Attachment 2

Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead

12-Year Assessment
2010-2022

Appendix I. Plan Actions

Oregon Department of Fish and Wildlife
4034 Fairview Industrial Drive SE
Salem, OR 97302

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
5 - Trib	Maintain screens and fish passage structures.	---	ongoing	Owners	Ongoing across the ESU.
6 - Trib	Develop recommendations for land management scenarios that address hydrograph changes due to climate change, impervious surfaces, and other factors that result in altered water runoff.	---	within 15 years	ODFW, ODF, OWRD, ODLCD, ODA, Counties, Metro, Municipalities	Nearly all municipalities and forms of government across the ESU have or are in the process of developing a Climate Action Plan; plans primarily focus on carbon emission reductions and not altered hydrology and land use planning. The City of Portland plan has two objectives dealing with floodplain management.
7 - Trib	Limit future in-river and groundwater withdrawals so that they do not impede achievement of recovery goals.	---	ongoing	OWRD, Legislature, Metro	Oregon water law has remained unchanged, but Oregon Water Resources Department (OWRD) rules do include procedures and standards to aid the Oregon Department of Fish and Wildlife (ODFW) in determining whether a proposed use will impair or be detrimental to the public interest regarding sensitive, threatened or endangered fish species. Oregon Revised Statute (ORS 537.409) also provides some provisions to ensure that certain reservoirs do not pose a significant detrimental impact to existing fishery resources. Oregon Administrative Rule (OAR) 690-033-0220 directs OWRD to determine if a proposed use of water is detrimental to the protection or recovery of a threatened or endangered species and cannot be conditioned or mitigated to avoid the detriment. ODFW does recommend conditions and/or mitigation for new water uses that may impede achievement of recovery goals.
8 - Trib	Develop options for water banking and implement.	---	within 15 years	OWRD, Metro	In progress. The Hood River Working Group completed the Feasibility Study of Program and Implementation Alternatives for a Hood River Water Bank in 2019 and is currently in discussion on creating a pilot program.
9 - Trib	Develop and/or implement stormwater management plans for urban areas and roads.	---	within 15 years	ODEQ, Counties, Metro, Municipalities	In progress. See City of Portland 2020 stormwater manual. Johnson Creek Watershed Council (JCWC) completed the Johnson Creek Watershed Stormwater Best Management Practice (BMP) Prioritization and implemented their first project in 2022. All counties, cities and Department of Transportations (DOT's) have requirements for treating stormwater for urban areas and roads.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
10 - Trib	Protect and restore riparian areas to improve water quality, provide long-term supply of large wood to streams, and reduce impacts that alter other natural processes.	---	within 15 years	WS Councils, ODFW, SWCD, Counties, Municipalities	In progress. Metro has secured lands through Nature bond measures in the Scappoose, Clackamas, and Sandy populations. The Cowlitz Tribe acquired property at the confluence of Youngs/Wallooskee River. The Portland Water Bureau secured conservation easements in Sandy per their Habitat Conservation Plan (HCP). Columbia Land Trust (CLT) and the Columbia River Estuary Task Force (CREST) have multiple conservation easements in the estuary downstream of Portland. CLT has a conservation easement on the Powerdale corridor in Hood. Across the Evolutionary Significant Unit (ESU), 77.9 percent of the broad sense goals and 146.8 percent of the revised delisting scenario goals for riparian enhancement have been met.
11 - Trib	Assure adequate regulations are in place to protect existing high-quality habitat and eliminate, or reduce and fully mitigate, impacts of future development (with cities, counties, DLCD, ODA, DEQ, etc.).	---	within 15 years	ODLCD, Counties, Municipalities	Regulations slightly improve with time. The National Oceanic and Atmospheric Administration (NOAA) continues to point to inadequacy of regulatory mechanisms under their listing factor criteria as an issue during the 5-year status reviews.
12 - Trib	Develop methodology to assess and identify, and then protect, stream reaches and population strongholds which will be resilient/resistant to climate change impacts.	---	within 15 years	WS Councils, ODFW, ODSL, Counties, Municipalities	In progress. ODFW is developing Statewide Aquatic Habitat Prioritization that includes climate change considerations.
13 - Trib	Protect and restore headwater rivers and streams (salmon and non-salmon bearing) to protect the sources of cool, clean water and normative hydrologic conditions.	---	within 15 years	WS Councils, ODFW, ODEQ, ODF, ODSL, OWRD, ODA, USFS, Counties, Metro, Municipalities	In Progress. Oregon Forest Practices Act revised in 2022 consistent with Private Forest Accord. Western Oregon State Forest Habitat Conservation Plan (HCP) in development. ODFW continues to apply for new instream water rights across the state. Metro purchases and protects McCarthy Creek headwaters.
14 - Trib	Conduct sediment source analysis and then implement actions to reduce sediment from identified sources.	---	within 15 years	ODEQ, ODA	Action has not been implemented.
15 - Trib	Coordinate and streamline efforts to restore impaired instream habitat complexity, access to off-channel habitat, and riparian conditions.	---	within 15 years	WS Councils, ODFW, ODF, ODSL, ODA, USFS, NRCS, SWCD, Metro	In progress. Work is being done across the ESU: Youngs Bay (YB), Big Creek (BC), Clatskanie (CT), Scappoose Bay (SB), Clackamas (CL), Sandy (SA), and Hood. The Lower Columbia Estuary Partnership (LCEP) is working in the Lower Gorge (LG) population.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
16 - Trib	Streamline permitting process for large wood placement for streams not covered by Forest Practices Act.	---	within 15 years	ODFW, ODSL, USACOE	In progress. Aquatic Restoration Biological Opinion (ARBO 2) for federal lands. Oregon Department of State Lands (ODSL) continues to offer the General Authorization/General Permit (GA/GP) for waterway habitat restoration and placement of Large Woody Debris (LWD) and United States Army Corps of Engineers (USACOE) offers a Nation Wide (NW 27). Permitting issues within the ESU are floodplain permitting, the no net rise clause associated with the Conditional Letter of Map Revision (CLOMR) process and Section 104 of the National Historic Preservation Act (NHPA), both cause significant delays and add significant costs to stream restoration.
17 - Trib	Implement credible, science-based programs, policies and rules that contribute collectively to protect fish and water resources.	---	within 15 years	ODFW, OWEB, ODF, ODSL, ODEQ, WRD, ODLCD, ODOT, ODOGAMI, ODA, OPRD, USFS, Counties, Metro, Municipalities	Ongoing.
18 - Trib	Provide adequate funding and staffing for existing programs to achieve their mandates.	---	ongoing	Legislature, USFS, Metro	In progress. Smaller Watershed Councils (WCs) still lack capacity to fully engage.
19 - Trib	Adequately fund and implement research needed to answer critical uncertainties related to the assumptions under which the recovery plan was developed.	---	within 15 years	ODFW, OWEB, Legislature, NMFS, Metro	In progress. Plan lists dozens of critical uncertainty research needs; some are occurring.
20 - Trib	Develop joint ODF/ODFW/ODA/DSL team to more clearly describe the large wood goals and potential ways to achieve these goals.	---	within 15 years	ODFW, ODF, ODSL, ODA	This was attempted by the Implementation Coordinator (IC) in 2014; a sub-committee was formed from the IC team and met twice. Eventually the restoration goals from the recovery plan were modified to reflect near-term goals associated with max feasible or delisting scenarios.
21 - Trib	Provide education on the goals of recovery plans, what is needed to achieve these goals, and how citizens can contribute.	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, OWRD, ODLCD, ODOT, ODOGAMI, ODA, OPRD	Ongoing. The Clackamas and Hood restoration Strategic Action Plans (SAPs) have direct links to recovery plan goals. IC has advised multiple entities throughout the years on recovery plan goals. IC has given multiple presentations across the ESU on the recovery plan and its goals.
22 - Trib	Support funding for outreach efforts that educate and engage landowners, including Coffee Klatches and Oregon Small Woodland Owner's Howdy Neighbor events.	---	ongoing	OWEB, ODF	Ongoing. The Oregon Department of Forestry (ODF) has both stewardship foresters as well as small grant programs for small woodlots owners. The Natural Resource Conservation Service (NRCS) works with small woodlot owners writing management plans and the Oregon Watershed Enhancement Board (OWEB) continues to support outreach efforts.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
23 - Trib	Fund OSU Extension Service to provide Riparian Function Workshops for all Oregon Plan participants to improve success rate of volunteer projects.	---	within 15 years	OWEB, OSU Extension Service	Did not occur.
24 - Trib	Provide education and outreach to contractors, developers, and resource owners.	---	ongoing	WS Councils, ODFW, ODF, ODSL, ODEQ, OWRD, SWCD, Metro	Ongoing action through ODFW watershed districts on habitat related permitting.
25 - Trib	Provide enhanced incentives for habitat restoration work, including: a) Rewarding and assisting landowners doing the 'extra' work needed to achieve recovery goals, and b) Developing an equitable system of recognition and rewards for both landowners who are not regulated and landowners who are regulated.	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODA, OGNRO, Legislature, NMFS, NRCS	a) Ongoing. The Western Oregon Stream Restoration Program (WOSRP) is assisting landowners doing work to achieve recovery plan goals. b) ODSL and ODF have recognition systems in place.
26 - Trib	Participate in the development of emerging ecosystem markets and ensure they are shaped to be consistent with recovery goals and actions.	---	ongoing	ODFW, OWEB, ODF, ODSL, ODEQ, OWRD, ODLCD, ODOT, ODOGAMI, ODA, OPRD, OGNRO, NRCS, SWCD	Ecosystem markets are limited in the ESU to ODSL wetland mitigation banks and Portland Harbor superfund mitigation sites.
27 - Trib	Provide liability protection for landowners that participate in restoration projects.	---	within 15 years	Legislature, OR Attorney General	ORS 496.270.
28 - Trib	Explore land use strategies and regulations to reduce ownership fragmentation, including, but not limited to, acknowledging the importance of family-owned forests and supporting actions that help sustain working family-owned forests.	---	within 15 years	ODF, ODLCD, Counties, Municipalities	Ongoing. Oregon's land use laws implemented in the 1980s vastly reduced land ownership fragmentation. The Oregon Department of Land Conservation and Development (DLCD) is charged with ensuring non-federal land management entities comply with statewide planning goals. Recent bills at the state level (HB2001:2020) Middle Housing Bill and Portland's Residential Infill Project 2021 allows higher densities on existing lots.
29 - Trib	Promote and provide technical support for volunteer efforts of private landowners and user groups to increase the amount of large wood in stream channels (e.g. site-specific riparian management plans, placement of large wood, reducing removal).	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, NRCS, SWCD	Ongoing. Watershed councils in nearly every Lower Columbia River (LCR) population area are assisting landowners to address primary limiting factors (LF's) affecting listed species. The IC and others are also working with groups to use LWD volume benchmarks instead of the key pcs benchmark commonly used in restoration practices. An area for improvement is coordination with NRCS staff who work with local small woodlot owners in writing timber management plans. There is a need to coordinate with landowners with high priority stream reaches to consider adding LWD to streams as part of the planning process.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
30 - Trib	Update floodplain and channel migration maps and incorporate into land use planning; include projected future floodplains resulting from climate change.	---	within 15 years	ODLCD, ODOGAMI, FEMA, Metro	In progress. Communities enrolled in the National Flood Insurance Program (NFIP) are required to update floodplain maps due to NOAA's 2016 Biological Opinion (BiOp) calling jeopardy on the program. Currently a pilot mapping program is being implemented, including the upper Sandy and Johnson Creek. The pilot includes future changes associated with climate change scenarios.
31 - Trib	Develop regulations to ensure that there is no impact from future new development and re-development in the 100-year floodplain (including stormwater, wetlands, vegetation, etc.).	---	within 15 years	ODSL, ODLCD, Counties, Metro, Municipalities	In progress. See Oregon Implementation Plan for NFIP-ESA Integration (draft 2021): Reasonable and Prudent Alternative (RPA) Element 4: Floodplain Management Criteria for Special Hazard Areas that Avoid, Minimize, and Mitigate Program Level Impacts, 4 path approach for communities. (Only for NFIP communities).
32 - Trib	Prohibit development of new dikes, levees, and floodwalls in 100-year floodplain unless they will not increase flood volume, size, and/or intensity.	---	within 15 years	ODSL, USACOE, FEMA, Counties, Municipalities	In progress. The Federal Emergency Management Agency (FEMA) partners with DLCD to implement the NFIP in Oregon. To participate in the NFIP, communities are required to meet the following standard: Ensure the prohibition of encroachments into the floodway portion of the 100-year floodplain if there would be any increase in flood level.
33 - Trib	Develop regulations to ensure that new or existing levees and floodwalls are vegetated.	---	within 15 years	ODSL, USACOE, Counties, Municipalities	Ongoing. Landscape planting is a requirement on all new and existing levees and floodwalls. Planting involves types of planting materials by zone.
34 - Trib	Revise the National Flood Insurance Program community rating system to be consistent with actions in this Plan.	---	within 15 years	FEMA	In progress. The Community Rating System was updated in 2017 and 2021 and includes mapping associated with climate change, open space preservation, increased regulation, buyout of structures in the floodplain and stormwater management.
35 - Trib	Provide FEMA funding for land acquisition in 100-year floodplain; prioritize acquisitions based on recovery plan priority areas.	---	within 15 years	FEMA	In progress. The decision to offer buyouts is made by the state using money that FEMA allocates through its Hazard Mitigation Grant Program to reduce future disaster losses. Seventy-five percent of any buy out cost is paid by FEMA and the rest is paid by the state and/or local government. No discussions have occurred with DCLD or local agencies regarding recovery plan priorities.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
36 - Trib	Regularly update inventories and maps of instream habitat conditions, water quality, wetlands, and riparian conditions (including restoration projects) to capture current habitat conditions more accurately; incorporate information into action plan prioritization process to improve likelihood of achieving desired watershed status goals.	---	within 15 years	ODFW, ODF, ODSL, ODEQ, ODA, USFS	Ongoing. Every major WC has updated their watershed action plans with the most recent water quality, habitat quality, riparian and wetland conditions. These are all used to set priorities within their service areas.
37 - Trib	Enhance efforts to enforce existing land use regulations, laws, and ordinances.	---	within 15 years	ODFW, ODF, ODSL, ODEQ, ODLCD, ODOGAMI, ODA, Legislature, Counties, Metro, Municipalities	In progress. Enforcement efforts on land use ordinances have remained consistent over the years.
38 - Trib	DSL will work within existing mandates to facilitate habitat actions by: 1) Continuing efforts to streamline the permitting process for fish habitat and wetland restoration projects. 2) Strengthening interagency coordination on projects that may impact natural ecological processes. 3) Where restoration projects are identified in this recovery plan, facilitating efforts to implement the action. 4) Requiring avoidance and minimization of impacts to waters of the state in priority areas identified in this recovery plan. 5) Working with landowners to design projects that avoid and minimize impacts to wetlands and other waters of the state. 6) Providing education and technical assistance to those interested in voluntary wetland restoration, creation, or enhancement projects. 7) Exploring opportunities to target compensatory mitigation towards areas with high intrinsic potential for salmon and/or have been identified as priority areas for restoration in watershed assessments and this recovery plan. 8) Exploring conservation easements for state-owned lands with high value for salmon recovery.	---	ongoing	ODSL	Ongoing. 1) ODSL continues to offer a GA for Stream Restoration and is attempting assumption for permitting of wetland mitigation banks under section 404 of the federal Clean Water Act. 2) ODSL continues coordination on projects with ecological impacts. 3) ODSL staff are not necessarily familiar with individual recovery plan actions but do facilitate permitting for these projects. 4) Additional coordination needed. 5) Ongoing process with regulatory agencies, commenting agencies, and others. 6) ODSL does this and frequently directs them to ODFW staff to build better projects when interest is shown by the project proponent. 7) Has not been implemented. 8) ODSL can do this through ORS 141-145, but unknown if any requests made of ODSL. Easement can be issued for 50% of Assessed Value (AV).

