphasis on juvenile rearing and migration because it was determined to be the most sensitive tributary life stage. The Partnership's TAC identified watershed- and reach-specific limiting factors based on a review of ODFW stream inventories, fish use and population assessments, spawning surveys, local watershed assessments and studies, the EDT analysis, other data sources, and regional strategies (i.e., the Oregon Conservation Strategy and the Intertwine Alliance's Regional Strategy). Appendix A outlines the watershed characteristics and limiting factors.

The Partnership's limiting factor evaluation confirmed the *LCR Plan's* primary limiting factor for the Clackamas salmon and steelhead population: physical habitat quality related to habitat complexity, including off-channel habitat access. The Partnership augmented this primary limiting factor with a set of six physical habitat quality sub-factors that contribute to habitat complexity. Identifying the sub-factors that contribute to impaired habitat complex helps to identify the conditions that are limiting fish populations at the reach or watershed-scales and assists with designing restoration projects that will address the factors that are specifically affecting the reach in question. The sub-factors are as follows:

- Degraded riparian areas and large wood recruitment
- Isolated side channels and off-channel habitats
- Degraded channel structure and complexity, including lack of large wood
- Degraded floodplain connectivity and function
- Channelization and hardening of streambanks and channels
- Invasive species (riparian and terrestrial)

Table 8 outlines the primary and secondary limiting factors identified in the *LCR plan* and by the Partnership. The table also shows the limiting factors that are addressed through PGE's FERC agreement and other regulatory processes outside of the Partnership's purview. The Partnership will track the implementation and success of PGE's actions and other efforts (i.e., municipal withdrawals).

The other limiting factors identified in the *LCR Plan* and confirmed by the Partnership's evaluation are as follows:

- Hydrograph/water quantity (altered hydrology): Upslope land uses, including stormwater, flashy flows, and altered groundwater recharge – a key primary limiting factor in the developed and developing watersheds;
- Physical habitat quality (excessive fine sediment): Rural and forestry roads – a secondary limiting factor; and
- Water quality (elevated water temperature): Land uses that impaired riparian condition – a secondary limiting factor

Table 8. The primary (bold) and secondary limiting factors identified in the *LCR Plan* and by the Partnership. Shaded rows: limiting factors addressed through PGE's FERC agreement and other regulatory process outside of the purview of the Partnership's voluntary restoration actions.

LCR Plan Code	Clackamas ESA-Listed Salmon and Steelhead Population Limiting Factors (LFs) (Primary LFs in Bold)	Notes
4a	Habitat access (impaired upstream passage): Large dams	Addressed through PGE FERC Agreement
4b	Habitat access (impaired downstream passage): Large dams	Addressed through PGE FERC Agreement
4d	Habitat access (impaired upstream passage): Road Crossings	*LCR Plan* Secondary LF (Applies to Johnson Creek System)
4e	**Habitat access (impaired upstream passage): Small dams, and diversions**	**Added as Primary LF in Kellogg-Mt. Scott System** (Secondary LF in Abernethy System)
5c	**Hydrograph/water quantity (altered hydrology): Upslope land uses, including storm water, flashy flows, and altered groundwater recharge**	*LCR Plan* Secondary LF **Added as Primary LF for Developed and Developing Watersheds**
5e	Hydrograph/water quantity altered hydrology: Reduced downstream flows (Municipal withdrawals limiting access to habitats and/or reducing habitat quality)	Addressed through Oregon Water Resources Dept. Regulatory Processes
6a	Physical habitat quality (excessive fine sediment): Rural and forestry roads	*LCR Plan* Secondary LF
6c	Physical habitat quality (impaired sediment/sand routing): Large dams impacting channel stability and leading to channel degradation (incision) and floodplain isolation	Addressed through PGE FERC Agreement
6d	**Physical habitat quality (impaired gravel recruitment): Large dams impacting gravel movement and spawning habitat downstream**	Addressed through PGE FERC Agreement (**Added as primary LF in Abernethy System**)
6e	**Physical habitat quality (impaired habitat complexity and diversity, including access to off-channel habitats):** **1. Physical habitat quality: Degraded riparian areas and large wood recruitment** **2. Physical habitat quality: Isolated side channels and off-channel habitats** **3. Physical habitat quality: Degraded channel structure and complexity, including lack of large wood** **4. Physical habitat quality: Degraded floodplain connectivity and function** **5. Physical habitat quality: Channelization and hardening of streambanks and channels** **6. Physical habitat quality: Invasive species (riparian / terrestrial)**	***LCR Plan* Primary (Key) LF (Six sub-factors added by Partnership)**
6g	Physical habitat quality (reduced/limited habitat quality/quantity): Reservoir inundation from Rivermill and North Fork dams	Addressed through PGE FERC Agreement
9a	Water quality (elevated water temperature): Land uses that impaired riparian condition	*LCR Plan* Secondary LF
9b	**Water quality (elevated water temperature): Large reservoirs**	Addressed through PGE FERC Agreement (**Added as primary LF in Abernethy System**)
9d	**Water quality (toxins): Urban and industrial practices, including stormwater**	**Added as Primary LF for Developed and Most Developing Watersheds**

Primary and secondary limiting factors not identified in the *LCR Plan* for the Clackamas salmon and steelhead population but identified as important limiting factors by the Partnership, at least for specific watersheds, are as follows:

- Habitat access (impaired upstream passage): Small dams, and diversions – primary limiting factor in the Kellogg-Mt Scott Creek system and a secondary limiting factor in the Abernethy Creek watershed;
- Physical habitat quality (impaired gravel recruitment): Large dams impacting gravel movement and spawning habitat downstream – a primary limiting factor in the Abernethy Creek system;
- Water quality (elevated water temperatures) – primary limiting factor in the Abernethy Creek watershed; and
- Water quality (toxins): Urban and industrial practices, including stormwater – primary limiting factor in developed watersheds and most developing watersheds

The identified limiting factors also address the primary factors affecting Pacific lamprey: degraded floodplain habitat, changes in stream hydrology, water quality (elevated water temperatures, toxins) and passage barriers (Poirier et al. 2017). Bull trout population status, threats, and limiting factors are evaluated through the upper Clackamas bull trout reintroduction project, a cooperative effort involving US Fish and Wildlife Service, the Mt. Hood National Forest, ODFW, and PGE. The Partnership will continue to track this effort and will work with the partners to address identified threats and limiting factors.

Threats

The key threats to future watershed conditions identified in the *LCR Plan* that are relevant to the Partnership's Plan Area are ongoing watershed urbanization and climate change. The Partnership is developing a strategy to address future urbanization and development through restoration actions (e.g., reducing impervious surfaces) and by targeting conservation and protection of important stream, riparian, floodplain and wetland habitats. Conserving high-quality habitats, particularly in developing watersheds, provides a buffer against watershed impairment from development. There is evidence that the maintenance of off-channel wetlands and healthy riparian areas mitigate for some of the effects of watershed urbanization (May et al. 1997). Clackamas Water Environment Services' Carli Creek project, which incorporated enhanced stormwater treatment wetlands within the Clackamas River floodplain, is an example of restoring habitat features that also provide stormwater treatment.

Climate change is affecting the region's watershed processes, habitats, and fish and wildlife populations (Independent Scientific Advisory Board 2007). The Climate Impacts Group at the University of Washington estimates that average annual air temperatures in western Oregon are projected to increase through the twenty-first century, resulting in warmer and drier summers (Climate Change Impacts Group 2011).

While the predicted consequences of future climate change are alarming, there is evidence that the Partnership's restoration initiatives will help buffer natural systems against the negative impacts of climate change. For example, an analysis of the future impacts of climate change in the Johnson Creek watershed (through 2040) showed that, with implementation of planned restoration projects, the quality of habitat for steelhead trout and coho and Chinook salmon would be maintained at a high level, even in the face of climate change; without the restoration actions, habitat quality would decline (ICF 2011).

The *LCR Plan* and others (Beechie et al. 2013) have identified actions that mitigate climate change. The Partnership's strategy is to buffer climate change impacts by improving watershed processes (e.g., improving water infiltration by reducing effective impervious area), shading streams, and restoring habitat diversity and access (Beechie et al. 2013). These restoration actions will increase habitat diversity and salmon population resilience in the face of climate change.

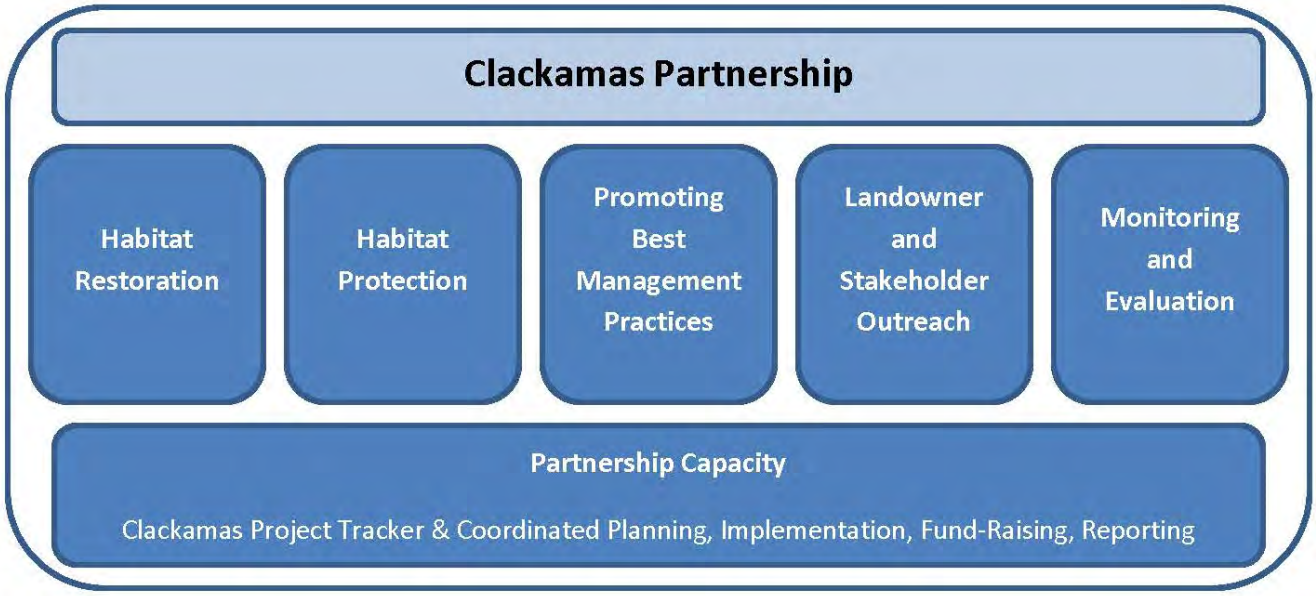
Clackamas Confluence Restoration Project during winter high flows. Source: Cheryl McGinnis, Clackamas River Basin Council

9. Conservation and Restoration Strategy and Projects

The Partnership organizes restoration and conservation strategy around five integrated programs (Figure 6):

1) Habitat Restoration
2) Habitat Protection
3) Promoting Land Use and Landowner BMPs
4) Landowner and Stakeholder Outreach
5) Monitoring and Evaluation

Figure 6. Clackamas Partnership Restoration and Conservation Programs



The Partnership designed its conservation and restoration strategy to:

1) Address the limiting factors and threats for the Clackamas salmon, steelhead, Pacific lamprey, and bull trout populations*;*
2) Prioritize habitat restoration and protected areas and approach based on restoration science and information from regional and local plans; and

3) Demonstrate project outcomes by tracking habitat performance measures tied to the *LCR Plan* and monitoring and evaluating habitat and fish population response

Addressing Limiting factors

The *LCR Plan* identifies a suite of tributary actions designed to address future threats – development and climate change – and limiting factors for the Clackamas salmon and steelhead population (Table 9). The actions fall into three broad categories: habitat restoration, habitat protection, and promoting land use BMPs. The *LCR Plan* actions inform the Partnership's approach to restoration project identification and design, habitat protection and conservation strategy, and outreach activities.

The Partnership's restoration and conservation strategy is designed to address the causes of habitat and ecosystem change that shape the factors limiting native fish populations (Roni et al. 2002). The strategy emphasizes restoration and conservation actions that address the following:

- Restoring watershed processes that are impairing habitats and water quality;
- Reconnecting isolated habitats;
- Protecting areas with existing high-quality habitats and intact watershed processes; and
- Addressing future threats from climate change and development

Restoring Watershed Processes

These actions focus on addressing the physical and biological processes that create and sustain habitats. Restoration actions include restoring native vegetation in riparian areas and floodplains to promote nutrient exchange and long-term delivery of large wood to the system; decommissioning or improving roads to reduce the routing and delivery of sediment to streams; improving stream flows and water infiltration by addressing effective impervious surfaces and implementing stormwater BMPs; enhancing the frequency and magnitude of floodplain inundation during annual high flow periods to re-set habitat-forming processes, support native vegetation, promote flood storage, re-engage surface and groundwater interaction, and create cool water refuge for fish in side channels and other habitats (Figure 7). In many cases implementing short-term habitat actions (e.g., large wood placement) will be necessary to improve habitats while long-term processes (e.g., riparian trees) recover.

Table 9. The *LCR Plan* tributary actions designed to address future threats and limiting factors for the Clackamas salmon and steelhead population. Future threats: Climate Change (CC); Development (D)

Actions	Limiting Factors Addressed	Future Threats Addressed
Restore Habitats		
Restore instream habitat complexity, including large wood placement	6e	CC
Create confluence habitat with cool water, restore channel, and reconnect tributary	6e, 9a	CC
Restore or create off-channel habitat and access to off-channel habitat: side channels	5c, 6e, 9a	CC

Actions	Limiting Factors Addressed	Future Threats Addressed
Restore or create off-channel habitat and access to off-channel habitats: alcoves, wetlands, and floodplains – restoration includes revegetation	5c, 6e, 9a	CC
Improve or regrade/revegetate streambanks	6a, 6e, 9a	CC
Plant native species and remove invasive plants from riparian and floodplain areas	6e, 9a	CC, D
Protect Habitats		
Identify and purchase key fish habitats	6e	D
Protect remaining high-quality off-channel habitat from degradation	5c, 6e, 9a	CC, D
Protect intact and functioning riparian areas through riparian easements and acquisition	6a, 6e, 9a	CC, D
Restore (plant/fence) and protect (conservation easements, acquisition) riparian areas that are degraded	6a, 6e, 9a	CC, D
Protect springs, seeps, and other cold water sources	5c	CC
Promote BMPs		
Implement pesticide and fertilizer BMPs to reduce sources of toxic contaminates	9d	D
Implement stormwater management plans for urban areas and roads	5c, 6a, 9a	CC, D
Provide incentives to promote landowner stewardship	5c, 6a, 6e, 9a	D
Reduce impacts that roads have on impairing the hydrograph	5c, 6a, 9a	CC, D
Identify sediment sources and implement actions to reduce sediment	6a, 6d	D

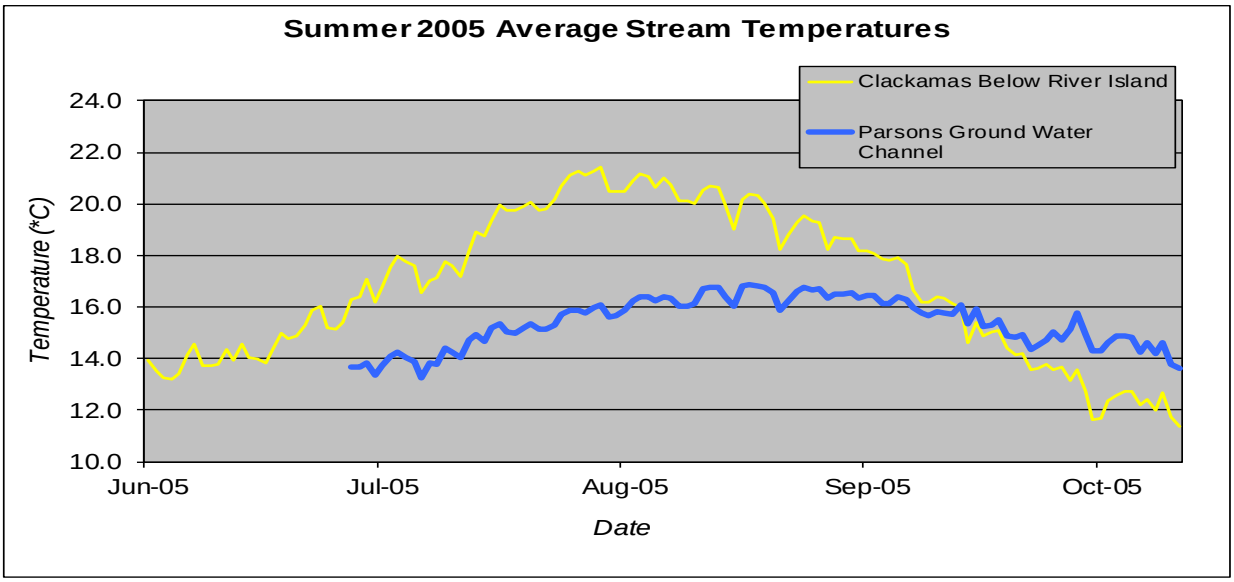
Reconnecting Isolated Habitats

These actions focus on addressing fish passage barriers related to road system (e.g., culverts) and other structures, and re-opening fish access to floodplains, side-channels, alcoves, and off-channel wetlands. This strategy also includes reconnecting fragmented habitat patches – for example restoring floodplain processes and habitats in areas between high-quality habitat areas to enhance watershed processes and create a connected habitat corridor for fish and wildlife.

