HABITAT IMPROVEMENT PROGRAM
HIP4
2024 ANNUAL MONITORING REPORT

Bonneville
POWER ADMINISTRATION

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SUMMARY

This is the **5th annual monitoring report** required under the new Habitat Improvement Program 4 Biological Opinions (HIP4) (NMFS No# WCRO-2020-00102, USFWS 01E0FWOO-19FY-0710). This report not only details the extensive activities undertaken in 2024 but also critically evaluates the incidental take associated with these operations, providing valuable comparisons to previous years.

At its core, HIP4 represents one of the largest and most intricate habitat enhancement initiatives globally, operating across the Columbia River basin. It serves as Bonneville Power Administration's (Bonneville) primary strategy for **"offsite" mitigation of federal hydrosystem impacts** and a vital commitment under the Endangered Species Act (ESA) to protect listed salmonids. The HIP is the primary means by which this habitat enhancement work gets reviewed, refined, and then covered under Section 7(a)2 of the ESA.

The program has evolved through several iterations, including HIP I (2003), HIP II (2008), HIP III (2013), and the current HIP4 (2020). The transition to HIP4 was initiated to modify activity categories based on feedback from monitoring results, stakeholder requests, and to include additional activities like **estuarine herbicide applications** and **Willamette Valley prairie restoration.**

Actions funded by Bonneville are implemented through **BPAs Habitat Strategy,** which seeks to facilitate watershed-scale prioritization and planning efforts to identify priority work for fish habitat restoration. The program is one of the largest and most complex of its kind in the world and includes collaborative work with states, tribes, federal agencies, local governments and non-profit organizations to implement the most biologically beneficial actions in the highest priority areas for ESA-listed salmonids.

In 2024 Bonneville has been **successful** in meeting incidental take criteria. Juvenile take was less than most years with no reported turbidity exceedance that persisted for more than 2 monitoring intervals. Juvenile presence within restoration sites remains highly stochastic, however in any case sponsors have demonstrated consistency in handling and moving ESA-listed fish with little to no injury or mortality.

Beyond its ecological successes, HIP4 maintains an unwavering commitment to **project quality assurance and control**. Bonneville is actively enhancing its internal capabilities to ensure high-quality project delivery through the optimization and refinement of its **HIP Review Process.** After over a decade of experience, this review process has evolved into a streamlined and standardized system, continually adapting based on feedback, re-evaluating past challenges, and building upon successes.

The **HIP4 Handbook**, a crucial tool, is also continuously updated to reflect the latest scientific advancements in restoration standards and practices, further shaping the quality and outcome of funded projects.

Figure 1. 2024002: Large wood structures on the Chiwawa River for the Chiwawa Outlet Fish Habitat Restoration Project.

Figure 2. 2024010: Coho salmon captured during fish salvage for the Coleman Creek 4.4 – Schomer/Beard YTAHP project.

HIP4 PROJECTS AUTHORIZED

During 2024 the HIP4 BOs authorized 101 projects, of which 13 were withdrawn, leading to a total of **88 projects being implemented in 2024** (Table 1, 2, & 3). Each project had multiple activity categories (Work Elements). Work Elements are the most discrete unit of action that BPA may undertake, with a contract typically consisting of multiple work elements. Work elements are discussed further on

In alignment with Bonneville's contracting rules, projects are mainly reported on the contract level, occasionally multiple contracts may be lumped together if they share the same sponsor & location**. A majority were low risk (46), 30 were medium risk, and 12 were high risk (Maps 1-6)**. Each medium and high risk underwent the **HIP Review process** which included a thorough technical review by BPA Engineering Technical Services (ETS), and if high risk, Interagency review by Service Habitat Biologists.

TABLE 1: HIP4 PROJECT AUTHORIZATIONS (46 LOW RISK) 2024

HIP_NO#	PROJECT
2024005	ODFW Willamette Valley O & M
2024008	Upper Salmon Fish Screen O & M
2024013	M2 Alder Creek Floodplain 2017-191
2024016	Tucannon PA 26
2024018	Pine Creek Conservation Area
2024023	Kelly Creek PA 45
2024024	ODFW Gravity Screens (Walla Walla & Bridge Creek)
2024026	Upper John Day Conservation
2024030	Southern Territories Habitat Project - Veg Mgmt
2024032	Oregon Fish Screens II
2024033	Asotin County Conservation District Habitat Enhancement and Restoration
2024034	Hellsgate Big Game Winter Range Veg Mgmt
2024037	Pott Road Invasive Crack Willow Removal and Fortune Habitat Protection
2024038	Latah SWCD Restoration Site Planting and Veg Mgmt
2024041	Annual Maintenance at Imeques and Thornhollow
2024042	Upper Columbia 2024 Habitat and Geomorphic Reach Assessment Services
2024044	CTUIR Grande Ronde Invasive Weed Treatment 2024
2024045	Trout Creek Watershed Noxious Weed Program (JCSWCD)
2024046	Trout Creek Watershed Noxious Weed Program (ODFW)
2024047	Baldwin Creek Fish Passage and Habitat Enhancement - Herbicides
2024048	Lower Yakima Vally Riparian Wetlands Restoration
2024051	Upper Salmon Restoration Weed Treatment and Hydroseeding
2024052	East Fork of South Fork Salmon River Restoration
2024057	Lapwai Creek Watershed Vegetation Management
2024058	Umatilla Passage O&M

2024059	Lapwai Creek Watershed Vegetation Maintenance
2024062	Grande Ronde and Umatilla Fish Habitat
2024063	Chahalpam Floodplain Restoration Phase 2 – Vegetation Mgmt
2024065	Isquuulktpe Watershed Project
2024066	Yakima Steelhead VSP Project
2024071	Rainwater Wildlife Area
2024072	Upper Salmon Basin Fish Screens
2024074	Asotin Creek Wildlife Area O&M 2024
2024075	Wenas Wildlife Mitigation
2024078	Raistakka Fish Enhancement Project – Geotechnical Investigation
2024079	Wind River Riparian Vegetation Management
2024080	Lapwai Creek PALs Modifications
2024084	Crooked River Salmon Carcass Placement
2024085	NE Oregon Precious Lands Wildlife Area
2024088	Shillapoo Wildlife Area
2024093	NFJD Fox Creek Reach 18 Irrigation System
2024094	John Day Fish Habitat Enhancement Program
2024095	Eagle Valley Ranch Habitat Improvement Veg Mgmt
2024098	CTUIR Mud Creek and Hideaway Creek Conservation Area Weed Control
2024099	Middle Fork John Day Vegetation Mgmt
2024100	Vegetation Mgmt - Walla Walla River

Figure 3. 2024024: New ODFW fish screen at North Fork Walla Walla River #4 site.

Figure 4. 2024066: Cle Elum River PIT array installed just upstream of the confluence with the Yakima River.