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
39 - Trib	Where habitat restoration targets exist and progress toward them is tracked, develop population-specific strategies (e.g., funding, incentives, outreach, regulations, etc...) to meet those targets where targets are not being met in the first five years of implementation, with priority given to populations required to become viable.	---	within 15 years	ODLCD, Counties, Municipalities	In progress. Habitat restoration targets exist in every population. Targets achieved in SA and YB. Strategies developed in Hood, CL, BC. CT and SB in progress.
40 - Trib	Where population-level habitat monitoring indicates statistically significant temporal degradation of key habitat features within a population, encourage new or revised regulatory measures for the key habitat feature(s) within the population that eliminate further degradation, protect existing high-quality areas, and allow long-term/"passive" restoration in other areas.	---	within 15 years	ODLCD, Counties, municipalities	In progress. Habitat monitoring is ongoing, but additional years of data collection are needed to determine if significant temporal degradation is occurring for key habitat variables.
41 - Trib	Streamline the delivery of large wood to restoration sites by: - designating a coordinating entity and creating an online database of large wood that links entities that have large wood to offer with those in need of large wood for restoration projects - developing storage/staging areas to enable storage of wood for future projects - working with federal, state, and private forests and other land managers to identify ways to improve access to available large wood - providing technical advice on what should be done with the large wood that is legally removed (e.g. during dredging operations)	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODOT, OPRD, USFS, City of Portland, Port of Portland	In progress. - Designation of a coordinating entity was attempted with a sub-group of the implementation team. No entity was interested in this role. - Storage areas have been developed in the CL population (Kellogg, Clackamas, Metro). Wood has not yet been delivered to storage areas. Restoration practitioners have not moved wood to storage areas even when wood has been donated. It costs more to move the wood twice than to buy the wood and transport when ready. - Recent catastrophic wildfires have brought this action to the front. The Bureau of Land Management (BLM) has been a resource in identifying mechanisms to move large wood to restoration projects. Clackamas County has been a willing cooperator. - This is likely done during the permit review process for dredging activities.
42 - Trib	Provide more resources and incentives to small (non-metropolitan) communities so they have the infrastructure to better manage runoff from impervious surfaces.	---	within 15 years	WS Councils, OWEB, ODEQ, Metro	Ongoing. The Oregon Department of Environmental Quality (ODEQ) offers Clean Water State Revolving Fund Loans and 319 grants.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
43 - Trib	Adequately fund and implement monitoring needed to track progress towards achieving recovery goals.	---	immediate	ODFW, OWEB, Legislature, NMFS, LCREP	Ongoing. The ESU has a robust monitoring program but, in some cases, has had to make cuts and focus on higher priority basins. In 2021, monitoring in the Hood focused on steelhead was cut due to prioritization of Bonneville Power Association (BPA) funding leaving a monitoring gap in the Hood population.
44 - Trib	Monitor, or continue to monitor, populations to track status and trends and improve understanding of the composition of natural spawners (what type/stray rates? how many? where from? timing?), other life history information, and habitat.	---	immediate	ODFW	Ongoing. The ESU has a robust monitoring program but, in some cases, has had to make cuts and focus on higher priority basins.
45 - Trib	Fund Implementation Coordinator position.	---	ongoing	ODFW, OWEB, NMFS	Ongoing.
46 - Trib	Complete annual reporting for this plan and coordinate adaptive management actions as necessary and indicated by monitoring and reporting results.	---	immediate	ODFW	Ongoing. Annual reporting has occurred for every year except 2019, when delays due to COVID and associated disruptions to data collection and availability occurred. Adaptive management actions are documented in annual reports and the 12-year assessment.
47 - Trib	Fund development and maintenance of web-based data management and reporting, including tracking needs and accomplishments by entity through a map-based depiction of prioritized actions and locations.	---	within 5 years	OWEB, NMFS	In progress. The Oregon Watershed Restoration Inventory (OWRI) was created in 1998 and is the most comprehensive inventory. OWRI is not used by all practitioners. There is no web-based tool that shows all accomplishments by entity and priority areas. The IC maintains a comprehensive Excel spreadsheet detailing projects by entity and location.
48 - Trib	Assess adequacy of local regulatory programs to address listing threat factors within the federal ESA framework (e.g., 5-year status reviews, delisting decision, other).	---	within 5 years	NMFS	Ongoing. 5-year status reviews have been completed in 2016 and 2022.
49 - Trib	Conduct detailed climate change risk analysis for all populations and use this to help prioritize actions, or develop new ones, that are contained in the Implementation Schedule.	---	immediate	ODFW	In progress. Crozier et al. completed a climate vulnerability study for ESUs in 2019. Lower Columbia River and Conservation Plan (LCRCRP) 12-year Assessment includes review of climate projections, vulnerability, and strategies for mitigating potential negative impacts. Projects in the CL population are prioritized for amelioration of climate impacts per Beechie et al. 2013.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
50 - Trib	Develop three-year Implementation Schedules across and within populations for priority actions at a site-specific scale based on existing reach-specific habitat assessments, identified regulatory requirements, other threat reduction needs, research and monitoring needs, and adaptive management; where no reach-specific assessment (i.e., Scappoose, Clatskanie, Big Creek, Youngs Bay), or assessment information at the appropriate scale for specific limiting factors or threats, exist, find funding and conduct assessments in order to develop the Implementation Schedule.	---	immediate	ODFW	In progress. The last completed three-year implementation schedule (3 YIS) ended in 2018. The IC helps each watershed council develop SAPs (which serve a similar purpose). Reach specific conditions and limiting factors have been identified for all areas except the Upper and Lower Gorge populations and are used in SAPs.
51 - Trib	Recommend to funding entities: - project solicitations and selection should reflect recovery plan priorities, - the majority of funds should be directed to high priority locations and actions, while reserving funding for other appropriate actions to meet goals in all pop areas, and - actions resulting from funding should be reported in metrics that allow tracking of progress toward recovery goals (requires initial work with Implementation Coordinator to develop or identify appropriate metrics).	---	ongoing	ODFW, NMFS	Ongoing. - The IC works with WCs to develop SAPs which reflect recovery plan priorities and use metrics for prioritization from the recovery plan. (YB, BC, CT, SC, CL, SA, Hood). The IC also is a member of the OWEB Regional Review team and makes funding recommendations reflecting LCR and Upper Willamette River ESU priorities. - The IC is an advocate for this action within the OWEB review team as well as various Partnerships within the ESU. Action is occurring and ongoing. Clackamas Project Tracker is a good example.
52 - Trib	Develop education and outreach materials on the benefit of beaver dams to ecosystem function in general and specifically to juvenile rearing habitat (especially for coho).	---	within 15 years	ODFW	Ongoing. Much has happened in this action since plan adoption: ODFW Living with Wildlife, ODFW Conservation Strategy, Oregon Zoo, Beaver Coalition. IC annual meetings promoting beaver habitat restoration, ODFW Beaver Working Group, Private Forest Accord (PFA) Beaver Biologists.
53 - Trib	Provide technical and financial assistance to landowners with property damage due to beavers and provide incentives to landowners that want to manage their land to achieve the habitat benefits provided by beaver dams. This includes developing agreements with landowners that would establish benchmarks for the amount of damage done by beavers. Once damage exceeded the agreed upon benchmark, a management entity would remove or reduce the beaver population from the affected property.	---	within 15 years	ODFW, OWEB, ODA, NRCS, SWCD	Ongoing. ODFW Biologists provide technical assistance to landowners with beaver damage and encourage non-lethal remedies. Other agency staff such as the Oregon Department of Transportation (ODOT), Oregon Forestry Research Institute (OFRI) and municipalities also encourage non-lethal options. No compensation programs for beaver damage have been noted to date.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
105 - YB	Provide / improve fish passage and water quality.	Tucker Crk and Crosel Crk tide gates	within 15 years	WS Councils, ODFW, NRCS, SWCD	Ongoing. 11 fish passage corrections completed, including Tucker Creek and Crosel Creek tide gates.
106 - YB	Explore cooperative water conservation measures.	Lewis and Clark R	within 15 years	WS Councils, ODFW, OWRD, City of Warrenton	In progress. See City of Warrenton Water Master Plan 2018. The city continues to make improvements to address non-revenue water, including recently installing meters at large users that were previously unmetered (Marina, Public Works Yard, and Wastewater Treatment Plant) and implementing a customer meter replacement program, completed in 2018. They are also now tracking hydrant use to account for in future water loss calculations.
107 - YB	Implement research, monitoring, and evaluation of headwater springs to investigate the concern that they may be drying up due to land management practices.	watershed-wide	within 15 years	ODFW, OWRD	Not yet implemented, but an identified action in the North Coast Watershed Association (NCWA) chum salmon habitat restoration plan.
108 - YB	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	Lower/mid Lewis and Clark R; Wallooskie Crk; Youngs R; South and North forks Klaskanine R	within 15 years	WS Councils, ODFW, ODF, NRCS, SWCD	No increase in off-channel habitat has been documented (not including the estuary).
109 - YB	Preserve recent wood input from 12/7 storm.	Upper Lewis and Clark HEA	within 15 years	WS Councils, ODFW, ODF	This is an action to preserve wood from a 2007 storm.
110 - YB	Assess need for additional LWD to improve instream habitat complexity.	Middle and North Fork Klaskanine	within 15 years	WS Councils, ODFW	Completed in 2021 Return of the Redds SAP.
111 - YB	Restore instream habitat complexity, including large wood placement.	Cullaby Crk; Upper Wallooskie; Upper Lewis and Clark HEA	within 15 years	WS Councils, ODFW, ODF	In progress; 4.2 miles of LWD have been added in YB population; this is 183 percent of the revised delisting scenario goal and 9.1 percent of the broad sense goal.
112 - YB	Protect intact and functioning riparian areas through riparian easements and acquisition.	Youngs Bay – mainly Lewis and Clark R	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODA, NRCS, SWCD	In progress; 320 acres acquired within the estuarine zone (Wallooskee/Youngs, Pacific Ridge and Alder Creek).
113 - YB	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Youngs Bay – mainly Lewis and Clark R	within 15 years	WS Councils, ODFW, OWEB, ODF, ODA, NRCS, SWCD	In progress; 14.07 miles of riparian habitat have been restored, this is 1563 percent of the revised delisting scenario goal and 74.1 percent of the broad sense goal.
114 - YB	Conduct sediment source analysis and then implement actions to reduce sediment from identified sources.	watershed-wide	within 15 years	WS Councils, ODEQ	Not yet implemented, but an identified action in the NCWA chum salmon habitat restoration plan.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
120 - BC	Explore cooperative water conservation measures.	Bear Crk; Water Supply Cr	within 15 years	WS Councils, ODFW, OWRD, City of Astoria	See Bear Creek, Astoria Water System Master Plan 2021. Graphics show that future demands through 2070 are projected to be within the capacity of the treatment plant and the total maximum authorized rate of the City's certificated water rights. No water conservation measures are discussed or planned.
121 - BC	Implement research, monitoring, and evaluation of headwater springs to investigate the concern that they may be drying up due to land management practices.	Watershed-wide	within 15 years	ODFW, OWRD	Action has not been implemented.
122 - BC	Restore instream habitat complexity, including large wood placement.	Coon Crk; Elk Crk; up. Big Crk; Rock Crk; l. Gnat Crk; Bear Crk; Water Supply Cr	within 15 years	WS Councils, ODFW, ODF, NRCS, SWCD	In progress;1.85 miles of LWD have been added in BC population, this is 7.8 percent of revised delisting scenario goal and 3.2 percent of the broad sense goal.
123 - BC	Possible road re-alignment.	Bear Crk; Water Supply Crk	within 15 years	ODFW	In progress; See Bear Creek, Astoria Water System Master Plan 2021. The existing transmission main route is subject to landslides, particularly in the event of a large earthquake. A 2019 geotechnical resilience study of the transmission main was conducted by Hart Crowser, Inc. to evaluate the vulnerability of the existing route and identify possible new, more resilient routes.
124 - BC	Provide / improve fish passage and water quality.	John Day Crk tide gate (Clairmont Rd)	within 15 years	WS Councils, ODFW, SWCD	Ongoing; 15 fish passage corrections completed, including John Day Creek tide-gate at Clairmont Road.
125 - BC	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	Upper Big Crk; Coon Crk; Elk Crk; Rock Crk; Lower Big Crk; Little Crk; Bear Crk; Water Supply Cr	within 15 years	WS Councils, ODFW, ODSL, SWCD	No increase in off-channel habitat has been documented (not including the estuary).
126 - BC	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Big Crk Pop-wide	within 15 years	WS Councils, ODFW, OWEB, ODF, ODA, SWCD	In progress; 3.26 miles of riparian habitat have been restored, this is 19.2 percent of the revised delisting scenario goal and 17.2 percent of the broad sense goal.
127 - BC	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	---	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress; 0.42 miles of side channel were improved/added, this is 23.3 percent of the revised delisting scenario goal and 8.4 percent of the broad sense goal.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
128 - BC	Conduct sediment source analysis and then implement actions to reduce sediment from identified sources.	watershed-wide	within 15 years	WS Councils, ODEQ	Not completed, but an identified action in the NCWA chum salmon habitat restoration plan.
135 - CT	Implement research, monitoring, and evaluation of headwater springs to investigate the concern that they may be drying up due to land management practices.	watershed-wide	within 15 years	ODFW, OWRD	Action has not been implemented.
136 - CT	Protect intact and functioning riparian areas through riparian easements and acquisition.	Priority tidal areas; lower Clatskanie; Middle Clatskanie; lower Beaver Crk	within 15 years	WS Councils, ODFW, OWEB, ODSL, ODA, NRCS, SWCD	In progress. Columbia Stock Ranch: 885 acres, and Kerry Island: 109 acres.
137 - CT	Protect remaining high-quality off-channel habitat from degradation.	Priority tidal areas; lower Clatskanie; Middle Clatskanie; lower Beaver Crk	within 15 years	WS Councils, ODFW, ODSL, ODA, NRCS, SWCD, Counties, Municipalities	In progress. Columbia Stock Ranch: 885 acres, and Kerry Island: 109 acres.
138 - CT	Breach, lower, remove, or relocate dikes and levees to establish or improve access to off-channel habitats; vegetate dikes and levees.	Priority tidal areas	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress; 332 acres: LA Swamp, Dibblee Point, Batwater Station, Kerry Island and Westport Slough, all estuarine.
139 - CT	Restore instream habitat complexity, including large wood placement.	Lower & upper Clatskanie R; Plympton Crk; lower Page Crk; lower NF Clatskanie, lower Carcus Crk, lower Miller Crk, lower Perkins Crk, lower Conyers Crk, lower Keystone Crk; Middle Clatskanie R; lower Beaver Cr	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress; 6.97 miles of LWD have been added in the CT population, this is 10.6 percent of revised delisting scenario goal and 9.2 percent of the broad sense goal.
140 - CT	Establish working group to identify priority areas for riparian and instream habitat enhancement, and work with landowners to implement projects.	Lower Clatskanie R Middle Clatskanie R; lower Beaver Crk	within 15 years	WS Councils, ODFW, ODF, ODSL, ODA, NRCS, SWCD	In progress. SAP completed in 2020.
141 - CT	Conduct sediment source analysis and then implement actions to reduce sediment from identified sources.	Up. Middle Clatskanie R; Plympton Crk; Little Clatskanie R; upper Clatskanie R; lower Page Crk; lower NF Clatskanie; lower Carcus Crk; lower Miller Crk; lower Perkins Crk; lower Conyers Crk; lower Keystone Crk; numerous small tributaries and headwaters streams	within 15 years	WS Councils, ODFW, ODF, ODEQ, NRCS, SWCD	Action has not been implemented.
142 - CT	Conduct full assessment of streams that were heavily damaged during Dec. 2007 storm to determine best approach to restoration.	Numerous small streams in western portion of population area	within 15 years	WS Councils, ODFW	In progress. Columbia County Soil and Water Conservation District (SWCD) is conducting assessment of Tandy Creek between Colvin Road and Hwy 30; Columbia County has acquired properties in this area that regularly floods.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
143 - CT	Implement Mid-Coast watershed council style limiting factors analysis to improve understanding of reach specific recovery action needs.	watershed-wide	within 15 years	WS Councils, ODFW	Action has not been implemented.
144 - CT	Inventory and assess connectivity and hydrologic function.	Tidal areas and wetlands	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress. Multiple properties have been assessed for connectivity. These are mostly BPA funded projects in the estuary. The Lower Columbia River Watershed Council (LCRWC) is attempting to conduct an assessment in the middle Clatskanie but has not yet received funding.
145 - CT	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	Priority tidal areas; lower Clatskanie; Middle Clatskanie; lower Beaver Crk	within 15 years	WS Councils, ODFW, ODSL, ODA, NRCS, SWCD	In progress. Off-channel habitat was increased by 307 m^2, which represents 1.7 percent of revised delisting scenario goal and .9 percent of the broad sense goal.
146 - CT	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Priority tidal areas; lower Clatskanie; Middle Clatskanie; lower Beaver Crk	within 15 years	WS Councils, ODFW, OWEB, ODSL, ODA, NRCS, SWCD	In progress; 3.2 miles of riparian habitat have been restored, this is 19.5 percent of the revised delisting scenario goal and 16 percent of the broad sense goal.
149 - CT	Explore adding a life-cycle monitoring site in the Clatskanie population.	current fishway in lower R at RM 10 falls	within 15 years	ODFW	Annual smolt trapping on the Clatskanie River has occurred, but a life-cycle monitoring site has not been added.
150 - SC	Provide / improve fish passage.	NF Scappoose (Bonnie Falls ladder); Milton Crk, Salmon Crk, Cox Crk, Siercks Crk, Dart Crk road crossings	within 15 years	WS Councils, ODFW, ODF, Counties	In progress; 17 fish passage corrections completed, including Cox, Salmon (2) and Dart Creek Crossings.
151 - SC	Implement research, monitoring, and evaluation of headwater springs to investigate the concern that they may be drying up due to land management practices.	watershed-wide	within 15 years	ODFW, OWRD	Action has not been implemented.
152 - SC	Protect intact and functioning riparian areas through riparian easements and acquisition.	Lower Merril, Tide & McBride Crks; lower Scappoose; lower SF Scappoose; Mid/upper Merril, Tide & McBride Crks; Goble Crk; Milton Crk; NF Scappoose headwater streams; SF Scappoose headwaters	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODA, NRCS, SWCD	In progress. Upper 1/3rd of McCarthy Creek: 402 acres, and Flights End on Sauvie Island: 42 acres.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
153 - SC	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Lower Merril, Tide & McBride Crks; lower Scappoose; lower SF Scappoose; Mid/upper Merril, Tide & McBride Crks; Goble Crk; Milton Crk; NF Scappoose headwater streams; SF Scappoose headwaters	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODA, NRCS, SWCD	In progress; 16 miles of riparian habitat have been restored in the SB population; this is 197.3 percent of the revised delisting scenario goal and 72.6 percent of the broad sense goal.
154 - SC	Protect/manage existing high-quality habitat.	Upper SF Scappoose Crk, Upper Milton Crk, Lower NF Scappoose Crk	within 15 years	WS Councils, ODFW, ODF, ODSL, ODA, Counties, Municipalities	Existing regulations maintained except county reduces protection of significant wetlands and eliminates riparian protection on non-fish bearing streams.
155 - SC	Restore instream habitat complexity, including large wood placement.	Merril Crk, Tide Crk, McBride Crk, NF Scappoose, SF Scappoose, Scappoose Crk, Goble Crk, Milton Crk, Dart Cr	within 15 years	WS Councils, ODFW, ODF, NRCS, SWCD	In progress; 7.09 miles of LWD have been added in the SB population, this is 30.6 percent of the revised delisting scenario goal and 11.6 percent of the broad sense goal.
156 - SC	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	Lower Merril, Tide & McBride Crks; lower NF Scappoose; lower Scappoose; Deer Island; Milton Crk; Mid/upper Merril, Tide & McBride Crks; Goble Cr	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress; 0.25 miles of side channel were improved/added in the SB population, this is 3.3 percent of the revised delisting scenario goal and 1.3 percent of the broad sense goal.
157 - SC	Restore connectivity to small tributaries.	Lower SF and NF Scappoose	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress. Tributaries were examined by the IC in 2018 and one site was found to be suitable rearing, site is now on the ODFW fish passage list.
158 - SC	Establish working group to identify habitat enhancement projects.	Lower Merril, Tide & McBride Crks; Mid/upper Merril, Tide & McBride Crks; Goble Cr	within 15 years	WS Councils, ODFW, ODF, ODSL, ODA, NRCS, SWCD	Working group established in 2017 and revised SAP completed in 2018.
159 - SC	Work with landowners to implement projects to prevent/reduce impacts from development and land management; provide resources and incentives.	Lower Merril, Tide & McBride Crks; lower NF Scappoose; lower Scappoose; lower SF Scappoose; Mid/upper Merril, Tide & McBride Crks; Goble Crk; NF Scappoose (upper mid-mainstem and tribs); Dart Cr	within 15 years	WS Councils, ODFW, ODSL, ODA, NRCS, SWCD, Counties, Municipalities	Ongoing. Many projects have been implemented in the SB, an example is the lower South Scappoose restoration starting a 1/3 of a mile upstream of Veterans Park and continuing downstream 1/3 of a mile of the park; bank sloping, riparian, natural revetments. Received positive press during reducing flooding.
160 - SC	Protect remaining high-quality off-channel habitat from degradation.	Scappoose Bottomlands tidal areas and wetlands	within 15 years	WS Councils, ODFW, ODSL, NRCS, SWCD, Counties, Municipalities	No actions completed beyond existing regulations.
161 - SC	Implement Mid-Coast watershed council style limiting factors analysis to improve understanding of reach specific recovery action needs.	watershed-wide	within 15 years	WS Councils, ODFW	Completed action in 2017, SAP with actions identified.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
162 - SC	Inventory and assess connectivity and hydrologic function.	Tidal areas and wetlands	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress. Multiple properties have been assessed for connectivity. These are mostly BPA funded projects in the estuary.
163 - SC	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	lower Scappoose; lower Merril, Tide & McBride Crks; lower NF Scappoose; SF Scappoose; Deer Island; mid/upper Milton Crk; mid/upper Merril Crk; Goble Crk	within 15 years	WS Councils, ODFW, ODSL, NRCS, SWCD	Ongoing. Off-channel habitat was increased by 22,047 m^2, in the SB, which represents 305 percent of revised delisting scenario goal and 305 percent of the broad sense goal.
164 - SC	Investigate ways to retain gravel in context of flood impact management considerations.	Lower Milton Crk	within 15 years	WS Councils, ODFW, ODSL	Action has not been implemented.
165 - SC	Improve system for monitoring water quality and quantity and ensure that information is integrated into existing regulatory framework.	watershed-wide	within 15 years	WS Councils, ODEQ, OWRD	Ongoing. The Scappoose Bay Watershed Council (SBWC), LCEP, Columbia SWCD and the IC are monitoring water quality parameters and used by ODEQ.
166 - SC	Breach, lower, remove, or relocate dikes and levees to establish or improve access to off-channel habitats; vegetate dikes and levees.	South Sauvie Island, Deer Island	within 15 years	WS Councils, ODFW, NRCS, SWCD	In progress; 4,125 acres, includes 9 projects on Sauvie Island. South Sauvie Island (Alder Creek Natural Resource Damage Assessment) became the first site restored under the Portland Harbor superfund; all other Sauvie Island projects are located on ODFW property.
167 - SC	Identify and implement flow improvements (to provide better migration into and out of Sturgeon Lake).	Dairy Crk and Gilbert R	within 15 years	WS Councils, ODFW, OWRD	Completed in 2019.
169 - CM	Remove dam.	Kellogg Crk Dam	within 15 years	ODFW	In progress. Design completed in 2021, existing lake to Oatfield Road likely to become a mitigation bank.
170 - CM	Provide / improve fish passage.	Miller Crk confluence, Tryon Crk-Highway 43 Culvert, Clear Crk, Deep Crk, Johnson Crk	within 15 years	ODFW, ODOT	In progress; 38 fish passage corrections completed, including N.FK Dep, Clear (4), and Johnson Creek (19) crossings.
171 - CM	Implement research, monitoring, and evaluation of headwater springs to investigate the concern that they may be drying up due to land management practices.	watershed-wide	within 15 years	ODFW, OWRD	Action has not been implemented.
172 - CM	Identify and implement flow improvements.	watershed-wide	within 15 years	WS Councils, ODFW, OWRD, USFS, NRCS, SWCD	Action has not been implemented.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
173 - CM	Inventory and protect seeps, springs, and other cold-water sources.	watershed-wide	within 15 years	WS Councils, ODFW, USFS, BLM	ODEQ 2020 Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study. Metro has secured multiple properties along the Clackamas with seeps and springs (e.g., Richardson Creek). EPA 2021 Columbia River Cold Water Refuges Plan.
174 - CM	Identify priority areas for increased instream flows.	watershed-wide	within 15 years	WS Councils, ODFW, OWRD, USFS	Action has not been implemented.
175 - CM	Establish minimum ecosystem-based instream flows.	Johnson Crk	within 15 years	ODFW, OWRD	Both Crystal Springs and Johnson Creek have instream water rights as of 1991; the fall instream flow rate for Johnson Creek is 2 cubic feet per second. No ecosystem-based flow discussions are known to have occurred.
176 - CM	Identify and halt illegal water withdrawals.	watershed-wide	within 15 years	WS Councils, ODFW, OWRD	Ongoing.
177 - CM	Enforce existing water rights.	watershed-wide	within 15 years	ODFW, OWRD	Ongoing.
178 - CM	Breach, lower, remove, or relocate dikes and levees to establish or improve access to off-channel habitats; vegetate dikes and levees.	Columbia Slough; Joslin Property	within 15 years	WS Councils, ODFW, City of Portland, Metro	In progress. The City of Portland has completed two projects in the Lower Columbia Slough; neither were removing dikes. The Joslin property is listed as potential mitigation for the Portland Harbor but is not completed. See Clackamas 186 for creation of off-channel habitat. CREST completed a project on Government Island.
179 - CM	Review land use plans in context of salmon recovery needs (i.e., forest lands of higher value to salmon recovery than urbanized lands).	Eagle Crk; Clear Crk; mainstem Clackamas R -- R Mill Dam to Goose Crk; mainstem Clackamas R -- R Mill Dam to Abernathy Crk; Deep Crk; Johnson Cr	within 15 years	ODFW, ODLCD, USFS, Counties, City of Portland, Metro, Municipalities	Action has not been implemented.
180 - CM	Provide incentives to promote good landowner stewardship.	Eagle Crk; Clear Crk; mainstem Clackamas R -- R Mill Dam to Goose Crk; mainstem Clackamas R -- R Mill Dam to Abernathy Crk; Deep Crk; Johnson Cr	within 15 years	WS Councils, OWEB, ODSL, NRCS, Counties, City of Portland, Metro	Ongoing. Clackamas Water Environmental Services offers 300k annually for River Health stewardship program.
181 - CM	Reduce impact that roads have on impaired hydrograph.	upper Clackamas and Collawash	within 15 years	WS Councils, ODFW, USFS, Counties, City of Portland, Municipalities	In progress. USFS Clackamas Ranger District 2009 EA Road Decommission for Habitat Restoration: approximately 300 miles were listed. USFS implemented in stages over the years.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
182 - CM	Finish Clackamas Fish Habitat Analysis.	watershed-wide	within 15 years	WS Councils, ODFW, USFS	Ecosystem Diagnostic and Treatment Draft completed.
183 - CM	Develop and/or implement stormwater management plans for urban areas and roads.	Deep Crk; Johnson Crk; all areas within urban growth boundaries	within 15 years	WS Councils, ODFW, ODEQ, NRCS, SWCD, Counties, City of Portland, Municipalities	Ongoing. All counties have stormwater manuals, rules and regulations, as do the cities. The City of Portland also has a Grey to Green plan where each year various locations receive stormwater management where stormwater requirements are not triggered. Various watershed councils have also conducted voluntary stormwater improvements including Columbia Slough Watershed Council (CSWC), JCWC and the Sandy River Watershed Council (SRWC). (Mount Hood Community College is now a Salmon Safe certified college because of stormwater treatment). New and renewed roads are also required to treat stormwater. Both CSWC and JCWC are in the planning process of how to move forward with voluntary stormwater management in their perspective watersheds (2020/21).
184 - CM	Protect remaining high-quality off-channel habitat from degradation.	Priority urban areas in lower watershed; Cathedral Park; Centennial Mills; Johnson Crk confluence; Columbia Slough; Johnson Crk confluence; Linnton Neighborhood; Saltzman Crk; Willamette Cove; Forest Park area; Stephens Crk confluence	within 15 years	WS Councils, ODFW, ODSL, Counties, City of Portland, Metro, Municipalities	Ongoing. Significant changes: Cathedral Park-riparian planting, Centennial Mills has been sold in 2021 and will be redeveloped, according to conceptual plan, a portion of the stream will be daylighted, but portions will remain "filled". Johnson Creek confluence has received LWD and in process (2022/23) of received a second round of LWD. Linnton Neighborhood area received protection through a mitigation bank, Forest Park protections increased because of Metro increasing protected acreage and Stephens Creek confluence was enhanced with LWD by City of Portland.
185 - CM	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	---	within 15 years	WS Councils, ODFW, NRCS, SWCD, City of Portland, Metro	In progress. 3 miles of side channel were improved/added, this is 5.3 percent of the revised delisting scenario goal and 3 percent of the broad sense goal.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
186 - CM	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	Linnton Neighborhood; Owens-Corning Banks and Floodplain; Ross Island; Swan Island lagoon; Columbia Slough confluence; Ramsey Lake wetland; Tryon Slough confluence; Powerline Corridor; Forest Park area; Kelley Point Park; Miller Crk confluence; Oaks Bottom Wildlife Refuge; West Hayden Island; Willamette Cove; Willamette Park; Cathedral Park; Centennial Mills; Johnson Crk confluence; Saltzman Crk; watershed-wide	within 15 years	WS Councils, ODFW, NRCS, SWCD, PGE, City of Portland, Metro	Ongoing. Off-channel habitat was increased by 69,602 m^2, which represents 353 percent of revised delisting scenario goal and 200 percent of the broad sense goal. Includes Linnton Neighborhood, Tryon confluence, Oaks Bottom, Government Island, and Johnson Ck confluence.
187 - CM	Improve or regrade/revegetate streambanks.	Linnton Neighborhood; Oaks Bottom Wildlife Refuge; Owens-Corning Banks and Floodplain; Swan Island lagoon; Tryon Cr confluence; West Hayden Island; Willamette Cove; Willamette Park; Balch Cr confluence; Cathedral Park	within 15 years	ODFW, Counties, City of Portland, Metro, Municipalities	In progress. Projects include Linnton Plywood NRDA, Oaks Bottom tidal restoration, Tryon Creek Confluence, Government Island tidal restoration and Cathedral Park. Swan Island lagoon and Willamette Cove are yet to be remediated.
188 - CM	Protect intact and functioning riparian areas through riparian easements and acquisition.	Eagle Crk; Clear Crk; mainstem Clackamas R (River Mill Dam to Goose Crk, R Mill Dam to Abernathy Cr); tributaries below R Mill Dam; Deep Crk; Johnson Crk; Forest Park area; Willamette R; West Hayden Island	within 15 years	WS Councils, ODFW, OWEB, ODSL, USFS, NRCS, SWCD, City of Portland, Metro	In progress. Clackamas SWCD obtained Eagle Creek Community Forest. Metro purchased properties along mainstem Clackamas, Deep Creek, Clear Creek, Johnson Creek, Abernethy Creek and Forest Park.
189 - CM	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Eagle Crk; Clear Crk; mainstem Clackamas R (River Mill Dam to Goose Crk, R Mill Dam to Abernathy Cr); tributaries below R Mill Dam; Deep Crk; Johnson Crk; Forest Park area; Willamette R; West Hayden Island	within 15 years	WS Councils, ODFW, OWEB, ODSL, NRCS, SWCD, City of Portland	In progress; 78.21 miles of riparian habitat have been restored in the CL, this is 224.7 percent of the revised delisting scenario goal and 126.1 percent of the broad sense goal.
194 - CM	Reduce the square footage of over-water structures; where possible, modify remaining overwater structures to provide beneficial habitat.	Willamette R	within 15 years	ODSL, ODLCD, City of Portland	Limited implementation; overwater structures increasing on lower Willamette River.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
195 - CM	Develop and implement Willamette mitigation bank river plan.	Willamette R	within 15 years	ODFW, NMFS, Counties, City of Portland, Metro, Municipalities	In progress. Three mitigation banks open: Alder Creek at south Sauvie Island, Rhinerson Slough, and Linton Plywood on Multnomah Channel; concepts in development for 4th at Kellogg Lake.
196 - CM	Identify and purchase key salmon habitats.	Willamette R	within 15 years	ODFW, OWEB, City of Portland, Metro	In progress. Metro has purchased multiple properties on the Clackamas mainstem, Deep Creek and Clear Creeks and the Clackamas SWCD received land near the Eagle Creek confluence; no new lands have been purchased on the Willamette.
197 - CM	Remove invasive plants and plant native species.	Kelley Point Park; Oaks Bottom Wildlife Refuge; Ross Island; West Hayden Island	within 15 years	City of Portland, Metro	Completed for all 4 sites. Oaks Bottom and West Hayden Island are also sites of tidal reconnection.
198 - CM	Restore instream habitat complexity, including large wood placement.	Johnson Crk confluence; Tryon Crk confluence; Eagle Crk; Clear Crk; mainstem Clackamas R -- R Mill Dam to Goose Crk; mainstem Clackamas R -- R Mill Dam to Abernathy Crk; Johnson Cr)	within 15 years	WS Councils, ODFW, USFS, NRCS, SWCD, PGE, Metro	In progress; 23.31 miles of LWD have been added in the CL, this is 37.3 percent of revised delisting scenario goal and 12.1 percent of the broad sense goal.
199 - CM	Daylight stream.	lower Doane Crk/Railroad Corridor; lower Saltzman Crk	within 15 years	City of Portland	Action has not been implemented.
200 - CM	Create confluence habitat with cool water, restore channel and reconnect upper creek.	Doane Crk/Railroad Corridor; Saltzman Crk	within 15 years	ODFW	Action has not been implemented.
201 - CM	Reconnect tributary to Willamette River and create high quality habitat at tributary junction.	Historical Swan Island channel; Saltzman Crk; Miller Crk confluence	within 15 years	ODFW	In progress (e.g., Stephens Creek).
202 - CM	Daylight stream.	Centennial Mills	within 15 years	City of Portland	Action has not been implemented. Centennial Mills was sold in 2021 to a developer, conceptual plans show a daylighting of Tanner Creek.
203 - CM	Revise and update stormwater management manual.	"Pork Chop" and Portland-wide	within 15 years	ODEQ, City of Portland, Municipalities	Ongoing. The City of Portland updates their stormwater manual approximately every 4 years, last completed in 2020.
204 - CM	Implement Gray2Green program.	"Pork Chop" and Portland-wide	within 15 years	City of Portland	Ongoing. The Gray to Green program was a 5-year effort that has been completed. While the program is officially over, all the elements of the program continue to persist today (green streets, stormwater, culverts, planting, etc.).
205 - CM	Re-establish connection to Columbia River for improved flushing, if feasible.	Columbia Slough	within 15 years	ODFW	The City of Portland completed a confluence habitat enhancement project here but no reconnection, not feasible due to site constraints.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
206 - CM	Implement pesticide and fertilizer best management practices to reduce sources of toxic and conventional contaminants entering the estuary (revise and update IPM for PDX owned property).	Clackamas R; Willamette R	within 15 years	ODEQ, Counties, Port of Portland, Metro, Municipalities	Ongoing. PDX and Metro updated 2019. The Clackamas SWCD runs the Clackamas Pesticide Stewardship Partnership that monitors 76 percent of the Clackamas basin and works to reduce pesticides in Clackamas waters that serves 300,000 people.
207 - CM	Monitor for contaminants.	Willamette R	within 15 years	ODEQ, City of Portland, Port of Portland	Ongoing. ODEQ and City of Portland continue to monitor water quality in the lower Willamette River including contaminate monitoring, this includes the superfund site.
208 - CM	Maximize habitat benefits by restoration or mitigation.	Willamette R	within 15 years	ODFW, ODSL, City of Portland, Metro	Ongoing.
219 - SY	Provide / improve fish passage.	Sandy Hatchery on Cedar Crk; Beaver Crk and Buck Crk road crossings	ongoing	ODFW, City of Portland	In progress; 14 fish passage corrections completed, including Sandy Hatchery and Beaver Creek (3) crossings.
220 - SY	Develop recommendations for land management scenarios that address hydrograph changes that are predicted to occur due to climate change.	watershed-wide	within 15 years	WS Councils, ODFW, USFS, Counties, Municipalities	Action has not been implemented.
221 - SY	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	lower Salmon R; Sandy R above Salmon R confluence; lower Gordon & Trout Crks; Beaver Crk	within 15 years	WS Councils, ODFW, City of Portland	In progress. Off-channel habitat was increased by 83,205 m^2 in the SA, which represents 1,528 percent of revised delisting scenario goal and 1,022 percent of the broad sense goal. Includes Lower Salmon and upper Sandy River tributaries.
222 - SY	Protect remaining high-quality off-channel habitat from degradation.	lower Salmon R; Sandy R above Salmon R confluence; lower Gordon & Trout Crks	within 15 years	WS Councils, ODFW, ODSL, USFS, NRCS, SWCD, Counties, City of Portland, Municipalities	In progress. The City of Portland has secured 295 of 373 acres of riparian habitat in the lower, middle, and upper Sandy as part of their Bull Run HCP, and Metro in 2021 purchased 100 acres of lower Trout Creek.
223 - SY	Obtain better understanding of fall Chinook and late fall Chinook life history, habitat needs, and response to restoration in tributaries and estuary.	watershed-wide	within 15 years	ODFW	In progress. ODFW is investigating genetic structure within Sandy Chinook to better understand the timing and distribution of the different runs.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
224 - SY	Limit future in-river and groundwater withdrawals so that they do not impede achievement of recovery goals.	watershed-wide	within 15 years	ODFW, OWRD	Oregon water law has remained unchanged, but OWRD rules do include procedures and standards to aid ODFW in determining whether a proposed use will impair or be detrimental to the public interest regarding sensitive, threatened or endangered fish species. Oregon statute (ORS 537.409) also provides some provisions to ensure that certain reservoirs do not pose a significant detrimental impact to existing fishery resources. OAR 690-033-0220 directs OWRD to determine if a proposed use of water is detrimental to the protection or recovery of a threatened or endangered species and cannot be conditioned or mitigated to avoid the detriment, and ODFW does recommend conditions and/or mitigation for new water uses that may impede achievement of recovery goals.
226 - SY	Conduct sediment source analysis and then implement actions to reduce sediment from identified sources.	watershed-wide	within 15 years	WS Councils, ODFW, ODEQ	Action has not been implemented.
227 - SY	Develop and/or implement stormwater management plans for urban areas and roads.	watershed-wide	within 15 years	ODEQ, Counties, Municipalities	In progress. The various cities, municipalities and ODOT continue to develop stormwater management plans. In 2017 Mt Hood Community College partnered with the Sandy Basin WC and conducted multiple voluntary stormwater projects and became the first Salmon Safe college campus.
228 - SY	Identify and rectify problem legacy roads.	watershed-wide	within 15 years	WS Councils, ODFW, USFS, Counties, Municipalities	In progress. The United States Forest Service (USFS) ZigZag Ranger District has and continues to remove legacy unneeded roads. As part of their combined efforts with the Freshwater Trust the USFS retires roads after stream restoration (e.g., Still Creek and upper Sandy 6th field).
231 - SY	Protect instream water right for fish.	Little Sandy R diversion	ongoing	ODFW, OWRD, PGE	Ongoing, nearly yearly efforts occur on Cedar Creek at Sandy Hatchery. ODFW applied for a new instream water right on Clear Creek in 2017, but the application remains contested.
232 - SY	Restore instream habitat complexity, including large wood placement.	Salmon R; Still Crk; Clear Fork; Zig Zag R; Cedar Crk; Beaver Crk; lower Gordon & Trout Crks	within 15 years	WS Councils, ODFW, USFS, City of Portland	In progress; 35.02 miles of LWD have been added in the SA, this is 100 percent of revised delisting scenario goal and 66 percent of the broad sense goal. Primary areas are Still Creek, Salmon River, ZigZag River, and lower Gordon and Trout Creeks.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
233 - SY	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	lower Sandy R; Salmon R	within 15 years	WS Councils, ODFW, USFS, City of Portland	In progress; 16.06 miles of side channel were improved/added in the SA, this is 91.8 percent of the revised delisting scenario goal and 59.5 percent of the broad sense goal.
234 - SY	Breach, lower, remove, or relocate dikes and levees to establish or improve access to off-channel habitats; vegetate dikes and levees.	Sandy R Delta	within 15 years	WS Councils, ODFW, USFS, City of Portland	In progress. Multiple levees have been removed on Salmon and ZigZag Rivers, and two projects have been completed in the Sandy River Delta: the delta dam on a side channel and a water control and levee structure in the SE corner.
235 - SY	Protect intact and functioning riparian areas through riparian easements and acquisition.	Salmon R; Zig Zag R; Cedar Crk; lower Gordon & Trout Crks	within 15 years	WS Councils, ODFW, OWEB, ODSL, NRCS, SWCD, City of Portland	In progress. The City of Portland has secured 295 of 373 acres of riparian habitat in the lower, middle, and upper Sandy has part of their Bull Run HCP and Metro in 2021 purchased 100 acres of lower Trout Creek.
236 - SY	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	Salmon R; Zig Zag R; Cedar Crk; lower Gordon & Trout Crks	within 15 years	WS Councils, ODFW, OWEB, ODSL, NRCS, SWCD, City of Portland	In progress; 56.58 miles of riparian habitat have been restored in the SA, this is 305.8 percent of the revised delisting scenario goal and 202.1 percent of the broad sense goal.
244 - LG	Identify and implement flow improvements.	Bonneville Hatchery	within 15 years	ODFW	Action has not been implemented.
245 - LG	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, ODA, USFS, NRCS, SWCD	In progress; 3.42 miles of riparian habitat have been restored, this is 48.9 percent of the revised delisting scenario goal and 38 percent of the broad sense goal.
246 - LG	Restore instream habitat complexity, including large wood placement.	---	within 15 years	WS Councils, ODFW, NRCS, SWCD, PGE	In progress; 1.77 miles of LWD have been added, this is 11.8 percent of revised delisting scenario goal and 11.8 percent of the broad sense goal.
247 - LG	Provide / improve fish passage.	watershed-wide; Cascade Hatchery	within 15 years	WS Councils, ODFW, ODOT, USFS	In progress. One fish passage project: passage was improved at Horsetail Creek.
248 - LG	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	watershed-wide	within 15 years	WS Councils, ODFW, ODOT, USFS, NRCS, SWCD	In progress. No increase in alcoves, wetlands, or floodplains documented, but see Action 249-LG.
249 - LG	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	watershed-wide	within 15 years	WS Councils, ODFW, ODOT, USFS, NRCS, SWCD	In progress; 0.4 miles of side channel were improved/added, this is 4.4 percent of the revised delisting scenario goal and 4.4 percent of the broad sense goal.
253 - UG	Provide / improve fish passage.	all railroad and I-84 crossings; Oxbow Hatchery	within 15 years	WS Councils, ODFW, ODOT, USFS	No stream passage improvements in Upper Gorge (UG) tributaries have been documented.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
254 - UG	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	---	within 15 years	WS Councils, ODFW, NRCS, SWCD	No restoration projects in UG tributaries have been documented.
255 - UG	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	---	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, ODA, USFS, NRCS, SWCD	No restoration projects in UG tributaries have been documented.
256 - UG	Restore instream habitat complexity, including large wood placement.	---	within 15 years	WS Councils, ODFW, NRCS, SWCD, PGE	No restoration projects in UG tributaries have been documented.
257 - UG	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	---	within 15 years	WS Councils, ODFW, ODOT, USFS, NRCS, SWCD	No restoration projects in UG tributaries have been documented.
266 - UG	Provide cover at mouth of Herman Creek that is inundated by Bonneville pool to reduce predation.	Herman Crk	within 15 years	WS Councils, ODFW	Action has not been implemented.
270 - HD	Provide / improve fish passage.	Laurance Lake Dam on Clear Branch; Moving Falls fish ladder on West Fork Hood R; irrigation diversions, road and railroad crossings, barriers formed by 2006 flood, and other barriers on Tony Crk, Upper Gorge tributaries, MF Hood R, and EF Hood R	within 15 years	WS Councils, ODFW, USFS	In progress; 18 fish passage corrections completed, including Moving Falls and multiple irrigation diversions.
271 - HD	Ensure that low head hydro projects do not adversely impact winter base streamflow.	Hood R Basin	within 15 years	ODFW, OWRD	Ongoing. Farmer's Irrigation District (FID) has worked with ODFW and ODEQ since 2009 to adaptively manage the hydropower facilities with water temperature monitoring and adjustments to the flow requirements (withdrawal allowances) and Project operations. The Memorandum of Agreement was most recently revised in 2019 to require the applicant to cease diversions from the mainstem Hood River under their hydropower right when mainstem mean daily discharge drops below 250 cfs.
272 - HD	Implement projects that aid in restoring the natural flow regime (e.g., HRWAP Project FP-3 Central Canal Pipeline/Neal Creek Siphon, future piping projects, Conserved Water Program, landowner technical assistance, etc.).	Neal Crk Watershed	within 15 years	WS Councils, ODFW, OWRD, Counties, Municipalities	In progress. A minimum estimate of 14 miles of open canal were piped and a minimum of 10.3 cfs were conserved. This occurred in the mainstem; Middle, East and West forks, and Evans Creek. None noted for Neal Creek.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
273 - HD	Provide education and resources to hobby farms and other rural residents to assist them with water saving measures.	Hood R Basin	within 15 years	WS Councils, ODFW, NRCS, SWCD	Occurring and ongoing.
274 - HD	Work with OWRD and others to keep water saved through publicly funded water conservation efforts instream for fish.	Hood R Basin	within 15 years	WS Councils, ODFW, OWRD	Occurring and ongoing. This is a specific objective of the Confederated Tribes of the Warm Springs (CTWS) under their annual BPA contract.
275 - HD	Develop and implement Best Management Practices and rules from the Hood River Agricultural Water Quality Area Management Plan and Rules.	Hood R	within 15 years	ODFW, ODA, USFS	Occurred, but focus has now shifted to Oregon Department of Agriculture's (ODA) Strategic Implementation Area (SIA).
276 - HD	Continue education and outreach programs identified in the HRWAP.	Hood R	ongoing	WS Councils, ODFW, USFS, NRCS, SWCD	Occurred, but is now the "Watershed 2040 – The Hood River Basin Partnership 20-Year SAP".
277 - HD	Identify and implement flow improvements.	East Fork Hood R; Middle Fork Hood R, Hood R	within 15 years	WS Councils, ODFW, OWRD, USFS, East Fork, Middle Fork, Farmers Irrigation Districts	Hood River Basin Water Conservation Strategy 2016, multiple actions taken see action 272-HD.
278 - HD	Work to expand streamside vegetation buffers.	Hood R	within 15 years	WS Councils, ODFW, ODA, USFS, NRCS, SWCD, Counties, Municipalities	In progress. The Hood River SWCD is the leader in this category. Although the main emphasis is on small scale irrigation improvements, they do work with landowners in specific areas to increase stream buffers and riparian plantings, including working on ODA SIA areas such as Whiskey Creek, Indian Creek and Odell Creek. The CTWS (Orchard Spray and Riparian revegetation project) also conducts occasional riparian projects, and the CLT is working in the Powerdale Dam Corridor.
279 - HD	Protect intact and functioning riparian areas through riparian easements and acquisition.	lower Hood R; Neal Crk; Lenz Crk; Hood R Delta; West Fork Hood R; upper West Fork Hood R	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, ODA, USFS, NRCS, SWCD	In progress. There is only one known easement/acquisition in the Hood; that is the Powerdale Dam corridor. Western Rivers Conservancy is seeking funding to acquire a conservation easement over 5,041 acres of the 19,983-acre Mid-Columbia Tree Farm (MCTF) located in Hood River County, OR (an in-holding by Weyerhaeuser on the Mount Hood National Forest, but unsuccessful to date).
280 - HD	Restore (plant and/or fence) and protect (conservation easements, acquisition) riparian areas that are degraded.	lower Hood R; Neal Crk; Lenz Crk; Hood R Delta; West Fork Hood R; upper West Fork Hood R	within 15 years	WS Councils, ODFW, OWEB, ODF, ODSL, ODEQ, ODA, USFS, NRCS, SWCD	In progress; 6.89 miles of riparian habitat have been restored, this is 35.9 percent of the revised delisting scenario goal and 13.3 percent of the broad sense goal.
281 - HD	Remove sections of railroad fill.	lower Hood R	within 15 years	ODFW	This was part of the Hood River 2014 action plan; action did not occur.

