

Willamette River Fish Recovery

Upper Willamette River Conservation & Recovery Plan for Chinook Salmon & Steelhead

EXECUTIVE SUMMARY

August 2011

Oregon Department of Fish & Wildlife
The State of Oregon
NOAA Fisheries, Northwest Region



ACKNOWLEDGEMENTS

Executive Summary

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See Appendix A in the Plan Appendices

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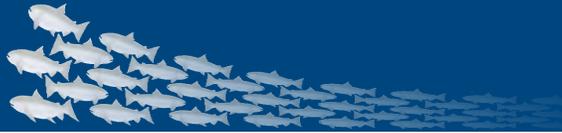


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Why the Plan is Needed

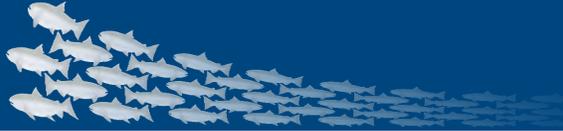


Scientists have estimated that prior to the arrival of Europeans more than a million salmon and steelhead returned to spawn in Oregon's rivers and streams in the Upper Willamette basin. Over the course of the last two centuries, the combined effects of fish harvest, hatchery fish interactions, flood control and hydropower operations, and habitat alterations have led to drastic declines in these populations. The pattern of declining abundance and range reductions provided scientific evidence that supported listing Upper Willamette River (UWR) spring Chinook and winter steelhead under the federal Endangered Species Act (ESA) and on the State of Oregon threatened or endangered species list.

This **Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead** (Plan) serves as a federal recovery plan for fish populations within the ESA-listed Upper Willamette River Chinook salmon evolutionarily significant unit (ESU) and the steelhead distinct population segment (DPS), where ESUs and DPSs are comprised of groups of populations with geographic and evolutionary similarities and are considered "species" under the ESA. The Plan also serves as a State of Oregon conservation plan for the same populations within Species Management Units (SMUs) for State of Oregon risk assessment and conservation status of native fish species, which is guided by Oregon's Native Fish Conservation Policy (NFCP). The Plan is designed to guide implementation of actions needed to conserve and recover these species by providing an informed, strategic, and voluntary approach to recovery that is based on the best available science, supported by stakeholders, and built on existing efforts and new proposed actions.



Plan Development



The Plan is the product of a multi-year, collaborative process led by the Oregon Department of Fish and Wildlife (ODFW), with extensive participation by the Oregon Governor's Natural Resources Office (GNRO), NOAA's National Marine Fisheries Service (NMFS), and the Upper Willamette River Stakeholder and Planning Teams. The primary authors of the Plan, representing ODFW and NMFS, benefited from the cooperative efforts of those entities as well as the involvement of a number of other state, federal, and local agencies. The Willamette/Lower Columbia Technical Recovery Team (WLC-TRT) and other NMFS-led preliminary efforts provided guidance for Plan development.

The Stakeholder Team consisted of members representing interest groups that may play a role in Plan implementation, or be affected by Plan implementation. Members of the team consisted of representatives from agriculture, business, conservation, federal government, tribal, fishing, forestry, local government, soil and water conservation districts, water, watershed council, utility, and other interests. Members of the Planning Team were technical representatives, primarily biologists, with management experience within the Upper Willamette area. Both the Stakeholder and Planning teams provided vital feedback in an iterative process during Plan development.

The authors used other existing plans, documents, assessments, or requirements in developing this Plan, notably, actions contained in the **Estuary Module** (an ESA recovery plan prepared by NMFS outlining recovery actions for all listed salmonids species that utilize the Columbia River estuary), the **Willamette River Basin Flood Control Project Biological Opinion** (Willamette Project, or WP, BiOp), Federal Energy Regulatory Commission (FERC) hydropower re-license agreements, the Willamette Total Maximum Daily Load Allocation (TMDL) report, and local habitat restoration or conservation plans. In addition, the contents of this Plan are consistent with, complementary to, or build upon strategies or actions contained in the **Oregon Plan for Salmon and Watersheds**, the **Conservation Strategy**, the Hatchery Science Review Group's assessment of Upper Willamette River hatchery programs, as well as other recent scientific papers and reports, and the Northwest Power and Conservation Council subbasin plan.

NMFS published the Proposed **Upper Willamette River Conservation and Recovery Plan for Salmon and Steelhead** in the Federal Register on October 22, 2010, and NMFS, ODFW and the Oregon Governor's Office held four formal public meetings and a number of informal sessions in order to obtain comments on the proposed Plan. More than thirty sets of comments were received.

NMFS and ODFW reviewed all comments received for substantive issues and new information and revised the Recovery Plan as appropriate. We received a number of very detailed and substantive comments, as well as editorial clarifications and minor corrections, requests to cite specific documents, and suggested changes in wording to clarify the document. Most commenters offered support for the Recovery Plan and its implementation, along with thoughtful comments. NMFS addressed the comments in the response to comments document, which is available on the NMFS Regional Office website - www.nwr.noaa.gov.

Based on a number of the comments, the final Plan places additional emphasis on:

- the importance of successful reintroduction of naturally reproducing salmon and steelhead above the flood control dams in the Willamette River subbasins and providing downstream passage for their offspring;
- the long-term challenges associated with setting priorities to protect existing salmon and steelhead habitat and restoring the additional habitat needed to recover these two species, including the high priority habitat in the North and South Santiam, Middle Fork Willamette, and McKenzie subbasins, and the rearing habitat in the entire mainstem Willamette River (including the lower Willamette River below Willamette Falls);
- the need for over-all integration of research, monitoring, and evaluation of Chinook, steelhead, and their habitat, to better inform future decisions;
- climate change and human population growth and how salmon and steelhead recovery efforts can adapt; and
- details describing strategies and actions concerning the effects of hatcheries.

The Oregon Fish and Wildlife Commission provided final approval for the Plan as a state conservation plan on August 5, 2011. The Plan will also be published by NMFS in the Federal Register as a federal recovery plan for the UWR subdomain.