Protecting High-Quality Areas

Habitat protection emphasizes areas with intact watershed processes (e.g., spring-fed wetlands), functioning habitats (e.g., unaltered floodplain areas), and habitats important for sustaining native fish populations (e.g., side channels and other off-channel habitats). The emphasis is on protecting these areas to conserve watershed processes and habitats while restoring watershed processes and habitats in other portions of the watershed.

Figure 7. Water Temperatures in the Lower Clackamas River in Comparison to Temperatures within a Nearby Side Channel Area with Groundwater Exchange. Source: Todd Alsbury, Oregon Department of Fish and Wildlife



Addressing Future Threats from Climate Change and Development

Restoring floodplain connectivity, restoring stream flow regimes (e.g., addressing stormwater quantity), improving riparian shade, and re-aggrading incised channels are most likely to ameliorate stream flow and temperature changes and increase habitat diversity and population resilience to climate change (Beechie et al. 2012).

Actions to address threats from future development include protecting high-quality habitats and watershed processes before habitats are degraded; promoting activities that improve watershed hydrology and water quality (e.g., applying stormwater BMPs); and enhancing the function riparian and wetland habitats.

Prioritizing Habitat Restoration and Protection Areas

The Clackamas steelhead and salmon population comprises sub-populations corresponding to the major tributary systems. The Clackamas River Basin supports the primary productivity and habitat capacity for the populations. The Abernethy, Kellogg, and Johnson Creek sub-populations provide additional habitat capacity and diversity. Together, the Clackamas River, Abernethy, Kellogg, and Johnson Creek sub-populations function as a whole to support and sustain the overall abundance, productivity, spatial structure, and diversity of the population.

The Partnership's TAC prioritized watershed and river reaches for habitat restoration and protection based on the following criteria:

- Life history needs of the fish populations with a focus on juvenile habitat requirements and limiting factors;
- The number of focal species and life history stages using the reach or watershed;
- Habitat intrinsic potential, with the assumption that high intrinsic potential (HIP) streams will respond more quickly to restoration actions and enhance watershed processes;

- Areas with high-quality habitats and functioning processes; and
- Locations with connected high-quality habitats

The approach to prioritizing restoration areas is in alignment with the recommended prioritization approach outlined in the *LCR Plan.* The following habitat evaluations also support the Partnership's resulting prioritization ranking:

- The Clackamas Population habitat restoration and protection rankings developed by ODFW in support of LCR Plan implementation. This prioritization ranked the Clackamas River Basin, and the Clackamas and Willamette river reaches (ODFW 2014);
- The *Oregon Conservation Strategy* and the *Intertwine Alliance Regional Conservation Strategy;* and
- The EDT analysis for the Clackamas River Basin, lower Willamette River, and Johnson Creek.

Table 10 describes the Partnership's habitat conservation and restoration priority area rankings, rationale, supporting information, and restoration and conservation strategy overview.

Table 10. The Partnership's geographic conservation and restoration priorities, rationale, supporting information, and restoration and conservation strategy overview

Watershed / Reach	Restoration Priority	Protection Priority	Rationale / Restoration Strategy	Supporting Information
Lower Clackamas and Willamette River Reaches (mainstem) and Floodplain Corridor	Highest	Highest	Both river corridors have extensive HIP habitat and support all fish populations: adult steelhead, salmon, and Pacific lamprey migration and juvenile rearing. Clackamas: High-quality floodplain habitats. The rivers form a contiguous habitat unit for migrating and rearing Clackamas steelhead and salmon populations. Restoration benefits increased juvenile populations from PGE actions in the upper basin and adults and juveniles from upper Wilmette basin. Degraded floodplains and off-channel habitats and access; toxic contamination in the Willamette River sediments where Pacific lamprey juveniles rear Strategy: Protect high-quality habitats; improve floodplain and off-channel habitat function, complexity and access; enhance lower tributary habitats within the river floodplains and confluence areas; enhance habitat corridors between high-quality habitat areas; identify and enhance cold water refugia	*EDT analysis*: Highest ranking for restoration *ODFW Prioritization*: Clackamas (#1); Willamette Rank (#3) *OR Conservation Strategy*: Conservation Opportunity area *Intertwine Alliance*: Clackamas River corridor contains some of the highest quality floodplain habitats in the region
Upper Clackamas River (mainstem)	Second Highest	Highest	The river corridor is largely intact and has extensive HIP habitats. Some areas of degraded habitat from the river-adjacent road, recreation, and harvest Strategy: Protect habitats; restore degraded habitats between high-quality habitat areas by improving complexity, off-channel habitats, and access	*EDT analysis*: Highest ranking for protection *ODFW Prioritization*: Middle Clackamas Reach (rank #8); Upper Clackamas Reach (#6) *OR Conservation Strategy*: No Conservation opportunity areas *Intertwine Alliance*: Not assessed
Upper Clackamas Tributaries	Lower	Highest	Wilderness areas and other high-quality habitats. Extensive HIP habitats. Some areas of degraded habitat from stream-adjacent roads, recreation, and harvest. Road system contributes sedimentation and landslides. Fish passage issues on some tributaries Strategy: Protect habitats; restore degraded habitats between high-quality habitat areas; decommission and stormproof roads; address fish passage barriers	*EDT analysis*: High ranking for protection *ODFW Prioritization*: Middle Clackamas Tributaries (rank #5); Upper Clackamas Tributaries (#9); Oak Grove Fork (#10) *OR Conservation Strategy*: Bull of the Woods North Conservation Opportunity Area *Intertwine Alliance*: Not assessed

Table 10. The Partnership's geographic conservation and restoration priorities, rationale, supporting information, and restoration and conservation strategy overview

Watershed / Reach	Restoration Priority	Protection Priority	Rationale / Restoration Strategy	Supporting Information
Lower Clackamas River Tributaries	Highest	Second Highest	High-quality habitats are still present, particularly in Clear-Foster and Eagle creeks. Extensive HIP habitats in Clear, Deep, and Eagle creeks. Habitats degraded from roads, harvest, etc. Past and ongoing development in Deep, Rock and other tributaries is impairing watershed processes and habitats Strategy: Protect habitats; restore degraded habitats, particularly enhance complexity and off-channel areas; decommission and stormproof forestry roads; enhance habitat corridors between high-quality habitat areas; identify and enhance cold water refugia; Deep, Rock Creek, and other urbanizing watersheds: Protect high-quality habitats; improve stormwater hydrograph and quality by applying BMPs; promote BMPs for urban, rural, and agricultural landowners	*EDT analysis*: Eagle, Deep, and Clear-Foster creeks are important for maintaining fish population productivity. Clear Creek is a high ranking for protection, followed by Eagle Creek *ODFW Prioritization*: Clear-Foster (#2); Deep (#7); Eagle (#4); other tributaries (e.g., Rock) (#12) *OR Conservation Strategy*: Lower Clackamas River COA (portions of Clear / Eagle Creeks) *Intertwine Alliance*: High quality riparian and other habitats in Clear, Deep and Eagle
Abernethy and Johnson Creeks	Second Highest	Second Highest	Historically high-quality habitat for coho and steelhead; important habitat for Pacific lamprey. Extensive HIP habitats but development (e.g., WPA walls) limits restoration potential. Past and ongoing development, stormwater, and habitat loss impairing watershed processes and habitats. Fish passage barriers on key Johnson Creek tributaries. Dam on Abernethy Creek increases water temperatures and impairs downstream habitat Strategy: Protect high-quality habitats: riparian, wetland, and off-channel to buffer development pressures; restore degraded habitats, particularly enhance complexity and off-channel areas; enhance cold water tributaries and confluence areas; enhance riparian vegetation and shade; improve stormwater hydrograph and quality by applying BMPs; promote BMPs for urban, rural, and agricultural landowners.	*EDT analysis*: Johnson Creek is important for providing spatial diversity of habitats; the stream can provide complexity and cold water habitats that are limited in the lower Willamette *ODFW Prioritization*: All lower Willamette Tributaries (#11) *OR Conservation Strategy*: Lower Willamette River COA (Confluence areas with the river) *Intertwine Alliance*: High-quality riparian and other habitats in upper Johnson Creek; high-quality habitats and riparian areas in lower and upper Abernethy Creek and Holcomb-Potter Creek.

Table 10. The Partnership's geographic conservation and restoration priorities, rationale, supporting information, and restoration and conservation strategy overview

Watershed / Reach	Restoration Priority	Protection Priority	Rationale / Restoration Strategy	Supporting Information
Kellogg-Mt Scott Creek and Urban Tributaries	Lower	Lower	Historically high-quality habitat for coho and steelhead. Cold water springs and large wetland areas in Rinearson and Boardman Creek watersheds. Kellogg Dam severely restricts fish passage. Past and ongoing development are impairing watershed processes and habitats. Strategy: continue to seek ways to address Kellogg Dam; restore degraded habitats, particularly enhance complexity and off-channel areas; enhance cold water tributaries and confluence areas; enhance riparian vegetation and shade; improve stormwater hydrograph and quality by applying BMPs; promote landowner BMPs	*EDT analysis*: None *ODFW Prioritization*: All lower Willamette Tributaries (#11) *OR Conservation Strategy*: Lower Willamette River COA (Confluence areas with the river) *Intertwine Alliance*: Scattered high-quality habitats in upper Kellogg and Mt Scott creeks

Prioritizing Threats from Development and Climate Change

All of the Partnership's watersheds function as an integrated and connected system for the Clackamas Fish Populations and the watershed processes that support clean water and healthy habitats. For example, land uses and expanding urban development that impairs habitats and water quality in the tributaries that flow in the lower Clackamas and Willamette rivers will affect adult and juvenile salmon, steelhead and Pacific lamprey migrating through the river system. Toxins from stormwater and elevated water temperatures from the tributaries affect adult and juvenile fish in the Clackamas and Willamette Rivers, including Pacific lamprey larvae residing in the river's fine sediments.

The Plan Area's integrated habitats and watershed processes is an important consideration for developing a strategy to address growing threats from development and climate change. These threats can undermine the success and long-term sustainability of the Partnership's habitat restoration and protection actions. Development in the lower Clackamas River tributaries also has the potential to impact the high-quality drinking water that communities depend on.

Addressing expanding urban development and climate change requires that habitat restoration in high priority areas is balanced with protecting and restoring habitats and processes in the Developing and Developed tributary watersheds. Restoring habitats and water quality in these tributaries will help buffer the system from future development and climate change. Creating a diverse portfolio of connected habitats in the rivers and tributaries will also help protect the Clackamas Fish Populations from environmental shocks – a catastrophic fire in the upper Clackamas River Basin, for example.

Recent work by the City of Portland and JCWC to address fish passage barriers in the Crystal Springs system, a cold-water tributary to lower Johnson Creek, is an example of how tributary actions can buffer against development and climate change. Fish can now access this important cold-water refugia area. An analysis of the future impacts of development and climate change in the Johnson Creek watershed (through 2040) showed that improving fish access into Crystal Springs will substantially improve the resiliency of steelhead, Spring chinook populations in the face of future development and climate change (ICF 2011). Continuing to improve cold-water refugia areas and access into cold tributaries is an important component of the Partnership's restoration strategy.

Table 11 describes the Partnership's priority area ranking for addressing development and climate change. Most of the emphasis on threat reduction is on the Developed and Developing watersheds where urban growth, combined with climate change, will have the most impact.

Table 11. The Partnership's priority area ranking for addressing development and climate change and restoration and conservation strategy overview

Watershed / Reach	Development and Climate Change Threat Priority	Strategy
Lower Clackamas and Willamette River Reaches (mainstem) and Floodplain Corridor	Highest	Improve floodplain connectivity and off-channel access to cold water areas; enhance habitat at cold-water tributary junctions and other identified cold-water areas
Upper Clackamas River Basin	Lower	Emphasize protection of habitats and access into cold-water tributaries
Upper Clackamas Tributaries	Lower	Emphasize protection of habitats and access into cold-water tributaries; restore impaired floodplains and riparian areas
Lower Clackamas River Tributaries	Highest	Continue to enhance riparian vegetation and shade; improve stormwater hydrograph and quality by applying BMPs; promote BMPs for industrial, urban, rural, and agricultural landowners; protect high quality riparian, floodplain, and wetland habitats; identify and implement actions that protect high-quality drinking water supplies
Abernethy and Johnson Creeks	Highest	Continue to enhance riparian vegetation and shade; provide access into cold water tributaries; enhance cold-water habitat areas; improve stormwater hydrograph and quality by applying BMPs; promote BMPs for industrial, urban, rural, and agricultural landowners; protect high quality riparian, floodplain, and wetland habitats
Kellogg-Mt Scott Creek and Urban Tributaries	Highest	Continue to enhance riparian vegetation and shade; explore improving access at Kellogg Dam and improving lower watershed springs and cold water areas; improve stormwater hydrograph and quality by applying BMPs; promote BMPs for urban, rural, and agricultural landowners; protect high quality riparian, floodplain, and wetland habitats

The Partnership will continue to evaluate the Plan Area's future urbanization and climate change impacts and develop approaches for adapting to these changes. This process is already underway for climate change. The Clackamas River Water Providers are funding a study by the Portland State University Institute for Sustainable Solutions that will evaluate how climate change will affect the resilience of the Clackamas River Basin. The study, which will examine how climate variability will affect water quantity, quality, and management of the basin, is a step towards developing a comprehensive climate change resilience plan and strategies for the future.

Restoration Project Identification

The Partnership identified a suite of proposed restoration projects for future implementation. The projects are designed to build on past restoration accomplishments and address the identified limiting factors, focus on geographic priorities, and address threats from development and climate change. In addition to restoration projects, the proposed projects also included feasibility studies and assessments (e.g., reach assessment to identify potential restoration projects). Information on the proposed projects, including location, lead partners, restoration description, limiting factors addressed, and performance measures (ecological outputs), were entered into the Clackamas Project Tracker website and database.

The proposed projects were evaluated and prioritized by the Partnership's TAC through two screening steps: first, the project proposals grouped by watershed development category were individually evaluated and ranked according to priority based on restoration project evaluation criteria developed by the Partnership; second, the project proposals from the first step were re-evaluated as a group for overall impact and cost-benefit for improving salmon and steelhead populations.

Restoration projects and studies were scored based on a set of evaluation criteria developed by the TAC. The project evaluation criteria included the following:

- Focal species affected
- Limiting factors addressed
- The probability of the project to protect and improve habitat quality
- The degree to which project restores watershed processes and is self-sustaining
- Likelihood of success given upstream surrounding current and future land uses
- The resiliency of location/project to climate change and development threats
- Project size and scale
- Project readiness, constraints, and risks
- Outreach, landowner relationship, and other socio-economic benefits
- For Studies – Will the feasibility study/assessment result in a restoration project(s) with significant ecological outcomes if the restoration project is feasible, cost-effective, and constructed?

The project proposals were prioritized and ranked based on the criteria and TAC scoring for each watershed development category – Developed, Developing, and Undeveloped. This ranking provides a prioritized group of projects for watersheds that have similar watershed processes and habitats. This evaluation also identified actions that will help buffer impacts from future development and climate change. Appendix C summarizes the proposed project descriptions and prioritization.

The TAC re-evaluated all of the project proposals from the individual project prioritization as a group based on their overall impact and cost-effectiveness for addressing the limiting factors and prioritized areas for improving juvenile salmon, steelhead, and Pacific lamprey populations. Each proposed project was also evaluated in the context of the full suite of proposed restoration projects for the following:

- Contribution as part a diverse portfolio of interconnected restoration areas that are implemented in phases; and

- The project's habitat and fish population benefits in the context of the overall restoration portfolio's contribution to addressing future threats from development pressures and climate change.