Table A-I: 1. Plan actions to address threats and limiting factors associated with Tributary Habitat Management.					
Action ID	Action	Location	Schedule	Potential Implementers	Notes
282 - HD	Restore or create off-channel habitat and/or access to off-channel habitat: side channels.	lower Hood R	within 15 years	WS Councils, ODFW, USFS, NRCS, SWCD	In progress; 0.85 miles of side channel were improved/added, this is 4.2 percent of the revised delisting scenario goal and 1.5 percent of the broad sense goal.
283 - HD	Restore or create off-channel habitat and/or access to off-channel habitat: alcoves, wetlands, and floodplains. - Restoration includes revegetation.	East Fork Hood R; Neal Crk; Lenz Cr	within 15 years	WS Councils, ODFW, USFS, NRCS, SWCD	In progress. CLT completed one project in 2015 on the Powerdale Corridor.
284 - HD	Restore instream habitat complexity, including large wood placement.	Tony Crk (above diversion); Hood R Delta; East Fork Hood R; upper West Fork Hood R	within 15 years	WS Councils, ODFW, USFS	In progress; 10.56 miles of LWD have been added, this is 31.4 percent of revised delisting scenario goal and 11.6 percent of the broad sense goal.
293 - HD	Provide cover at mouth of Herman Creek that is inundated by Bonneville pool to reduce predation.	Herman Crk	within 15 years	WS Councils, ODFW	Action has not been implemented.
294 - HD	Implement BMPs for ag chemicals.	Neal & Lenz Crk	within 15 years	ODEQ, ODA	Ongoing and implemented by the Hood River Pesticide Stewardship Partnership.
295 - HD	Improve domestic on-site sewage system management and residential chemical use.	Hood R	within 15 years	ODEQ, Counties, Municipalities	Ongoing. Hood River County Environmental Health is contracted by the ODEQ to conduct site evaluations, issue permits, and perform inspections for all systems producing less than 2500 gallons of wastewater per day.
308 - HD	Explore adding a life-cycle monitoring site in the Hood population.	Neal Crk	within 15 years	ODFW	Action has not been implemented.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
64 - Mxd	CRE-1: Protect intact riparian areas in the estuary and restore riparian areas that are degraded. 1) Educate landowners about the ecosystem benefits of intact riparian areas and the costs of degraded riparian areas. 2) Encourage and provide incentives for local, state, and federal regulatory entities to maintain, improve (where needed), and enforce consistent riparian area protections throughout the lower Columbia region. 3) Actively purchase riparian areas from willing landowners in urban and rural settings when the riparian areas cannot be effectively protected through regulation or voluntary or incentive programs and (1) are intact, or (2) are degraded but have good restoration potential. 4) Restore and maintain ecological benefits in riparian areas; this includes managing vegetation on dikes and levees to enhance ecological function and adding shoreline/instream complexity for juvenile salmonid refugia. 5) Conduct assessment to update and refine inventory of areas that either currently have high quality riparian conditions or have high riparian restoration potential (by 2010).	estuary	within 25 years (see EM)	WS Councils, ODFW, OWEB, ODSL, USACOE, SWCD, BPA, LCREP, Counties, Municipalities	1) Ongoing; all restoration groups and entities are talking to landowners regarding riparian restoration and protection. 2) In progress. Clatsop County is revising their Comprehensive Plan in 2022; last updated in 1985 and contained no riparian resources codes. Clackamas County SWCD sees a return of NRCS's Conservation Reserve Enhancement Program (CREP) and in process of administering ODFW's Wildlife Habitat Conservation Program (WHCP) which has been absent in the district due to workload issues. Columbia County eliminates riparian protection for non-fish bearing streams. 3) In progress. Total: 1,716 acres (Columbia Stock Ranch: 885, Knapton Cove: 378, Flights End: 42, S. Tongue Pt: 7, Kerry Island: 109, Wallooskee/Youngs: 183, Rhinerson SI: 33, Linton Mills: 27, Alder CK: 52). 4) In progress. Estuary enhancement and riparian enhancement are described with individual watersheds in Table A-1:1. Vegetated dikes were not a part of the Levee Ready Columbia, Oregon Solutions meetings. 5) LCEP conducted a habitat change analysis of the entire estuary in 2013. This was followed by a prioritization process. Since then, the process has been succeeded by the Expert Regional Technical Group (ERTG) landscape principles document that dominates the selection process as it funds a vast majority of estuary restoration projects.
66 - Mxd	CRE-3: Establish minimum instream flows for the lower Columbia River mainstem that would help prevent further degradation of the ecosystem. 1) Explore technical options and develop policy recommendations on instream flows. 2) Implement instream flow regulations in accordance with the policy recommendations from the project above.	estuary	within 25 years (see EM)	USACOE, LCREP	Action has not been implemented.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
68 - Mxd	CRE-5: Study and mitigate the effects of entrapment of fine sediment in reservoirs, to improve nourishment of the littoral cell. 1) Identify the effects of reservoir sediment entrapment on economic and ecological processes; this includes effects on ship channels, turning basins, port access, jetty activities, littoral cell erosion and accretion, and habitat availability. 2) Develop a regionwide sediment plan for the estuary and littoral cell to address salmonid habitat-forming processes. 3) Implement projects recommended in the plan to mitigate the effects of sediment entrapment.		within 25 years (see EM)	USACOE, LCREP	Action has not been implemented.
69 - Mxd	CRE-6: Reduce the export of sand and gravels via dredge operations by using dredged materials beneficially. 1) Establish a forum to develop a regionwide sediment plan for the estuary and littoral cell . 2) Identify and implement dredged material beneficial use demonstration projects, including the notching and scrape-down of previously disposed materials and placement of new materials for habitat enhancement and/or creation. 3) Dispose of dredged materials using techniques identified through the demonstration projects and regionwide planning.	estuary	within 25 years (see EM)	ODSL, NMFS, USACOE, LCREP, Port of Portland	In progress. USACOE convened a team of local regulatory, fish biologists and restoration personnel. The group discussed potential project locations and techniques to use dredge materials beneficially in restoration projects. A site was picked in 2019 at Woodland Islands, a project was implemented and is being evaluated. The USACOE has a recommended framework for finding locations in the Columbia River Estuary and will likely conduct projects at additional locations in the future. 1) USACOE has begun this process. 2) In progress; 2019 project at Woodland Island. 3) Has not yet occurred, likely after monitoring of Woodland Island in the future.
70 - Mxd	CRE-7: Reduce entrainment and habitat effects resulting from main and side-channel dredge activities and ship ballast intake in the estuary. 1) Identify and evaluate dredge operation techniques designed to reduce entrainment and other habitat effects. 2) Initiate demonstration projects designed to test and evaluate dredge operations. 3) Implement best management techniques for dredging. 4) Study the effects of entrainment of juvenile salmonids from ship ballast water intake. 5) Implement a demonstration project to evaluate the feasibility of reducing entrainment of juvenile salmonids from ship ballast intake.	estuary	within 25 years (see EM)	ODFW, ODSL, USACOE, LCREP	Ongoing 1) The USACOE has received a BiOp from National Marine Fisheries Service (NMFS) for the Continued Operations and Maintenance Dredging Program (NMFS NO. 2011/02095). The USACOE has received a BiOp from United States Fish and Wildlife Service (USFWS) for the Continued Operations and Maintenance Dredging Program (01EOFW00-2014-F0012). 2) Has not occurred. 3) Occurring per NOAA and USFWS BiOps. 4) Has not occurred. 5) Has not occurred.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
71 - Mxd	CRE-8: Remove or modify pilings and pile dikes when removal or modification would benefit juvenile salmonids and improve ecosystem health. 1) Inventory, assess, and evaluate in-channel pile dikes for their economic value and their negative and positive impacts on the estuary ecosystem; develop working hypotheses for removal or modification. 2) Implement demonstration projects designed to test working hypotheses and guide future program priorities. 3) Remove or modify priority pilings and pile dikes. 4) Monitor the physical and biological effects of pile dike removal and modification.	estuary	within 25 years (see EM)	ODFW, ODSL, USACOE, BPA, LCREP	1) LCEP conducted this study in 2010-2011. Final recommendations were that pile dikes were beneficial to salmonids by protecting shallow water habitat and recommended no removal of any pile dikes. 2) Recommendations were made to add habitat features and dredged material in association with pile dikes. Project occurred at Woodland Island in 2019, monitoring in progress. 3) None removed. 4) No monitoring occurred, no projects completed.
72 - Mxd	CRE-9: Protect remaining high-quality off-channel habitat from degradation and restore degraded areas with high intrinsic potential for high quality habitat. 1) Educate landowners about the ecosystem benefits of protecting and stewarding intact off-channel estuarine areas and the costs of restoring degraded areas. 2) Encourage and provide resources for local, state, and federal regulatory entities to maintain, improve (where needed), and consistently enforce estuarine habitat protections throughout the lower Columbia region. 3) Actively purchase off-channel estuarine habitats in urban and rural settings that (1) cannot be effectively protected through regulation, (2) are degraded but have good restoration potential, or (3) are highly degraded but could benefit from long-term restoration solutions. 4) Restore degraded off-channel habitats with high intrinsic potential for increasing habitat quality.	estuary	within 25 years (see EM)	WS Councils, ODFW, OWEB, ODSL, ODLCD, NMFS, USACOE, SWCD, BPA, LCREP, Counties, Municipalities	In progress. 1) Landowner Outreach Plan, NCWA: Restoration work on privately owned land is both a significant challenge and a critical element to future habitat restoration projects in the estuary. Salmon are an economically and culturally important species in rural riverine/estuarine communities. Involving the community in natural resource management is expected to lead to an increased interest in salmon conservation and generate potential restoration projects through a greater awareness of current limiting factors for salmon populations. 2) Oregon statewide planning goal 16 requires all local agencies with management authority of estuaries to develop management plans. ODSL and USACOE permit fill and removal activities in estuaries. 3) 2010-2021: 1,288 acres (Youngs/Wallooskee, Kerry Island, Col Stock Ranch, Flights End). 4) 2010-2020: 3,115 acres restored to tidal (minimum estimate).