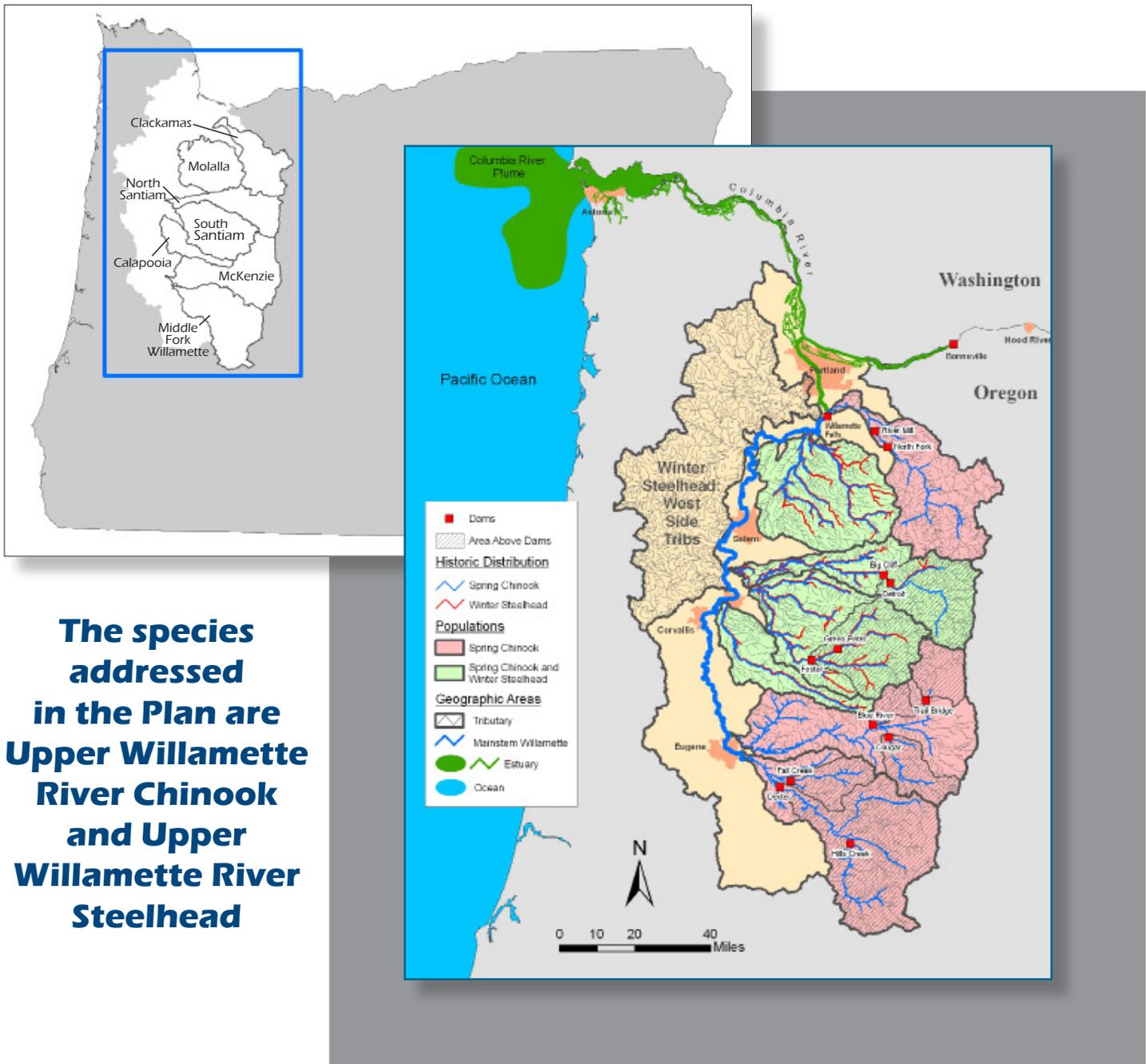


Gary Halvorson, Oregon State Archives

Salmon & Steelhead Addressed in the Plan



The UWR Chinook (*Oncorhynchus tshawytscha*) ESU includes all historically independent populations of spring Chinook salmon in Willamette River subbasins upstream of Willamette Falls and in the Clackamas River subbasin. The UWR steelhead (*Oncorhynchus mykiss*) DPS includes all historically independent winter-run steelhead populations in Willamette River subbasins upstream from Willamette Falls to the Calapooia River subbasin (inclusive). Clackamas spring Chinook are included by ODFW in the Lower Columbia River SMU but are part of the Upper Willamette River Chinook ESU listed by NMFS.



The species addressed in the Plan are Upper Willamette River Chinook and Upper Willamette River Steelhead

Plan Goals & Analyses



The Plan has two recovery goals for UWR salmon and steelhead. These are: 1) achieve **delisting** from the federal ESA threatened and endangered species list, and 2) achieve **'broad sense recovery'**, defined by Oregon as having populations of naturally produced salmon and steelhead that maintain self-sustaining SMUs while providing for significant ecological, cultural, and economic benefits.

The first goal is to meet Federal ESA delisting requirements and the second goal is to fulfill the mission of the Oregon Plan for Salmon and Watersheds and the requirements of Oregon's NFCP. These two goals are consistent, although delisting necessarily occurs before broad sense recovery, which achieves a level of performance that is far more robust than that needed to remove the ESU or DPS from ESA protection. Further details about broad sense recovery are addressed in a later section of this summary.

This Plan adopts the biological criteria for achieving delisting that were established by the WLC-TRT, based on the concept of population **'viability'**, which means a population with negligible risk of extinction over a 100 years. The WLC-TRT criteria are based on a scoring system to describe each population's probability of extinction, as categorized into **'extinction risk'** classes. In order to meet the biological criteria for delisting, the UWR Chinook ESU must have 4 (out of 7) viable populations, and the UWR steelhead DPS must have 3 (out of 4) viable populations.

ODFW technical staff performed population assessments using the best available data and scientific analysis to determine **current status** (in terms of extinction risk) and the improvements necessary to reduce extinction risk to targeted categories of lower extinction risk (**'desired status' for delisting under the ESA**). The difference between current extinction risk status and desired extinction risk status is the **'conservation gap'** that would need to be closed in order to achieve delisting. ODFW also assessed extinction risk for all UWR populations, consistent with McElhany et al. (2000), taking into account four biological population attributes related to salmonid viability: abundance, productivity, spatial distribution, and diversity. ODFW then quantitatively modeled population abundance and productivity parameters relative to extinction risk.

A Note on Delisting Decisions

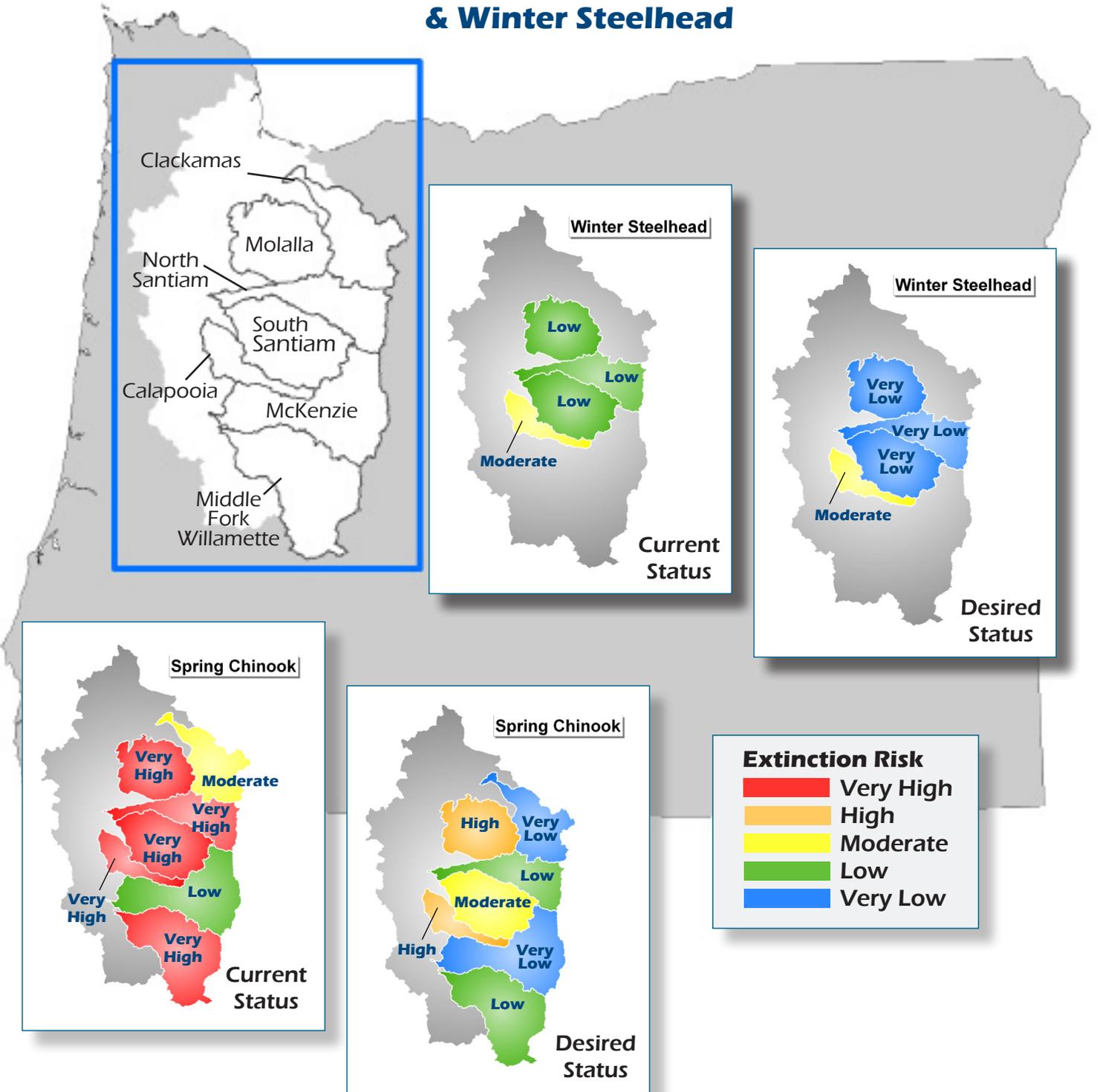
In this Plan, the UWR Chinook ESU and Steelhead DPS are the two 'species' listed by NMFS under the ESA, and for which NMFS must identify delisting criteria. In addition to identifying biological delisting criteria and data, NMFS identified threats criteria that must be met for delisting to occur. These threats criteria are related to the five factors identified in section 4 of the ESA, which NMFS is to consider in making listing decisions. These *listing factors* include habitat impacts, overutilization, disease/predation, regulatory inadequacy, and 'other' factors. The Plan explains that NMFS will continue to work on refining measurable criteria for these listing factors. This will help guide actions, gauge progress, and provide information for NMFS to apply in a future delisting decision. Consistent with ESA requirements, NMFS will review the biological status of the species and threats every five years.