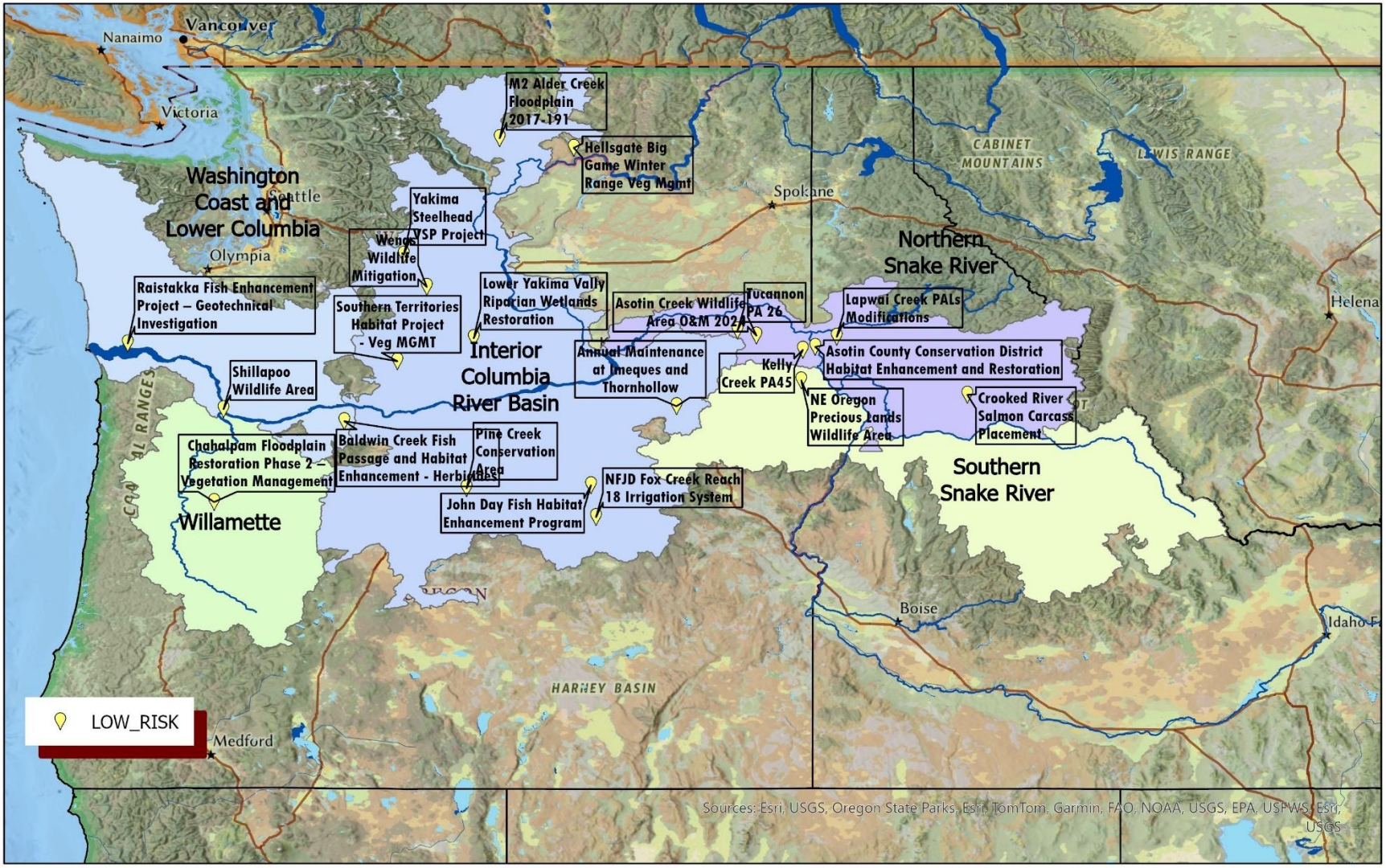
TABLE 2: HIP4 PROJECT AUTHORIZATIONS (30 MEDIUM RISK) 2024

HIP_NO#	PROJECT
2024002	Chiwawa Outlet Fish Habitat Enchancement Project
2024010	Coleman Creek 4.4 - Schomer/Beard YTAHP
2024011	Naneum Creek 2.9 and 3.2 – Fish Screening and Passage YTAHP
2024014	Oregon Fish Screens Project I
2024015	Sill Creek BDAs
2024017	Pole Creek Instream Complexity Project
2024019	McInernie Cr. Culvert replacement for fish passage
2024021	Asotin Creek PA-06 Instream habitat
2024022	Couse Creek PA-78 Instream Habitat Enhancement
2024025	Wolf Bay Restoration
2024027	Oregon Fish Screens Project (O & M)
2024028	Upper Nason Creek - Phase 2
2024029	Southern Territories Habitat Project - BDAs
2024031	Southern Territories Habitat Project - White Creek LWD Phase II
2024035	Couse Creek RM 4 Process Based Restoration Phase II
2024043	Road Creek Culvert to Bridge Project
2024050	South Fork Walla Walla Adaptive Mgmt
2024053	Elk Creek BDA's and Plantings
2024054	Columbia Stock Ranch – Veg and fence Mgmt
2024055	Lower Elochoman Restoration Phase II
2024056	Lower Elochoman Restoration Phase III
2024060	North Fork Salmon River Cole Property
2024061	Last Chance Ranch Upper Pahsimeroi Phase 1 Modification
2024064	Neal Creek Phase 3 Habitat Enhancement Projects - Tree Felling
2024067	Neal Creek Phase 3 Habitat Enhancement Projects
2024068	Baldwin Creek Fish Passage and Habitat Enhancement
2024073	WF Little Bear Creek Instream Habitat Improvement #2
2024076	Low-Tech Maintenance at Big Creek Ranch and IDL
2024087	Peterson Dam
2024097	Cascade Orchard Irrigation Company Irrigation Efficiency and Pump Exchange Project

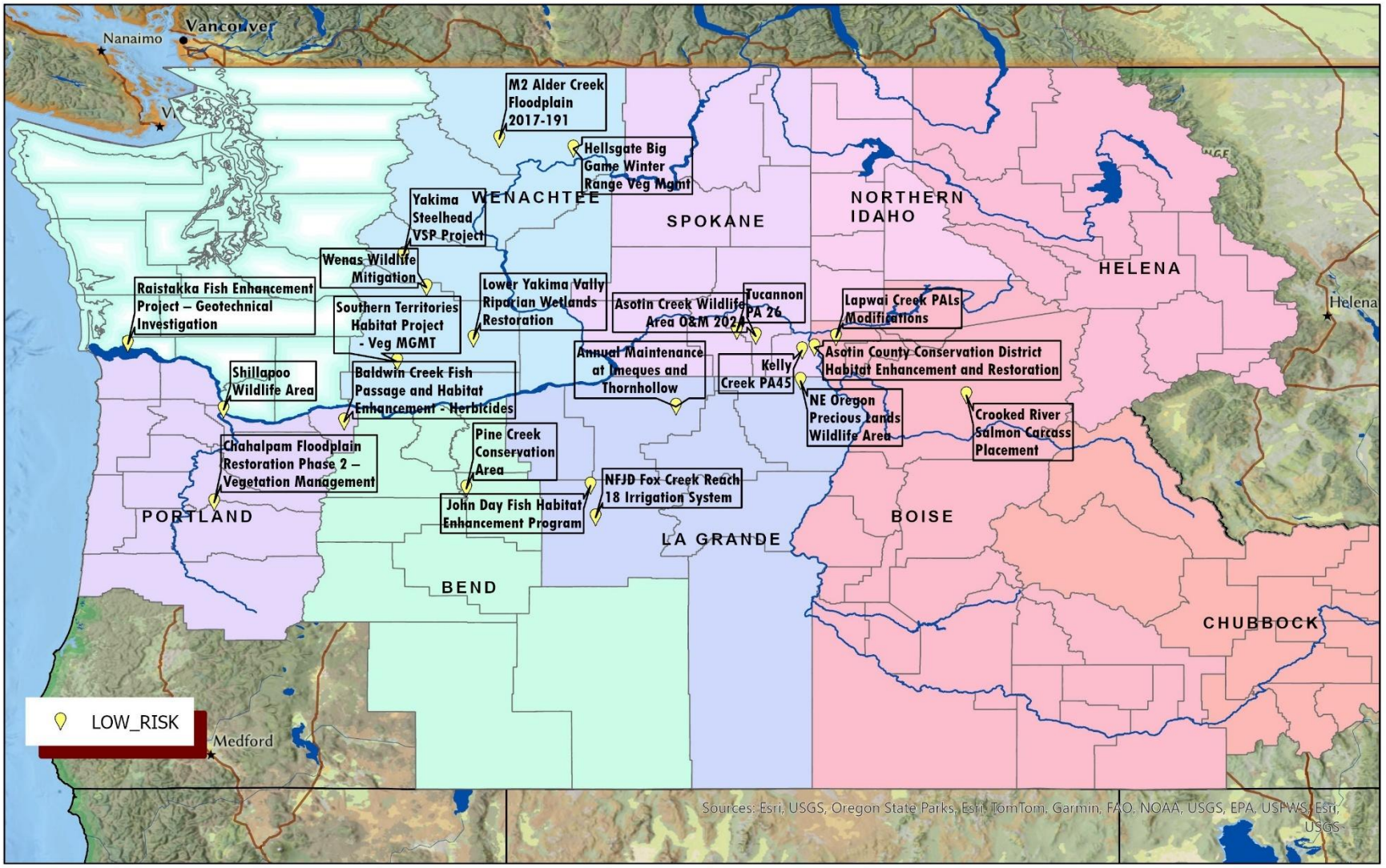
Figure 5. 2024076: BDA structure with willows on the Pahsimeroi River in Idaho.

Figure 6. 2024028: Upper Nason Creek habitat restoration.