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
73 - Mxd	CRE-10: Breach or lower dikes and levees to establish or improve access to off-channel habitats. 1) Breach or lower the elevation of dikes and levees to create and/or restore tidal marshes, shallow-water habitats, and tide channels. 2) Vegetate dikes and levees. 3) Remove tide gates to improve the hydrology between wetlands and the channel and to provide juveniles with physical access to off-channel habitat; use a habitat connectivity index to prioritize projects. 4) Upgrade tide gates or perched culverts where (1) no other options exist, (2) upgraded structures can provide appropriate access for juveniles, and (3) ecosystem function would be improved over current conditions.	estuary	within 25 years (see EM)	ODFW, ODSL, USACOE, BPA, LCREP	In progress. 1) 2010-2020: 3,115 acres restored to tidal (minimum estimate) after levee and/or dike breach. Miles of tidal channel restored. 2) Dikes generally only vegetated with grasses. 3) Estimate 5-10 tide gates removed/replaced. 4) Only 1 replaced tide gate known to be buoy compensated, remainder w/o tide gates.
74 - Mxd	CRE-11: Reduce the square footage of over-water structures in the estuary. 1) Inventory over-water structures in the estuary and develop a GIS layer with detailed metadata files. 2) Initiate a planning process to evaluate existing and new over-water structures for their economic, ecological, and recreational value. 3) Remove or modify over-water structures to provide beneficial habitats. 4) Establish criteria for new permit applications to consider the cumulative impacts of over-water structures in the estuary. 5) Conduct research, monitoring, and evaluation of modifications that can be made to overwater structures to assess ecological benefits.	estuary	within 25 years (see EM)	ODSL, ODLCD, USACOE, LCREP	1 & 2) There has not been an estuary wide effort to complete these actions. During 2022 the Pacific Fisheries Management Council (PFMC) completed a partial assessment of overwater structures (docks and piers) in the saline portion of the estuary (Sherman, K. 2022. Core CMECS GIS Processing Methods for the Columbia River Estuary. Pacific States Marine Fisheries Commission. 20pg). 2) Has not occurred. 3) Has not occurred. 4) ODFW Residential Dock Guidelines, February 2016. For the lower Willamette River, dock applicants (as late as 2020) are using a piling GA to circumvent dock guidelines. 5) Has not occurred.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
75 - Mxd	CRE-12: Reduce the effects of vessel wake stranding in the estuary. 1) Analyze factors contributing to ship wake stranding to determine potential approaches to reducing mortality in locations where juveniles are most vulnerable. Design and implement demonstration projects and monitor their results. 2) Implement projects identified in analysis above that are likely to result in the reduction of ship wake stranding events. 3) Use existing and new research results documenting stranding by ship wakes to estimate juvenile mortality throughout the estuary. Modeling could use newly emerging Light Detection and Ranging (LIDAR) satellite imagery to conduct analyses.	estuary	within 25 years (see EM)	ODFW, USACOE, LCREP, Port of Portland	1) A model was developed in 2013 to examine the effects of deepening the Columbia River Navigation Channel from -40 to -43', the model predicted little difference between the two scenarios and no known actions have been taken since model development. 2) Has not occurred. 3) See Pearson, W.H. 2011. Assessment of potential stranding of juvenile salmon by ship wakes along the LCR under scenarios of ship traffic and channel depth: Report prepared for the Portland District USACOE, Portland, Oregon; Pearson, W.H., and J.R. Skalski. 2011. Factors affecting juvenile salmonid by wakes from ship passage in the lower Columbia River. River Research and Applications 7: 926-936.
77 - Mxd	CRE-15: Implement education and monitoring projects and enforce existing laws to reduce the introduction and spread of invasive plants. 1) Increase public awareness of exotic plant species in the estuary and proper stewardship techniques. 2) Inventory exotic plant species infestations in the estuary and develop a GIS layer with detailed metadata files. 3) Implement projects to address exotic plant infestations on public and private lands. 4) Monitor infestation sites.	estuary	within 25 years (see EM)	ODFW, ODA, USACOE, BPA, LCREP	Ongoing. 1) All watershed councils that operate within the LCR estuary have outreach on invasive plants and conduct invasive control and riparian planting events. The LCEP is a leader in this category and offers training sessions to volunteer groups as well as training packets for educators. 2) ODA Oregon Weed Mapper. 3) Inventory occurred in the early 2010's. No known Geographic Information Service (GIS) layer for estuary aquatic invasive plants. Personnel reports suggest aquatic invasive plant distribution is expanding. 4) Ongoing.
81 - Mxd	CRE-19: Prevent new introductions of aquatic invertebrates and reduce the effects of existing infestations by: 1) Assemble existing technical information on introduced aquatic invertebrates in the estuary and develop a plan for managing existing infestations and preventing new infestations. 2) Implement recommendations from the plan above for managing existing and preventing new infestations.	estuary	within 25 years (see EM)	ODFW, ODA, LCREP, Port of Portland	Ongoing. 1) BMPs for cleaning and treating equipment have been developed to reduce the spread of existing invasive aquatic invertebrates (i.e. New Zealand mud snail). The largest effort by far is the Aquatic Invasive Species program run by ODFW. The program has dedicated funding from permitted watercraft and has inspection stations across the state at entry points, with particular attention focused on zebra and quagga mussels. 2) Ongoing.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
82 - Mxd	CRE-20: Implement pesticide and fertilizer best management practices to reduce estuarine and upstream sources of nutrients and toxic contaminants entering the estuary. 1) Implement pesticide, fertilizer, and nutrient best management practices to reduce contaminants entering the estuary. 2) Evaluate adequacy of best management practices and update as needed. 3) Increase funding for education and outreach programs targeted to professional and leisure agricultural activities so as to promote reduced use of toxic materials.	estuary	within 25 years (see EM)	ODEQ, ODA, NRCS, LCREP, Counties, Municipalities	Ongoing. 1) State of Oregon Pesticide Management Plan for Water Quality Protection; Oregon State University (OSU): Best Management Practices for Fertilization; OSU: Nutrient Management. 2) Monitoring occurs through ODEQ 319 grants and through ODA SIA areas. The focus of SIA monitoring is to assess watershed-scale status and trends in response to land management actions. SIA monitoring may include stream temperature, sediment, bacteria, nutrients, or other water quality and landscape conditions as appropriate to evaluate the results of conservation actions. 3) ODA and SWCDs have these programs.
83 - Mxd	CRE-21: Identify and reduce terrestrially and marine-based industrial, commercial, and public sources of pollutants. 1) Identify sources, loads, and pathways of point and non-point pollution in the estuary. 2) Provide cost-share incentives for National Pollution Discharge Elimination System (NPDES) permit holders to upgrade effluent above their permit requirements. 3) Study and establish threshold treatment standards for pharmaceuticals and other unregulated substance discharges; update existing NPDES permits to reflect the new standards. 4) Provide grants and low-cost loans to permit holders required to treat effluent to standards established in the study above.	estuary	within 25 years (see EM)	ODEQ, LCREP, Counties, Municipalities	Ongoing. The Columbia River Basin Restoration Act (2015) and EPA's Columbia Basin Restoration Assistance Program (2022) have brought funds to the region to improve water quality through toxics reduction. 1) 2019 Status Update: Columbia River Basin Toxics Reduction (EPA). 2) City of Portland MS4 compliance report 2019-20: Provided technical assistance, incentives, and grants as part of programs to encourage onsite retrofits and water quality improvements for existing private development. Under the Clean River Rewards utility discount program, the city received 112 new commercial site registrations and 1,898 new residential site registrations. 3) EPA 2019, Management Standards for Hazardous Waste Pharmaceuticals 4) Has not occurred.