Figures 8 and 9 show the prosed restoration project locations. **Appendix B summarizes the high priority restoration project proposals and locations.** The next section describes the project goals, objectives, and phasing.

Figure 8. Clackamas Partnership Proposed Projects across the Partnership's Plan Area

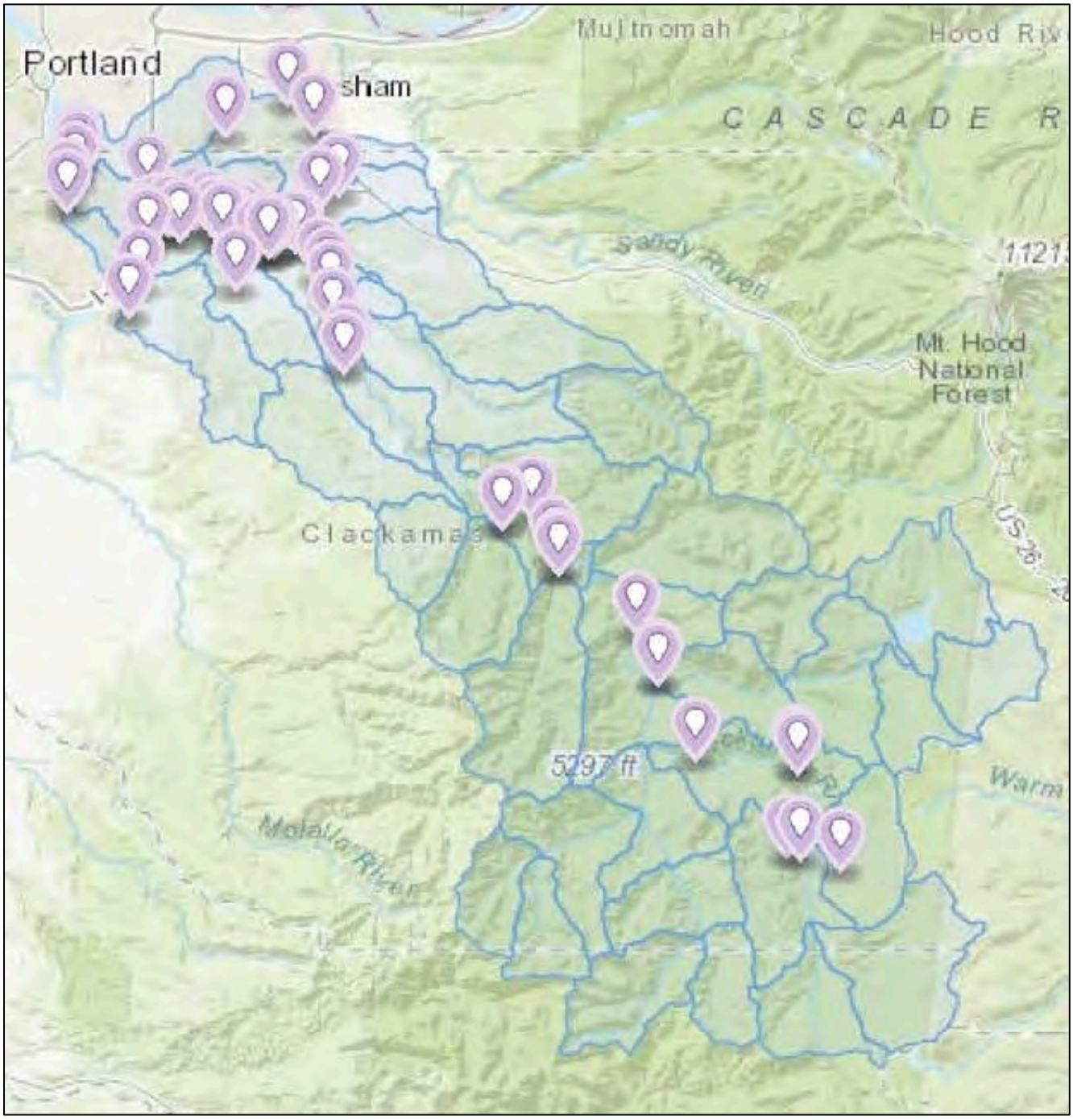


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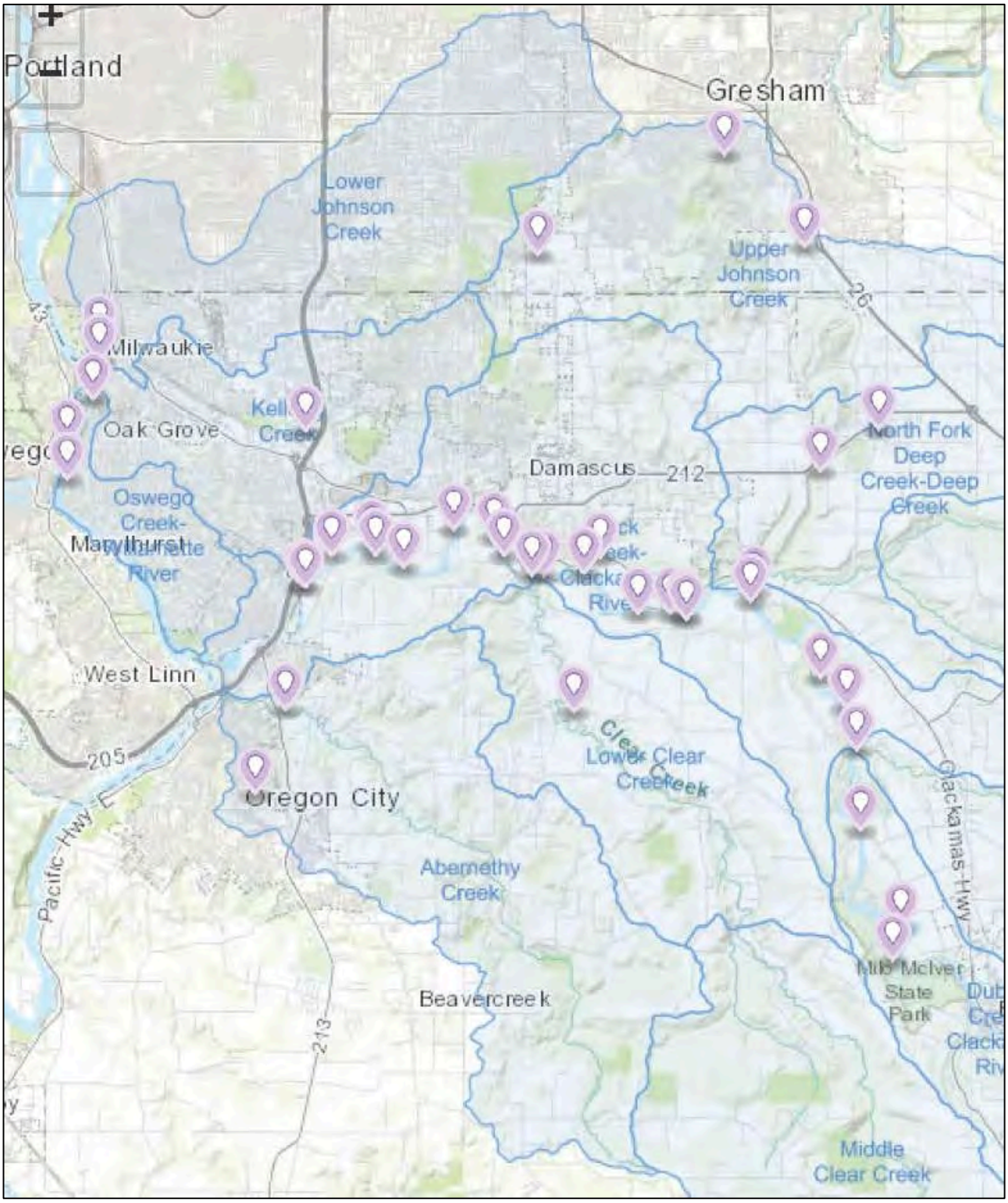
Figure 9. Clackamas Partnership Proposed Projects for the Lower Clackamas River Basin, Willamette River Reach, and Abernethy, Kellogg-Mt. Scott, and Johnson Creek Watersheds



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10. Goals, Objectives, and Phasing

GOAL 1: Improve Habitat Complexity in the Lower Clackamas River Reach: Floodplains, Tributary Confluence Areas, and Off-channel Habitats

Phase: 2018 – 2021

Objective 1.1. Multiple projects: Place large wood within 1.24 miles of off-channel habitat by 2021

Objective 1.2. Multiple projects: Control invasives and plant native floodplain vegetation on 25.5 acres by 2021

Objective 1.3. Multiple projects: Increase side channel access in 2,000 feet of channel by 2021

Phase: 2022 – 2023

Objective 1.4. Multiple projects: Place large wood within 3.2 miles of off-channel habitat by 2023

Objective 1.5. Multiple projects: Place large wood within 0.9 miles of floodplain habitat by 2023

Objective 1.6. Multiple projects: Control invasives and plant native floodplain vegetation on 12.0 acres by 2023

Objective 1.7. Multiple projects: Increase side channel access in 2.0 miles of channel by 2023

Objective 1.8. Increase off-channel wetland area and access by 1.0 acres along the river by 2023

Phase: 2024 – 2025

Objective 1.9. Multiple projects: Place large wood within 2 miles of off-channel habitat by 2025

Objective 1.10. Multiple projects: Control invasives and plant native floodplain vegetation on 25.0 acres by 2025

Objective 1.11. Multiple projects: Increase side channel access in 2,000 feet of channel by 2025

Objective 1.8. Increase off-channel wetland area and access by 1.0 acres along the river by 2025

Goal 2: Improve Complexity in Willamette River Reach: Floodplain and Off-channel Habitats

Phase: 2018 – 2021

Objective 2.1. Place large wood within 400 feet of off-channel or floodplain habitat by 2021

Phase: 2022 – 2023

Objective 2.2. Identify additional Willamette River Reach habitat restoration projects

Phase: 2024 – 2025

Objective 2.3. Place large wood within off-channel or floodplain habitats – to be determined

Goal 3: Improve Habitat Complexity in Lower Clackamas Basin Tributaries

Phase: 2018 – 2021

Objective 3.1. Place large wood in 600 feet of N.F. Deep Creek channel by 2021

Objective 3.2. Control invasives and plant native riparian vegetation on 3 acres along N.F. Deep Creek by 2021

Objective 3.3. Increase N.F. Deep Creek side channel access in 150 feet of channel by 2021

Objective 3.4. Place large wood in 4,000 feet of Richardson Creek channel and floodplain habitat by 2021

Objective 3.5. Control invasives and plant native riparian vegetation on 30 acres along Richardson Creek by 2021

Objective 3.6. Increase off-channel wetland area and access by 2.3 acres along Richardson Creek by 2021

Phase: 2022 – 2023

Objective 3.7. Place large wood in 17,500 feet of Clear Creek channel and floodplain by 2023

Objective 3.8. Increase off-channel wetland area and access by 1.4 acres along Clear Creek by 2023

Objective 3.9. Place large wood in 5,000 feet of N.F. Deep Creek channel by 2023

Phase: 2024 – 2025

Objective 3.10. Place large wood in 3,500 feet of tributary channels and floodplain by 2025

Objective 3.11. Increase off-channel wetland area and access by 2 acres along tributary channels by 2025

Objective 3.12. Place large wood in 3,000 feet of tributary channels by 2025

Goal 4: Improve Habitat Complexity in Upper Clackamas River Reaches (Mt. Hood NF)

Phase: 2018 – 2021

Objective 4.1. Place large wood in 1,500 feet of Middle Reach river channel habitat by 2021

Objective 4.2. Plant native riparian vegetation for 500 feet along the Middle Reach river channel by 2021

Phase: 2022 – 2023

Objective 4.3. Place large wood in 5,500 feet of the Middle Reach river channel habitat by 2023

Objective 4.4. Control invasives and plant native floodplain vegetation on 40 acres along the upper River Reach by 2023

Objective 4.5. Increase side channel access in 0.6 miles of Upper Reach channel by 2023

Phase: 2024 – 2025

Objective 4.6. Place large wood in 5,500 feet of the Middle or Upper Reach river channel habitat by 2025

Goal 5: Improve Habitat Complexity in Urban Tributaries

Phase: 2018 – 2021

Objective 5.1. Place large wood in 5,574 feet of Newell and Abernethy Creek channel habitat by 2021

Objective 5.2. Place large wood in 1,000 feet of lower Johnson Creek channel by 2021

Objective 5.3. Place large wood in 3,500 feet of upper Johnson Creek habitat by 2021

Objective 5.4. Plant 7 acres of native riparian vegetation along upper Johnson Creek by 2021

Objective 5.5. Increase off-channel wetland area by 7.0 acres along upper Johnson Creek by 2021

Objective 5.6. Place large wood in 3,000 feet of Mt. Scott Creek habitat by 2021

Objective 5.7. Plant 7.6 acres of native riparian vegetation along Mt. Scott Creek by 2021

Objective 5.8. Increase off-channel wetland area by 7.6 acres along Mt. Scott Creek by 2021

Phase: 2022 – 2023

Objective 5.9. Control invasives and plant native riparian vegetation on 0.7 acres along upper Johnson Creek by 2023

Objective 5.10. Place large wood in 300 feet of upper Johnson Creek channel and floodplain by 2023

Phase: 2024 – 2025

Objective 5.11. Control invasives and plant native riparian vegetation on 3 acres of tributaries by 2025

Objective 5.12. Place large wood in 500 feet of tributary channel and floodplain by 2025

Goal 6: Improve Johnson Creek Watershed fish passage

Phase: 2018 – 2021

Objective 6.1. Remove a passage barrier and increase fish access in Kelly Creek, an important cold water tributary, by 1.8 miles by 2021

Phase: 2022 – 2023

Objective 6.2. Remove a passage barrier and increase fish access in Mitchell Creek, an important cold water tributary, by 1.4 miles by 2023

Phase: 2024 – 2025

Objective 6.3. Identify and address additional fish passage barriers and miles of improved access by 2025

Goal 7: Address Impervious Surfaces and Stormwater through Appropriate BMPs

Phase: 2018 – 2021

Objective 7.1. Treat 307 acres of impervious surface in the Carli Creek drainage (lower Clackamas River basin) by 2021

Phase: 2022 – 2023

Objective 7.2. Treat 400 acres of impervious surface in by 2023 – locations to be determined

Phase: 2024 – 2025

Objective 7.3. Treat 500 acres of impervious surface by 2025 – locations to be determined

11. Evaluating Success

Baseline data

The Partnership's restoration and conservation project outputs are tracked through established measures (e.g., volume of large wood placed, area planted with native vegetation). Implemented restoration project outputs, also called performance measures, will be documented in the Clackamas Project Tracker database. See Clackamas Project Tracker for a list of performance measures: https://www.clackamaspartnership.org/PerformanceMeasure/Index

The Partnership's working hypothesis is that the restoration outputs will collectively improve habitat quality, capacity, and diversity, enhance water quality and quantity, and sustain watershed processes and habitat. Comprehensive habitat enhancement will create the following ecological outcomes: Improved habitat complexity, enhanced capacity for supporting juvenile fish, and better water quality. Over the long-term, the Partnerships habitat restoration actions will result in increased Clackamas Fish Populations and improved watershed health.

The Partnership has been collecting baseline data on fish populations and watershed health parameters for more than fifteen years. Research, monitoring and evaluation (RM&E) of salmon and steelhead populations, and their habitats, is conducted by ODFW, PGE and other organizations. Spawning adult salmon, steelhead, and Pacific lamprey returning to Clackamas Partnership's watersheds are assessed through ODFW's spawning surveys and counts of adult fish passing through PGE's North Fork facilities. Adult salmon and steelhead can only migrate upstream through these counting facilities, thus providing a known number of adult fish passing upstream into the upper Clackamas River Basin. ODFW also collects baseline data on aquatic/riparian habitat through systematic aquatic habitat inventories. These inventories often include juvenile salmon and steelhead counts.

Since 1990 various Partners have also been systematically collecting baseline data on macroinvertebrate populations, which widely recognized as an effective tool for measuring and monitoring overall ecological integrity of these systems. Macroinvertebrate communities lend particularly well to bio-monitoring because they are diverse, they range widely in sensitivity to water pollution and other perturbations, and they are easy to collect (Cole 2017). Macroinvertebrate communities simultaneously integrate the effects of multiple stressors and therefore provide an index of the aggregate effects of all pollutants and other stressors in a system. For these reasons, macroinvertebrate assessment and monitoring is widely used as a gauge of watershed health.