An Expert Panel the Planning Team and representatives of resource management agencies determined the **limiting factors and threats** for each salmonid life stage and for different life cycle locations for each population. This process identified specific impacts within threat categories, to guide and structure specific strategies and actions for reduction of threats. In light of the current status assessments and based on delisting criteria, an iterative process with ODFW, the Stakeholder Team, NMFS, and the Planning Team produced the delisting desired status of each population. Once the desired status for each population was determined, ODFW and the Stakeholder Team evaluated **threat reduction scenarios** as one way to scope how suites of actions could decrease conservation gaps by reducing mortality within several threat categories. The Planning Team provided input on the feasibility and relative importance of implementing certain actions within the threat reduction scenarios. The scenarios illustrate the level and relative priority of actions necessary to address each threat to a population. The **threat categories** represent mortality impacts where current anthropogenic mortality rates were able to be estimated and actions can be applied to reduce impacts. These categories include: freshwater habitat, estuary habitat, hydropower, harvest, hatchery, and 'other species.'

Current & Desired Statuses

The following figures identify the current status and delisting desired status for each species within the UWR. Different colors indicate the different extinction risk classes identified for the independent populations that comprise the Chinook salmon ESU and steelhead DPS.

Current & Desired Status for Spring Chinook & Winter Steelhead



Summaries of Threats, Limiting Factors, & Strategies & Actions for UWR Chinook & Steelhead



The Plan describes limiting factors as the physical, biological, or chemical conditions and associated ecological processes and interactions experienced by the fish that may impede recovery. General categories of limiting factors include competition, disease, food web, habitat access, hydrograph/water quality, physical habitat quality/quantity, population traits, predation, and water quality. The Plan describes threats as human impacts that cause or contribute to limiting factors. The general threat categories are: flood control/hydropower, land management, other species, harvest management, and hatchery management.

The authors, in response to comments received, amended the proposed Plan in several areas, including:

Stronger statements about the need to protect and restore salmon and steelhead habitat.

We cannot achieve recovery of salmon and steelhead in the Upper Willamette while continuing the past and current practices that degrade salmon and steelhead habitat. Two requirements for success include: 1) a clear vision of what is necessary for recovery; and 2) an ability to implement the Plan despite ecological, political, and practical challenges. Embedded in these two concepts is the growing scientific evidence that highlights the need to protect high quality habitat while strategically improving degraded areas with active restoration. This means that the cumulative effects that result from the incremental degradation of habitat must either stop or include adequate compensation. The scientific evidence is well established that salmon and steelhead require sufficient clean water within specific ranges of temperature and stream characteristics including adequate gravel, connection to floodplains, complexity, pools, and other features in order to survive and successfully reproduce the next generation. In addition, the water quality necessary for wild salmon and steelhead and other native species must include adequate oxygen levels and be free from lethal levels of contamination. A source of uncertainty that is a potential concern is the combined effects of sublethal levels of pollutants on salmon and steelhead.

To achieve recovery, we will also need to increase education, positive incentives, and regulatory enforcement. The salmon and steelhead species cannot recover if society's actions continue to degrade the ecosystems that supports them. 'Death by a thousand cuts' is a very real concern for Willamette River salmon and steelhead and their habitat.

Hatchery

Appendix E includes additional details describing strategies and actions concerning the effects of hatcheries.

Harvest

The Plan recommends review of existing fishing regulations, if warranted, to ensure that harvest does not pose unacceptable risk to the natural origin fish populations.

Estuary



Overarching Management Strategies

Land Use and Flood Control/Hydropower

Implement the suite of Estuary Module land use actions, Federal Columbia River Power System (FCRPS) BiOp flow actions, and additional UWR-specific actions to address multiple (and somewhat related) limiting factors. Actions include:

- Land use and flow modification actions that improve food web structure and function by increasing macrodetrital inputs and decreasing microdetrital inputs.
- Flow modification actions that improve fine sediment/sand recruitment and routing in the estuary.
- Land use actions that improve habitat complexity and diversity by removing or modifying revetments; restoring riparian structure and function, including the recruitment of large wood; and restoring floodplain connectivity and access to off-channel habitat.
- Flow modification actions that address other limiting factors associated with altered hydrology from Columbia basin hydropower operations.

Harvest

Implement harvest actions identified in the Lower Columbia River Conservation & Recovery Plan for Oregon Populations of Salmon & Steelhead (OrLCR Plan) for other species and populations that have indirect benefit for UWR populations. Actions include:

- Shift mainstem commercial spring Chinook harvest to terminal areas during low return years and monitor harvest levels in all fishery areas for all species.
- Within the ocean, implement the new Pacific Salmon Treaty (PST) that reduces ocean fisheries on Chinook and support mark-selective ocean fisheries when a new PST is negotiated in 10 years.

Other Species

- Adjust hatchery management practices (basin-wide) to reduce the secondary limiting factor of juvenile hatchery fish competition
- Implement Estuary Module predation actions and land use actions to reduce the secondary limiting factor of predation by birds and other piscivores.

Research, Monitoring, and Evaluation

- Provide coordination for a basin-wide integration of RM&E efforts.
- Address critical uncertainties.
- Monitor trends and effectiveness of actions.
- Adaptively manage based on updated information.

Mainstem Willamette River



Overarching Management Strategies

Land Use

Implement the suite of Willamette basin TMDL water quality actions, rural and urban best management practices (BMPs), and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Willamette basin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Willamette basin pesticide and nutrient TMDL Water Quality Management Plan actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.
- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats that are not covered by actions in other plans and restore areas that are degraded.

Flood Control/Hydropower

Implement the suite of Willamette Project BiOp flow actions to address multiple (and somewhat related) limiting factors. Actions include:

- Willamette Project BiOp revetment modification/reduction and habitat restoration actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Willamette Project BiOp flow actions that increase the occurrence of peak flows that maintain and create habitat, thereby contributing to increased channel complexity and habitat diversity.
- Willamette Project BiOp flow actions to meet salmon and steelhead rearing and migration flow targets in the mainstem Willamette River.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs and implement and evaluate potential reduction approaches.

Clackamas Subbasin

Overarching Management

Strategies

Land Use

Implement the suite of rural and urban best management practices (BMPs), and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats that are not covered by actions in other plans and restore areas that are degraded.
- Breach, lower, remove, or relocate dikes and levees to establish or improve access to off-channel habitats; vegetate dikes and levees.
- Evaluate water allocation policies and legal and illegal water withdrawals. Look for opportunities to keep more water in the stream.
- Finish the Clackamas Fish Habitat Analysis and review local land use plans in the context of salmon recovery needs.
- Provide/improve downstream passage of juvenile fish at non-Portland General Electric (PGE) water control structures.

Flood Control/Hydropower

Implement the suite of PGE’s FERC agreement actions to address multiple (and somewhat related) limiting factors. Actions include:

- Reduce the key limiting factor of downstream fish passage at Portland General Electric (PGE) -owned dams.
- Correct water temperature effects by implementing all water quality and hydrograph measures in the Clackamas River Hydroelectric Project (FERC Project No. 2195) Fish Passage and Protection Plan.
- Use PGE’s FERC mitigation and enhancement fund to improve habitat complexity and diversity

- Increase retention and sourcing of gravels and other materials below PGE facilities with a combination of habitat improvements, targeted flows, and augmentation.
- Annually place 8,000 cubic yards of spawning sized gravel below River Mill Dam.

Hatchery

Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally by reducing the proportion of hatchery fish on spawning grounds to target levels.