Table A-I: 2. Plan actions to address threats and limiting factors associated with Estuary Habitat Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
84 - Mxd	CRE-22: Restore or mitigate contaminated sites. 1) Develop criteria and a process for evaluating contaminated estuarine sites to establish their restoration potential. 2) Develop an integrated multi-state funding strategy to address contamination cleanup in the estuary from non-identifiable upstream sources. 3) Restore those contaminated estuarine sites that will yield the greatest ecological and economic benefits.	estuary	within 25 years (see EM)	ODFW, ODEQ, NMFS, LCREP	In progress. 1) See United States Geological Survey (USGS) 2017: Columbia River Contaminants and Habitat Characterization Study. A sediment transport and habitat model developed for the project may allow prediction of sediment and contaminant distributions under different flow scenarios and potential for management applications to track effluent, spills, etc. 2) Environmental Protection Agency (EPA) 2010: Columbia River Basin Toxics Reduction Action Plan (not estuary specific). 3) In September 2020, EPA announced the award of $2 million in 14 grants to tribal, state and local governments, non-profits and community groups throughout the Columbia River Basin. These projects will increase agricultural best practices, green infrastructure, and monitoring and assessment; promote pollution prevention; and increase citizen education and involvement. These inaugural year projects will serve as models for toxics reduction and assessment throughout the Basin so that others may replicate these successes for years to come. In November 2021, EPA Region 8 and Region 10 launched the second request for applications.
85 - Mxd	CRE-23: Implement stormwater best management practices in cities and towns. 1) Monitor stormwater outputs to measure treatment compliance with existing local and state regulations throughout the basin; develop a network of monitoring sites and establish a data repository that includes data collected by permittees. 2) Establish a fund source for regulatory agencies and local governments to use when insufficient resources are available to (1) access best available science, (2) develop standards beyond requirements, or (3) adequately enforce regulations. 3) Evaluate adequacy of best management practices and update as needed. 4) Provide incentives for low impact development practices.	estuary	within 25 years (see EM)	ODEQ, LCREP, Municipalities	Ongoing 1) All Oregon MS4 permittees are required to produce an annual monitoring report submitted to ODEQ. 2) EPA: Grants for State and Interstate Agencies under Section 106 of the Clean Water Act. 3) Monitoring occurs for each permit holder on an annual basis, if a BMP is not working then another is implemented in its place. 4) EPA: Encouraging Low Impact Development; City of Portland Eco roofs.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
65 - Mxd	CRE-2: Operate hydrosystem to reduce the effects of reservoir surface heating or conduct mitigation measures. 1) Conduct a reservoir heating study to determine the extent of the issue and identify hydrosystem operational changes (including design) that would reduce effects and/or mitigate downstream temperature issues; and 2) Implement hydrosystem operational changes to reduce temperature effects; if no change is possible, mitigate effects by restoring tributary riparian areas.	FCRPS	within 25 years (see EM)	USACOE, LCREP	In progress. 1) Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake Rivers (May 18, 2020). 2) Hydrosystem operations consider adult and juvenile anadromous species, but temperature issues are not currently influencing operations. There are tributary riparian projects occurring in nearly all Oregon LCR population areas, but they are not designed to mitigate the effects of Columbia River reservoirs.
67 - Mxd	CRE-4: Adjust the timing, magnitude, and frequency of flows (especially spring freshets) entering the estuary and plume to better reflect the natural hydrologic cycle, improve access to habitats, and provide better transport of coarse sediments and nutrients in the estuary, plume, and littoral cell. 1) Conduct a flood study to determine the risks and feasibility of returning to more normative flows in the estuary. 2) Conduct a study to determine the habitat effects of increasing the magnitude and frequency of flows (i.e., how much access of river to off-channel habitats would increase). 3) Conduct additional studies to determine the extent of other constraints (international treaties, system-wide fish management objectives, and power management). 4) Make policy recommendations to action agencies on flow (consider beneficial estuary flows, flood management, power generation, irrigation, water supply, fish management, and other interests). 5) Implement modified estuary flow regime (all reaches and plume) annually in concert with other interests (including hydroelectric, flood control, water withdrawals).	estuary	within 25 years (see EM)	USACOE, LCREP	In progress. 2020 Federal Columbia River Power System (FCRPS) Record of Decision (ROD): Operational measures would provide flexible water management across the basin to adjust to local conditions and ensure water availability to benefit resident fish in the upper basin and potentially improve flow conditions for ESA-listed fish in the middle and lower basin. Research is needed to assess the potential benefits to estuary flow dynamics. The *Juvenile Fish Passage Spill* measure would be implemented using adaptive management as more information on the effects of increased spill becomes available. The Preferred Alternative also includes a measure to ensure future flexibility for Reclamation to meet authorized water supply obligations. 1) No action taken. 2) See Helaire et al. 2019. Historical Changes in Lower Columbia River and Estuary Floods: A Numerical Study. JGR Oceans 124: 7926-7946. https://doi.org/10.1029/2019JC015055. 3) No action to date. 4) Columbia River Treaty Regional Recommendations 2013: Policy recommendations were made. Treaty negotiations continue. 5) No action to date.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
86 - Mxd	RPA 4: Operate the FCRPS storage projects for flow management to aid anadromous fish.	FCRPS	within 25 years	USACOE	Ongoing. The Action Agencies operated the FCRPS storage projects to provide flows to improve juvenile and adult fish survival consistent with Hydropower Strategy 1 of the BiOp as described in the 2015 Water Management Plan (WMP) (BPA et al. 2014a). In accordance with the adaptive management provisions of the 2008 BiOp, the WMP was developed to meet RPA water management actions identified in the NOAA Fisheries 2008 BiOp, the NOAA Fisheries 2010 Supplemental BiOp, and the NOAA Fisheries 2014 Supplemental BiOp (collectively referred to as NOAA's 2014 Supplemental BiOp).
87 - Mxd	RPA 5: Operate the FCRPS run-of-river mainstem lower Columbia River and Snake River projects to minimize water travel time through the lower Columbia and Snake rivers to aid in juvenile fish passage.	FCRPS	within 25 years	USACOE	Ongoing. The 2015 Water Management Plan (WMP) included operations for these run-of-river projects. The projects were operated consistent with the WMP and the 2015 Fish Operations Plan (FOP) which were consistent with the NOAA Fisheries and USFWS Biological Opinions to guide spill operations for juvenile fish passage and to also minimize water travel time through the Lower Columbia and Snake Rivers to aid in juvenile fish passage and water temperature management.
88 - Mxd	RPA 6: In-season water management via water management plans and by the Regional Forum.	FCRPS	within 25 years	USACOE	Ongoing. The annual WMP is consistent with the adaptive management provisions considered in the Columbia River System Operations (CRSO) Environmental Impact Statement (EIS) and ROD, as well as the 2020 CRS BiOp. System operations contained in the WMP may be adjusted in-season in coordination with the Technical Management Team (TMT). The Action Agencies (AAs) prepare seasonal updates to the 2021 WMP in coordination with the TMT and will post any updates on the following website: http://pweb.crohms.org/tmt/documents/wmp/
89 - Mxd	RPA 7: To address forecasting and climate change/variability, hold annual forecast performance reviews and report on effectiveness of experimental or developing/emerging technologies.	FCRPS	within 25 years	USACOE	Ongoing. The Columbia River Forecast Group (CRFG) continues to work collaboratively to assist the AAs in implementing this Reasonable and Prudent Alternative (RPA) action. The CRFG annual reports are available at http://www.salmonrecovery.gov/Hydro/Operations.aspx.
90 - Mxd	RPAs 8-9: Manage the FCRPS for operations and fish emergencies.	FCRPS	within 25 years	USACOE	Ongoing. The AAs manage interruptions or adjustments in water management actions, which may occur due to unforeseen power system, flood control, navigation, dam safety, or other emergencies. Such emergency actions will be viewed by the AAs as a last resort and will not be used in place of operations outlined in the annual WMP.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
91 - Mxd	RPAs 10-13: Columbia River Treaty and non-Treaty storage management, agreements, and coordination.	FCRPS	within 25 years	USACOE	Completed. Under authority detailed in the 2014-2015 Detailed Operating Plan, the Columbia River Treaty Operating Committee signed and executed a Non-power Uses agreement to provide mutual advantageous non-power benefits for both Entities. In January 2011, BPA and the USACOE completed the return of non-Treaty storage water called for under the 1990 Non-Treaty Storage Agreement (NTSA). Refill was accomplished outside of fish passage season to minimize adverse impact to fisheries. BPA coordinated with federal agencies, states and tribes throughout the spring and summer of 2015 on Canadian project operations, including non-Treaty storage operations in addition to the regular twice-yearly meetings (spring and fall) described above. The 2012 NTSA allows for coordinated use of non-Treaty storage in Canada to shape flows within the year for fisheries benefits and provides up to an additional 0.5 million acre-feet of water to benefit fish in the lowest water conditions. This action continued to be implemented in 2015.
92 - Mxd	RPA 14: Manage flow during dry years to maintain and improve habitat conditions for ESA-listed species.	FCRPS	within 25 years	USACOE	Ongoing. The dry year actions as outlined in RPA Action 14 were implemented in water year 2015 as follows: Reservoir draft limits, Treaty operations, annual agreements between the United States and Canada, non-treaty storage, alternative flow strategies, Snake River migrant transportation, Guide to Tools and Principles for a Dry Year Strategy.
93 – Mxd	OR: Draft storage reservoirs to meet lower Columbia summer flow and velocity equivalent objectives on a seasonal and weekly basis.	FCRPS	within 25 years	USACOE	In progress. 2020 FCRPS EIS: Sliding scale operations for summer flow augmentation are staged to better respond to local water supply conditions by using local forecasts and to better balance anadromous and resident fish needs.
94 - Mxd	OR: Operate reservoirs at rule curves and seek additional flow augmentation volumes from Snake River and Canadian reservoirs to better meet spring and summer flow and velocity objectives.	FCRPS	within 25 years	USACOE	In progress. 2020 FCRPS EIS: Sliding scale operations for summer flow augmentation are staged to better respond to local water supply conditions by using local forecasts and to better balance anadromous and resident fish needs.
190 - CM	Annually place 8,000 yd^3 of spawning sized gravel below River Mill Dam as per FERC settlement agreement.	Mainstem Clackamas R below R Mill Dam	within 15 years	PGE	Ongoing and completed every year, cubic yards increased to 20k in 2018 and Oak Grove Fork (and tribs) augmentation in 2017.
191 - CM	Implement all measures in the Clackamas River Hydroelectric Project (FERC Project No. 2195) Fish Passage and Protection Plan, including measures for downstream fish passage (3% or less mortality at River Mill and North Fork dams), Oak Grove Mitigation and improvements to North Fork fish ladder/trap.	PGE's Clackamas R Hydroelectric Project	within 15 years	ODFW, PGE	Ongoing. Pacific General Electric (PGE) has met yearly Federal Energy Regulatory Commission (FERC) requirements since plan adoption.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
192 - CM	Utilize the Clackamas Hydroelectric Project Mitigation and Enhancement Fund to provide for habitat mitigation and enhancements in the Clackamas Basin.	watershed-wide	within 15 years	ODFW, PGE	Ongoing. PGE has and continues to use the mitigation fund for Clackamas River basin projects. PGE, fish passage committee, and FERC modified disbursement of funds to accommodate Clackamas FIP.
193 - CM	Restore instream habitat complexity, including large wood placement (mitigate for loss of fall and spring Chinook habitat complexity due to Clackamas hydropower dams).	High intrinsic potential rearing areas for fall and spring Chinook watershed-wide	within 15 years	ODFW, PGE, City of Portland	In progress. The Clackamas Partnership's FIP is focusing on instream habitat and side channel connectivity on the mainstem Clackamas River below River Mill Dam. In 2022, the WOSRP and USFS staff implemented major restoration project on USFS lands, focusing on best available habitat for ChS, Coho, StW, and Bull Trout.
218 - SY	Implement measures in the Bull Run Water Supply Habitat Conservation Plan (HCP).	watershed-wide	within 15 years	City of Portland	In progress. From 2010- 2021, the City of Portland has been in full compliance with the terms and conditions of the HCP except for the downstream water temperature in the lower Bull Run River for multiple years (2015-2021). Staff meet yearly to discuss water management and will be an issue moving into the future, especially considering climate change predictions.
225 - SY	Meet minimum streamflow requirements for water temperature compliance below Bull Run dams (modified tower intakes and spillway plunge pool).	lower Bull Run R	within 15 years	ODFW, OWRD, City of Portland	In progress. Infrastructure changes implemented in 2014. The City meets regularly with ODFW, NOAA and ODEQ every year to discuss temperature management but has rarely met this condition since 2015, nor are they projecting meeting this requirement under a changing climate.
229 - SY	Gravel placement for spawning.	below Bull Run Dams	within 15 years	ODFW, PGE, City of Portland	City of Portland is in full compliance with their Bull Run Water Supply Habitat Conservation Plan (HCP) for gravel augmentation.
230 - SY	Remove dam.	Little Sandy R diversion	Completed (2008)	ODFW, OWRD, PGE	Completed.
258 - UG 285 - HD	RPA 15: Continue to update the Water Quality Plan for Total Dissolved Gas and Water Temperature in the mainstem Columbia and Snake rivers and implement water quality measures to enhance ESA-listed juvenile and adult fish survival and maintain spawning and rearing habitat.	Bonneville Dam	within 15 years	ODFW, USACOE, BPA	Each fall, the AAs prepare an annual WMP (draft by October 1 and final by December 31). The AAs prepared the WMP for the 2021 water year consistent with the CRSO EIS ROD, as detailed in the Final CRSO EIS, 2020 CRS BiOps, 2020 CRS Biological Assessment (BA), and 2020 BA Clarification Letter. The WMP describes the planned operations of the CRS dams and reservoirs for the 2021 water year (October 1, 2020, through September 30, 2021).
259 - UG	RPAs 18-21: Prepare, in cooperation with NMFS and comanaging agencies, configuration and operational plans for the Bonneville Project (2008), The Dalles Project, John Day Project (2008) and McNary Project (2009).	Bonneville Dam	within 15 years	ODFW, NMFS, USACOE, BPA	In progress. Bonneville Sluiceway improvements, turbine runner install, minimum gaps in turbine runners, screen bypass, spillway deflectors. Dalles: turbine ops, spillway. John Day: bypass, turbine operations, surface flow outlet. McNary: turbine operations, debris management, and bypass operations.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
260 - UG 287 - HD	RPA 27: Operate turbine units to achieve best fish passage survival (currently within 1% of best efficiency at mainstem dams on the lower Columbia and lower Snake rivers).	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	In 2015, turbine units on mainstem dams on the Lower Columbia and lower Snake Rivers were operated within 1 percent of best efficiency from April 1 to October 31 (hard constraint) and from November 1 to March 31 (soft constraint).
261 - UG	RPA 28: Implement structural improvements to adult passage at the mainstem Columbia River and Snake River projects.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	Bonneville Dam: improved the Bradford Island ladder system to reduce stress and improve reliability of upstream adult passage (2013). The Dalles Dam: East ladder emergency auxiliary water supply system and/or modifications that return adult salmon and steelhead use of the North ladder to pre-spillway conditions to improve reliability of upstream adult passage (2013). John Day Dam: Adult ladder systems modifications to improve upstream adult passage conditions (2011).
262 - UG	RPA 29: Provide spill to improve juvenile fish passage while avoiding high TDG supersaturation levels or adult fallback problems.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	Ongoing. Spill operations were implemented in accordance with the 2015 FOP consistent with the 2014 Supplemental BiOp. The FOP is Appendix E of the 2015 FPP (USACOE 2015a, see RPA Action 32 below). Implementation of these operations and regional coordination on in season adjustments are reported monthly during the migration season and can be found in Appendix D of the 2015 TDG Report (USACOE 2015b). Spring and summer spill operations and TDG monitoring.
263 - UG	RPA 32: Prepare annually a fish passage plan in coordination with NMFS and the Regional Forum. Operate projects year around in accordance with the criteria in the fish passage plan.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	Ongoing annually. The FPP was completed in full coordination with the region. USACOE fish passage facilities were operated in accordance with criteria in the FPP. Any deviations from the FPP were coordinated with the region and were necessary to protect fish or conduct emergency repairs on vital equipment.
264 - UG	OR - Operate lower Columbia reservoirs at minimum operating pool (MOP) during spring and summer if barge transport and irrigation needs are met.	Bonneville Dam	within 15 years	ODFW, USACOE, BPA	In progress. Oregon proposed MOPs in 2022, but no action has occurred yet.
265 - UG	OR - Provide spill to total dissolved gas limits of water quality waivers or biological constraints at all dams, except maximize transportation at Snake River collector projects during lowest (10th percentile) flow years.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	ODEQ provided waivers to allow an increase of TDG in 2020 and 2021 for additional voluntary spill at Columbia River dams to aid in fish passage survival.
286 - HD	RPAs 18-21: Prepare, in cooperation with NMFS and comanaging agencies, configuration and operational plans for the Bonneville Project (2008), The Dalles Project, John Day Project (2008) and McNary Project (2009).	Bonneville Dam	within 10 years	ODFW, NMFS, USACOE, BPA	Bonneville Sluiceway improvements, turbine runner install, minimum gaps in turbine runners, screen bypass, spillway deflectors. Dalles: turbine operations, spillway. John Day: bypass, turbine operations, surface flow outlet. McNary: turbine operations, debris management, and bypass operations.