Monitoring Approach

Using scientifically sound monitoring design and methods, the Partnership's monitoring and evaluation program will build upon and enhance current macroinvertebrate monitoring efforts and ODFW's monitoring of fish populations and habitat.

While no single entity has consistently monitored macroinvertebrate communities across all the Partnership's watersheds, various Partners have sampled macroinvertebrates over multiple sites and years. For example, Clackamas River Water Providers developed and is implementing a long-term macroinvertebrate monitoring plan for the lower Clackamas River and its tributaries. Macroinvertebrate monitoring has also been conducted by CRBC, JCWC, PGE, Metro and others. These data provide an initial baseline for macroinvertebrate community conditions across the Partnership's watersheds.

The Partnership will build upon the existing macroinvertebrate monitoring by creating and implementing a statistically-sound sampling and evaluation approach that will produce a robust dataset necessary to identify changes in biological conditions. This effort will standardize data collection methods and analysis to provide a framework for evaluating conditions among sites and across years.

ODFW's Aquatic Inventories Project's (AQI) stream habitat survey protocol and juvenile fish sampling is designed to provide quantitative information on habitat conditions and fish use for streams throughout Oregon. This information is used to provide basic information on habitat conditions and to direct, focus, and evaluate habitat restoration efforts. Under current funding, ODFW samples approximately 20 to 25 habitat inventory sites annually in the Partnership's area. This level of effort contributes to strata scale population (parr) estimates. An additional 20 to 25 sites will be added in order to confidently detect trends in juvenile abundance and occupancy at the population level. The additional sites will also help with detecting trends resulting from the Partnership's habitat restoration program. Monitoring of habitat and juvenile fish will be conducted at specific restoration sites and selected non-restoration (reference site) sites.

Based on ODFW's evaluation, there is little need for additional spawning survey effort for the adult coho populations. The existing effort, including the North Fork facility counts, provides reliable and precise estimates with the existing funding and level of effort. The current spawning survey effort will be expanded to include surveying the entire lower Clackamas River reach, which will improve the precision of both fall and spring Chinook monitoring. The winter steelhead spawning survey effort will also be expanded by adding a third surveyor to the standard crew. The steelhead spawning survey effort will also cover the pacific lamprey spawning season. The additional spawning survey effort will also include non-random surveys in restoration reaches.

The Partnership will report restoration project accomplishments on an annual basis, including summarizing project outputs documented in Clackamas Project Tracker. The website provides a structured and sophisticated platform for tracking project accomplishments and performance measures at a range of scales – reach, watershed, FIP Initiative, and entire Partnership Strategic Plan geography. The Corvallis Environmental Protection Agency (EPA) laboratory has offered to assist the Partnership in the development of the macroinvertebrate sampling design, data collection approach, and data analysis methods. A Partnership organization (to be determined) will coordinate macroinvertebrate monitoring across the Partnership's watersheds. Macroinvertebrate monitoring results will be reported for each biennium.

Spawning survey data will be reported, as per ODFW reporting protocols, on an annual basis. The Partnership will collaborate with ODFW on the selection of project areas for characterizing reference site and post-project habitat and juvenile fish occupancy. The data will be evaluated to determine the relationship between pre- and post-restoration habitat characteristics and juvenile fish use. Adult abundance, aquatic habitat (reference and post-project), and juvenile fish abundance results will be reported each biennium. The reporting will synthesize the findings and evaluate the relationship between the Partnership's restoration actions and salmon, steelhead, and Pacific lamprey abundance at the scale of the Clackamas Fish Populations.

12. Communication Plan

The success of the Strategic Plan rests in part on the engagement and involvement of local landowners, as well as active participation in outreach activities by the Partners. The Partnership will implement coordinated communications that prioritize informing stakeholders about the status of Clackamas Fish Populations, what actions they can take to improve habitat, and the important role communities play in improving watershed health. Targeted outreach will also assist with recruiting landowners for restoration actions on private lands.

To guide external communications activities that will support implementation of the Strategic Plan, the Partnership developed a C*ommunications Plan for Landowner Engagement and Community Awareness*. All of the Partner organizations have community outreach programs that vary in their message and reach. The overarching objective of the *Communications Plan* is to leverage each Partner's ongoing community outreach efforts to inform and engage landowners and other stakeholders in restoration activities.

See **Appendix C**: ***Communications Plan for Landowner Engagement and Community Awareness.***

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Appendix A:

Watershed Characteristics and Limiting Factors

Clackamas Partnership: Watershed / Reach Summary

Watershed (6-Field HUC)	Area (mi^2)	% of HUC within UGB	Jurisdictions	Primary Streams	Land Uses	Percent Impervious Surface	Urban Development Category	Current / Historical Focal Fish Population Use	Miles of Combined Historical High IP Habitat (Co, ChS, ChF, StW)	Primary Limiting Factors	Secondary Limiting Factors
Abernethy Creek	32.87	14%	Metro, Oregon City, Clackamas Co.	Holcomb, Potter, Root, Thimble, Newell	Urban, rural residential, agriculture	31	**Developed**	Co, StW, Plamp, Chum	23.7	6e3, 4, 5 / 9a	5c / 6a / 6d / 6e1, 3, 4, 5, 6 / 9b2
Johnson Creek (combined 6-fields)	52.36	85%	Portland, Gresham, Metro, Milwaukie, WES, NCPRD, Clackamas Co.	Crystal Springs, North Fk, Kelly	Urban, rural residential, industrial, agriculture	43	**Developed**	Co, StW, ChF, Plamp, Chum	26.6	5c / 6a / 6b / 9a	6e1, 3, 4, 5 / 9a / 9d
Kellogg Creek	16.28	100%	Clackamas (City), Oak Grove, Metro, NCPRD, Milwaukie, WES, OLWSD, Clackamette Co.	Kellogg, Mt. Scott	Urban, industrial	47	**Developed**	Co, StW, ChF, Plamp, Chum	8.0	4e / 5c / 6b / 6e3 / 9a	6e 4, 5 / 9d
Rock Creek-Clackamas River	42.78	49%	Damascus, Gladstone, Metro, NCPRD, WES, Clackamas Co.	Rock, Sieben, Carli, Cow	Urban, rural residential, industrial, agriculture	38	**Developed**	Co, StW, ChF, Plamp, Chum	6.2	5c / 9a	6b / 6e 3, 4, 5 / 9a / 9d
Small Willamette Tributaries	5.87	100%	Gladstone, Milwaukie, Metro, WES, NCPRD, OLWSD, Clackamette County	Boardman, Rinearson, River Forest Lake	Urban	44	**Developed**	Co, StW, ChS, Plamp	0.0	4d / 5c / 6e3	5c / 6e1, 3, 4, 5, 6 / 9a / 9d
Willamette River			Oregon City, Gladstone, Milwaukie, NCPRD, OLWSD, Metro	Willamette River	Urban	n/a	**Developed**	Co, ChF, ChS, StW, Plamp, BT	7.8	6e2, 5 / 9a / 5c	5b / 6e3,4 / 9c / 9d
Clackamas River, Lower Reach			Estacada, OPRD, Metro, WES, Clackamas (City), Gladstone, Oregon City, Clackamas Co.	Clackamas River	Urban, rural residential, agriculture, industrial, forestry	n/a	**Developing**	Co, StW, ChF, Plamp, Chum	34.2	6e2, 3, 4	6e1 / 9a / 9b
Clackamas River, Middle Reach			USFS, Clackamas Co.	Clackamas River	Mt. Hood National Forest, hydropower Infrastructure	n/a	**Developing**	Co, StW, ChF, Plamp,	31.9	6e2, 3, 4	4b / 6e3, 5 / 6f / 9a
Clear Creek (combined 6-fields)	72.74		Clackamas Co., Metro	Mosier, Little Clear	Forestry, rural residential, agriculture	12	**Developing**	Co, StW, ChF, Plamp, Chum	36.8	6b, 6e3	6e1, 2, 5 / 9a
Deep Creek (combined 6-field HUCs)	49.37	10%	Boring, Happy Valley, Metro, Sandy, Clackamas Co.	Tickle, North Fk, Lwr Deep	Agricultural, urban, rural residential	28	**Developing**	Co, StW, ChF, Plamp, Chum	31.4	4d / 5c / 6b / 6e3, 5 / 9a / 9c	5c / 6e3, 4, 5, 6 / 9c / 9d
Helion Creek	18.31		USFS, Clackamas Co.	Clackamas River	Mt. Hood National Forest, hydropower Infrastructure	11	**Developing**	Co, ChS, StW, Plamp	0.1		
Clackamas River, Upper Reach			USFS, Clackamas Co.	Clackamas River	Mt. Hood National Forest	n/a	**Undeveloped**	Co, StW, Chs, Plamp, BT	39.9	6e3	6f / 9a
Collawash River (combined 6-fields)	152.31		USFS, Clackamas Co.	East Fk, Happy, Upper/Lower Hot Spr. Fk, Elk Lake Cr., Nohorn	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp, BT	27.6		6a / 6e3 / 6f
Cub Creek	23.25		USFS, Clackamas Co.	Cub Creek	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp, BT	7.1		6e3
Dubois Creek	19.74	10%	Estacada, Clackamas Co.	Dubois Creek	Urban, rural residential, hydropower Infrastructure	3	**Undeveloped**	Co, StW, Plamp	0.4		
Eagle Creek (combined 6-fields)	89.92	2%	Estacada, Clackamas Co., USFS	North Fork, Bear, Eagle Creek	Forestry, rural residential, agriculture, Mt. Hood National Forest	6	**Undeveloped**	Co, StW, ChF, Plamp	45.3	6e2, 3, 4	6a / 6b / 6e5 / 9a
Fish Creek	46.56		USFS, Clackamas Co.	Fish Creek	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp	10.8		6a / 6e3
Headwaters Clackamas River	40.59		USFS, CTWS, Clackamas Co.	Lemiti, Squirrel	Mt. Hood National Forest	0	**Undeveloped**	Co, StW, Plamp, BT	0.0		6e3
Last Creek-Pinhead Creek	27.16		USFS, Clackamas Co.	Last, Pinhead	Mt. Hood National Forest	0	**Undeveloped**	Co, StW, Plamp, BT	6.3		6e3
Lowe Creek-Clackamas River	30.82		USFS, CTWS, Clackamas Co.	Lowe, Hunter	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp, BT	3.8		6e3
North Fork Clackamas River	32.24		USFS, Clackamas Co.	North Fk Clackamas	Mt. Hood National Forest	2	**Undeveloped**	Co, StW, Plamp	2.4		6a / 6e1, 3
Oak Grove FK (combined 6-fields)	141.38		USFS, CTWS, Clackamas Co.	Cot, Shellrock, Anvil, Stone, Timothy Lk, Headwaters OGF	Mt. Hood National Forest, Hydropower Infrastructure	3	**Undeveloped**	Co, StW, ChS, Plamp, BT	7.0		5b / 6e3
Pot Creek-Clackamas River	35.87		USFS, Clackamas Co.	Pot Creek	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp	1.8		6e3
Roaring River	42.66		USFS, Clackamas Co.	Roaring River	Mt. Hood National Forest	2	**Undeveloped**	Co, StW, Plamp	3.7		6a/6e3
South Fork Clackamas River	27.58		USFS, Clackamas Co.	S.F. Clackamas River	Mt. Hood National Forest	3	**Undeveloped**	Co, StW, Plamp	0.4		6a / 6e1, 3
Three Lynx Creek	49.28		USFS, Clackamas Co.	Trout, Big	Mt. Hood National Forest	5	**Undeveloped**		2.4		

Appendix B:

High Priority Restoration Project Proposals

See Clackamas Project Tracker

for descriptions of current proposals and project status

Clackamas Partnership: Biennium 1 (2019 – 2021) Work Plan

Map ID	Goal	Project / Activity	Lead Partner	Watershed / River Reach	Project Tracker Webpage with Project Map and Details	Project Description	Primary Limiting Factor Addressed	Restoration Objectives	Actions / Outputs (Clackamas Project Tracker Pre-Implementation Performance Measures)
CRBC-1	Lower Clackamas River Reach Improved Habitat Complexity: Floodplain/Off-Channel	Lower Clackamas Sieben Creek Confluence Side Channel Reconnection	CRBC	Lower Clackamas River Reach (Floodplain and Sieben Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/1065	The proposed project is on private property downstream of the Rock Creek Confluence on the right bank of the Clackamas River. The project focuses on increasing channel complexity and connectivity. Work would create approximately 1,750 linear feet of side channel habitat by excavating approximately 1,300 feet of existing high-flow channel to provide perennial connectivity downstream to an existing alcove. Large wood would be placed the length of the channel. Placements would include a large apex jam at both the proposed side channel's inlet and outlet and ten habitat complexity structures along the side channel's proposed alignment.	Isolated side channels and off-channel habitats	Improve off-channel habitat access and floodplain, river channel, and off-channel habitat complexity	Large Wood Placement (Channel): 1,750 ft Large Wood Placement (Floodplain): 1,750 ft Riparian/Floodplain Invasive Removal: 4 ac Riparian/Floodplain Native Planting: 4 ac Side Channel Habitat Increase: 1,750 ft
CRBC-2	Lower Clackamas River Reach Improved Habitat Complexity: Floodplain/ Confluence	Lower Clackamas Foster Creek Confluence Re-meandering	CRBC	Lower Clackamas Reach (Floodplain and Foster Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/49	The proposed realignment of Foster Creek would result in 1,450 linear feet of side channel habitat increase. Roughened channel construction is anticipated to encourage occupation of the former channel alignment, support salmonid access, and protect upstream infrastructure.1,200 linear feet of large wood placement is proposed. Placement includes six habitat complexity log jams, (eight to twelve pieces each), distributed throughout the re-occupied Foster Creek channel. The structures are intended to provide cover and complexity and would be placed to avoid impact to existing mature vegetation. Five buried channel margin jams will redirect flow down the former alignment.	Isolated side channels and off-channel habitats	Improve off-channel habitat access and floodplain, river channel, and off-channel habitat complexity	Large Wood Placement (Channel): 1,450 ft Large Wood Placement (Floodplain): 1,450 ft Floodplain Invasive Removal: 3.5 ac Floodplain Native Planting: 3.5 ac Side Channel Habitat Increase: 1,450 ft
CRBC-3	Lower Clackamas River Reach Improved Habitat Complexity: Floodplain/ Confluence/Off-Channel	Lower Clackamas Johnson Creek Confluence and Side Channel Restoration	CRBC	Lower Clackamas River Reach (Floodplain and Johnson Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/40	Excavation is proposed to reactivate a historical side channel along the Clackamas's left bank. The existing channel is perennially connected at the downstream end, and the majority of excavation would be focused near the proposed inlet. Proposed work would include removal of an existing culvert barrier along the proposed side channel path, as well as a small cement dam barrier near the outlet of Johnson Creek. Placement of approximately ten large wood structures (approximately 5 to 10 pieces) and two larger structures (25 to 30 pieces) at the inlet and outlet are proposed, totaling 1,680 linear feet of large wood placement as well as 1,680 linear feet of side channel reconnection.	Isolated side channels and off-channel habitats	Improve off-channel habitat access and floodplain, river channel, and off-channel habitat complexity	Large Wood Placement (Channel): 1,680 ft Large Wood Placement (Floodplain): 1,680 ft Riparian/Floodplain Native Planting: 2 ac Side Channel Habitat Increase: 1,680 ft