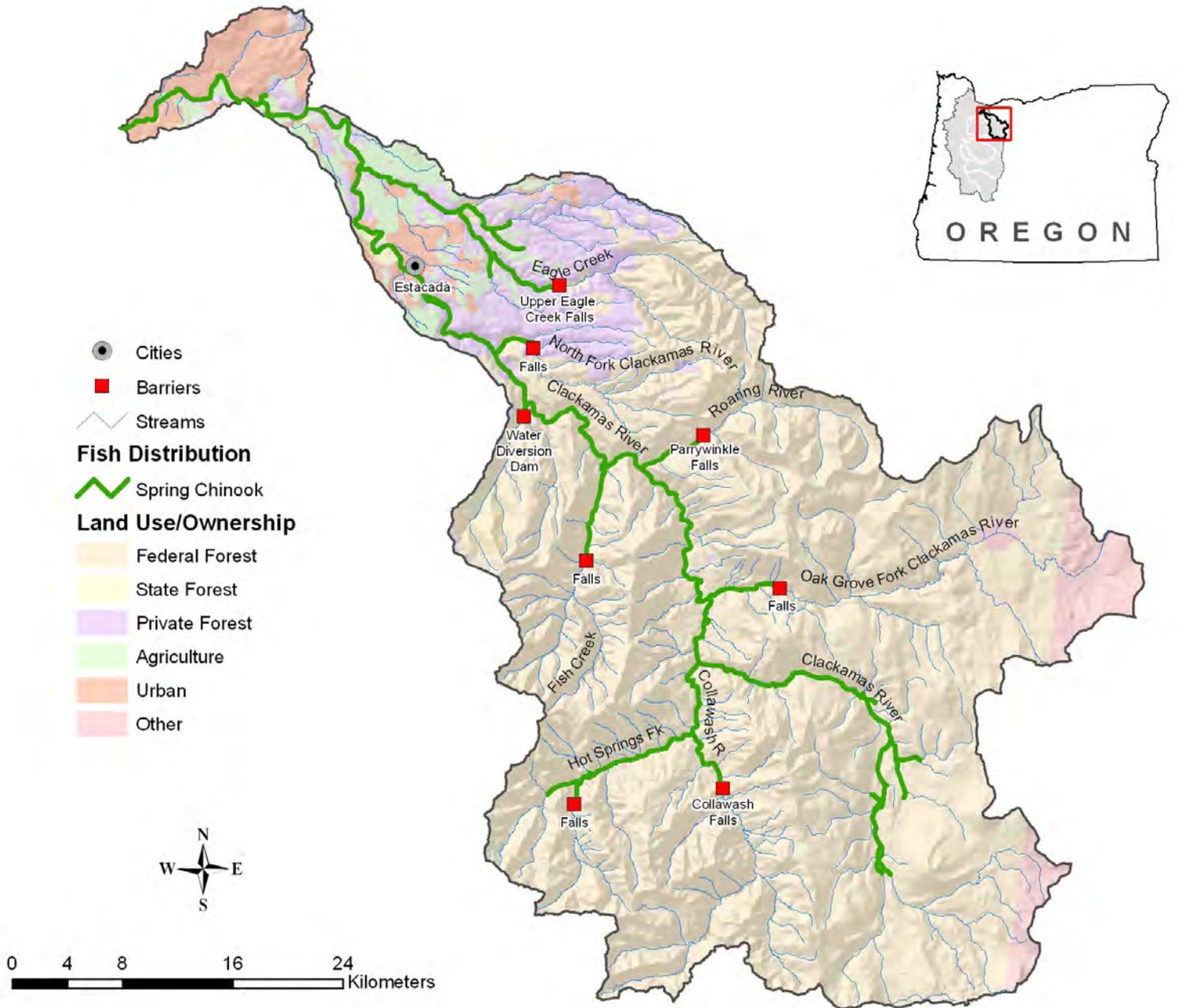
Actions include:

- Maintain a wild fish management zone in the principle spawning areas above PGE hydropower facilities.
- Evaluate/implement additional actions within the hatchery program.
- Mark all hatchery fish.

Research, Monitoring, and Evaluation

- Monitor wild populations
- Address critical uncertainties
- Monitor trends and effectiveness of actions
- Adaptively manage, based on updated information

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Moderate	Core	Very Low



Molalla Subbasin



Overarching Management Strategies

Land Use

Implement the suite of Molalla subbasin TMDL water quality actions, rural and urban best management practices (BMPs), habitat access actions, water conservation actions, and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Molalla subbasin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones, particularly in areas used by over-summering Chinook salmon.
- Promoting incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Molalla subbasin pesticide and nutrient TMDL Water Quality Management Plan actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs and implement and evaluate potential reduction approaches.

Hatchery

Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally by reducing the proportion of hatchery fish on spawning grounds to target levels.

Actions include:

- Consider two options: 1) immediately designate and maintain a wild fish management zone in the principle spawning areas in upper subbasin; allow this area to be naturally re-populated with unmarked fish, and reduce hatchery fish from these areas with a variety of actions, or 2) modify the existing harvest augmentation hatchery Chinook salmon program (to more local stock) as a separate augmentation and conservation program for a few generations, before designating the subbasin as a wild fish management zone.
- Mark all hatchery fish.

Research, Monitoring, and Evaluation

- Monitor wild populations
- Address critical uncertainties
- Monitor trends and effectiveness of actions
- Adaptively manage, based on updated information

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Very High	Non Core	High
Winter Steelhead	Low	Core	Very Low



North Santiam Subbasin



Overarching Management Strategies

Land Use

Implement the suite of Santiam subbasin TMDL water quality actions, rural and urban best management practices (BMP's), water conservation actions, habitat access actions, and other land use actions to address multiple (and somewhat related) Limiting Factors. Actions include:

- Santiam subbasin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones.
- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats (particularly in moderate gradient streams) that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Implement other plans and actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.
- Work with and assist landowners with grants, funding, and design to screen known water diversions or other structures that impair movement of juvenile and adult steelhead.

Flood Control/Hydropower

Implement the suite of WP BiOp actions associated with federally owned and operated water control facilities to address multiple (and somewhat related) limiting factors. Actions include accelerating the implementation of efforts to:

- Reduce the key limiting factor of downstream fish passage at large water control facilities.
- Improve adult facilities and outplanting measures to reduce prespawn mortality and improve adult access to holding and spawning areas above large water control facilities.
- Construct, operate, and evaluate a temperature control structure at Detroit Dam to release water that more closely resembles normative water temperatures, reduces TDG exceedences, and meets TMDL temperature targets downstream of North Santiam dams, and operate dams to maximize benefits to Chinook and steelhead.
- Correct flow alterations below water control facilities that lead to elevated fall water temperatures and premature hatching/emergence of Chinook salmon.
- Implement the WP BiOp actions that prescribe release flows from Detroit/Big Cliff dams to meet flow targets in the North Santiam River that protect spawning, incubation, rearing, and migration of salmonids.
- Implement the flow actions that increase the occurrence of peak flows that maintain and create habitat, thereby contributing to increased channel complexity and habitat diversity.
- Implement a combination of habitat improvements, targeted flows, and gravel augmentation actions that increase the retention and sourcing of gravels and other materials below USACE facilities.

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Very High	Core	Low
Winter Steelhead	Low	Core, Genetic Legacy	Very Low

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs. Implement and evaluate potential reduction approaches.

Hatchery

Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally achieved by reducing the proportion of hatchery fish on spawning grounds to target levels.

Actions include:

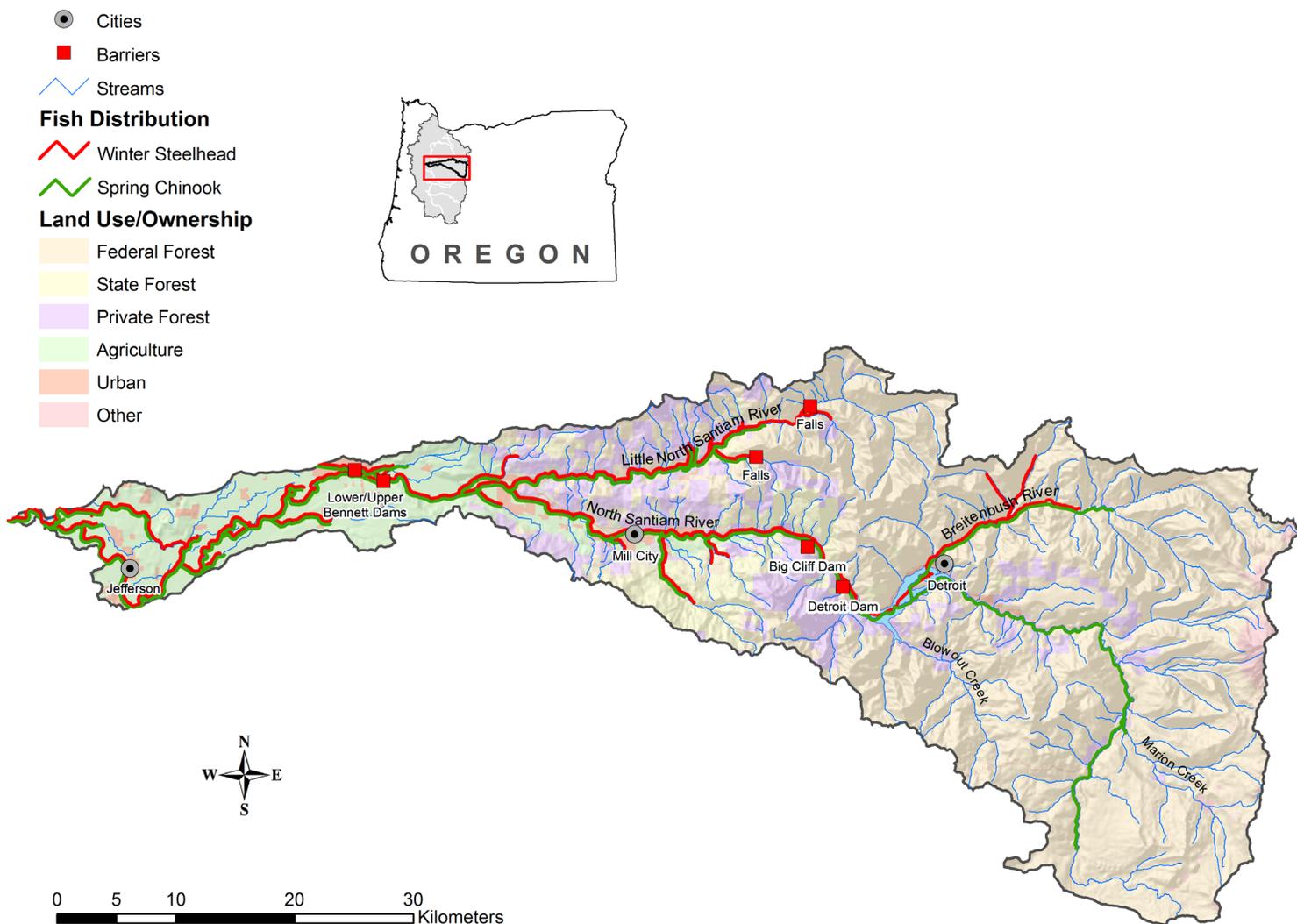
- Promote a wild fish management zone above Detroit dam.
- Promote a long-term conservation hatchery strategy that will lead to a viable naturally-produced population.
- In the short term, implement actions and associated RME below Minto facility that will reduce genetic and demographic risk to the extant natural origin fish population.