Table A-I: 3. Plan actions to address threats and limiting factors associated with Hydropower Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
288 - HD	RPA 28: Implement structural improvements to adult passage at the mainstem Columbia River and Snake River projects.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	Bonneville Dam: improved the Bradford Island ladder system to reduce stress and improve reliability of upstream adult passage (2013). The Dalles Dam: East ladder emergency auxiliary water supply system and/or modifications that return adult salmon and steelhead use of the North ladder to pre-spillway conditions to improve reliability of upstream adult passage (2013). John Day Dam: Adult ladder systems modifications to improve upstream adult passage conditions (2011).
289 - HD	RPA 32: Prepare annually a fish passage plan in coordination with NMFS and the Regional Forum. Operate projects year around in accordance with the criteria in the fish passage plan.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	Ongoing annually. The FPP was completed in full coordination with the region. Corps fish passage facilities were operated in accordance with criteria in the FPP. Any deviations from the FPP were coordinated with the region and were necessary to protect fish or conduct emergency repairs on vital equipment.
290 - HD	OR - Operate lower Columbia reservoirs at minimum operating pool (MOP) during spring and summer as long as barge transport and irrigation needs are met.	Bonneville Dam	within 15 years	ODFW, USACOE, BPA	In progress. Oregon proposed MOPs in 2022, but no action has occurred yet.
291 - HD	OR - Provide spill to total dissolved gas limits of water quality waivers or biological constraints at all dams, except maximize transportation at Snake River collector projects during lowest (10th percentile) flow years.	Bonneville Dam	within 10 years	ODFW, USACOE, BPA	ODEQ provided waivers to allow an increase of TDG in 2020 and 2021 for additional voluntary spill at Columbia River dams to aid in fish passage survival.
292 - HD	Remove Powerdale Dam.	Powerdale Dam	2010	PacifiCorp	Completed in 2010.