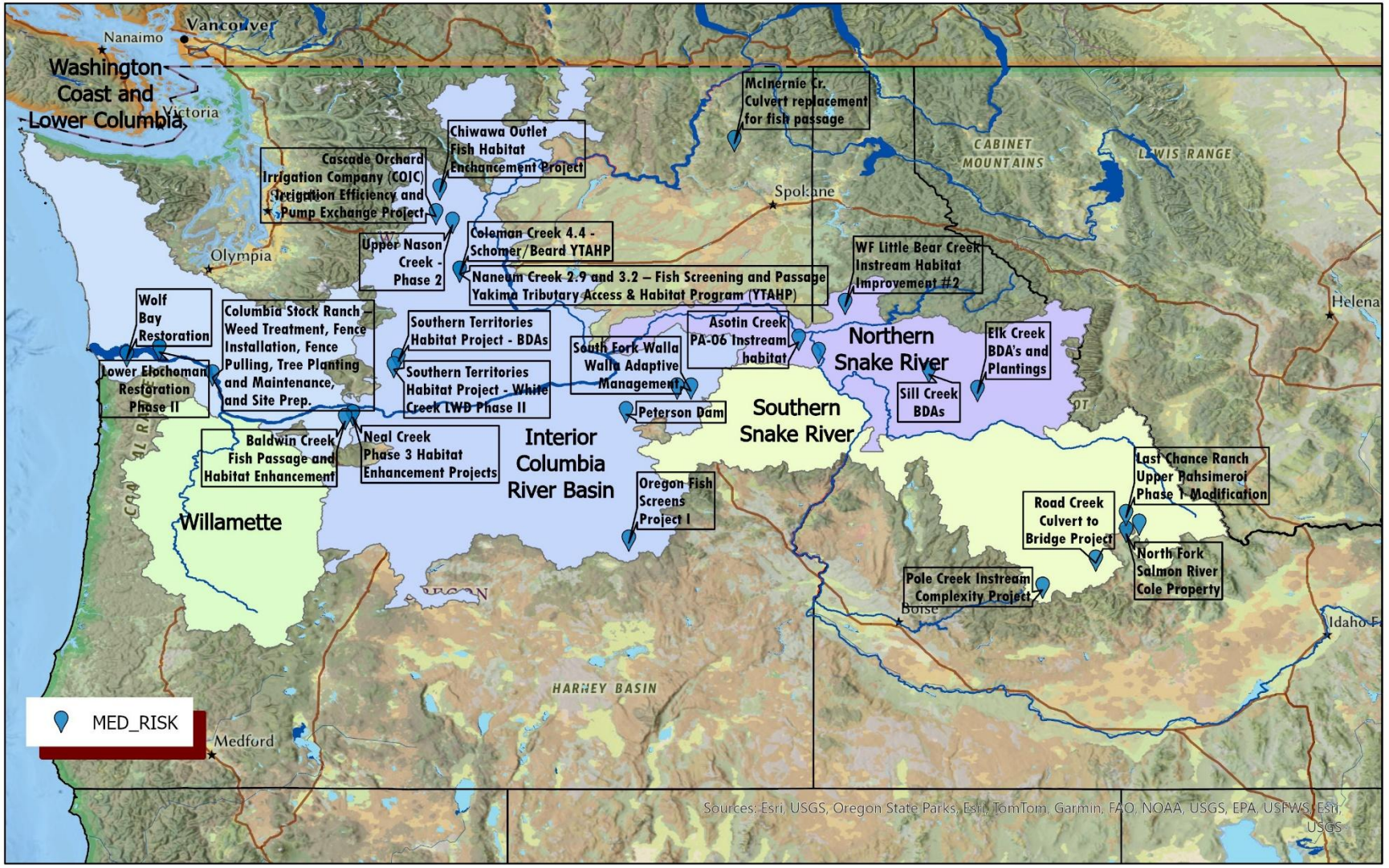
MAP 1: 2024 LOW RISK HIP4 PROJECT LOCATIONS (NMFS)



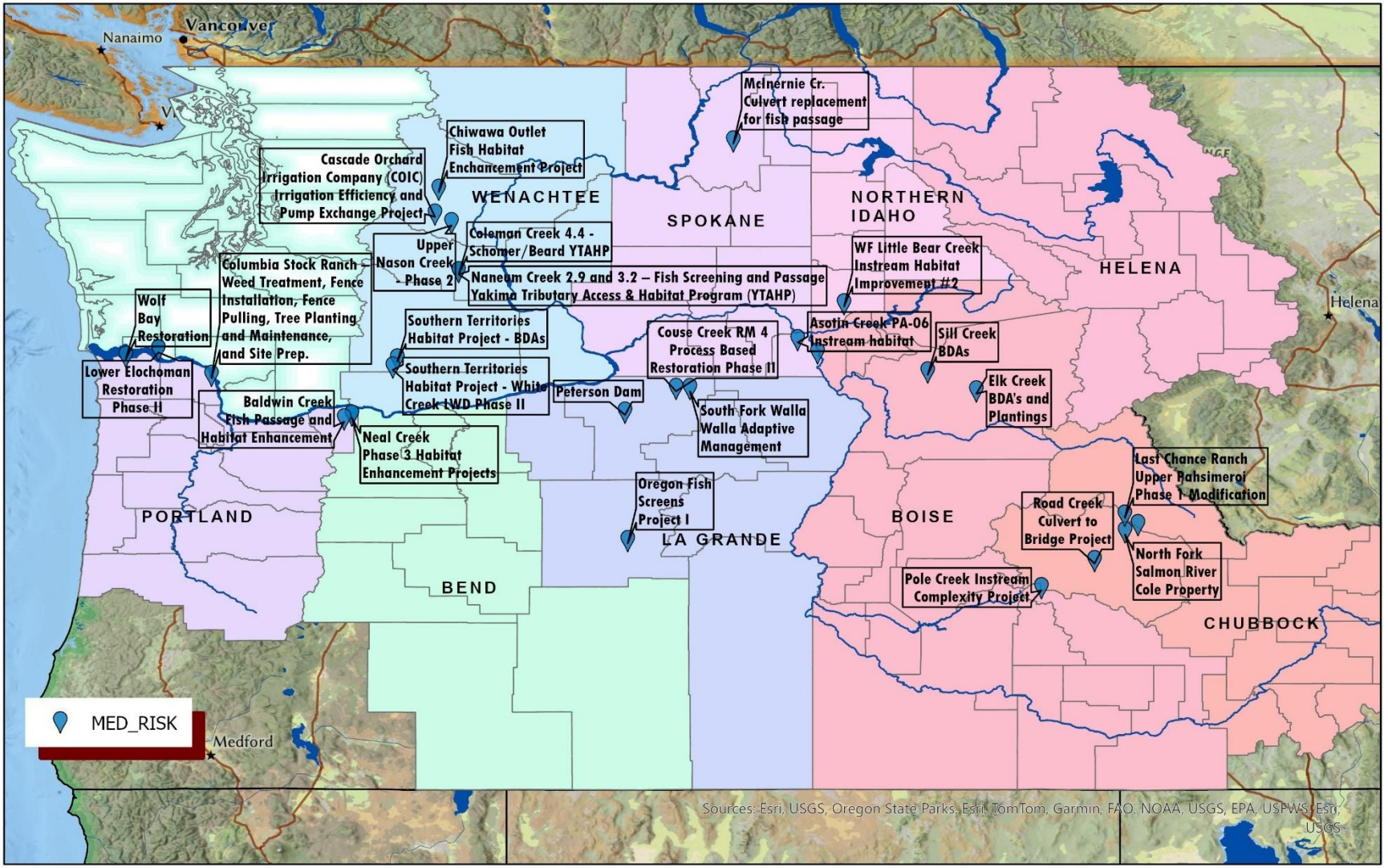
MAP 2: 2024 LOW RISK PROJECT LOCATIONS (USFWS)



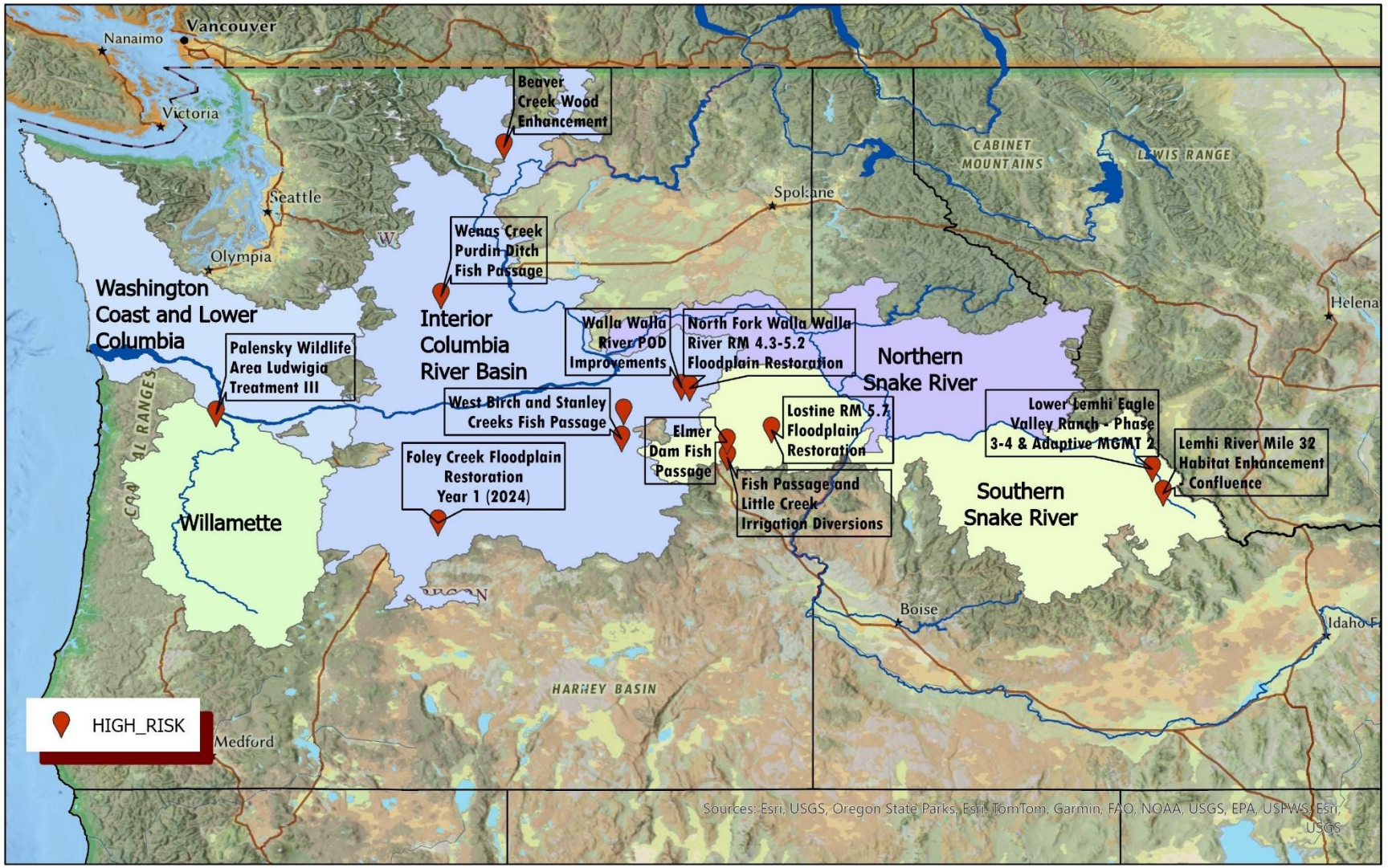
MAP 3: 2024 MED RISK PROJECT LOCATIONS (NMFS)