- Over long term, increase wild fish production below Big Cliff Dam through WP BiOp water quality/quantity improvements for the Detroit/Big Cliff flood control/hydro complex and other actions addressing limiting factors. Further develop a Conservation Supplementation (reintroduction) Program (CSP) or set of strategies to be implemented above Detroit dam.
- Mark all hatchery fish.

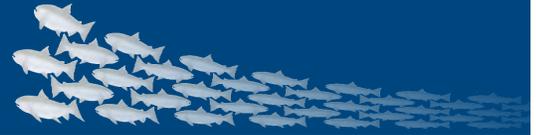
Reduce the key limiting factor of in-basin competition with naturally produced progeny of hatchery summer steelhead and residualized steelhead by conducting RME on release practices and other ways to reduce interactions.

Research, Monitoring, and Evaluation

- Monitor wild populations
- Address critical uncertainties
- Monitor trends and effectiveness of actions
- Adaptively manage based on updated information



South Santiam Subbasin



Overarching Management Strategies

Land Use

Implement the suite of Santiam subbasin TMDL water quality actions, rural and urban best management practices (BMPs), water conservation actions, habitat access actions, and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Santiam subbasin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones.
- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats (particularly in moderate gradient streams) that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Implement other plans and actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.
- Work with and assist landowners with grants, funding, and design to screen known water diversions or other structures that impair movement of juvenile and adult steelhead.

Flood Control/Hydropower

Implement the suite of WP BiOp actions associated with federally owned and operated water control facilities to address multiple (and somewhat related) limiting factors.

Actions include:

- Reduce the key limiting factor of downstream fish passage at large water control facilities.
- Improve adult facilities and outplanting measures to reduce prespawn mortality and improve adult access to holding and spawning areas above large water control facilities.
- Implement environmental pulse flows and combine with WP BiOp actions to restore substrate recruitment and reduce streambed coarsening below dams.
- Implement the water quality measures in the WP BiOp that prescribe release flows from Foster dam to meet flow targets in the South Santiam River that protect spawning, incubation, rearing, and migration of salmonids.
- Implement other flow actions that increase the occurrence of peak flows that maintain and create habitat, thereby contributing to increased channel complexity and habitat diversity.
- Implement a combination of habitat improvements, targeted flows, and gravel augmentation actions that increase the retention and sourcing of gravels and other materials below USACE facilities.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs. Implement and evaluate potential reduction approaches.

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Very High	Non Core	Moderate
Winter Steelhead	Low	Core, Genetic Legacy	Very Low

Hatchery

Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally achieved by reducing the proportion of hatchery fish on spawning grounds to target levels.

Actions include:

- Promote a wild fish management zone above Foster dam.
- Promote a short and long-term conservation hatchery strategy that will lead to a viable naturally-produced population.
- In the short term, implement actions and associated RME below Foster facility that will reduce genetic and demographic risk to the extant natural origin fish population.
- Over long term, increase wild fish production below

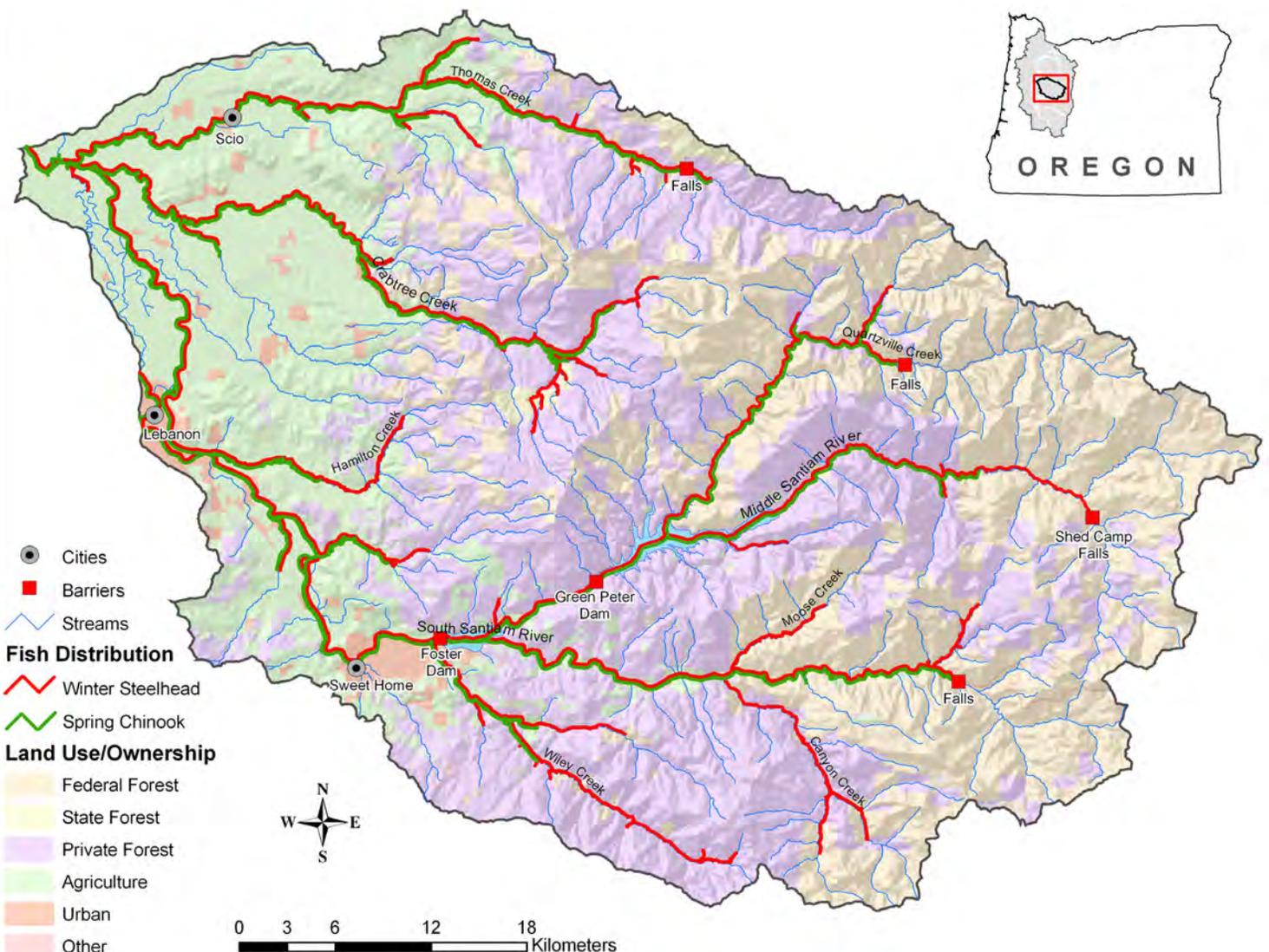
Foster Dam through WP BiOp water quality/ quantity improvements and other actions addressing limiting factors. Further develop a Conservation Supplementation (reintroduction) Program (CSP) or set of strategies to be implemented above Foster dam.