Table A-I: 4. Plan actions to address threats and limiting factors associated with Harvest Management.

Table A-I: 4. Plan actions to address threats and limiting factors associated with Harvest Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
54 - Trib	Tag natural origin outmigrants from different populations to understand differential harvest/fishery impacts and return timing.	---	within 10 years	ODFW, NMFS	Action has not been implemented.
95 - Mxd	Adopt, eliminate, or revise Oregon's in-river coho harvest matrix and modify currently used PFMC Amendment 13 coho harvest matrix as necessary.	estuary	within 10 years	ODFW, NMFS, PFMC, WDFW	Completed in conjunction with weak stock management considerations in 2015.
96 - Mxd	Implement "weak stock management" for coho harvest by: a) Identifying appropriate weak grouping of populations based on population recovery goals/probability, run timing relative to harvest, and other factors (not necessarily within the weakest stratum - likely will be within Coast stratum rather than potentially infeasible Gorge stratum), b) Re-calibrating the current coho abundance-based harvest matrices, and c) Conducting weak stock monitoring.	estuary	within 10 years	ODFW, NMFS, PFMC, WDFW	Ongoing. See Coho harvest matrix. a) Previously used only the Clackamas and Sandy, update in 2015 now includes the Clatskanie and Scappoose in addition to some Washington populations for the Parental Escapement/Ave. percent of full seeding component of the matrix. b) Recalibration was done as part of the harvest matrix update c) Clatskanie and Scappoose adult coho abundance monitoring occurring.
97 - Mxd	Implement mark-selective, mainstem, commercial coho fisheries by: a) Researching and developing live-capture gear and techniques, and b) Implementing mark-selective, mainstem, commercial fisheries if feasible.	estuary	within 10 years	ODFW, WDFW	Ongoing. Live-capture commercial fisheries using tangle net gear have been implemented in most years since 2013. Fisheries using purse seines and beach seines were prosecuted in 2014-16. Mark-selective, live-capture commercial fisheries in the mainstem using pound nets, purse seines and/or beach seines are expected to occur beginning in 2024 under Washington Department of Fish and Wildlife's (WDFW) Emerging Commercial Fishery process.
98 - Mxd	Implement the new Pacific Salmon Treaty (reduce ocean fisheries on Chinook).	ocean	ongoing	ODFW, PSC, WDFW	Ongoing. New fishing regimes are in force from 2019 through 2028, with regular Pacific Salmon Commission review of stock status and regulatory effectiveness throughout that period.
99 - Mxd	Support mark-selective ocean fisheries when a new PST is negotiated in 10 years.	ocean	~2017	ODFW, NMFS, WDFW	A Mark Selective Fishery Fund was established to assist fishery management agencies and partners with implementing mark selective fisheries in each country. The fund supports a competitive grant program to a) mass-mark or sample hatchery-produced Chinook salmon, b) estimate incidental mortality, and c) maintain and improve the ability to estimate exploitation rates on Chinook salmon indicator stocks encountered in mark selective fisheries.

Table A-I: 4. Plan actions to address threats and limiting factors associated with Harvest Management.

Action ID	Action	Location	Schedule	Implementers	Notes
100 - Mxd	Implement mark-selective Columbia fall Chinook fisheries by: a) Developing live-capture commercial gear and techniques, b) Conducting release mortality studies for all fisheries, c) Implementing for Columbia R commercial fisheries in August and September if live-capture is feasible, and d) Implementing for sport fisheries in ocean, Buoy 10, tributaries, and mainstem above Buoy 10 (if upriver/Snake natural origins are low).	ocean, estuary, mainstem, and/or tributaries	within 20 years [a) and b) by 2016; c) start 2017-2022 (sooner if possible); d) start 2011-2016]	ODFW, NMFS, WDFW	Ongoing. Live-capture commercial fisheries using tangle net gear have been implemented. Continued evaluation of this technique is needed. Commercial fisheries using purse and beach seines were prosecuted in 2014-16. Mark-selective, live-capture commercial fisheries in the mainstem using pound nets, purse seines and/or beach seines are expected to occur beginning in 2024 under WDFW's Emerging Commercial Fishery process. Deemed not feasible in fall gill net fishery due to elevated water temperatures. Columbia River sport fisheries are mark-selective or non-mark-selective for Chinook depending on the management need and run size. Mark selective fall chinook fisheries have been prosecuted, and fishing effort is shifting upstream resulting in higher harvest rates on Snake River fall Chinook. Additional years of monitoring are needed to determine trends as well as a release mortality rate study given the large numbers of projected releases.
101 - Mxd	Develop an abundance-based, sliding scale harvest matrix that incorporates "weak stock management" for fall Chinook by implementing population monitoring and then: a) Identifying appropriate weak grouping of populations based on population recovery goals/probability, run timing relative to harvest, and other factors, b) Developing run forecast model, and c) Developing marine survival indices for returning adults.	estuary	within 20 years	ODFW, NMFS, PSC, WDFW	Current NMFS-approved harvest control rule is an abundance-based, sliding scale harvest matrix. NMFS has conducted multiple periodic reviews of the harvest control rule and proposed revisions as necessary. a) NOAA 2012: Effects of the Pacific Coast Salmon Plan Fisheries on the LCR Chinook ESU. Consistent with the Council's recommendation, NMFS proposes to manage fisheries subject to a total exploitation rate limit that would be set each year based on the preseason forecast of Lower River Hatchery Chinook salmon. b) Complete. c) Has not occurred.
102 - Mxd	Develop harvest management strategies to protect the strongest Chinook population (late Sandy ChF).	estuary	within 20 years	ODFW, PSC, WDFW	In progress. Commercial fall Chinook fisheries occur in zones 4 and 5; existing closed-fishing sanctuaries around the mouths of the Sandy and Washougal rivers are standard.
103 - Mxd	Shift mainstem commercial spring Chinook harvest to terminal areas during low return years (de facto "sliding scale").	estuary	within 20 years	ODFW, WDFW	Although not predicated on abundance, this has occurred via Columbia River Harvest Reform efforts beginning in 2017. Since then, only one mainstem commercial fishing period using live-capture, mark-selective regulations have been adopted (in 2022)
104 - Mxd	Monitor harvest levels in all fishery areas for all species (direct and indirect mortality).	estuary	ongoing; modify as needed	ODFW, PFMC, WDFW	Ongoing.
115 - YB	Consider terminal fisheries changes to reduce harvest of late returning natural origin coho.	Youngs Bay	within 10 years	ODFW, WDFW	Functionally occurring. By mid-October effort in Select Area commercial fisheries has declined.
129 - BC	Consider terminal fisheries changes to reduce harvest of late returning natural origin coho.	Knappa/Blind Slough	within 10 years	ODFW, WDFW	Functionally occurring. By mid-October effort in Select Area commercial fisheries has declined.

Table A-I: 4. Plan actions to address threats and limiting factors associated with Harvest Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
267 - UG	Discuss Zone 6 fishery actions with Tribes to reduce potential additional impacts. Potential actions include extending sanctuaries from mouths, and/or modifying season length or timing.	Columbia R mainstem	within 10 years	ODFW	The treaty tribes have not taken any action to modify current standards.
296 - HD	Discuss Zone 6 fishery actions with Tribes to reduce potential additional impacts. Potential actions include extending sanctuaries from mouths, and/or modifying season length or timing.	Columbia Mainstem	within 10 years	ODFW	The treaty tribes have not taken any action to modify current standards.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
1 - Trib	Continue the release of hatchery fish as smolts to reduce competition and predation with natural origin fish in tributaries and estuaries.	---	ongoing	ODFW, WDFW	Ongoing. Throughout the ESU, hatchery fish are released as smolts except for chum reintroduction program releases and very small salmon and steelhead releases through The Salmon and Trout Enhancement Program (STEP) classroom program.
2 - Trib	Investigate the feasibility of coordinated release timing among hatcheries, to reduce the numbers of out-migrating hatchery fish in-river at any one time.	---	within 15 years	ODFW, NMFS, WDFW	Action has not been implemented.
3 - Trib	Eliminate/reduce/shift program: To decrease mainstem and estuary competition and predation and reduce straying of hatchery fish onto natural spawning grounds, investigate and/or implement hatchery release reductions or program shifts to lower river terminal areas; include out-of-ESU programs and programs with surplus hatchery fish returns which are not harvested.	---	ongoing	ODFW, NMFS, WDF	Ongoing. Under Columbia River Harvest Reform, Bonneville, Sandy, and Clackamas Hatcheries shifted some production of coho and spring Chinook to Select Area release sites.
4 - Trib	Require hatchery programs/releases that are new, or increased more than 10% from 2009 levels, to complete or modify an HGMP and receive ODFW Fish Division approval; require reduced or eliminated programs to withdraw or modify their HGMP.	---	ongoing	ODFW, NMFS	Ongoing. ODFW hatchery programs covered under Hatchery Genetic Management Plans (HGMPs) and/or BiOps.
55 - Trib	Mark all hatchery fish.	---	completed (with 2009 tribal coho releases)	ODFW, NMFS, WDFW	Completed.
56 - Trib	Evaluate the need for and efficacy of double index tags for all coho hatchery programs.	---	within 15 years	ODFW	See Pacific Salmon Commission Selective Fishery Evaluation Committee. 2021. Analysis of Coho Salmon Double Index Tag (DIT) Groups for Brood Years 1998-2011. Report SFEC (21)-1.
57 - Trib	Coded-wire tag enough fish from each hatchery release to allow identification of hatchery origin of strays and evaluate rearing and/or release techniques of problem hatcheries.	---	within 15 years	ODFW, NMFS, USFWS, WDFW	Ongoing.
58 - Trib	Monitor stray rates for 9 years and implement adaptive management options if rates called for in recovery scenarios are exceeded.	---	within 15 years	ODFW	Ongoing. See adaptive management for Hood River winter steelhead.
59 - Trib	Based on the best available science, evaluate whether integrated or segregated hatchery programs are more compatible with recovery, considering the objective of each hatchery program.	---	within 15 years	ODFW	See Paquet et al. 2011. Hatcheries, Conservation, and Sustainable Fisheries—Achieving Multiple Goals: Results of the Hatchery Scientific Review Group's Columbia River Basin Review. Fisheries 36: 547-561.
60 - Trib	Re-evaluate current TRT-developed Gorge stratum's historical status and population structure and revise recovery goals if modifications are made.	---	within 5 years	ODFW, NMFS, WDFW	Action has not been implemented.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
61 - Trib	Trap and sort hatchery adults: Identify a fall Chinook population with high stray rates, no hatchery program, and potential for un-supplemented natural origin fish recovery and place weir to see if hatchery fish removal causes natural origin fish increase.	---	within 15 years	ODFW	Action has not been implemented.
62 - Trib	Identify the most appropriate stock, timing, and strategies for a ChF reintroduction hatchery program and implement, if fish managers determine that reintroductions are needed to recover any fall Chinook population.	---	within 15 years	ODFW, NMFS	Action has not been implemented.
63 - Trib	Carry out the Columbia River Chum Salmon Recovery Strategy, including: 1) Assess, identify, and protect chum habitat (all strata). 2) Restore chum habitat, looking for efficiencies with fall Chinook restoration efforts (all strata). 3) Reintroduce chum using an appropriate hatchery stock (one Coast stratum population initially, followed by other populations and strata as needed or as reintroduction knowledge grows).	---	within 15 years	ODFW, ODSL, ODA, Counties, Municipalities	In progress; see Appendix II of the 12-year Assessment.
116 - YB	Consider implementing terminal commercial fisheries for fall Chinook to reduce stray rates.	Youngs Bay	within 15 years	ODFW	Complete. Fall-season commercial fisheries in Youngs Bay have occurred annually since 1962.
117 - YB	Maintain existing natural origin fish sanctuary.	sort at Klaskanine Hatchery	ongoing	ODFW	Ongoing. Coho and winter steelhead were sorted at Klaskanine Hatchery during all years.
118 - YB	Trap and sort hatchery adults: Begin passing tules and chum if suitable habitat exists.	Klaskanine Hatchery	within 15 years	ODFW	Ongoing. ODFW records indicate that natural origin fall chinook were released into North Fork Klaskanine upstream of the hatchery starting in 2016; no chum were captured.
119 - YB	Trap and sort hatchery adults: Investigate placing trap to sort hatchery fish from upstream migrants.	Lewis and Clark R at the current City of Warrenton diversion's fishway	within 15 years	ODFW	Ongoing. Hatchery winter steelhead are removed at the City of Warrenton's diversion fishway. The ladder is not managed for coho.
130 - BC	Consider implementing terminal commercial fisheries for fall Chinook to reduce stray rates.	Knappa/Blind Slough	within 15 years	ODFW	Complete. Fall-season commercial fisheries in Blind/Knappa Slough have occurred annually since 1996.
131 - BC	Trap and sort hatchery adults: Develop trap and haul capability to pass unmarked Coho and STW above hatchery. (Gnat Creek Hatchery)	Gnat Crk Hatchery	within 15 years	ODFW	Action has not been implemented. As of 2022, there is a natural barrier 100 m downstream of hatchery intake. A natural waterfall is developing and multiple pieces of LWD are accumulating as well as gravel. Providing passage at intake dam may not provide full benefits due to natural barrier.
132 - BC	Maintain existing natural origin fish sanctuary.	Big Crk Hatchery	ongoing	ODFW	Ongoing. Only natural origin coho and steelhead are passed above Big Creek Hatchery. NOR fall Chinook have been occasionally passed but ceased due to near 100 percent pre-spawn mortality.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
133 - BC	Trap and sort hatchery adults: Begin passing tules and chum.	Big Crk Hatchery	completed (2009)	ODFW	This was completed but is no longer occurring. Passing tules mostly resulted in fallback on the hatchery weir because of low flows. High mortality occurred during trucking operations. Due to high mortality, Natural Origin Returns (NOR) returns were released downstream. Chum were passed for three years, with little to no reproduction found during monitoring. ODFW and NOAA agreed to bring natural origin chum collected at the hatchery weir to be incorporated in reintroduction program broodstock.
134 - BC	Eliminate/reduce/shift program: Reduce hatchery tule releases (5.7M to 3.7M in 2009; shifted to Youngs Bay).	---	completed (2009)	ODFW	Completed.
147 - CT	Trap and sort hatchery adults: Investigate placing trap to sort hatchery fish from upstream migrants, if stray rate is greater than 10%.	current fishway in lower R at RM 10 falls, Clatskanie	within 15 years	ODFW	Action has not been implemented. There are typically no fall chinook in the Clatskanie outside of Plympton Creek; winter steelhead stray rates are below 10 percent; and coho average proportion Hatchery fish On Spawning grounds (pHOS) remained below 10 percent until 2018, when adult NOR returns were very low. In recent years, hatchery coho in Plympton Creek have driven stray rates for Clatskanie population above 10 percent.
148 - CT	Maintain existing natural origin fish sanctuary (do not stock hatchery fish).	watershed-wide	ongoing	ODFW	Ongoing. No hatchery releases of fall Chinook, coho, or winter steelhead occur in this population, although Big Creek releases influence the Clatskanie population due to straying into Plympton Creek.
168 - SC	Maintain existing natural origin fish sanctuary (do not stock hatchery fish).	watershed-wide	ongoing	ODFW	Ongoing. No hatchery releases occur in Scappoose population area.
209 - CM	Increase harvest rate of hatchery coho as needed or permanently (3 daily bag) if program is maintained.	Below North Fork Dam	within 15 years	ODFW	Implemented in 2014, permanent rule.
210 - CM	Maintain existing natural origin fish sanctuary.	sort at North Fork Dam	ongoing	ODFW, PGE	Ongoing.
211 - CM	Eliminate/reduce/shift program: Reduce hatchery coho releases (500k to 350k beginning in 2009).	Eagle Crk Nat'l Hatchery	completed (2009)	ODFW, USFWS	Completed in 2009.
212 - CM	Eliminate/reduce/shift program: Eliminate in-basin hatchery coho program and releases if hatchery coho production shifts to out-of-ESU stocks (Yakima and Umatilla).	Eagle Crk Nat'l Hatchery	within 15 years	USFWS	Eagle Creek National Fish Hatchery (NFH) continues broodstock collection from Clackamas returns to the facility.
213 - CM	Operationally open the hatchery trap for a longer period.	Eagle Crk Nat'l Hatchery	within 15 years	ODFW, USFWS	Action was not implemented.
214 - CM	Purchase a freezer trailer to aid the logistical disposition to carcass placement, tribes, and food banks if program is maintained.	Eagle Crk Nat'l Hatchery	within 15 years	ODFW, USFWS	Completed. Northwest Steelheaders purchased in 2015.
215 - CM	Eliminate/reduce/shift program: Reduce the Eagle Creek hatchery winter steelhead releases if needed (150k to 100k).	Eagle Crk Nat'l Hatchery	2010	ODFW, USFWS	Winter steelhead releases from Eagle Creek NFH are at 100k.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
216 - CM	Implement a sliding scale for take of natural origin winter steelhead broodstock for the integrated hatchery program based on the forecasted total return of natural origin fish to the population (<500: no take; 500-1000: reduced take); develop forecast model as necessary.	Below North Fork Dam	within 15 years	ODFW	Ongoing. 2017 HGMP: broodstock will incorporate 20-30 percent natural origin fish (males only, live spawned); broodstock collection not to exceed two percent of natural origin steelhead abundance; no wild adults taken if the wild adult winter steelhead run into the Clackamas River expected to be at or below 650.
217 - CM	Explore feasibility of shifting the Clackamas Hatchery winter steelhead program to a 2-year-old smolt program. If implemented and they maintain natural origin run-timing, consider segregated program to reduce natural origin brood harvest.	Clackamas Hatchery	within 15 years	ODFW	Action was considered, but not feasible at this time due to limited space and costs.
237 - SY	Eliminate/reduce/shift program: Reduce hatchery coho releases (700k to 500k in 2010; shifted to Youngs Bay).	Sandy Hatchery	2010	ODFW	Completed in 2010.
238 - SY	Acclimate 100% of hatchery spring Chinook releases into the Sandy.	Sandy Hatchery (Cedar Crk) and Bull Run R or Gordon Crk	within 15 years	ODFW, City of Portland	Ongoing. 100 percent of Sandy spring Chinook are acclimated in the Sandy basin.
239 - SY	Trap and sort hatchery adults: Collect (weir and trap at or near acclimation sites) hatchery spring Chinook if stray rate is too high.	Cedar Crk (mouth) and Bull Run R or Gordon Crk	within 15 years	ODFW, City of Portland	Bull Run is the acclimation site for the Sandy. Cedar Creek Hatchery staff trap and sorts returns, and Bull Run weirs are placed to remove hatchery spring Chinook.
240 - SY	Increase water quantity in Cedar Creek for more attraction (end illegal diversions, increase outreach and coordination with OWRD, potentially purchase water rights).	Cedar Crk	within 15 years	ODFW	In progress. City of Portland HCP Measure 4-5: Portland Water Bureau (PWB) documented the history of action taken for this conservation measure. PWB has found no willing sellers of certificated surface water rights in the Cedar Creek drainage. PWB was not able to implement this measure. This measure has been replaced and approved by NOAA and ODEQ. Nearly every year education and outreach occur as the local watermaster must regulate this stream so ODFW can affectively operate the hatchery during summer months. Ongoing issue.
241 - SY	Implement a sliding scale for take of natural origin winter steelhead and spring Chinook broodstock for the integrated hatchery programs based on the forecasted total returns of natural origin fish to the population (<500: no take; 500-1000: reduced take); develop forecast model as necessary.	watershed-wide	within 15 years	ODFW	Ongoing. HGMPs approved in 2013: proposed minimum abundance (650) for natural origin take; limit the number of wild adults collected for broodstock to less than 2 percent of the naturally spawning population.
242 - SY	Eliminate the upper basin and Marmot Dam acclimation pond releases.	watershed-wide	completed	ODFW	Completed.
250 - LG	Trap and sort hatchery adults: Investigate placing new weir and trap to sort hatchery fish from upstream migrants. (Eagle Creek)	Eagle Crk (near mouth); Tanner Crk	within 15 years	ODFW	Action has not been implemented.
251 - LG	Eliminate/reduce/shift program: Reduce Bonneville Hatchery coho releases (1.225M to 0.725M in 2010 and shift to lower Columbia River).	Bonneville Hatchery	2010	ODFW	Completed in 2010.