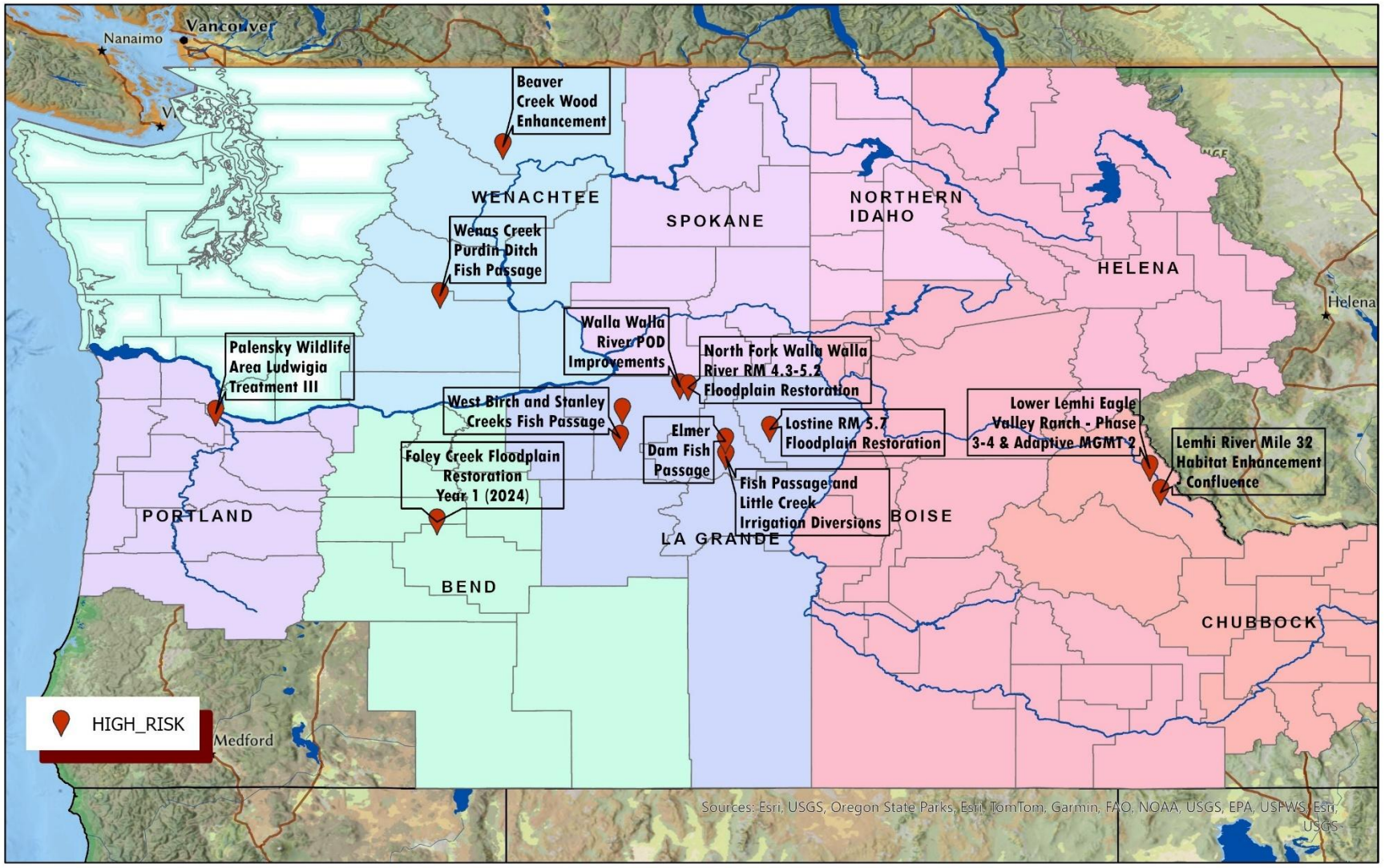
MAP 4: 2024 MED RISK PROJECT LOCATIONS (USFWS)



MAP 5: 2024 HIGH RISK PROJECT LOCATIONS (NMFS)



MAP 6: 2024 HIGH RISK PROJECT LOCATIONS (USFWS)



HIGH RISK PROJECT SHOWCASE:

The following projects represent **Bonneville's most significant achievements in salmon restoration during 2024**. These are complex undertakings, often continuing from prior years, demanding extensive collaboration, funding, design, and meticulous planning. As high-risk projects, they underwent rigorous interagency review by both the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). While Bonneville provides funding and technical expertise, the **project sponsors** are instrumental **in fostering and maintaining vital landowner relationships and negotiations**.

TABLE 3: HIGH RISK PROJECTS (12)

HIP_NO#	PROJECT
2024004	Lemhi River Mile 32 Habitat Enhancement – Confluence
2024006	Fish Passage at Little Creek Irrigation Diversions 5 and 6
2024009	Foley Creek Floodplain Restoration Year 2
2024012	Lostine RM 5.7 Floodplain Restoration
2024039	West Birch and Stanley Creeks Fish Passage
2024040	Palensky Wildlife Area Ludwigia Treatment Year 3
2024049	Walla Walla River POD Improvements
2024070	Umabirch Birch Creek Floodplain PA4
2024077	Beaver Creek Wood Enhancement
2024083	North Fork Walla Walla River RM 4.3-5.2 Floodplain Restoration
2024086	Wenas Creek Purdin Ditch Fish Passage
2024101	Lower Lemhi Eagle Valley Ranch – Phase 3-4 & Adaptive Management 2

TABLE 4: Lemhi River Mile 32 Habitat Enhancement – Confluence

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024004	Trout Unlimited	Lemhi River Lemhi County, Idaho	• Consolidate or Replace Existing Irrigation Diversions • Improve Secondary Channel and Wetland Habitats • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Fencing Construction for Livestock Control	220 Captured - 142 Steelhead/ Rainbow Trout - 78 Chinook Salmon 0 Mortalities

Description:

The completed project features a newly excavated floodplain cut that has two side channels delivering water year-round to a relic side channel network that was dry before the project was constructed. Three additional side channels were excavated throughout the project reach to improve off-channel habitat conditions. Riffles were constructed to help raise the water surface elevation to improve floodplain connectivity that had been lost due to channelization. Large wood structures and pools were also constructed to provide cover, rearing, and overwintering habitat for juvenile salmonids. The L-40 diversion was also replaced with a new lateral flow headgate structure that eliminates the need for the landowner to enter the river to replace and repair the former wing dam twice a year.

Primary project features:

- Lower floodplain elevation below confluence of Hayden Creek
- Construct new side channel segments
- Connect new side channels to existing channel networks and riparian areas
- Construct riffles in the existing channel
- Install large woody materials and bank treatment structures
- Install floodplain roughness features
- Native riparian plantings

Lessons Learned:

There were five instances where turbidity exceeded background levels. All turbidity exceedances occurred during the introduction of water to newly constructed channels and the removal of bulk bags for the coffer dams. In all five situations, turbidity returned to background levels within 30 minutes.

Figure 7. 2024004: Post-project aerial view of the floodplain cut and constructed side channels at the upper end of the project reach

Figure 8. 2024004: Post-project perennial flow in a relic Hayden Creek channel that was dry

TABLE 5: Fish Passage at Little Creek Irrigation Diversions 5 and 6

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024006	Union Soil and Water Conservation District	Little Creek Union County, Oregon	• Consolidate or Replace Existing Irrigation Diversions • Headcut and Grade Stabilization • Providing Fish Passage at an Existing Facility • Install New or Upgrade/Maintain Existing Fish Screens	3 Captured - Steelhead 0 Mortalities

Description:

The project improves conditions at two irrigation diversions along Little Creek by constructing fish bypass structures, installing new stanchion structures, and adding fish screens to the irrigation intakes.

The Little Creek Diversion Numbers 5 and 6 (LC 5 and 6) were channel-spanning concrete structures that accommodated stop logs to seasonally divert stream flows into unscreened irrigation intakes. With the stop logs in place during irrigation season, these structures blocked fish passage, and the unscreened irrigation intakes allowed fish into the ditch system. The structures also caused debris to accumulate and created personnel safety issues associated with wading into the river to maintain the structures and clear debris.

The project removed the LC 5 and 6 diversion structures and replaced them with modern steel stanchions. The new structures allow for placing stop logs without entering the river, give more control over the water level at the diversions, and require less maintenance and debris clearing than the former structures. New rotary drum fish screens fabricated by Oregon Department of Fish and Wildlife (ODFW) were installed at each irrigation intake. Fish bypass channels were constructed around each of the new diversion structures to maintain year-round fish passage.