- Mark all hatchery fish.

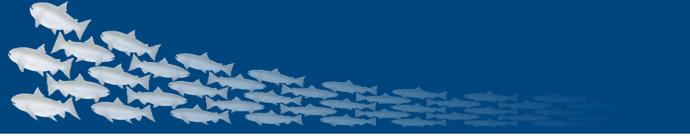
Reduce the key LFT of in-basin competition with naturally produced progeny of hatchery summer steelhead and residualized steelhead by conducting RME on release practices and other ways to reduce interactions.

Research, Monitoring, and Evaluation

- Monitor wild populations
- Address critical uncertainties
- Monitor trends and effectiveness of actions
- Adaptively manage, based on updated information



Calapooia Subbasin



Overarching Management Strategies

Land Use

Implement the suite of Willamette basin TMDL water quality actions, rural and urban best management practices (BMPs), habitat access actions, water conservation actions, and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Continue to work with agencies and private parties for a solution on the passage of adult Chinook salmon over Sodom and Shear dams that are associated with the Thompson’s Mills State Heritage Site.
- Subbasin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones, particularly in areas used by over-summering Chinook salmon.
- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Prioritize habitat actions that create adult Chinook holding pools in upper subbasin to reduce prespawning mortality.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.

- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Implement other water quality actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs. Implement and evaluate potential reduction approaches.

Hatchery

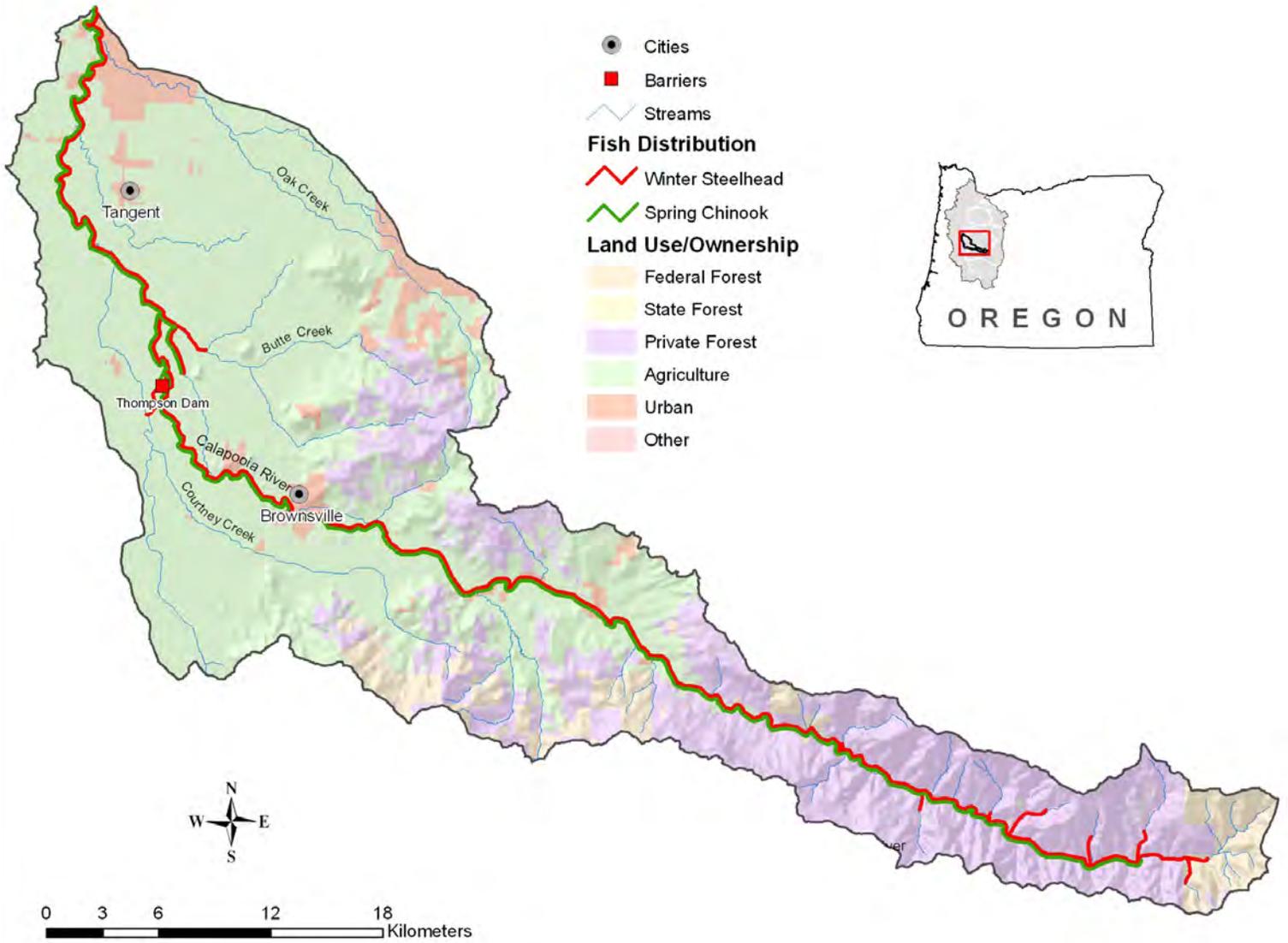
Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally by reducing the proportion of hatchery fish on spawning grounds to target levels. Actions include:

- Modify hatchery Chinook program practices in other subbasins of the ESU to minimize hatchery fish spawning in the Calapooia subbasin.

Research, Monitoring, and Evaluation

- Monitor wild populations
- Address critical uncertainties
- Monitor trends and effectiveness of actions
- Adaptively manage, based on updated information

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Very High	Non Core	High
Winter Steelhead	Moderate	Core	Moderate



McKenzie Subbasin



Overarching Management Strategies

Land Use

Implement the suite of rural and urban best management practices (BMPs), water conservation actions, and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Use existing plans and assessments to guide priority of habitat protection and habitat restoration opportunities in rural and urban areas.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).

Flood Control/ Hydropower

Implement the suite of WP BiOp actions associated with federally owned and operated water control facilities, and Eugene Water and Electric Board’s FERC agreement to address multiple (and somewhat related) limiting factors. Actions include:

- Improve adult facilities and outplanting measures to reduce prespawn mortality and improve adult access to holding and spawning areas above large water control facilities.
- Provide safe and effective downstream passage through Cougar and Trail Bridge reservoirs and dams.
- Operate Trail Bridge Dam to minimize adverse effects of ramping on fish stranding, redd desiccation, and loss of habitat in the McKenzie River downstream of Trail Bridge.

- Operate the facilities to mimic natural temperature regime, while at the same time complementing the downstream passage benefits of spilling and managing ramping rates to minimize stranding of early Chinook salmon life stages.
- Implement other flow actions that increase the occurrence of peak flows that maintain and create habitat, thereby contributing to increased channel complexity and habitat diversity.
- Implement a combination of habitat improvements, targeted flows, and gravel augmentation actions that increase the retention and sourcing of gravels and other materials below USACE facilities.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs. Implement and evaluate potential reduction approaches.

Hatchery

Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally achieved by reducing the proportion of hatchery fish on spawning grounds to target levels. Actions include:

- Promote a wild fish management zone above Leaburg dam.
- Promote a short and long term conservation hatchery strategy that will lead to a viable naturally-produced population.
- In the short term, implement actions and associated RME below Leaburg dam that will reduce genetic and demographic risk to extant natural origin fish population.