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
252 - LG	Discuss longer acclimation/rearing at tribal release sites to reduce imprinting at OR and WA hatcheries (rearing sites).	Out-of-ESU	within 15 years	ODFW, NMFS	Action has not been implemented.
268 - UG	Trap and sort hatchery adults: Investigate placing trap to sort hatchery fish from upstream migrants. (Herman Creek)	Herman Crk at Oxbow Hatchery	within 15 years	ODFW	Action has not been implemented.
297 - HD	Eliminate/reduce/shift program: Investigate further reducing releases of Klickitat and Umatilla coho (primary strays in Hood R); coho releases in the Umatilla will be reduced from 1.5M to 1.0M in 2010 and all fish will be marked.	Out-of-ESU	ongoing	ODFW, NMFS, WDFW	Ongoing. Umatilla coho are reared at Cascade Hatchery. Releases are down to 500k and 100% fin marked. Klickitat coho releases decreased from 3.7M to 2.5 M.
298 - HD	Identify the specified time, stock, timing, and strategies for reintroduction if fish managers determine that reintroductions are needed to recover the coho population.	watershed-wide	within 15 years	ODFW, NMFS	Action has not been implemented.
299 - HD	Trap and sort hatchery adults: Investigate placing new weir and trap to sort hatchery fish from upstream migrants.	Neal Crk	within 15 years	ODFW	Placed in 2015, destroyed in 2016; then landowner denial, not replaced.
300 - HD	Trap and sort hatchery adults: Install a floating weir to remove stray hatchery winter steelhead, spring Chinook and coho.	East Fork Hood R	within 15 years	ODFW	Ongoing; installed in 2015.
301 - HD	Trap and sort hatchery adults: Install and operate a fish trap at Moving Falls to remove stray hatchery spring Chinook.	West Fork Hood R at Moving Falls	within 15 years	ODFW, NMFS	Ongoing; installed in 2015.
302 - HD	Move toward in-basin rearing of hatchery spring Chinook for better local adaptation of the out-of-ESU Deschutes stock used for re-introduction.	watershed-wide	within 15 years	ODFW	Ongoing. In-basin rearing occurs at Moving Falls Fish Facility (MFFF) and at Parkdale Fish Hatchery (PFH); production has increased to an annual release at 250k smolts. 150k reared in basin and 100k reared at Round Butte Hatchery.
303 - HD	Work with Confederated Tribes of Warm Springs to evaluate re-introduction and explore alternative options if current program not successful.	watershed-wide	within 15 years	ODFW	In progress. There are insufficient NOR returns to provide a reliable abundance estimate. The Independent Science Review Pannel (ISRP 2019) on the Hood River Production Program (HRPP) spring Chinook: The recent 5-year average values suggest that the proposed objectives for 2018 (from Table 8 of 2008 Master Plan) have been met or exceeded for Hatchery Origin Returns (HOR). to the river mouth (1,640 average > 600 target), in-river harvest (1,020 > 318), and Smolt to Adult Returns (SARs 0.65 percent > 0.4 percent), and nearly met for NORs at the river mouth in 2016, the only year of enumeration (285 < 300).
304 - HD	Work with the Confederated Tribes of Warm Springs to develop a sliding scale for take of natural origin spring Chinook broodstock for the integrated hatchery program based on the forecasted total return of natural origin fish to the population; develop forecast model as necessary.	West Fork Hood R	within 15 years	ODFW	Did not occur. The goal is 10 percent NOR in the broodstock. NOR returns to Moving Falls fish ladder remains at very low levels (20-30 adults annually).

Table A-I: 5. Plan actions to address threats and limiting factors associated with Hatchery Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
305 - HD	Implement a sliding scale for take of natural origin winter steelhead broodstock for the integrated hatchery program based on the forecasted total return of natural origin fish to the population (<200: no take); develop forecast model as necessary.	East Fork Hood R	within 15 years	ODFW	Revised HGMP approved in 2017; moved to 100 percent natural origin broodstock; if wild spawner escapement was projected to not be robust enough to remain below the 25 percent broodstock take limit, project will incorporate some returning hatchery fish into the broodstock following Hatchery Science Review Group (HSRG) guidelines (up to a maximum of 20 hatchery-origin adults) or will be discontinued until wild run size recovers. Winter steelhead program was discontinued in 2021.
306 - HD	Eliminate/reduce/shift program: Discontinue hatchery summer steelhead program (last smolt release in 2009).	watershed-wide	completed (2009)	ODFW	Completed in 2009.

Table A-I: 6. Plan actions to address threats and limiting factors associated with Predation Management.

Table A-I: 6. Plan actions to address threats and limiting factors associated with Predation Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
76 - Mxd	(Similar to CRE-13): Manage pikeminnow and other piscivorous fish, including introduced species and hatchery fish, to reduce predation on salmonids. 1) Monitor the abundance levels of pikeminnow, smallmouth bass, walleye, and channel catfish. 2) Implement actions as necessary to prevent population growth (i.e., modify habitat); increase the northern pikeminnow bounty program in the estuary. 3) Conduct research to evaluate impact that predation by hatchery origin fish has on natural origin salmon and steelhead (especially ocean-type salmon juveniles: tules and chum) in the estuary. 4) Develop plan to reduce predation by hatchery origin fish if research above shows significant impact.	estuary	within 25 years (see EM)	ODFW, USACOE, LCREP, Metro	1) Ongoing. For latest report, see Report on the Predation Index, Predator Control Fisheries, and Program Evaluation for the Columbia River Basin Northern Pikeminnow Sport Reward Program, 2022 Annual Report. Pacific States Marine Fisheries Commission, Washington Dept. of Fish and Wildlife, Oregon Dept. of Fish and Wildlife 2) Ongoing. The Pikeminnow Sport Reward Fishery Program, funded by the BPA and administered by the PSMFC, pays anglers for each Northern Pikeminnow that they catch that is nine inches or larger. Rewards range from $6 to $10 per fish, and special tagged fish are worth $500. The program operates from May 1 to September 30, 2022, in the lower Columbia River (mouth to Priest Rapids Dam) and the Snake River (mouth to Hells Canyon Dam). 3) NOAA has conducted investigations into fish assemblages, genetic stock ID, estuary timing, etc. No recent study has been conducted examining hatchery juvenile fish predation on natural origin juvenile fish. 4) See above.
78 - Mxd	CRE-16: Implement projects to redistribute part of the Caspian tern colony currently nesting on East Sand Island. 1) Enhance or create tern nesting habitat at alternative sites in Washington, Oregon, and California. 2) Reduce tern nesting habitat on East Sand Island to 1 to 1.5 acres. 3) Monitor the regional tern population.	estuary	within 25 years (see EM)	ODFW, USACOE, USFWS, LCREP	1) In progress. Tern nesting habitat was created at various locations across Oregon, Washington, and California. 2) Tern nesting habitat is limited to a 1-acre size, densities of tern nesting have increased. 3) Ongoing. Conducted annually by Bird Research Northwest.
79 - Mxd	CRE-17: Implement projects to reduce double-crested cormorant habitats and encourage dispersal to other locations. 1) Identify, assess, and evaluate methods of reducing double-crested cormorant abundance numbers. 2) Implement demonstration projects resulting from assessment above (i.e., decoys and audio playback methods). 3) Implement projects resulting in reduced predation by cormorants.	estuary	within 25 years (see EM)	ODFW, USACOE, USFWS, LCREP	Ongoing. Implementation of plans to reduce Double-crested Cormorant (DCCO) abundance at East Sand Island have worked effectively. Displacement to the Astoria Megler Bridge has occurred, potentially resulting in greater predation impacts. 1) Ongoing. See 2015 Management Plan for DCCO in the LCR in addition to yearly management plans. 2) Management has been via lethal take, egg take, egg oiling and harassment outside of 1.3-acre breeding area. 3) In progress. Implemented actions include reducing breeding habitat on East Sand Island, collecting adults, oiling eggs, and passive dissuasion measures. Overall effect on predation by DCCO is uncertain due to displacement to other locations within Columbia River Estuary.

Table A-I: 6. Plan actions to address threats and limiting factors associated with Predation Management.					
Action ID	Action	Location	Schedule	Implementers	Notes
80 - Mxd	(Similar to CRE-18) Reduce competition with non-native and hatchery origin fish in the estuary. 1) Organize existing technical information about shad and identify data gaps and potential control methods; 2) Implement demonstration projects to evaluate effective shad management methods; 3) Implement shad population management techniques; 4) Monitor and evaluate shad management techniques; 5) Conduct research to evaluate impact that competition with hatchery origin fish have on natural origin salmon and steelhead in the estuary; and 6) Develop a plan to reduce competition with hatchery origin fish if research above shows significant impact.	estuary	within 25 years (see EM)	ODFW, NMFS, WDFW, LCREP	1) See ISAB. 2021. American Shad in the Columbia River: Past, Present and Future. ISAB 2021-4. 2) See below. 3) Ongoing. Commercial harvest of shad occurs in Area 2S (upstream of navigation aid #50 near Gary Island), but effort and catch have been low in recent years. In addition, work has been conducted to explore the feasibility of using alternative gear types to increase opportunities to harvest the abundant shad runs while minimizing impacts to salmonids. Shad were harvested with seines in 2011, 2012 (primarily purse seine), 2014 (beach seine), and 2016 (purse seine) under experimental gear permits issued by ODFW. In 2019, a limited number of shad were captured in an experimental pound net located in Cathlamet Channel. 4) Ongoing. See 2023 Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and Other Species. Joint Columbia River Management Staff. 5) Multiple studies investigating size, timing, diet, etc. have been completed or are in progress. 6) Has not occurred.
269 - UG	(Similar to CRE-14) Expand federal and state activities at Bonneville Dam to test and implement non-lethal and potentially lethal methods of reducing pinniped populations. This includes efforts to manage pinnipeds through the Marine Mammal Protection Act.	Bonneville Dam	ongoing	ODFW, NMFS, USACOE, BPA, WDFW LCREP	Ongoing. Under Marine Mammal Protection Act Section (MMPA) 120, NOAA Fisheries has authorized the lethal removal of sea lions in the Columbia River basin to reduce predation on salmon and steelhead listed under the ESA.
307 - HD	(Similar to CRE-14) Expand federal and state activities at Bonneville Dam to test and implement non-lethal and potentially lethal methods of reducing pinniped populations. This includes efforts to manage pinnipeds through the Marine Mammal Protection Act.	Bonneville Dam	ongoing	ODFW, NMFS, USACOE, BPA, WDFW, LCREP	Ongoing. Under MMPA Section 120, NOAA Fisheries has authorized the lethal removal of sea lions in the Columbia River basin to reduce predation on salmon and steelhead listed under the ESA.