Primary project features:

- Removal of the existing concrete LC 5 and 6 diversion structures.
- Installation of new steel diversion structures.
- Installation of rotary drum fish screens at the irrigation intakes.
- Construction of fish bypass channels around each diversion structure.

Lessons Learned:

There were no significant issues encountered during the construction of the project. The lesson learned from this project was that a good contractor with a well thought out plan can make construction observation and management very straightforward.

Figure 9. 2024006: Before (left) and after (right) photos of the diversion

Figure 10. 2024006: Before (left) and after (right) photos of the bypass

TABLE 6: Foley Creek Floodplain Restoration – Year 2

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024009	Oregon Department of Fish and Wildlife	Foley Creek Jefferson County, Oregon	• Bridge and Culvert Removal or Replacement • Improve Secondary Channel and Wetland Habitats • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Decommission Roads • Plant Vegetation	0 Captured 0 Mortalities

Description:

Work in 2024 represented the second year of a two-year improvement project to improve spawning and rearing habitat for ESA-listed steelhead trout by relocating a private dirt road, replacing two culverts with a bridge, and recontouring the floodplain of Foley Creek. The project area is a narrow valley through which Foley Creek runs, with Dutchman Creek and Big Log Creek flowing into Foley Creek in the project area. The road bisected the Foley Creek floodplain, preventing natural interaction between the stream and floodplain. Additionally, the confluence of Foley, Dutchman, and Big Log creeks was forced into two undersized and perched corrugated metal pipe culverts, forming a passage barrier that prevented fish use of habitat upstream of the confluence.

The first year of the project (in 2023) involved realigning the Dutchman Creek and Big Log Creek channels, removing the two perched culverts, and replacing the culverts with a pre-cast concrete bridge. The 2024 project activities included removing the existing dirt road bisecting the floodplain and relocating it to the eastern side of the valley, outside of the floodplain. A new channel for Foley Creek was excavated with a more gradual slope and higher thalweg than the previous incised channel, to improve floodplain connection. Large wood structures consisting of large logs with rootwads were installed in and around the new channel to provide fish habitat, reduce stream velocity, and help retain sediment. Forbs and small trees were planted along the new channel to establish riparian vegetation.

Primary project features:

- Decommissioning (removal) of existing road from the Foley Creek floodplain
- Construction of new road outside of the floodplain
- Large wood installation in Foley Creek
- Riparian plantings

Lessons Learned:

None noted.

Figure 11. 2024009: New floodplain plantings and stream channel for Foley Creek

Figure 12. 2024009: Bridge installed at the Dutchman Creek crossing

Figure 13. 2024009 Upper End of project area

Figure 14. 2024009: Lower end of project area

Figure 15. 2024009: Dutchman Creek

Figure 16. 2024009: Steelhead Red observed in 2025

TABLE 7: Lostine RM 5.7 Floodplain Restoration

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024012	Nez Perce Tribe	Lostine River Wallowa County, Oregon	• Improve Secondary Channel and Wetland Habitats • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Fencing Construction for Livestock Control	574 Captured 32 Mortalities - Juveniles

Description:

The Nez Perce Tribe (NPT) completed this project to improve stream conditions at river mile (RM) 5.7 of the Lostine River. The river historically provided extensive spawning and rearing habitat for a number of salmonid species, but increased channelization, irrigation withdrawals, and development have degraded the habitat. The reach of RM 5.7 is one area that was extensively channelized. Riprap bank armoring had severed the stream from its historical floodplain and prevented natural lateral migration, resulting in a highly incised channel with high water speeds, preventing the development of quality fish habitat. Additionally, the confined channel had begun to scour the neighboring bluff on which multiple residences are located.

The project involved excavating a new channel complex in the river's historic floodplain. The new complex has one channel designed to be active under most flow conditions and function as a co-dominant channel with the existing mainstem channel. A number of smaller side channels and depressions were also excavated in the floodplain that are intended to inundate during higher springtime flows, reducing velocities in the main river channel and facilitating better interaction with the floodplain. Riprap bank armoring was removed. Spoils from the excavation were used to partially fill remnant cattle watering ponds and the existing channel where it is beginning to erode the bluff. Woody structures formed of logs, slash, and rootwads were placed throughout the channels and floodplain to help reduce flow velocity, create habitat pools, and help retain sediment. Willow tranches were planted throughout the floodplain along the new channels, and additional planting was completed to help re-establish vegetation in the project area.

Primary project features:

- Excavation of new channel complex
- Removal of riprap bank armoring
- Filling of remnant cattle ponds and eroding section of main channel
- Large wood structure installation
- Planting

Lessons Learned:

The project sponsor obtained an exception to working in the standard in-water work window, postponing construction from the usual July-August timeframe to the month of September for the purpose of minimizing potential impacts to upstream migrating adult Chinook salmon and to avoid higher flows often encountered in the month of July, which could make water management more difficult and increase the risk of potential work area isolation failures or other water quality impacts.

Despite the later construction start, several adult salmon entered the project reach (bypass) within the first few days of construction. Within hours of discovering the adults and after consulting with the ODFW Wallowa District Fish Biologist, the sponsor and the contractor placed clear plastic Visqueen sheeting along the bottom of the bypass channels to prevent salmon from spawning in the newly revealed substrate, and the adults passed through the temporary bypass without harm. For the remainder of project implementation, NPT Production staff operating the Lostine River weir (downstream) trapped and hauled all remaining adult Chinook salmon from the weir and relocated them upstream to favorable spawning habitat well above the project reach.

Figure 17. 2024012: Before (left) and after (right) photos of the floodplain and habitat structures

Figure 18. 2024012: Before (left) and after (right) photos of the bluff fill area, large wood structure, and low-flow channel

Figure 19. 2024012: Before (left) and after (right) photos looking upstream toward side channel confluence

TABLE 8: West Birch and Stanley Creeks Fish Passage

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024039	Confederated Tribes of the Umatilla Indian Reservation	West Birch Creek and Stanley Creek Umatilla County, Oregon	• Dams, Water Control or Legacy Structure Removal • Headcut and Grade Stabilization • Bridge and Culvert Removal or Replacement • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Install Habitat-Forming Materials • Manage Vegetation Using Physical Controls • Plant Vegetation	287 Captured - All Steelhead - 32 Fry and 252 Smolts 3 Mortalities - Smolts

Description:

The project is part of efforts to remediate or remove several high-priority fish passage barriers in Birch Creek, a major tributary in the Umatilla River basin. The project involved the removal and rehabilitation of an irrigation diversion structure no longer in use on West Birch Creek and replacing a County road culvert stream crossing with a bridge on Stanley Creek (tributary to West Birch Creek). Barrier removal will provide benefit for at least 8 miles of upstream spawning and rearing habitat for ESA-listed Mid-Columbia River steelhead trout.

Primary project features:

- Removal of existing concrete diversion sill and apron in West Birch Creek
- Re-grading of the channel bed and installation of habitat boulders and roughened riffle in West Birch Creek
- Removal of existing 42-inch diameter CMP culvert in Stanley Creek

- Re-grading of the channel bed and installation of habitat boulders in Stanley Creek\
- Installation of a pre-fabricated modular bridge at Stanley Creek
- Seeding and planting of native grasses, shrubs, and trees

Lessons Learned: None noted

Figure 20. 2024039: Culvert to be removed prior to construction

Figure 21. 2024039: New bridge after construction

Figure 22. 2024039: Dam before construction

Figure 23. 2024039: Dam removal area after construction

TABLE 9: Palensky Wildlife Area Ludwigia Treatment Year 3

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024040	Oregon Department of Fish and Wildlife	J.R. Palensky Wildlife Area Multnomah Channel Multnomah County, Oregon	• Manage *Ludwigia* using Herbicides (Willamette)	N/A

Description:

The J.R. Palensky Wildlife Area is located along the southern shoreline of the Multnomah Channel downstream from its confluence with the Willamette River. In the summer of 2021, invasive creeping water primrose (*ludwigia*) was first detected in Horseshoe Lake on the wildlife area. By late 2021, more than 9 acres of the lake were fully infested.

Beginning in June 2022, ODFW began treatments for *ludwigia* on Horseshoe Lake, by which time nearly 10 acres of the roughly 40-acre lake had been colonized. Aquatic glyphosate treatment continued with applications in 2023 and again in 2024.

Primary project features:

- Herbicide treatment of *ludwigia* as required to eliminate the infestation.

Lessons Learned:

Three years of glyphosate treatment have not fully eradicated the ludwiga infestation at the Palensky Wildlife Refuge. Coverage of the invasive species has varied from about 10 acres when treatment started in 2022 to more than 20 acres in 2023. It has remained relatively consistent at about 12 acres since the 2024 treatment. ODFW is evaluating potential options for using a different herbicide mixture, rather than pure glyphosate, to improve effectiveness.

TABLE 10: Walla Walla River POD Improvements

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024049	Confederated Tribes of the Umatilla Indian Reservation	Walla Walla River Umatilla County, Oregon	• Consolidate or Replace Existing Irrigation Diversions	N/A

Description:

The 2024 work activities involved completion of irrigation diversion improvements that were one element of the multi-year Walla Walla River Forks Restoration Project. The overall project improves floodplain connection and in-stream habitat conditions within the Walla Walla River, North Fork Walla Walla River, and South Fork Walla Walla River through selective levee removal, side channel grading, large wood enhancement, and improvement of two irrigation diversions for fish passage and entrainment issues. Construction of the larger project began in 2022 and was completed in 2024.