CRBC-4	Lower Clackamas River Reach Improved Habitat Complexity: Floodplain/Off-Channel	Lower Clackamas Kingfisher Side Channel Reconnection	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/4264	Historically this stretch of the Clackamas had complex multiple channels. Currently, there are remnant side channels that have been disconnected from annual flows. This project will reconnect 1,620 linear feet of historical side channel and would include placement of log jams along the entire length. The large wood placement would include five larger structures (one large apex logjam at the side channel inlet, one to promote scour at the outlet, and three along the reconnected channel driving channel form) and eight smaller structures for habitat complexity.	Isolated side channels and off-channel habitats	Improve off-channel habitat access and floodplain, river channel, and off-channel habitat complexity	Large Wood Placement (Channel): 1,620 ft Large Wood Placement (Floodplain):1,620 ft Riparian/Floodplain Invasive Removal: 4 ac Floodplain Native Planting: 4 ac Side Channel Habitat Increase: 1,620 ft
NCPRD-1	Willamette River Reach Improved Habitat Complexity: Floodplain	Willamette Riverfront Milwaukie Bay Habitat Enhancement Project	NCPRD	Willamette River Reach	https://www.clackamaspartnership.org/Project/Detail/1088	The focus of this project is to increase floodplain complexity along the mainstem of the Willamette River near the confluence of Johnson Creek. Actions include controlling Invasives, improving cottonwood floodplain forest, adding large wood to increase complexity of floodplain.	Degraded floodplain connectivity and function	Improve floodplain habitat complexity and enhance native floodplain vegetation	Large Wood Placement (Floodplain): 400 ft Riparian/Floodplain Invasive Removal: 0.25 ac / 400 ft Riparian/Floodplain Native Planting: 0.25 ac / 400 ft
Metro-1	Lower Clackamas Basin Tributary Improved Habitat Complexity	Cazadero North Stream and Wetland Restoration Project	Metro	N.F. Deep Creek	https://www.clackamaspartnership.org/Project/Detail/1068	This project is focused on stream channel large wood placement, wetland/floodplain connectivity, adding a side channel, decommissioning a road/parking area and modifying a storm water outfall. Design/permits completed in 2017 by Metro. Construction in 2018 and 2019 could be an early implementation project for the FIP.	Degraded riparian areas and large wood recruitment	Improve stream channel habitat complexity, enhance native riparian vegetation, reduce road impervious area, and improve stormwater quality	Large Wood Placement (Channel): 600 ft Road Decommissioning: 0.1 mile Riparian/Floodplain Native Planting: 3 ac Side Channel Habitat Increase: 150 ft
Metro-2	Lower Clackamas Basin Tributary Improved Habitat Complexity	Richardson Creek Stream Restoration Project	Metro	Rock/ Richardson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/1070	The project will add large wood and habitat complexity to Lower Richardson Creek, re-meander a previously straightened unnamed tributary, replace an undersized culvert, remove a house and barn, and increase Clackamas River floodplain connectivity and roughness. Includes a significant level of planting immediately following construction.	Degraded riparian areas and large wood recruitment	Improve off-channel habitat access and floodplain, stream channel, and off-channel habitat complexity	Large Wood Placement (Channel): 4,000 ft Large Wood Placement (Floodplain): 4,000 ft Riparian/Floodplain Native Planting: 30 ac Off-channel Wetland Area Increase: 108,900 sq ft
WES-1	Lower Clackamas River Reach Improved Habitat Complexity: Floodplain/Off-Channel/ Confluence	Carli Creek Water Quality / Habitat Enhancement Project	WES	Lower Clackamas Reach (floodplain and Carli Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/30	Project, which encompasses lower Carli Creek and the Clackamas River floodplain, consists of an Integrated Stormwater Treatment Facility designed for habitat and water quality benefits and in-stream enhancement. The project includes the following components: Diverting stormwater from industrial land uses to constructed channels, ponds, wetlands, and permeable berms for treatment (through detention, infiltration, & filtration); grading areas adjacent to Carli Creek to create off-channel and floodplain habitat; removing non-native and invasive vegetation and planting native species; adding large woody debris and beaver-attraction structures to the Carli Creek	Degraded channel structure and complexity	Improve 0ff-channel access and tributary and floodplain complexity, enhance native riparian vegetation, improve stormwater hydrology and water quality	Large Wood Placement (Channel): 1,700 ft Riparian/Floodplain Invasive Removal: 12 ac Riparian/Floodplain Native Planting: 12 ac Side Channel Habitat Increase: 400 ft Area treated with stormwater BMPs: 307 ac

						channel. Estimated total cost includes land acquisition.			
USFS-1	Middle Clackamas River Reach Improved Habitat Complexity: Mainstem Channel	Upper Clackamas Large Wood (Sites 113-114)	USFS	Middle Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1123	This project will add 50 whole trees in the Clackamas River channel. The goal is to add instream large wood to increase habitat complexity and alter the stream channel by reducing water velocity and increasing stream depth and pool frequency. The project includes riparian restoration in disturbed areas and restricted recreational access to allow riparian vegetation recovery.	Degraded channel structure and complexity	Improve river channel habitat complexity and enhance native riparian vegetation	Large Wood Placement (Channel): 500 ft Riparian/Floodplain Native Planting: 500 ft, 0 -10 m wide
USFS-2	Middle Clackamas River Reach Improved Habitat Complexity: Mainstem Channel	Upper Clackamas Large Wood (Sites 106-108)	USFS	Middle Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1124	This project will place whole trees instream as single pieces along the riverbank or as jams at mid-channel or on point bars.	Degraded channel structure and complexity	Improve river channel habitat complexity	Large Wood Placement (Channel): 5,000 ft
GOCWC-1	Urban Tributary Improved Habitat Complexity	Newell North Stream Restoration Project	GOCWC	Abernethy Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/1066	This project is focused on improving complexity in lower Newell Creek and Abernethy Creek. The primary action is large wood placement to enhance stream and floodplain habitat complexity and processes. Previous work in the area focused on restoring native riparian vegetation and controlling invasive weeds. The proposed in-channel work will enhance stream habitat in low gradient, relatively unconfined sections of Newell and Abernathy creeks. The placed large wood will jump-start habitat forming processes and enhance floodplain connectivity. This is a partnership between GOCWC and Metro.	Degraded riparian areas and large wood recruitment	Improve stream channel habitat complexity	Large Wood Placement (Channel): 7,200 ft
JCWC-1	Urban Tributary Improved Habitat Complexity	Lower Johnson Creek Habitat Enhancement	JCWC	Johnson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/29	The first mile of Johnson Creek is nearly devoid of large wood, except for the Willamette River confluence, where JCWC implemented a large wood project in 2011. At river mile 0.5 is a small cold water tributary on ODOT property near the cloverleaf highway ramp to Hwy 224. Adding large wood strategically in this nearly 1,000 ft reach near the cold water tributary can provide important holding habitat for fall chinook spawners not only in the Johnson Creek, but as holding habitat for spawners to other Willamette tributaries during especially hot years. The riparian canopy is	Degraded channel structure and complexity	Improve stream channel habitat complexity and native riparian vegetation	Large Wood Placement (Channel): 1,000 ft

						marginal, so planting is also a component of this project.			
Metro-3	Urban Tributary Improved Habitat Complexity	Upper Johnson Creek Ambleside Stream Restoration Project	Metro	Upper Johnson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/1071	The project will remove a concrete weir and walls from Johnson Creek channel and add large wood jams throughout the reach to improve channel function and increase habitat complexity. Removal of floodplain structures and the associated road and bridge will enable restoration of floodplain connectivity. Plantings of native will occur throughout the site following construction.	Impaired Fish Passage: Small Dams and Diversions	Improve fish passage, and floodplain, stream channel, and off-channel habitat complexity	Large Wood Placement (Channel): 3,500 ft Floodplain Native Planting: 3,500 ft, 20 - 30 m wide Off-channel Wetland Habitat Area Increase: 304,920 sq ft
WES-2	Urban Tributary Improved Habitat Complexity	Mt. Scott Creek Oak Bluff Reach restoration	WES	Kellogg/Mt. Scott Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/3155	The Oak Bluff Reach of Mt Scott Creek is in an urban setting between I-205 and 3-Creeks Natural Area. Development has significantly altered hydrology and sediment, resulting in flashier peak flows, flooding and transport of sediment out of the project reach. Lack of riparian vegetation and wood has reduced stream complexity. Steelhead, cutthroat and coho use this reach, but in low numbers. The project will provide habitat for these species. The project will install approximately 25 pieces of large wood, create a 1.6 acre backwater, and replace invasive vegetation with natives over 7.6 acres. The restored site will increase opportunities for the public to interact with this natural area.	Degraded channel structure and complexity	Improve off-channel habitat access and floodplain, stream channel, and off-channel habitat complexity	Large Wood Placement (Channel): 3,000 ft Floodplain Native Planting: 7.6 ac Off-channel Wetland Habitat Area Increase: 69,600 sq ft
JCWC-2	Johnson Creek Improved Fish Passage	Kelley Creek Fish Passage	JCWC	Johnson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/47	A nearly 6-ft. high impoundment at RM 0.5 on Kelley Creek in private ownership is a 100% salmonid passage barrier. The landowner is willing to work with JCWC to restore fish passage by removing the dam and supplying him with a small irrigation pump so he can continue to use his legal water right. A 30% engineering design is completed.	Impaired fish passage: Small dams and diversions	Restore fish passage to a cool water tributary and enhance riparian vegetation	Remove Fish Passage Barrier (Access): 1.8 mi Riparian/Floodplain Native Planting: 200 ft, 11 - 20 m wide

Goal	Project / Activity	Lead Partner	Watershed / River Reach	Project Description	Primary Limiting Factor / or Constraint Addressed	Objectives	Actions / Outputs
Support and Sustain Initiative Capacity	Initiative Coordination, Organizational Development, and Staff Support	CRBC	Initiative Geography	This work focuses on Initiative implementation capacity funding to the four watershed councils for: Coordination; facilitation; overall Partnership accomplishment reporting; Clackamas Project Tracker administration and development; soliciting funding and grant proposal development; and contracted support. CRBC will lead and coordinate activities. The project will include contracting with a facilitator to assist with meetings and on-going Partnership capacity development.	Partnership capacity to increase the pace and extent of its activities	Coordinate and facilitate on-going Partnership organizational process, and reporting	Partnership is sustained with appropriate number of meetings, considerations for new partners, etc. Projects are vetted and readied for implementation Outreach with landowners, funding sources, community at-large completed Project Tracker, web-based spatial data base, maintained with updates showing project progress Organizational development documents recorded
Engage Stakeholders	Landowner and Stakeholder Engagement and Outreach	CRBC	Initiative Geography	The *Communications Plan for Landowner Engagement and Community Awareness* will guide outreach activities. The Partnership will implement coordinated communications that prioritize informing stakeholders about the status of Clackamas Fish Populations, what actions they can take to address habitat restoration needs, and the important role communities play in improving watershed health. Targeted outreach will also assist with recruiting landowners for restoration actions on private lands. CRBC will coordinate Partnership outreach activities and the other watershed councils support outreach in collaboration with the Partnership.	Stakeholder engagement, support for Partnership activities, and landowner participation	Greater community understanding of the fish population status and the Partnership's accomplishments; increased stakeholder support and engagement in Partnership activities; landowners recruited for restoration actions	Number of volunteers engaged in Partnership activities Number of households/individuals participating in Partnership outreach events Number of households/individuals receiving outreach materials or visiting the Partnership's website Number of landowners recruited for restoration actions on private lands
Assess Habitat and Identify Restoration Opportunities and Priorities	Stream Inventory and Restoration Actions for Abernethy Creek and Tributaries	GOCWC	Abernethy Creek Watershed	This assessment project focuses on synthesizing recent information (e.g., collected after the 2002 watershed assessment) on fish populations and habitat in the Abernethy Creek watershed. The work will include 1) aquatic/riparian habitat inventories for areas where there are gaps in habitat information; 2) water temperature monitoring to identify cold water refugia; and 3) an identification of restoration opportunities and project sites based on an evaluation of the data and identified limiting factors. The project will include outreach to stream-adjacent property owners to identify potential restoration projects on private lands.	Identify limiting factors, including stream habitat complexity, water temperatures, and riparian/floodplain conditions	Collect stream/riparian habitat data, evaluate limiting factors, and identify prioritized restoration opportunities and sites	Identified limiting factors and locations Number of feasible restoration projects identified Number of landowners contacted

							Number of landowners agreeing to implement restoration projects
Assess Habitat and Identify Restoration Opportunities and Priorities	Lower Clackamas River Habitat Assessment and Project Prioritization	CRBC / Metro	Lower Clackamas River Reach	This assessment project focuses on synthesizing recent information, collecting new data, and identifying restoration projects for the Lower Clackamas River Reach. The work will include 1) assessing reach-level channel geomorphology and habitat conditions; 2) evaluating the current list of proposed projects (biennia 2 and 3) and identifying other restoration opportunities; 3) identifying restoration project feasibility and priorities; and 4) developing concept designs and budgets for high priority projects to be implemented in biennia 2 or 3. The project will include outreach to river-adjacent property owners to identify potential restoration projects on private lands.	Identify limiting factors, including river/floodplain habitat complexity, and water temperatures	Collect river/floodplain habitat data, evaluate limiting factors, and identify prioritized restoration opportunities and sites	Identified limiting factors and locations Number of feasible restoration projects identified Number of landowners contacted Number of landowners agreeing to implement restoration projects
Assess Habitat and Identify Restoration Opportunities and Priorities	Kellogg Creek and Urban Tributaries Restoration Project Identification and Prioritization	NCUWC	Kellogg Creek Watershed and Urban Tributaries (e.g., Rinearson Creek)	This planning project focuses on synthesizing recent information on habitat and water quality conditions and identifying restoration projects. The work will include 1) assessing stream and watershed conditions and limiting factors; 2) identifying restoration project feasibility and priorities; and 3) developing concept designs and budgets for high priority projects. The project will include outreach to stream-adjacent property owners to identify potential restoration projects on private lands.	Identify limiting factors, including stream/riparian habitat complexity, water temperatures, and stormwater	Summarize stream/riparian habitat and water quality data, evaluate limiting factors, and identify prioritized restoration opportunities and sites	Identified limiting factors and locations Number of feasible restoration projects identified Number of landowners contacted Number of landowners agreeing to implement restoration projects
Develop and Implement Land Use and Stormwater BMPs and Actions	Stormwater and Land Use BMP Actions	JCWC	Developed and Developing Watersheds	Assess current approaches to stormwater management and the application of land use BMPs. Develop and implement a strategy and materials for engaging municipalities, landowners and other stakeholders in the application of improved stormwater and land use BMPs designed to enhance water quality and quantity. Activities include identifying improved stormwater management and prioritized actions in the Johnson Creek Watershed. This effort will identify alternative funding sources for implementing on-going activities in future Biennia.	Identify and implement BMPs that will address stormwater and other water quality parameters limiting fish populations and watershed health (e.g., water temperature and sediment)	Develop BMP approaches and materials; engage municipalities, landowners, and stakeholders in BMP application, identify future funding sources for implementation	BMP outreach materials produced Number of municipalities, landowners, and stakeholders engaged and applying BMPs Future funding sources identified to support on-going implementation
Identify Habitat Protection Priorities, Strategy, and Funding Sources	Riparian, Off-Channel and Wetland Habitat Protection	CRBC	Developed and Developing Watersheds	This assessment project focuses on identifying habitat protection priorities, strategies, and funding, with a focus on protecting riparian, off-channel and wetland habitats that are important for fish populations and watershed health. The work will include 1) summarizing successful habitat protection strategies (e.g., the McKenzie EWEB example); 2) developing a strategy for identifying and evaluating habitat protection areas; 3) identifying habitat protection areas and priorities and funding needs; and 4) developing an approach for protecting habitats (e.g., land purchase, easements, and incentives). The project will identify funding sources for implementation in biennia 2 and 3.	Identify and protect high quality habitat areas that contribute to addressing the key factors limiting fish populations and watershed health	Develop habitat protection strategies and priorities Implement habitat protection with sufficient funding	Habitat protection areas identified and prioritized Successful application of the habitat protection strategy Number of funding sources identified and engaged

Monitor and Evaluate Watershed Habitats and Conditions, Fish Populations, and Project Effectiveness	Monitoring Evaluation, and Reporting	ODFW, JCWC	Initiative Geography	Using scientifically sound monitoring design and methods, the Partnership's monitoring and evaluation program will build upon and enhance current macroinvertebrate monitoring efforts and ODFW's monitoring of fish populations and habitat. The Partnership will contract with ODFW for spawning surveys, habitat assessments (reference and post-restoration project), and juvenile abundance surveys. JCWC will coordinate the development of macroinvertebrate monitoring sampling design and lead the sampling effort for the Partnership's geography. The Partnership will work with ODFW and other experts to evaluate the data and evaluate the relationship between the Partnership's restoration activities and watershed health and fish population response. The evaluation will identify adaptive approaches to restoration project selection and design.	Monitoring will identify factors limiting watershed health and fish populations and changes in the limiting factors over time	Summarize and evaluate macroinvertebrate populations as an indicator of watershed health; summarize and evaluate adult spawning data as an indicator of fish populations abundance; summarize evaluate juvenile fish populations as an indicator of changes in habitat capacity	A scientifically-sound description of the relationship between the Partnership's restoration activities, ongoing development and watershed health over time A scientifically-sound description of the relationship between the Partnership's restoration actions, enhanced habitat conditions, and adult and juvenile fish population response over time