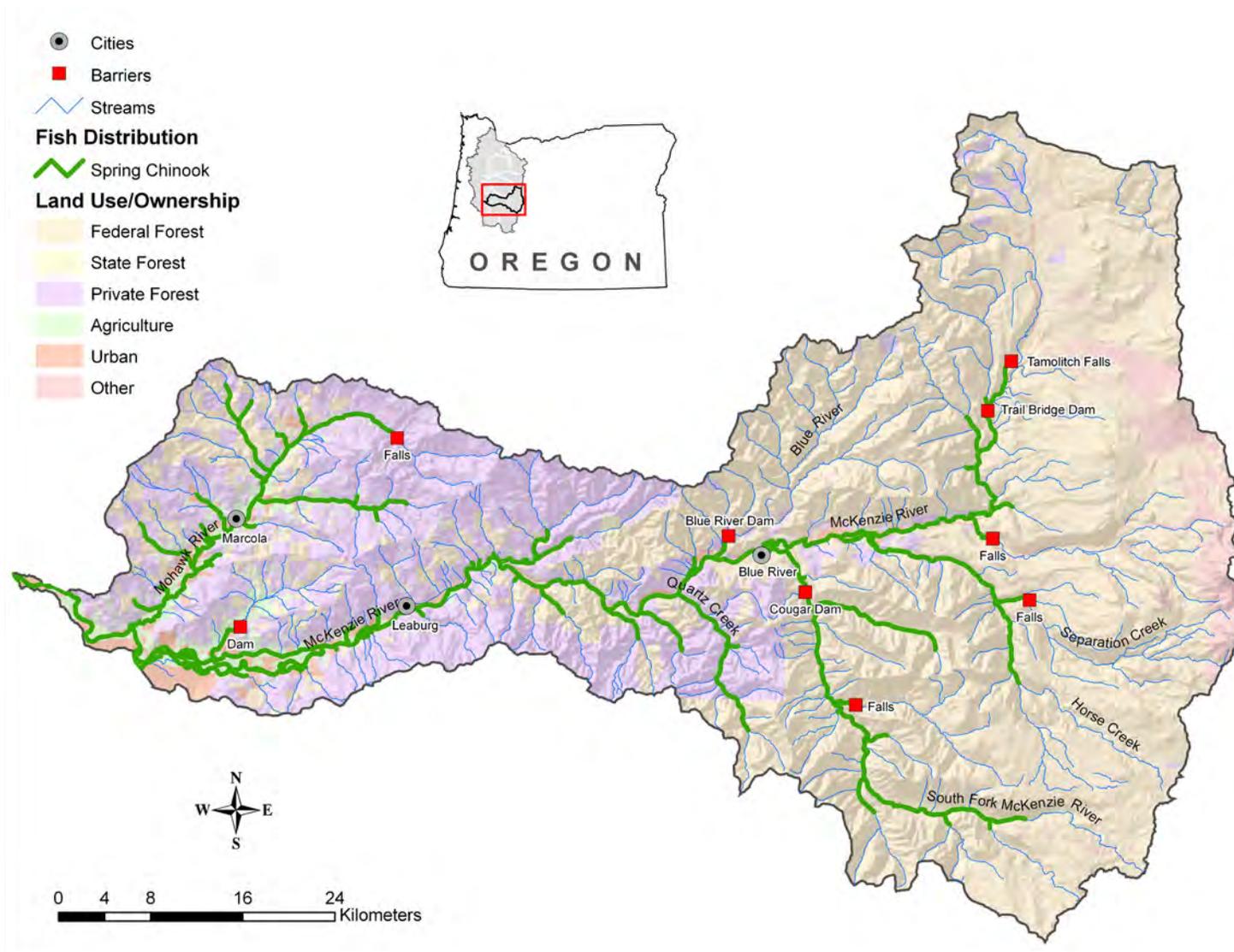
	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Low	Core, Genetic Legacy	Very Low

- Over the long term, increase natural fish production below and above Leaburg Dam through WP BiOp water quality/quantity improvements and other actions addressing limiting factors.
- Further develop a Conservation Supplementation (reintroduction) Program (CSP) or set of strategies to be implemented above Cougar dam and discontinue outplants of hatchery fish.
- Mark all hatchery fish.

Research, Monitoring, and Evaluation

- Monitor wild populations.
- Address critical uncertainties.
- Monitor trends and effectiveness of actions.
- Adaptively manage based on updated information.

Reduce the secondary limiting factor of predation by hatchery rainbow trout originating from the hatchery program in the subbasin by implementing different release strategies.



Middle Fork Willamette Subbasin



Overarching Management

Strategies

Land Use

Implement the suite of Middle Fork Willamette subbasin TMDL water quality actions, rural and urban best management practices (BMPs), water conservation actions, habitat access actions, and other land use actions to address multiple (and somewhat related) limiting factors. Actions include:

- Middle Fork Willamette subbasin temperature TMDL Water Quality Management Plan actions that increase the amount of riparian vegetation to improve shade function of riparian zones.
- Promote incentives to private landowners to protect intact riparian areas, floodplains, and high-quality off-channel habitats (particularly in moderate gradient streams) that are not covered by actions in other plans. Restore areas that are degraded and prioritize actions that improve the amount, complexity, diversity, and connectivity of riparian, confluence, and off-channel habitats.
- Evaluate water allocation policies and legal and illegal water withdrawals and look for opportunities to keep more water in the stream.
- Strengthen and implement BMPs that reduce non-point sourcing of inputs and runoff of agricultural and urban chemicals (pesticides).
- Implement other plans and actions that reduce point and non-point sourcing of runoff from urban, industrial, rural, and agricultural practices.

Flood Control/Hydropower

Implement the suite of WP BiOp actions associated with federally owned and operated water control facilities to address multiple (and somewhat related) limiting factors. Actions include:

- Improve adult facilities and outplanting measures to reduce pre-spawn mortality, and improve adult access to holding and spawning areas above large water control facilities.
- Provide safe and effective downstream passage through Willamette Project reservoirs and dams, including consideration of drawing down the reservoir levels on both an interim and long-term basis to improve juvenile survival.
- Operate the facilities or eventually build temperature control structures to mimic natural temperature regimes, particularly in the fall.
- Implement other flow actions that increase the occurrence of peak flows that maintain and create habitat, thereby contributing to increased channel complexity and habitat diversity.
- Implement a combination of habitat improvements, targeted flows, and gravel augmentation actions that increase the retention and sourcing of gravels and other materials below USACE facilities.

Other Species

Conduct RME to resolve uncertainty of impact of predation by native and non-native fish species within the subbasin that are not associated with hatchery programs. Implement and evaluate potential reduction approaches.

	Current Extinction Risk Status	TRT Designation	Desired Extinction Risk Status
Spring Chinook	Very High	Core	Low

Hatchery

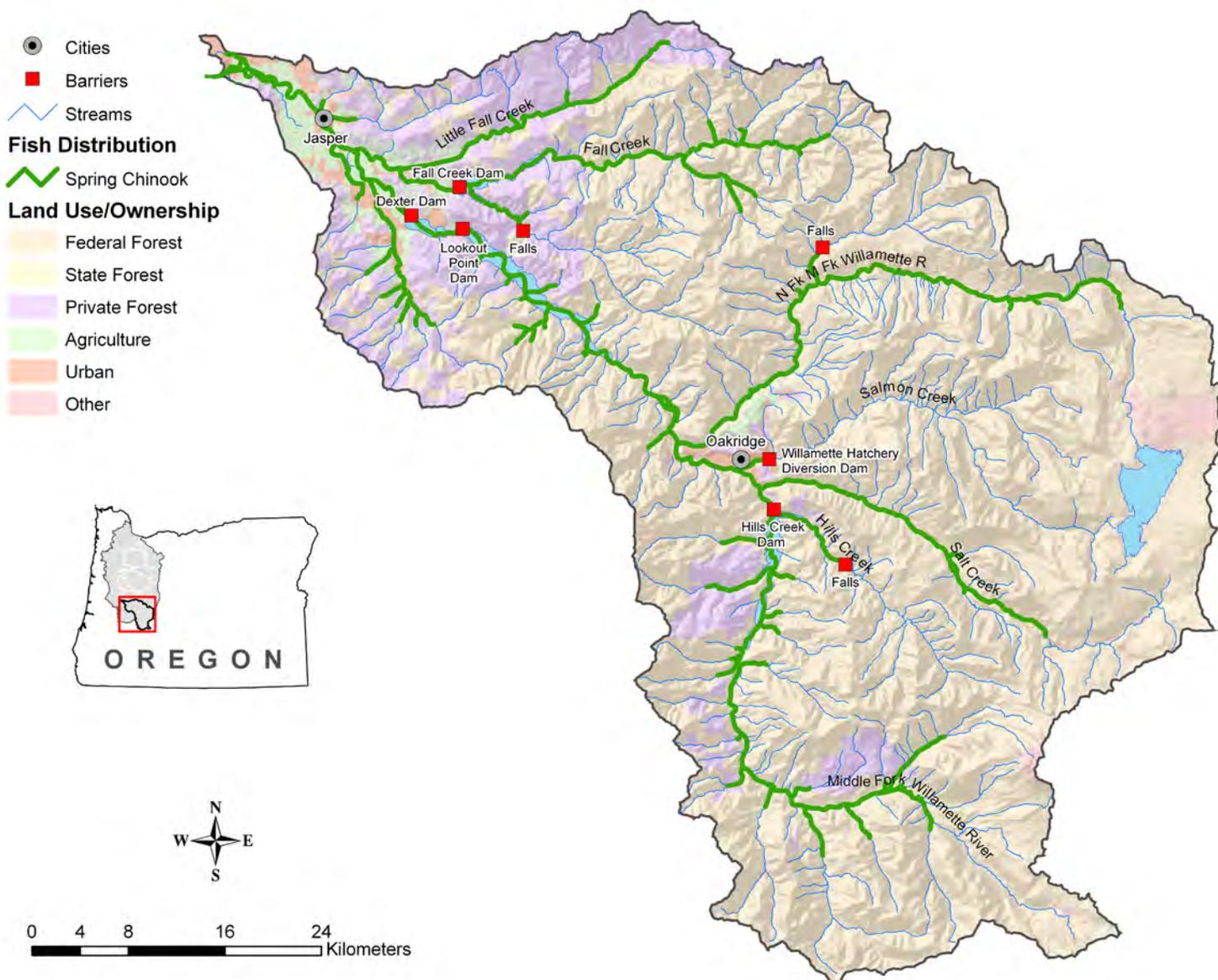
Implement actions that reduce the effects of hatchery fish on the productivity and diversity of the wild population, principally by reducing the proportion of hatchery fish on spawning grounds to target levels.