During the 2023 in-water work window, a new headgate was installed on the South Fork Walla Walla River immediately upstream of a roughened riffle that was constructed in 2022. During the winter of 2023-2024, irrigation piping and a new fish screen were installed to connect the new head gate to the existing irrigation conveyance system. The new headgate, fish screen, and irrigation pipe replaced the point of diversion (POD) located on the mainstem Walla Walla River, which was damaged in a February 2020 flood event.

The former POD had a fish bypass with a return pipe that discharged to a disconnected and largely dry side channel, presenting a risk to any fish that became entrained in the diversion. To remedy this, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) completed a water rights transfer to relocate the POD to the South Fork Walla Walla River to a more geomorphically stable location. The roughened riffle constructed in 2022 was intended to allow fish passage and set a stable elevation for the new diversion. The new fish screen and bypass are intended to safely return fish to the river.

Primary project features:

- Irrigation piping

- Fish screen installation

Lessons Learned:

None noted.

Figure 23. 2024049: South Fork Walla Walla diversion and roughened riffle

Figure 24. 2024049: New fish screen for the South Fork Walla Walla River POD

Figure 25. 2024049: New fish bypass pipe discharging to pool near large wood structure

TABLE 11: Umabirch Birch Creek Floodplain PA4

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024070	Confederated Tribes of the Umatilla Indian Reservation	Birch Creek Umatilla County, Oregon	• Improve Secondary Channel and Wetland Habitats • Setback or Removal of Existing Berms, Dikes, and Levees • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Install Habitat-Forming Materials	178 Captured - 170 Steelhead - 8 Salmon 37 Mortalities - All steelhead

Description:

This project is located on Birch Creek approximately 2 miles upstream of its confluence with the Umatilla River. The completed project improves instream and floodplain processes and habitat for the benefit ESA-listed MCR steelhead, bull trout, and non-listed fish.

The project involved the construction of a new primary channel as well as disconnecting and partially filling the old (previously existing) channel to better connect the stream with its floodplain. The project also included the placement of 77 large wood structures and 50 surface-placed logs. Approximately 3,200 black cottonwood and white alder trees were planted along the newly constructed channel, and coyote willow cuttings were placed near the waterline and large wood structures.

Primary project features:

- Excavation of 56,800 cubic yards of floodplain alluvium material to create a new channel and wetlands
- Fill of 56,800 cubic yards of floodplain alluvium material for existing channel fill, floodplain topography, floodplain terraces, embankment fill, and large wood structure ballast
- Installation of 77 large wood structures and 50 surface-placed logs
- Seeding and planting of native grasses, shrubs, and trees
- Removal of an irrigation well, pipeline, and associated electrical utility infrastructure

Lessons Learned:

Fish salvage resulted in 170 steelhead captured and 37 mortalities. This was attributed to the difficulty with Birch Creek being such a long segment of stream to de-fish (one mile). With the old channel going dry and the design calling for filling so much of it, the CTUIR biologists needed to move the captured fish approximately two miles downstream to the mouth of Birch Creek. With mortalities realized during salvage efforts, extra steps were implemented to keep the fish alive and relocated safely. These included increasing the number of buckets and increasing the bubblers and adding ice to the buckets to keep water within temperature standards.

Figure 26. 2024070: Aerial photo of the project area after construction

TABLE 12: Beaver Creek Wood Enhancement

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024077	Colville Confederated Tribes	Beaver Creek Okanogan County, Washington	• Improve Secondary Channel and Wetland Habitats • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Install Habitat-Forming Materials • Install New or Upgrade/Maintain Existing Fish Screens	212 Captured - 161 Steelhead - 51 Coho 5 Mortalities -3 steelhead -2 Coho

Description:

The project included the installation of Beaver Dam Analogs (BDAs) and Post Assisted Log Structures (PALS) designed to retain mobile sediment and maximize shallow, low-velocity inundation areas. Additional wood posts were constructed across depositional portions of the main channel, side channel, and floodplain to trap any mobile wood before it reaches a bridge at the downstream end of the project area.

The project also included the placement of habitat boulders in the main channel to increase diversity of fish habitat by inducing gravel sorting and pool formation. Bank-attached large wood structures were also installed to reduce near-bank velocity to improve fish passage in select locations.

Primary project features:

- Installation of 262 logs
- Installation of 45 PALS
- Installation of 48 slash bundles
- Installation of 78 habitat boulders
- Installation of 45 log jams

Lessons Learned:

The landowner at site 1 (lower site) expressed concern that placing logs near his access bridge might result in wood racking up against it during extremely high flow events. As such, we elected to place boulders upstream of the bridge, and bank attached jam (discussed below) location, to create roughness and diversity but without the chance of them becoming mobile.

The project was highly successful and resulted in the creation of 45 new log jams and approximately the same number of PALS built within the 1.25 miles of Beaver Creek stream that encompassed the three project sites. Using a helicopter to transport logs and boulders resulted in minimal damage to the riparian and rangeland habitat adjacent to Beaver Creek.

Several PALS were utilized by Beavers as dams and modified within only weeks of the project's completion and increased floodplain access and ground water retained is expected to improve the riparian habitat further. Future plans for the project site are to continue monitoring log jam and PAL structures annually, and to return and reconstruct PALS in areas where they may fail following high flow events.

Figure 27: 2024077: Logs stacked prior to helicopter placement

Figure 28. 2024077: Columbia Helicopter Vertol 107-2 heavy lift helicopter staged

Figure 29. 2024077: Logs and slash bundles being dropped in Beaver creek site 3, slash bundles positioned in creek perpendicular to flow for ease of PAL construction.

Figure 30. 2024077: Bank attached jam under construction with bridge in background.

Figure 31: 2024077: Cofferdam positioned to exclude fish from the jam.

Figure 32: 2024077: Beaver Dam Analogues

TABLE 13: North Fork Walla Walla River RM 4.3-5.2 Floodplain Restoration

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024083	Walla Walla Basin Watershed Council	North Fork Walla Walla River Umatilla County, Oregon	• Headcut and Grade Stabilization • Improve Secondary Channel and Wetland Habitats • Setback or Removal of Existing Berms, Dikes, and Levees • Protect Streambanks • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Install Habitat-Forming Materials • Fencing Construction for Livestock Control • Plant Vegetation	0 Captured 0 Mortalities

Description:

The Walla Walla watershed is home to ESA-listed steelhead trout, bull trout, and re-introduced spring Chinook salmon. Factors limiting the success of these populations include fish passage barriers, lack of instream habitat complexity, inadequate riparian and floodplain function, and water quality impairment. The North Fork Walla Walla River (NFWWR) RM 4.3 – 5.2

Floodplain Restoration Project is the third phase of a larger overall project intended to improve floodplain function and riverine habitat conditions in the NFWWR to benefit ESA-listed fish.

Historic floods in 2020, coupled with emergency flood response actions, resulted in a leveed, single-flume channel along the NFWWR and expansive areas of erosion in the riparian and floodplain areas. The initial phase of the overall project was completed in 2022 and involved reconnecting 15 springs to the mainstem NFWWR that had become isolated from the river due to the 2020 flood. Improvements to juvenile salmonid habitats through accessibility to quality off-channel habitat have resulted from those reconnection efforts. Phase 2 was effectively implemented in 2023 and involved restoring RM 3.6-4.3 of the NFWWR.

Phase 3 of the project was constructed in 2024 and involved restoring a section of the river between RM 4.3 and 5.2. Deficiencies in the project reach were addressed as the anthropogenic, flumed channel was converted to a network of braided channels with the creation of 0.3 miles of complex side channels. Pools were created to provide holding cover for several age classes of salmonids. Hundreds of 3-foot diameter boulders and 35’ long whole trees with root wads were added to improve physical habitat complexity. Phase 3 restored 17 acres of floodplain, reduced dominant substrate size by reducing stream slope, and significantly improved habitat complexity.

Once severely degraded by the 2020 flood and its response measures, this reach now supports juvenile Chinook salmon, bull trout, and steelhead and shows early signs of beaver colonization, wetland expansion, and improved water quality. The results of the initial phases of the NFWWR project have been recognized by the Oregon State Land Board, which named it the project of the year for 2024. Additionally, the project received a River Restoration Northwest project of the month award in 2024.

Primary project features:

- Construction of 0.3 miles of side channels
- Pool creation
- Installation of hundreds of boulders and large wood, including more than 35 engineered log jams (ELJs)
- 17 acres of floodplain restoration

Lessons Learned:

None noted.