Clackamas Partnership: Biennium 2 (2021 – 2023) Work Plan

Map ID	Goal	Project / Activity	Lead Partner	Watershed / River Reach	Project Tracker Webpage with Project Map and Details	Project Description	Primary Limiting Factor Addressed	Restoration Objectives	Actions / Outputs (Clackamas Project Tracker Pre-Implementation Performance Measures)
CRBC-1	Improve Complexity in Lower Clackamas River Reach: Floodplain/ Confluence	Lower Clackamas / Clear Creek Confluence Large Wood Enhancement	CRBC	Lower Clackamas River Reach (floodplain, Lower Clear Creek and Confluence)	https://www.clackamaspartnership.org/Project/Detail/48	The proposed Clear Creek Confluence project is on Clackamas County property at the confluence of Clear Creek and the Clackamas River. The project focuses on increasing physical habitat and complexity at the mouth of Clear Creek and an upstream alcove. 2.7 acres of invasive species removal will promote the recolonization of the property by native species. Replanting the area with native riparian vegetation will assist in the colonization of native communities as well as encourage understory development and provide future sources of large wood. Large wood placement is proposed along 1,350 linear feet of channel. Placement includes 7 complexity log jams, 12 to 25 pieces each. Structures are proposed along river left, as well an apex jam and outlet jam.	Degraded channel structure and complexity	Improve stream and floodplain habitat complexity and enhance native floodplain vegetation	Large Wood Placement (Channel): 1,300 ft Large Wood Placement (Floodplain): 1,300 ft Riparian/Floodplain Invasive Removal: 3 ac Riparian/Floodplain Native Planting: 3 ac
Metro-1	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas North Logan Side Channel Enhancements	Metro	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1093	The project will implement additional enhancement to the previously constructed Parson Side channel. The project focuses on adding large wood to a long side-channel (6,000 ft) to provide additional complexity.	Degraded channel structure and complexity	Improve off-channel habitat complexity	Large Wood Placement (Channel): 6,000 ft
CRBC-2	Improve Complexity in Lower Clackamas River Reach: Floodplain/Confluence	Lower Clackamas / Eagle Creek Confluence Side Channel Reconnection	CRBC	Lower Clackamas River Reach (floodplain and Eagle Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/1099	The project would reconnect multiple historic side channels, add large wood structures, improve native plant densities and manage invasive species at the confluence of Eagle Creek and the Clackamas mainstem. This stretch of the Lower Clackamas historically was highly complex with multiple channels. Over the years the river has been confined to a single channel.	Isolated side channels and off-channel habitats	Side Channel Habitat Increase: 3,500 ft	Side Channel Habitat Increase: 3,500 ft
CRBC-3	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Feldheimer Side Channel Reconnection	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1100	The project will reconnect an historic side channel, add large wood structures, improve native plant densities and manage invasive species. Historically this stretch of the Clackamas would have been highly complex with multiple channels. Over the years the river has been confined to a single channel.	Isolated side channels and off-channel habitats	Improve side-channel habitat access and floodplain, and off-channel habitat complexity	Side Channel Habitat Increase: 2,500 ft

CRBC-4	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Mainstem Channel Enhancements - Riverside	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1089	The project is located on a stretch of the Lower Clackamas that has been heavily degraded through channelization and hardening of banks. The project would improve riparian conditions through large wood placement, riparian plantings and invasive species management. The project would address the 3500 hundred feet of the river between Carli Creek and Riverside Park and would include confluence restoration of Carli Creek. There is also potential for a re-connection of a historic side channel in this stretch.	Degraded channel structure and complexity	Improve floodplain habitat complexity	Large Wood Placement (Floodplain): 3,500 ft Side Channel Habitat Increase: 1,000 ft
CRBC-5	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Mainstem Channel Enhancements - CRD	CRBC	Lower Clackmas River Reach	https://www.clackamaspartnership.org/Project/Detail/1078	This project is located across from the Cow Creek Confluence on the Lower Clackamas River. The project will address riparian conditions and include floodplain restoration through large wood placement, native plantings, and invasive species management.	Degraded riparian areas and large wood recruitment	Improve floodplain habitat complexity and enhance native floodplain vegetation	Floodplain Native Planting: 2,500 ft, 20 - 30 m wide Floodplain Invasive Removal: 2,500 ft, 20 - 30 m wide
CRBC-6	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Concordia Side Channel Reconnection	CRBC	Lower Clackmas River Reach	https://www.clackamaspartnership.org/Project/Detail/1098	The project would reconnect an historic side channel, add large wood structures, improve native plant densities, and manage invasive species. Historically this stretch of the Lower Clackamas would have been highly complex with multiple channels. Over the years, the river has been confined to a single channel.	Isolated side-channels and off-channel habitats	Improve side-channel habitat access; improve and floodplain, and off-channel habitat complexity and enhance native floodplain vegetation	Side Channel Habitat Increase: 2,000 ft
Metro-2	Complexity Lower Basin Mainstem/ Floodplain/Off-Channel	Lower Clackamas River Island Phase II	Metro	Lower Clacakmas River Reach	https://www.clackamaspartnership.org/Project/Detail/1095	The River Island Phase 2 project aims will continue restoration efforts at the River Island Natural Area. Phase 2 would include additional off-channel large wood placement.	Degraded channel structure and complexity	Improve side-channel habitat access; enhance floodplain, and off-channel habitat complexity	Large Wood Placement (Channel): 5,000 ft
JCWC-1	Improve Johnson Creek Fish Passage	Upper Mitchell Creek Fish Passage	JCWC	Johnson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/4256	Mitchell Creek is a cold water tributary to Johnson Creek (via Kelley Creek). Most of its headwaters is an intact natural area owned by Metro. Six barriers prevent anadromous fish from accessing this headwaters area. JCWC will be removing two of those barriers in 2018 and one in 2019. The final three barriers are 1) one small private culvert, which will be removed; 2) A culvert under Baxter Road (Multnomah County) will be repaired; 3) A culvert under 162nd St (Portland) will be replaced. This latter culvert is on Portland's Capital Improvement Projects list.	Impaired fish passage: Road crossings	Restore fish passage to a cool water tributary	Address Fish Passage Barrier (Access): 1.4 mi

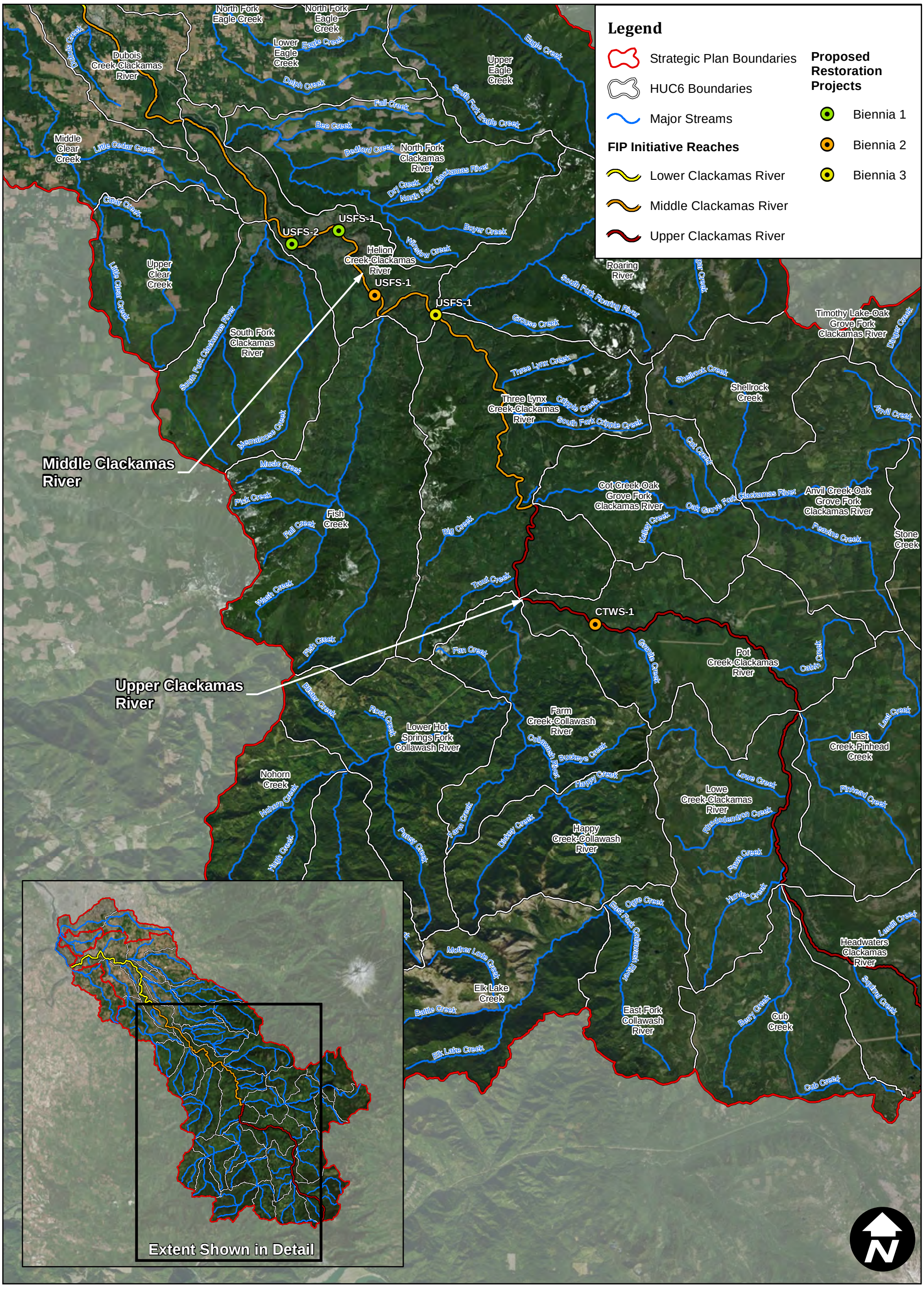
JCWC-2	Improve Complexity in Urban Tributary	Johnson Creek Gresham instream habitat restoration	JCWC	Johnson Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/3154	This reach of Johnson Creek is completely straight and lacks any large wood or pool features. Coho carcasses have been found a half mile above this reach, and juvenile coho and steelhead have been found further upstream, as have adult and juvenile Pacific lamprey. A small cold water seep enters the creek in this reach, owned by two different private landowners. Large wood will be added to Johnson Creek in structures designed to create not only rearing/hiding habitat, but also to create physical channel features (pools) and retain spawning gravel. There are several mature riparian trees here, but planting and blackberry removal will also be required to assure future large wood recruitment.	Degraded channel structure and complexity	Improve stream habitat complexity and enhance native floodplain vegetation	Large Wood Placement (Channel): 300 ft Riparian/Floodplain Invasive Removal: 0.5 ac Riparian/Floodplain Native Planting: 0.7 ac
Metro-3	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Barton Natural Area Stream Restoration Project	Metro	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1067	Restoration of a floodplain pond and in-channel areas to benefit both turtles and fish. Includes removal of levee/berm to promote floodplain function and connectivity of off-channel habitats. Preservation of population of pond turtles is a high priority. Includes a significant level of planting and maintenance to establish healthy riparian and floodplain forest habitat following construction.	Isolated side channels and off-channel habitats	Improve off-channel habitat access and complexity and enhance native floodplain vegetation	Large Wood Placement (Channel): 3,500 Riparian/Floodplain Native Planting: 4 ac Off-channel Wetland Area Increase: 43,560 sq ft
Metro-4	Improve Complexity in Lower Clackamas Tributary	North Fork Deep Creek Stream Restoration	Metro	N. F. Deep Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/1069	Large wood placement by land-based machine and helicopter over multiple areas/sites. The project will focus on instream complexity in this naturally confined section of North Fork Deep Creek.	Degraded riparian areas and large wood recruitment	Improve stream habitat complexity	Large Wood Placement (Channel): 5,000
Metro-5	Improve Complexity Lower Clackamas Tributary	Lower Clear Creek Phase 2 Restoration Project	Metro	Clear Creek Watershed	https://www.clackamaspartnership.org/Project/Detail/1063	Helicopter placed large wood throughout in-stream and floodplain areas. Stream length approximately 3.5 miles. Builds on previous engineered log jams placed in 2012 and 2015. Work is expected to increase inundation of water to off channel habitats. No plantings: Significant planting efforts completed by CRBC in 2015-2017.	Degraded riparian areas and large wood recruitment	Improve off-channel habitat access and enhance flood plain and off-channel habitat complexity	Large Wood Placement (Channel): 17,500 ft Large Wood Placement (Floodplain): 17,500 ft Off-channel Wetland Area Increase: 60,000 sq ft
USFS-1	Improve Complexity in Middle Clackamas River Reach	Upper Clackamas Large Wood (Sites 109, 110, 115)	USFS	Middle Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1125	This project will add 50 whole trees in the Clackamas River, near Fish Creek, along margins as single pieces or in jams. Actions include riparian restoration in disturbed areas and restricted access to allow riparian vegetation recovery.	Degraded channel structure and complexity	Improve river channel habitat complexity and enhance native riparian vegetation	Large Wood Placement (Channel):5,500 ft Riparian/Floodplain Native Planting: 0.25 ac
CTWS-1	Improve Complexity in Upper Clackamas River Reach	Upper Clackamas Austin Hot Springs Conservation Area	CTWS	Upper Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1076	Confederated Tribes of Warm Springs acquired Austin Hot Springs in September 2017 (~$500,000). The property includes nearly a mile of mainstem Clackamas River. Key restoration objectives for listed fish species include: 1. Re-connect and restore function to a major side channel. 2. Restore historical habitat that has been damaged human impacts in the mainstem Clackamas River. 3. Restore functionality of the hot springs for an optimal benefit for Fish and Wildlife. 4. Restore riparian habitat on one side of the river.	Isolated side channels and off channel habitats	Improve side-channel habitat access; enhance floodplain native vegetation	Floodplain Invasive Removal: 15 Floodplain Native Planting: 40 Side Channel Habitat Increase: 3,000

Goal	Project / Activity	Lead Partner	Watershed / River Reach	Project Description	Primary Limiting Factor / or Constraint Addressed	Objectives	Actions / Outputs
Support and Sustain Initiative Capacity	Initiative Coordination, Organizational Development, and Staff Support	CRBC	Initiative Geography	Continuation of Biennium 1 capacity support activities	Partnership capacity to increase the pace and extent of its activities	Coordinate and facilitate on-going Partnership organizational process, and reporting	Partnership is sustained with appropriate number of meetings, considerations for new partners, etc. Projects are vetted and readied for implementation Outreach with landowners, funding sources, community at-large completed Project Tracker, web-based spatial data base, maintained with updates showing project progress Organizational development documents recorded
Engage Stakeholders	Landowner and Stakeholder Engagement and Outreach	CRBC	Initiative Geography	Continuation of Biennium 1 stakeholder engagement activities	Stakeholder engagement, support for Partnership activities, and landowner participation	Greater community understanding of the fish population status and the Partnership's accomplishments; increased stakeholder support and engagement in Partnership activities; landowners recruited for restoration actions	Number of volunteers engaged in Partnership activities Number of households/individuals participating in Partnership outreach events Number of households/individuals receiving outreach materials or visiting the Partnership's website Number of landowners recruited for restoration actions on private lands
Monitor and Evaluate Watershed Habitats and Conditions, Fish Populations, and Project Effectiveness	Monitoring Evaluation, and Reporting	ODFW, JCWC	Initiative Geography	Continuation of Biennium 1 monitoring activities	Monitoring will identify factors limiting watershed health and fish populations and changes in the limiting factors over time	Summarize and evaluate macroinvertebrate populations as an indicator of watershed health; summarize and evaluate adult spawning data as an indicator of fish populations abundance; summarize evaluate juvenile fish populations as an indicator of changes in habitat capacity	A scientifically-sound description of the relationship between the Partnership's restoration activities, ongoing development and watershed health over time A scientifically-sound description of the relationship between the Partnership's restoration actions, enhanced habitat conditions, and adult and juvenile fish population response over time