Actions include:

- Promote a wild fish management zone above Falls Creek and Lookout Point dams.
- Promote a short and long-term conservation hatchery strategy that will lead to a viable naturally-produced population.
- Further develop a Conservation Supplementation (reintroduction) Program (CSP) or set of strategies to be implemented above dams.
- Mark all hatchery fish.

Research, Monitoring, and Evaluation

- Monitor wild populations.
- Address critical uncertainties.
- Monitor trends and effectiveness of actions.
- Adaptively manage based on updated information.



Implementation



Multiple entities have contributed to recovery actions in all threat categories since ESA listing in the late 1990s, but the pace of implementation needs to accelerate in order to achieve recovery. The intent of this Plan is to focus actions in the most important areas and provide a prioritized roadmap for future actions. To this end, the Plan calls for coordination and communication of efforts from the ground level to the Willamette basin ESU/DPS level and across other related resource management groups within Oregon. To achieve this implementation, coordination, and communication, the implementation plan for this Recovery Plan has a defined structure for meeting and tracking progress towards recovery goals and a clear policy and management coordination path to other conservation and management plans. Internally it links functional roles among: 1) the implementers of 'on-the-ground' actions, 2) an RME program that tracks the results of such actions, and 3) an ESU/DPS-level reporting and coordinating management body. The objective of the framework is to facilitate information exchange regarding: 1) Plan action priorities at local scales, 2) how to effectively implement those local priorities within other regional conservation efforts and coordinated funding strategies, 3) technical issues and resources, and 4) linkages to state, ESU/DPS, and regional forums. The implementation framework will adapt and change as necessary to adjust to funding, available resources, and implementation needs. A key component of coordination will be development of three-year implementation schedules, which will outline site-specific, prioritized projects, with costs, timeframe, and responsible parties, based on actions identified in the Plan. Therefore, the implementation schedule will include more details and project-specific actions than are presented in the Plan and will provide more clarity and accountability for Plan implementation. The Coordination Team will coordinate policy, scientific, and project needs with the Willamette Project BiOp implementation and with the numerous efforts that are underway and expected to protect and restore habitat and native species in the Willamette Valley.



George Gentry, USFWS

A Note on Uncertainty Within the Plan, the Future Threats of Climate Change and Population Growth, and the Importance of RME and Adaptive Management

Although every effort was taken to use the best data and information available to conduct the analyses that went into this Plan, the data were not complete and, where data did exist, were subject to the imprecision, bias, and/or inaccuracy of all data sets, especially those collected for a different or more narrow purpose than that to which they were being applied. In addition, the complex, ecosystem dynamics across a large spatial and temporal scale addressed in this Plan likely have interactive and cumulative effects beyond the scope of the data or analyses. Therefore, there is a fair amount of uncertainty in the analyses of this Plan. In addition to analytical uncertainty, there is a fair amount of uncertainty as to several specific future threats, including climate change and human population growth and related development. In addition, there is uncertainty with respect to whether the proposed actions will be effective and lead to recovery and whether they will actually be completed given the largely voluntary nature of this Plan. Other uncertainties include costs associated with recovery actions, uncooperative or uninterested landowners or stakeholders, the feasibility of engineering or technological solutions, and conflicts with other societal goals or infrastructure.

In order to compensate for all of this uncertainty, a number of approaches were utilized. First, 'analytical conservation buffers' are factored into the analyses to assure that there is no erring on the side of assuming that recovery goals have been met when in fact they have not. The approaches entailed shifting extinction risk classes so that a lower extinction risk probability was necessary to achieve a given risk class, adding 20% to risk class gaps to account for climate change and human population growth, independently cross-checking results with other model results or professional judgment exercises, and making research, monitoring, and evaluation (RME) a primary component of Plan implementation so appropriate data can be collected and adaptive management can be implemented. In addition to the analytical conservation buffers, the Plan establishes an adaptive management framework, based on RME results that will allow the Plan and actions to be updated as needed to achieve recovery. It also calls for the immediate implementation of actions to address all identified threat categories, especially habitat-based actions which may take time to realize their full benefit. Finally, if recovery goals are not being met in an appropriate timeframe, more restrictive management, and possibly regulatory actions, may be necessary.

Research, Monitoring, & Evaluation & Adaptive Management



For this Plan to be successful, steps must be taken to implement the strategies and actions it calls for, to learn during implementation, and to continually check progress toward reaching recovery goals, making adjustments as necessary. The Plan calls for new or continued RME to resolve uncertainties, assess the effectiveness of actions, and gather data on the status and trends of populations, their habitats, and sources of threats. The Plan also incorporates an **adaptive management** process that dictates the use of new information derived from RME in order to modify, add, or discontinue actions or strategies. This ensures that the best and most effective means of achieving recovery are utilized, as uncertainty about the needs of fish populations and benefits of certain actions are reduced. In addition, the Plan calls for tracking of actions carried out as part of Plan implementation and in achieving recovery goals. RME results, adaptive management modifications, and action tracking will be documented in annual reports.

Timeframe & Costs



The implementation plan guides conservation and recovery actions through a 25-year time period, during which actions are to be completed and maintained. The Recovery Plan also calls for immediate implementation of as many actions as possible. Defining an implementation plan period was necessary to structure action implementation needs, as well as overall plan costs. However, the plan is designed to be flexible to account for new information, analyses, science, strategies, actions, criteria, population structures, or policy direction that arise within that timeframe as a result of RME, adaptive management or a scheduled revision to the Recovery Plan after 12 years.

The overall cost of achieving delisting was estimated at \$266,000,000 over 25 years. Not included in the overall cost were actions from the Estuary Module, Willamette Project BiOp, TMDL implementation plans, or other regulatory programs. Most costs were associated with improving habitat and water quality conditions in subbasins. Professional judgment was used for some costs, and where there was not enough information to determine the quantity or specifics of an action, identification of costs was deferred into the future. Therefore, the cost estimate should be considered a low figure.

Broad Sense Recovery



If Oregon and NMFS are successful in effectively implementing the actions identified in this Plan, the ESA delisting recovery goal should be achieved. However, at this level, it will be unlikely that wild Chinook salmon and steelhead populations of the UWR sub-domain will provide many significant benefits to the citizens of Oregon. Therefore, Oregon has an additional broad sense recovery goal of **“having Oregon populations of naturally produced salmon and steelhead that maintain a self-sustaining SMU while providing significant ecological, cultural, and economic benefits.”** The Plan identifies criteria to achieve this more ambitious goal, as well as desired statuses and threat reduction scenarios. In addition, actions contained within the Plan will help achieve this goal, although the Plan does not go so far as to identify all of the actions necessary for each population to achieve it. Population-specific actions are described to achieve the delisting goal; actions necessary, if any, for each population to transition from a delisting desired status to a broad sense recovery desired status will be identified in the future.

Conclusion



Recovery of ESA-listed salmon and steelhead will require actions that conserve and restore the key biological, ecological, and landscape processes that support the ecosystems upon which salmonid species depend. These measures will require implementation of specific habitat protection and restoration actions and complementary management of harvest, hatchery, and hydropower programs. The development of an effective implementation framework coupled with a responsive RME and adaptive management plan provides the best assurance that the Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead will be fully implemented and effective. The Plan's identification of desired statuses, key and secondary factors that have caused gaps between current and desired statuses, and actions to close gaps will ensure that delisting goals will be achieved if the Plan is fully implemented, and that progress will be made towards achieving broad sense recovery goals. The key to full implementation and success in achieving the Plan's goals will be the full implementation and funding of supporting plans and the voluntary embracing and participation of Oregon citizens living within the Upper Willamette River sub-domain. It is only through the involvement of all of those who live and work in this area that recovery will be achieved.