Figure 33. 2024083: Post 2020 flood response footprint typical in project area

Figure 34. ELJ structure near RM 5.2 provides fish habitat uplift

TABLE 14: Wenas Creek Purdin Ditch Fish Passage

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024086	North Yakima Conservation District	South Fork Wenas Creek Yakima County, Washington	• Dams, Water Control or Legacy Structure Removal • Consolidate or Replace Existing Irrigation Diversions • Headcut and Grade Stabilization • Providing Fish Passage at an Existing Facility • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction • Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches or Canals • Install New or Upgrade/Maintain Existing Fish Screens	0 Captured 0 Mortalities

Description:

This project by the North Yakima Conservation District, in partnership with the Yakima Tributary Access and Habitat Program, removed a fish passage barrier, screened a surface water diversion used to supply irrigation water, and enhanced instream habitat in South Fork Wenas Creek (commonly referred to as Dry Creek). The project prevents entrainment of salmonids in the Purdin Ditch Association's infrastructure and improves habitat by allowing more water to stay in the South Fork Wenas Creek for a longer duration into the irrigation season. Prior to the project, the Purdin Ditch Association's point of diversion was unscreened and did not return to Wenas Creek, putting fish including ESA-listed MCR steelhead at direct risk for entrainment into artificial waterways and mortality. Further, the instream check dam was a full fish passage barrier.

Primary project features:

- Removal of existing concrete check dam (a fish passage barrier) from Wenas Creek
- Installation of a new concrete diversion structure
- Installation of two new rotary drum fish screens that meet NMFS and WDFW criteria
- Installation of a roughened channel fishway
- Installation of large wood
- Native plantings

Lessons Learned:

In late February 2025 (after construction), snowmelt from the surrounding drainages caused the stream level to rise and engage large woody debris that had been installed near the new diversion structure's wingwalls. It was identified that water was seeping along one rootwad and log via uncompacted soil, around the wingwall of the new structure, and emerging downstream on the banks of the roughened channel. This put the structure and the banks of the channel at risk of failure. Adaptive management measures were implemented to remove the rootwad and replace it with ecology blocks, effectively extending the wingwall of the structure. When the reservoir upstream of the site filled, water levels rose again, and the same issue was identified on the opposite bank. In early March the trunk portion of one piece of large woody debris was removed and replaced with ecology blocks, leaving the rootwad in place.

Figure 35. 2024086: Before (top) and after (bottom) photos of the diversion

Figure 36. 2024086: Channel with rootwads between point of diversion and fish screen

TABLE 15: Lower Lemhi Eagle Valley Ranch – Phase 3 & Adaptive Management 2

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES	FISH CAPTURE
2024101	Idaho Department of Fish and Game	Lemhi River Lemhi County, Idaho	• Headcut and Grade Stabilization • Improve Secondary Channel and Wetland Habitats • Setback or Removal of Existing Berms, Dikes, and Levees • Protect Streambanks Using Bioengineering Methods • Install Habitat-Forming Natural Material Instream Structures • Riparian Vegetation Planting • Channel Reconstruction	391 Captured - 138 Chinook Salmon - 252 Steelhead/ Rainbow Trout 1 Mortality - Chinook Salmon

Description:

The Eagle Valley Ranch Habitat Improvement Project is located on the lower Lemhi River. This project consists of Subreach 1 of the larger Lower Lemhi River Rehabilitation Project. The overall project includes four subreaches between RM 9.7 and 12.6 and is intended to restore natural stream processes to create new channels and floodplain habitats that will benefit fish and wildlife, with an emphasis on salmonids. Subreach 1 is located between RM 11.0 and 12.3 on private land with owners who have agreed to work with Idaho Department of Fish and Game, the project sponsor.

Due to the magnitude of the project, work in Subreach 1 has been phased, working from upstream to downstream. Phase 1 construction started in 2020 and continued through 2021, with new channels activated in summer 2021. Phase 2 construction started in fall of 2021, with channels activated in summer 2022 and side channel and floodplain enhancement continuing through summer 2023. Phase 3 construction started in 2022 and continued through 2024 with floodplain and channel treatments similar to those constructed in Phase 2. Examples include the addition of floodplain roughness, floodplain grading, and excavation to reconnect the Lemhi River to its natural floodplain; creation of side channel and off-channel habitat; and re-meandering the mainstem river. Instream treatments included construction of riffles to raise the surface elevation of the river, installation of brush banks for roughness, construction or large wood complexes, floodplain excavation to increase inundation, and side channel construction/reactivation.

The 2024 work also included Adaptive Management Phase 2, which was constructed in response to an icing incident in the project area in winter of 2023/2024. This second phase of adaptive management reduced small-radius bends on the original Phase 2 project area in order to better maintain river velocities to reduce ice accumulation.

Other project activities in 2024 included securing a revegetation contractor to implement revegetation efforts over approximately 25 acres of the Phase 2 project area. The primary revegetation actions completed in 2024 included willow procurement, willow stake placement, advance ordering of plant stock for planting in 2025, and planning for 2025 plantings.

Primary project features:

- Excavation of new channel segments and earthwork to increase the overall length of the main Lemhi River within the project area and increase total channel length (including mainstem, channel splits, side channels, etc.).
- Earthwork (excavation and fill) within the active channel zone to increase riverine complexity.
- Creation of side channels, islands, and inset floodplain areas to increase margin habitat with concealment cover and accessible riparian areas.
- Installation of large woody debris structures to promote in-channel complexity, force hydraulic response, and provide concealment cover for juvenile salmonids.
- Adaptive management of the original Phase 2 project area to modify the channel and reduce small-radius bends to reduce the potential for ice accumulations.

Lessons Learned:

A key lesson learned from observations of previously completed project phases, and from research on frazil ice, is that surface ice tends to form when water velocities fall below 2 feet per second (fps). When surface ice forms, it provides a substrate for frazil flocs to bind, and an ice jam builds from the surface ice down into the water column, eventually reaching the bottom of the river. The design team used this information to inform the design of the adaptive management phases.

Two main design approaches were used in the adaptive management to keep water velocities above the 2-fps threshold. The first was to reduce the channel length, and the second was to maintain a more consistent slope through the reach. The existing project slope was built with a pool-riffle-pool sequencing. The new design applied a continuous run type sequence while still maintaining some pools and riffles. Post-construction, the severity of the ice dams and the increase in flood stage during the winter of 2024/2025 was significantly less than in previous years, indicating that the adaptive management actions had positive results.

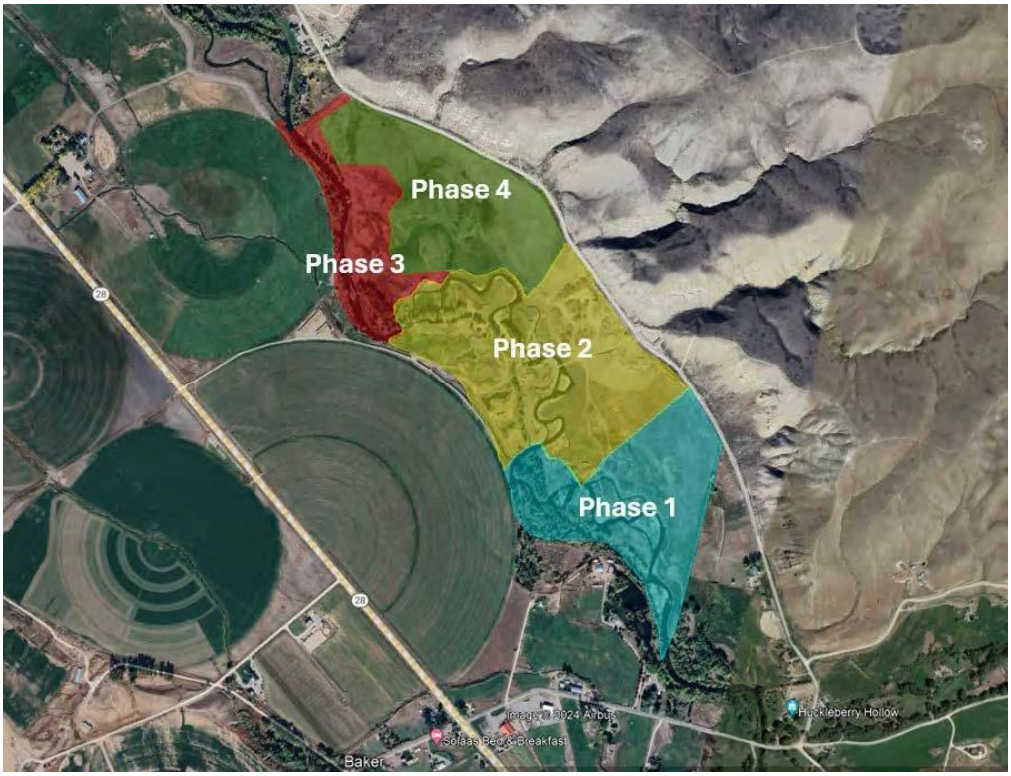


Figure 37. 2024101: 2024 activities were in Phase 3 and 4 areas on this map, with adaptive management also done in Phase 2 area.

Figure 38. 2024101: Frazil ice flocs visible in the Lemhi River during extreme cold weather in January 2025

Figure 39. 2024101: Looking towards the main Lemhi River channel with newly installed habitat structure in Phase 3 area

ACTIVITY CATEGORIES

The projects undertaken by Bonneville Power Administration (BPA) and its partners encompass a diverse portfolio of activities, grouped into several main categories:

• **Fish Passage Restoration:** This includes removing dams, water control or legacy structures, consolidating or replacing irrigation diversions, stabilizing grades, providing fish passage at existing facilities, and removing or replacing bridges and culverts.