Clackamas Partnership: Biennium 3 (2023 – 2025) Work Plan									
Map ID	**Goal**	**Project / Activity**	**Lead Partner**	**Watershed / River Reach**	**Project Tracker Webpage with Project Map and Details**	**Project Description**	**Primary Limiting Factor Addressed**	**Restoration Objectives**	**Actions / Outputs (Clackamas Project Tracker Pre-Implementation Performance Measures)**
CRBC-1	Improve Complexity in Lower Clackamas River Reach: Floodplain/ Confluence	Lower Clackamas/ Cow Creek Confluence Enhancement Project	CRBC	Lower Clackamas River Reach (floodplain and Cow Creek Confluence)	https://www.clackamaspartnership.org/Project/Detail/1080	Cow Creek subbasin drains 871 acres of primarily industrial and residential land. The project would address upstream passage by removing two failed culverts near its confluence with the Clackamas. The project would also include Cow Creek and Clackamas River floodplain restoration by adding large wood debris to the tributary and mainstem.	Land uses that impair riparian conditions	Improve stream and floodplain habitat complexity and enhance up upstream fish passage	To Be Developed
CRBC-2	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Beebe Island Side Channel Enhancement	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/41	The proposed Beebe Island project is on private property downstream of Sah-Hah-Lee Golf Course and upstream of Johnson Creek on the right bank of the main stem Clackamas River. The project focuses on increasing channel complexity and connectivity which is only accessible at high flows due to deposition at the head of a gravel bar island. Constructing an apex jam would rack material and scour an upstream pool. Habitat structures throughout the channel would add structure, provide cover and initiate scour pools.	Isolated side channels and off-channel habitat	Improve side channel and floodplain habitat complexity	To be Developed
CRBC-3	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Windswept Side Channel Re-Connection	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1084	The project would reconnect an historic side channel, add large wood structures, improve native plant densities and manage invasive species. There are existing barbs, and dikes on this property that would need to be modified or removed. There are two side channels that would be reconnected. The first is 2700 feet and the second is 1700 feet totaling 4400 feet of off channel habitat that would be created. This stretch of the Lower Clackamas would have been highly complex with multiple channels but over the years the river has been confined to a single channel.	Isolated side channels and off-channel habitat	Improve off-channel habitat access and floodplain and off-channel habitat complexity and enhance native floodplain vegetation	To be Developed
CRBC-4	Improve Complexity in Lower Clackamas River Reach: Floodplain/Off-Channel	Lower Clackamas Fish Wheel Alcove Enhancement	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1096	The project focuses on increasing physical habitat and complexity including alcove enhancements. Adding large wood throughout the alcove would add structure, provide cover. The project would also improve native plant densities and manage invasive species. Historically, this stretch of the Clackamas was highly complex with multiple channels. Over the years the river has been confined to a single channel.	Degraded channel structure and complexity	Improve off-channel and floodplain habitat complexity and enhance native floodplain vegetation	To be Developed

CRBC-5	Improve Complexity in Lower Clackamas River Reach: Floodplain	Lower Clackamas Bakers Ferry Floodplain Enhancement	CRBC	Lower Clackamas River Reach	https://www.clackamaspartnership.org/Project/Detail/1085	The project would add large wood structures, improve native plant densities and manage invasive species. A floodplain culvert that restricts floodwaters would be removed.	Degraded channel structure and complexity	Improve floodplain access and complexity and enhance native floodplain vegetation	To be Developed
Metro-1	Improve Complexity in Willamette River Reach: Off-channel	Willamette Falls Riverwalk Habitat Project	Metro	Willamette River Reach	https://www.clackamaspartnership.org/Project/Detail/6283	Willamette Falls is second largest waterfall by volume in North America and it has long been an important cultural and gathering place for Native American tribes. Industrial development, beginning in the 1830s, blocked the Falls from public access and greatly modified the riverbank with man-made industrial structures. The Willamette Falls Legacy Partners wish to develop public access to the falls and restore natural habitats including off channel alcoves and placement of large wood. This work will be completed in multiple phases.	Channelization and hardening of streambanks	Improve habitat complexity in shallow water areas and alcoves	To be Developed
NCPRD-1	Improve Complexity in Willamette River Reach: Floodplain	Willamette River Rivervilla Habitat Enhancement Project	NCPRD	Willamette River Reach	https://www.clackamaspartnership.org/Project/Detail/1090	This site is on the east side of mainstem Willamette within a long stretch where there are few opportunities to improve habitat on public land. This project proposes to improve habitat for migrating juvenile anadromous fish including creating shallow water beach habitats and improving a cottonwood riparian forest. The actions will include invasives management and revegetation of cottonwood forest and riparian willows, etc. There will be placement of large wood adjacent to beach area a where backwater eddy forms downstream of bedrock outcropping.	Degraded channel structure and complexity	Improve floodplain habitat complexity and enhance native floodplain vegetation	To be Developed
USFS-1	Improve Habitat Complexity in the Middle or Upper Clackamas River Reach	Upper Clackamas Complexity Projects	USFS	Middle or Upper Clackamas River Reach	To be developed	There are areas within the upper Clackamas River channel where past land uses have reduced in-channel wood and other habitat complexity elements. This project will identify and then implement restoration in areas where placing large wood in the river's channel will benefit fish habitat.	Degraded channel structure and complexity	Improve floodplain habitat complexity and enhance native floodplain vegetation	To be Developed

Goal	Project / Activity	Lead Partner	Watershed / River Reach	Project Description	Primary Limiting Factor / or Constraint Addressed	Objectives	Actions / Outputs
Support and Sustain Initiative Capacity	Initiative Coordination, Organizational Development, and Staff Support	CRBC	Initiative Geography	Continuation of Biennium 2 capacity support activities	Partnership capacity to increase the pace and extent of its activities	Coordinate and facilitate on-going Partnership organizational process, and reporting	Partnership is sustained with appropriate number of meetings, considerations for new partners, etc. Projects are vetted and readied for implementation Outreach with landowners, funding sources, community at-large completed Project Tracker, web-based spatial data base, maintained with updates showing project progress Organizational development documents recorded
Engage Stakeholders	Landowner and Stakeholder Engagement and Outreach	CRBC	Initiative Geography	Continuation of Biennium 2 stakeholder engagement activities	Stakeholder engagement, support for Partnership activities, and landowner participation	Greater community understanding of the fish population status and the Partnership's accomplishments; increased stakeholder support and engagement in Partnership activities; landowners recruited for restoration actions	Number of volunteers engaged in Partnership activities Number of households/individuals participating in Partnership outreach events Number of households/individuals receiving outreach materials or visiting the Partnership's website Number of landowners recruited for restoration actions on private lands
Monitor and Evaluate Watershed Habitats and Conditions, Fish Populations, and Project Effectiveness	Monitoring Evaluation, and Reporting	ODFW, JCWC	Initiative Geography	Continuation of Biennium 2 monitoring activities	Monitoring will identify factors limiting watershed health and fish populations and changes in the limiting factors over time	Summarize and evaluate macroinvertebrate populations as an indicator of watershed health; summarize and evaluate adult spawning data as an indicator of fish populations abundance; summarize evaluate juvenile fish populations as an indicator of changes in habitat capacity	A scientifically-sound description of the relationship between the Partnership's restoration activities, ongoing development and watershed health over time A scientifically-sound description of the relationship between the Partnership's restoration actions, enhanced habitat conditions, and adult and juvenile fish population response over time



Date: 6/28/2018

Scale: 1 inch = 5 miles

Data Source: ESRI, 2016; USDA, Watershed Boundary Dataset, 2014; ODFW, 2016

Clackamas Partnership Initiative Proposed Restoration Projects-Southern Section

CASCADE ENVIRONMENTAL GROUP

0 1 2 4 Miles

Clackamas Partnership

Legend

- Strategic Plan Boundaries
- HUC6 Boundaries
- Major Streams
- Willamette River

FIP Initiative Reaches

- Lower Clackamas River
- Middle Clackamas River
- Upper Clackamas River

Proposed Restoration Projects

- Biennia 1
- Biennia 2
- Biennia 3

Lower Johnson Creek
Upper Johnson Creek
Kellogg Creek
Mount Scott Creek
Rock Creek
Rock Creek-Clackamas River
Small Willamette Tributaries
North Fork Deep Creek-Deep Creek
Tickle Creek
Tickle Creek-Deep Creek
Willamette River
Holcomb Creek
Foster Creek
Goose Creek
Lower Clear Creek
Abernethy Creek
Eagle Creek
Deep Creek
Bear Creek
North Fork Eagle Creek
Lower Eagle Creek
Currin Creek
Abernethy Creek
Mosier Creek
Little Clear Creek
Dubois Creek-Clackamas River
Dubois Creek
Delph Creek
Middle Clear Creek
Swagger Creek
Little Cedar Creek
North Fork Clackamas River
Helion Creek-Clackamas River
Clear Creek
Upper Clear Creek
Little Clear Creek

JCWC-2
Metro-3
JCWC-2
JCWC-1
JCWC-1
NCPRD-1
NCPRD-1
WES-2
Metro-1
Metro-4
CRBC-1
WES-1
CRBC-4
CRBC-3
Metro-2
CRBC-5
CRBC-1
Metro-3
CRBC-5
CRBC-2
Metro-1
Metro-2
CRBC-6
GOCWC-1
Metro-1
Metro-5
CRBC-2
CRBC-3
CRBC-4
CRBC-4

Willamette River Focus Reach

Lower Clackamas River

Middle Clackamas River

Extent shown in detail

N

Date: 6/28/2018

Scale: 1 inch = 5 miles

Data Source: ESRI, 2016; USDA, Watershed Boundary Dataset, 2014; ODFW, 2016

Clackamas Partnership Initiative Proposed Restoration Projects - Northern Section

CASCADE ENVIRONMENTAL GROUP

0 1 2 4 Miles

Clackamas Partnership

Appendix C:

Communications Plan for Landowner Engagement and Community Awareness

Communications Plan for Landowner Engagement and Community Awareness

Final | June 20, 2018

Prepared by:

John Runyon, Cascade Environmental Group
Cheryl McGinnis, Clackamas River Basin Council
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Contents

Introduction

The nine hundred square mile Clackamas River Basin and other Portland Metropolitan Area watersheds are unique. The area's streams drains a diverse and changing landscape that ranges from wilderness areas to growing cities. A major river in the Portland metropolitan region is the Clackamas River, which begins high in the Cascade Mountains and flows out of National Forest lands into an increasingly developed landscape before it meets the Willamette River. The Clackamas River Basin and tributary streams supports fishing, boating, camping and other recreational activities, generates hydro-electric power, supports agriculture and forestry, and supplies high quality water to more than 300,000 residents. In addition to the Clackamas River and its tributaries, several major streams – Abernethy, Kellogg, and Johnson – drain into the west side of the Willamette River.

Clackamas Partnership
Clackamas County Water Environment Services
Clackamas River Basin Council
Clackamas River Water Providers
Clackamas Soil and Water Conservation District
Confederated Tribes of Warm Springs
Greater Oregon City Watershed Council
Johnson Creek Watershed Council
Metro
North Clackamas Parks & Recreation District
North Clackamas Urban Watersheds Council
Oregon Dept. of Environmental Quality
Oregon Dept. of Fish and Wildlife
Oregon Parks and Recreation Dept.
Portland General Electric
U.S. Forest Service, Mt. Hood National Forest, Clackamas River Ranger District

*Other organizations contributing to the Clackamas Partnership: Clackamas County Parks, Bureau of Land Management (BLM), Confederated Tribes of the Grande Ronde, and the Oregon Wildlife Foundation

Historically, the Clackamas River and nearby urban tributaries supported thriving salmon, steelhead and other native fish populations. Today, however, native fish populations are in trouble. The region's salmon and steelhead populations have declined to critically low levels with some species listed as threatened through the federal Endangered Species Act. Even so, the Clackamas River has some of the strongest salmon and steelhead populations in the region. In addition, urbanized streams have also seen a dramatic decline in fish populations. Abernethy, Kellogg, and Johnson Creeks, in addition to other degraded streams, have been altered by the effects of the urban environment, including stormwater runoff and loss of streamside vegetation.

Improving the health of the region's watersheds is the first step in restoring native fish populations to sustainable levels. The **Clackamas Partnership** (Partnership) is a collaboration of Portland Metropolitan area watershed councils, agencies and other organizations committed to restoring the habitat that supports the Clackamas populations of ESA-listed salmon, steelhead and other native fish populations. The Parnership's restoration efforts focus on spring Chinook salmon, fall Chinook salmon, coho salmon, chum salmon, and winter steelhead populations. Restoration actions also emphasize Pacific lamprey (a state and federal sensitive

species) and bull trout (an ESA-listed species that was historically present in the Clackamas River Basin and recently reintroduced). Collectively, the seven fish species are the "Clackamas Fish Populations."

The Partnership's Strategic Action Plan (SAP) will guide voluntary aquatic, riparian, and floodplain restoration actions designed to restore habitats and natural hydrology and improve water quality. The SAP focuses on improving salmon and steelhead populations that are listed as threatened or endangered by the federal government and the state of Oregon: Spring and fall Chinook, winter steelhead, and coho. Chum salmon, which historically were present but are now absent from the region's streams, are also part of the SAP. The SAP will also address Pacific lamprey and bull trout populations identified in federal and state native fish recovery and conservation plans.

Purpose

The success of the SAP rests in part on the engagement and involvement of local landowners, as well as active participation by the Partners. The Partnership will implement coordinated communications that prioritize informing stakeholders about the status of Clackamas Fish Populations, what actions they can take to address the problems, and the important role communities play in improving watershed health. The purpose of this Communication Plan (Plan) is to guide external communications activities that will support implementation of the SAP.

Section 1: Background

The Clackamas Partnership

The Clackamas Partnership formed in 2016 to accelerate watershed restoration progress and address Oregon Watershed Enhancement Board's Focused Investment Partnership Priority for Aquatic Habitat for Native Fish Species, specifically the Clackamas Populations.

Clackamas Partnership's Vision

> *The Clackamas Partnership envisions healthy watersheds that sustain native fish and wildlife populations, diverse habitats, and thriving human communities.*

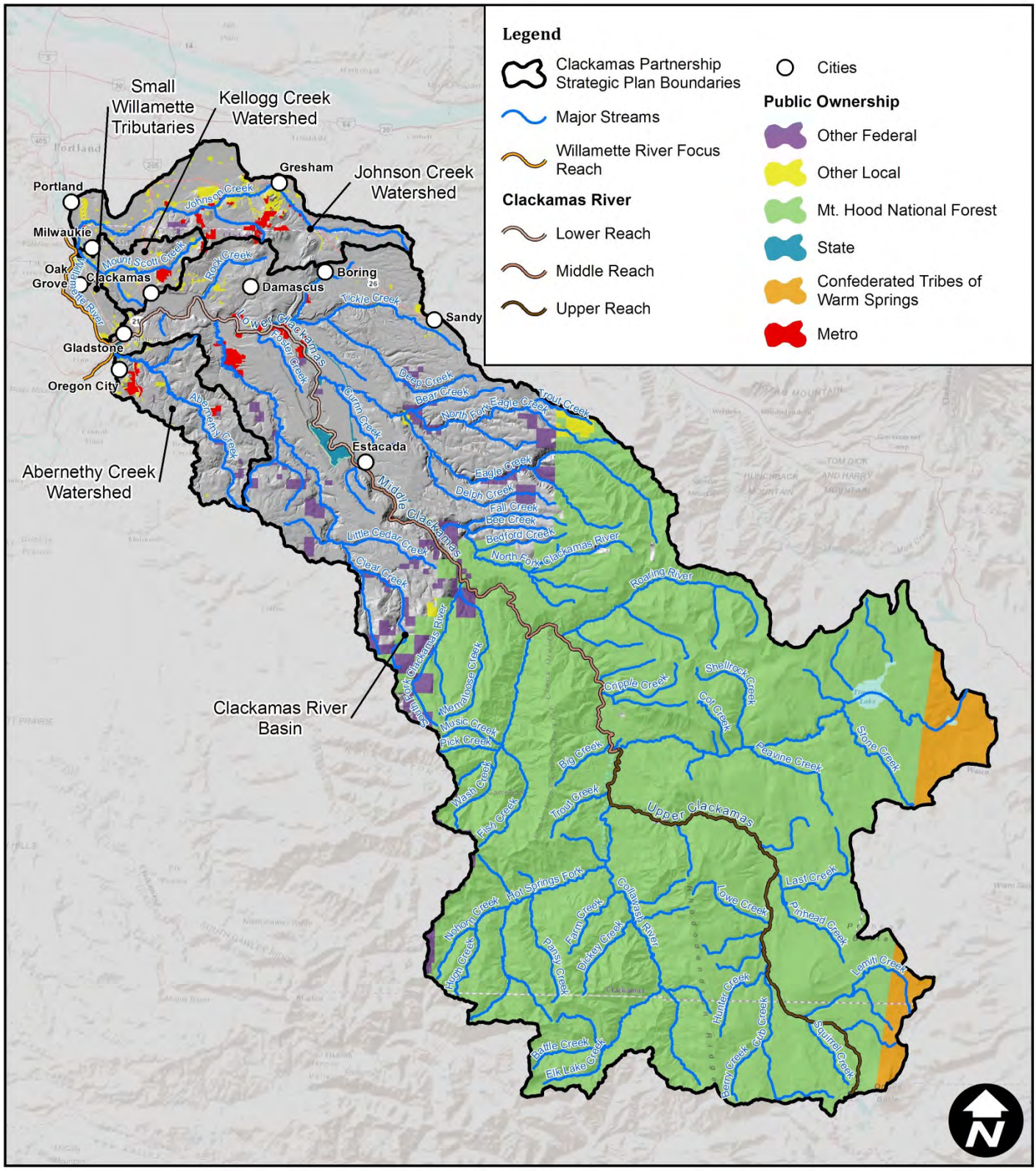
Clackamas Partnership's Mission

> *The Clackamas Partnership collaborates on coordinated aquatic, riparian and floodplain restoration, conservation, and habitat protection actions to enhance watershed health, support the recovery and sustainability of native fish populations, and contribute to the region's economic and social vitality.*

Geographic Scope

The geography covered in the SAP is a includes the Clackamas River Basin, a stretch of the Willamette River from Willamette Falls downstream to the mouth of Johnson Creek in the City of Milwaukie, and other tributaries flowing into the east side of the Willamette River between those points, including Abernethy, Kellogg, and Johnson creeks (Figure 1). The Partnership's geography is home to urban, suburban, and rural residents, agricultural, timber, and nursery landowners and operators, private forest landowners, and a wide variety of businesses. The cities of Portland, Gresham, Happy Valley, Milwaukie, Oregon City, Sandy and Gladstone all fall within the scope of the SAP.

Figure 1. Clackamas Partnership Focus Area, Streams, Cities, and Land Ownership



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Landowner Survey

In 2015, Clackamas River Water Providers (a Partner) and Portland State University conducted a survey of private forestry, agricultural, and residential landowners to investigate landowner interest in and preferences for watershed stewardship programs in the Clackamas River watershed[1]. The survey provides valuable information on approaches for messaging to landowners about watershed stewardship programs. (Note that these landowners are not representative of the Partnership's entire project area because they do not include urban residents or non-stream-adjacent landowners)

Landowners qualified for the survey if they met the following four criteria:

- Property is outside of the Urban Growth Boundary
- Property is at least 2 acres in size
- Property has been zoned as agricultural, rural, or forestry land
- Property edge is within 100 feet from a stream
- Any nursery operating within the watershed, regardless of property size, was also eligible

The survey parameters applied are representative of the landowner population the Partnership hopes to engage. The survey received a 28.7% response rate (275 of 959).

Results of the survey identified a number of barriers and opportunities that the Partnership considered in the development of this communication plan. Below is a list on five key findings and the Partnership's proposed response.

1. *A majority of respondents stressed that they manage their land to protect environmental attributes such as open space, clean water, and wildlife.* When collaborating with landowners, tailor restoration activities to meet landowner land-management goals.
2. *A high proportion of respondents either agreed or strongly agreed that functioning stream ecosystems are important for a clean water supply*. When collaborating with landowners, inform them how restoration activities achieve fish population and water quality objectives.
3. *Restoration projects focused on controlling invasive species, enhancing habitat, maintaining healthy streamside forests, restoring floodplains, or planting new riparian forests showed the most widespread support.* When collaborating with landowners, use these five overarching topics to frame restoration options.
4. *Despite noting that a watershed conservation program would be entirely voluntary, respondents expressed a high degree of concern about government intrusion and regulatory implications.* Emphasize that the Partnership's restoration activities are entirely voluntary and are not associated with regulatory actions.

[1] The 2015 Clackamas River Watershed Survey: Landowner perspectives on watershed stewardship programs. 2016. Report Prepared by Portland State University, OR, for the Clackamas Water Providers. http://www.clackamasproviders.org/wp-content/uploads/2014/10/Clackamas_Landowner_Survey_Summary_2016.pdf

5. *Respondents noted that lack of information and lack of trust in program organizations were key barriers to enrollment in restoration programs.* Building trust will require expanded awareness of the Partnership Organizations and their role in voluntary restoration.

Based on the survey these are the Partnership's key messages to convey to landowners:

Restoration activities are tailored to meet landowner land-management goals.

Restoration activities achieve fish population and water quality objectives.

There are five overarching topics that frame restoration options: 1) controlling invasive species; 2) enhancing habitat; 3) maintaining healthy streamside forests; 4) restoring floodplains; and 5) planting new riparian forests.

The Partnership's restoration activities are entirely voluntary and are not associated with regulatory actions.

Section 2: Planning

The Clackamas Partnership includes four watershed councils and more than ten other Partner organizations. All of these organizations have community outreach programs that vary in their message and reach. One overarching objective of the Plan is to leverage each organization's ongoing community outreach efforts to inform and engage landowners and other stakeholders in the restoration activities. Partnership outreach and engagement materials shall be developed in a manner that compliments partner organizations' current outreach methodologies. As such, the following section will define Partnership goals, objectives, and actions that build on each Partnership organizations' ongoing outreach efforts.

Goal

The goal of the Partnership's Communication Plan is to promote increased awareness and support for the Partnership's efforts to protect and restore aquatic and riparian habitats for long-term sustainability of Clackamas Fish Populations.

Objectives

Note: The action timeline is preliminary. The objectives and actions will be scheduled in coordination with the Partners and as OWEB FIP and other funding becomes available.

Objective 1: Increase landowner and stakeholder awareness and involvement about the Partnership by creating tools that will support outreach and engagement activities.

Action 1.1 – Creation of a Partnership logo and associated brand guidelines.

Timeline: March 2018

Action 1.2 – Creation of Partnership branded materials for the general public which may include a brochure, postcard, introductory video, and/or introductory/recruitment letters to target landowners.

Timeline: August 2019

Action 1.3 – Development and ongoing maintenance of a publically available website – Clackamas Project Tracker (https://www.clackamaspartnership.org/). This website will serve as a launch point for Partnership projects and official business and will be updated periodically/timely to ensure credibility and trustworthiness.

Timeline: Ongoing

Objective 2: Engage voluntary landowner participation in projects identified in the SAP and future restoration efforts.

Action 2.1 – Identify streamside and floodplain landowners that own property on priority or identified project sites.

Timeline: March 2018 - ongoing

Action 2.2 – Collaborate with landowners to implement restoration or conservation actions that meet their land management goals. Provide resources to them on restoration options compatible with their management goals.

Timeline: March 2018 - ongoing

Action 2.3 – Use landowner testimonials to communicate the Partnership's integrity and trustworthiness.

Timeline: June 2018 - ongoing

Action 2.4 – Lead three restoration tours annually within the Partnership's geography for landowners. Partnership staff and landowners who participated in restoration projects will share project success stories and attract new landowners for future restoration projects.

Timeline: June 2019 - ongoing

Objective 3: Increase stakeholder awareness about the status of native fish populations including population status, reasons for decline, and actions that will help to improve the populations.

Action 3.1 – Create a factsheet or brochure that describes and explains the status of the Clackamas Fish Populations (to include an outline of the Partnership's strategy and proposed actions). Develop a plan to distribute the material to targeted stakeholders.

Timeline: September 2018 – ongoing revisions as new information is available

Action 3.2 – Lead/Collaborate/Organize/Coordinate three community events/meetings annually where the Partnership can showcase how fish populations will benefit from the work of the Partnership and its organizations.

Timeline: June 2019 - ongoing

Objective 4: Engage with state-regulated stakeholder groups (i.e., municipalities, designated management authorities, industrial operators) to better understand and address their barriers and opportunities for riparian, instream, and wetland habitat protection strategies and engage those stakeholders in habitat protection actions (e.g., conservation easements or other land protection mechanisms).

Action 4.1 – Meet with MS4 Phase I permittees as appropriate to discuss priority projects and encourage regional collaboration and capacity building.

Timeline: March 2018 - ongoing

Action 4.2 –Provide resources as appropriate to state-regulated stakeholder groups about the direct benefits of low impact development and green infrastructure implementation. As a first step, inform regulated stakeholders how collaboration with the Partnership may also help meet their permit requirements. Explore providing resources that will assist them with communicating the benefits of Low Impact Development (LID) to their customers.

Timeline: June 2019 - ongoing

Outcomes

Execution of this plan toward the above objectives will achieve the following:

1. Recognition of the Partnership as a reliable, credible, trustworthy and cooperative partner for watershed stewardship projects.
2. Landowners who are supportive, engaged, and enthusiastic about voluntary landowner restoration projects.
3. Established rapport and dialog with regional stakeholders.
4. Public understanding of the threats facing Clackamas Fish Populations.

Clackamas Partnership Stakeholders

The Partnership is fortunate to have involvement of organizations that represent a wide range of landowners and stakeholders. Partnership success will be largely dependent on voluntary

stakeholder participation. As such, the following section identifies stakeholder groups and organizations for Partnership reference when conducting outreach. Partnership member organizations are denoted with an asterisk (*).

Landowners

Landowners with stream frontage or floodplain properties will be prioritized for direct outreach.

- Agricultural landowners and operators
- Streamside businesses
- Industrial forest operators
- Nursery owners and operators
- Rural residential homeowners
- Small woodlot landowners
- Urban residential homeowners and multi-family building owners/residents

Municipal governments

Small municipalities that do not currently implement stream or river restoration projects or whose purview does not currently include stream and river restorationi, including the following cities:

- Barlow
- Boring
- Clackamas
- Eagle Creek
- Estacada
- Gladstone
- Happy Valley
- Johnson City
- Milwaukie
- Oak Lodge
- Oregon City
- Redland
- Viola
- Sandy

County and regional governments

- Clackamas County Parks Division*
- Clackamas County Water Environment Services*
- Clackamas Soil and Water Conservation District *
- North Clackamas Parks and Recreation District*
- Metro*
- Confederated Tribes of Grand Ronde*
- Confederated Tribes of Warm Springs*

State and Federal Government agencies

- Bureau of Land Management (BLM)*
- NOAA Fisheries
- Oregon Department of Agriculture (ODA)
- Oregon Department of Environmental Quality (DEQ)*
- Oregon Department of Fish and Wildlife (ODFW)*
- Oregon Department of Forestry (ODF)

- Oregon State Parks*
- U.S. Army Corps of Engineers
- USDA Forest Service – Mt. Hood National Forest (USFS)*
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)
- U.S. Natural Resources Conservation Service (NRCS)

Nonprofit organizations

- Association of NW Steelheaders
- Audubon Society of Portland
- Clackamas River Basin Council (CRBC)*
- Greater Oregon City Watershed Council (GOCWC)*
- Hunting groups
- The Intertwine Alliance
- Johnson Creek Watershed Council (JCWC)*
- The Nature Conservancy (TNC)
- North Clackamas Urban Watersheds Council (NCUWC)*
- SOLV
- Trout Unlimited (Clackamas River)
- Willamette Riverkeeper

Water and energy providers

- Clackamas River Water
- Clackamas River Water Providers (CRWP)*
- Oak Lodge Water Services
- Portland General Electric (PGE)*
- South Fork Water Board
- Sunrise Water Authority

Additional stakeholders

Additional stakeholder groups include: grassroots organizations (e.g. Oregon Farm Bureau), professional societies (e.g. Oregon Landscape Contractors Association), and academic institutions (e.g. OSU Extension Service) that are active in the area, as well as local home owner associations, designated management authorities, and community planning organizations (CPO).

Key Messaging

A series of key messages will be incorporated into Partnership branded materials and communication tactics to reinforce the goals and objectives outlined in the Plan.

Tag Line: Restoring your watershed, together

Call to Action: Restore your property to improve fish and wildlife habitat and your quality of life

Key messages for landowner engagement:

- The Partnership and landowners are working together to restore watershed health and native fish populations through voluntary, non-regulatory restoration actions.
- Improving watershed health and fish populations while meeting their land management goals.
- Strategies for restoring watershed health and native fish populations are compatible with land management goals. Strategies include: controlling invasive species, enhancing habitat, maintaining healthy streamside forests, restoring floodplains, and planting new riparian forests.

To be developed: Key messages for urban landowners, municipalities, industrial landowners

Section 3: Implementation

Resources

The Partnership has a variety of resources that will support the implementation of this communication plan:

- Paid staff
- Volunteers
- Landowner databases
- Research databases
- Stakeholder relationships/Partners in service
- Existing and new public forums
- Print and broadcast media
- Website and social media platforms

Responsibilities

The Memorandum of Understanding agreed upon by Partnership member organizations includes two responsibilities directly tied to Partnership communications.

Representation of the Clackamas Partnership. The Parties are encouraged to communicate publicly about the purpose of the Clackamas Partnership. In the event a Party wishes to represent the Clackamas Partnership in a way that is beyond the scope of this MOU and/or Clackamas Partnership-approved materials, the Party will first seek the consent of the other Parties. Although all Parties are encouraged to speak publicly about the Clackamas Partnership and their role in it, no Party may represent another without the consent of the affected Party or Parties.

Media and Communications. The Parties will coordinate their public statements about the Clackamas Partnership and any projects associated with it. All Parties will be afforded a reasonable opportunity to review, edit, and approve all marketing materials, public statements,

and media communications concerning the Clackamas Partnership prior to initial publication or release.

Section 4: Evaluation

The following methods and metrics will be used to evaluate and measure the level of success of the Plan.

Attendance – The Partnership plans to initiate several different events to promote and educate the public on Partnership projects and opportunities. Attendance will be taken for all tours, presentations and public meetings.

Target: 120 individuals/annually

Annual surveys – Landowners who participate in projects under the Partnership umbrella will be asked to complete an annual survey about their experiences. These surveys may change over time to track key pieces of information.

Target: 85% response rate for the participating landowners

Enrollment – Enrollment in a restoration projects may be used as an indicator of success depending on the projects scheduled.

Target: 12 new landowners/annually with willingness to participate in restoration projects

Focus groups – Focus groups with key stakeholder and landowners (e.g., municipal staff, industrial landowners) groups may provide insignts into the best approaches for engaging landowners

Media hits – Metrics from all media sources (print, digital, social) will play an important role in evaluating the reach of our communication efforts. Media metrics may also reveal topics of particular interest to our constituents. Media metrics include:

1. Volume – How many visitors visit the Project tracker website on a daily, weekly, monthly basis and what are they looking at when they are on there?

   Target: 30 new website visits per month

2. Reach – This is a measurement of the potential audience size.

   Target: Distribution of materials, news paper articles, and other outreach documents to 10,000 households

3. Influence – Who is visiting the website and sharing our materials? Any important companies, nonprofits, individuals?

Key informant interviews – Landowners who participate in projects under the Partnership umbrella may be called for an interview to solicit feedback that will help improve the process going forward. Feedback will be used in future iterations of this plan, which will be updated periodically as metrics are reported.

Appendix:

A. Actions and Tactics – to be developed in coordination with all Partnership Organizations

Strategy	Deliverable	Frequency	Indicator of Success
Action 1.1 – Creation of a Partnership logo and associated brand guidelines.			
Action 1.2 – Creation of Partnership branded materials for the general public which may include a brochure, postcard, introductory video, and introductory/recruitment letters to target landowners.What's the difference between this and 3.1?			
Action 1.3 – Development and ongoing maintenance of a publically available website - Project Tracker. This website will serve as a launch point for Partnership projects and official business and will be updated periodically/timely to ensure credibility and trustworthiness.			
Action 2.1 – Identify streamside and floodplain landowners that own property on priority or identified project sites.			
Action 2.2 – Collaborate with landowners to implement land management techniques that will meet their goals and provide resources to them on restoration options compatible with that management.			
Action 2.3 – Use landowner testimonials to communicate the Partnership's integrity and trustworthiness.			
Action 2.4 – Lead three restoration tours annually within the Partnership's geography for landowners. Partnership staff and landowners who participated in restoration projects will share project success stories and attract new landowners for future restoration projects.			
Action 3.1 – Create a factsheet or brochure that describes and explains the status of the Clackamas Fish Populations (to include an outline of the Partnership's strategy and proposed actions). Can this be included with 1.2 so we don't need multiple brochures?			
Action 3.2 – Lead/Collaborate/Organize/Coordinate three community events/meetings annually where the Partnership can showcase how both fish populations and landowners will benefit from the work of the Partnership and its organizations.			
Action 4.1 – Meet with MS4 Phase I and Phase II permittees as appropriate to discuss priority projects and encourage regional collaboration and capacity building.			
Action 4.2 – Provide resources as appropriate to state-regulated stakeholder groups about the direct benefits of low impact development and green infrastructure implementation.			