• **River, Stream, Floodplain, and Wetland Restoration:** Activities here focus on improving secondary channel and wetland habitats, setting back or removing existing berms, dikes, and levees, protecting streambanks using bioengineering methods, installing habitat-forming instream structures (like large wood and boulders), riparian vegetation planting, channel reconstruction, and adding sediment and gravel.

• **Invasive and Non-Native Plant Control:** This involves managing vegetation through physical controls and various herbicide applications (riverine, estuarine, and Willamette Valley), as well as juniper and prescribed burning. Herbicide use is the most widely used project activity category under HIP4, often for managing wildlife mitigation areas.

• **Piling Removal:** Although less frequent, this activity was recorded in 2024.

• **Road and Trail Erosion Control, Maintenance, and Decommissioning:** This category includes maintaining existing roads and trails, and decommissioning others.

• **In-channel Nutrient Enhancement:** A specific activity recorded in 2024.

• **Irrigation and Water Delivery/Management Actions:** This involves converting delivery systems, changing water conveyance methods, installing or replacing fish screens, and other related actions in support of State run fish screen programs.

• **Fisheries, Hydrologic, and Geomorphologic Surveys:** These are conducted to gather data.

• **Special Actions (for Terrestrial Species):** This includes installing/developing wildlife structures, constructing fencing for livestock control, planting vegetation, and tree removal for large wood projects.

TABLE 16: ACTIVITY CATEGORY SUMMARY

Category	Subcategory	3-year Average		2024 Totals
1. Fish Passage Restoration				
	a. Dams, Water Control or Legacy Structure Removal.	7		5
	b. Consolidate, or Replace Existing Irrigation Diversions.	5		9
	c. Headcut and Grade Stabilization.	8		9
	d. Low Flow Consolidation.	0		0

	e. Providing Fish Passage at an Existing Facility.	4		7
	f. Bridge and Culvert Removal or Replacement.	9		6
	g. Bridge and Culvert Maintenance.	2		0
	h. Installation of Fords.	2		2
2. River, Stream, Floodplain, and Wetland Restoration.				
	a. Improve Secondary Channel and Wetland Habitats.	25		23
	b. Set-back or Removal of Existing, Berms, Dikes, and Levees.	11		6
	c. Protect Streambanks Using Bioengineering Methods.	10		11
	d. Install Habitat-Forming Instream Structures (Large Small Wood, Boulders	39		40
	e. Riparian Vegetation Planting.	51		48
	f. Channel Reconstruction.	11		12
	g. Sediment and Gravel.	5		7
3. Invasive and Non-Native Plant Control.				
	a. Manage Vegetation using Physical Controls.	34		28
	b. Manage Vegetation using Herbicides (Riverine)	36		31
	c. Manage Vegetation using Herbicides (Estuary)	5		3
	d. Manage Vegetation using Herbicides (Willamette)	0		1
	e. Juniper Burning	1		1
	f. Prescribed Burning	4		4
4. Piling Removal.				
	Pile Removal	0		2
5. Road and Trail Erosion Control, Maintenance, and Decommissioning.				
	a. Maintain Roads.	7		7
	b. Decommission Roads.	1		4
6. In-channel Nutrient Enhancement.				
	Nutrient Enhancement.	0		1
7. Irrigation and Water Delivery/Management Actions.				
	a. Convert Delivery System to Drip or Sprinkler Irrigation.	1		0
	b. Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking	2		1
	c. Convert from Instream Diversions to Groundwater Wells for Primary Water	0		0
	d. Install or Replace Return Flow Cooling Systems.	0		0
	e. Install Irrigation Water Siphon Beneath Waterway.	1		0
	f. Livestock Watering Facilities.	2		2
	g. Install New or Upgrade/Maintain Existing Fish Screens.	1446		1442
8. Fisheries, Hydrologic, and Geomorphologic Surveys.				
	Surveys	6		5
9. Special Actions (for Terrestrial Species).3				
	a. Install/develop Wildlife Structures.	3		3
	b. Fencing construction for Livestock Control	13		14
	c. Plant Vegetation.	14		13
	d. Tree Removal for LW Projects.	14		6
	e. Willamette Valley Prairie Restoration	8		7

Moving the bridge to the new location over Dutchman Creek.

Bridge installed at the Dutchman Creek crossing.

Figure 40. 2024002: Chiwawa Outlet Fish Habitat Enhancement Project

HABITAT METRICS

The following table is a 2024 compilation of sponsor inputed data into our CBFISH contracting database for various work elements that likely required HIP4 coverage. Reported values for habitat improvement metrics are self-reported by sponsors and may vary in accuracy or interpretation due to inconsistent methodologies and a lack of standardized reporting protocols across projects. As such, these figures should be interpreted as proximate and may not reflect uniform criteria.

Work Element Name	Definition	HIP Category	Risk Level	
Increase Aquatic and/or Floodplain Complexity	Work that adds natural materials instream to create habitat features or to improve channel morphology. Also includes improving complexity by creation of pools or fish spawning habitat by addition of gravel. Miles of stream with improved complexity.	**2a – 2g**	**low-high**	**119.61 miles**
Realign, Connect, and/or Create Channel	Active attempts to directly add sinuosity, meanders, side channels, and/or off-channel habitats (e.g., sloughs or oxbows). May include reconnection of historical channels, excavation of new channels, and/or significantly improving the functionality of existing channels. Miles of stream with improved channel form.	**2a, 2f**	**med-high**	**27.95 miles**
Decommission Road/Relocate Road	Any activity that makes a road or trail unusable including adding berms, pits, boulders or logs, and/or ripping, scarifying, recontouring, or obliterating the road or trail with heavy equipment that may involve re-contouring the slope. Miles of road decommissioned.	**5a, 5b**	**low-med**	**71.56 miles**
Develop Alternative Water Source	Provision of water supply for livestock that is out of the water zone and at a distance beyond that which may affect the conditions of the water body. Includes, but not limited to, watering troughs, spring and well development, and guzzler installation.	**7f**	**low-med**	**16 sources**
Develop Terrestrial Habitat Features	Includes the installation and/or creation of structures for the benefit of wildlife species, including, but not limited to, nest boxes/platforms, avian perches, snags, guzzlers, and artificial roosting sites.	**9a, 9f**	**low**	**134 features**
Install Fence	Work to install various types of fence and/or gates for habitat improvement. If applicable, include cattle guards or water gaps for livestock as part of the deliverable. Acres protected in riparian areas.	**9b**	**low**	**837 Riparian Acres**
Enhance Nutrients in Water Bodies	Addition of fish carcasses, or direct nutrient introduction methods to improve biological diversity in streams, rivers, or lakes.	**6**	**low**	**248 carcasses**
Plant Vegetation	Use for wildlife cover and forage enhancement, erosion control and soil stabilization, roughness recruitment, shading, restoring native habitat, wildfire restoration, and rehabilitating removed roads/trails.	**2e, 9c**	**low**	**943.75 Riparian Miles**
Remove/Breach Fish Passage Barrier	Work that facilitates fish passage over a human-made barrier by breaching or removal without replacement. This includes dams, weirs, fish ladders, tidegates, culverts, bridges, and road crossings.	**1a**	**med-high**	**11 structures removed**

Enhance Floodplain/Remove, Modify, Breach Dike	Refers to the removal, breaching, or alteration/set-back of a dike to restore riparian/floodplain or wetland habitat. This may also involve the installation of a tidegate or culvert.	**2a, 2b**	**med-high**	**7,428 Acres improved**
Create, Restore, and/or Enhance Wetland	Refers to the creation, restoration, or enhancement of a wetland area or function. This may be from the installation of a water control structure, re-contouring, and excavation to improve habitat connectivity.	**2a-2g**	**low-high**	**519.75 Acres improved**
Remove Vegetation	Use during the initial year of treating a site if removing one or more plant species, or a number of individuals of a plant species, by mechanical, biological, and/or chemical means, or by controlled burn.	**3a, 3b, 3c, 3d, 9d**	**low**	**3,134.92 Acres**

Figure 41. 2024002: Chiwawa Outlet Fish Habitat Enhancement Project

INCIDENTAL TAKE REPORTING

In the HIP4 the NMFS and USFWS HIP4 BOs defined four categories of incidental take based on the likelihood of adverse effects to ESA-listed species.

1. Capture of juvenile and adult fish during in-water work area isolation.

NMFS anticipates the capture of 7,500 juveniles (6000 juveniles in the Interior Recovery Domain, 1500 juveniles from the Willamette/Lower Columbia Recovery Domain), and the capture of up to 4 adults (3 from the Interior Columbia Recovery Domain and one from the Willamette/Lower Columbia Recovery Domain of the salmon and steelhead species considered in this consultation.

USFWS anticipates no more than 350 bull trout will be captured in a single year, and no more than 5 percent of the total number captured will be killed (up to 18 in a single year).

TABLE 17: INCIDENTAL TAKE DUE TO FISH HANDLING (NMFS)

Pacific Salmon and Steelhead		
	Capture	Mortality
2014	3593	8
2015	3541	59
2016	2435	130
2017	2446	78
2018	3282	189
2019	1174	33
2020	3504	84
2021	6640	329
2022	7452	92
~~2023~~	~~4285~~	~~65~~
2024	**2435**	**78**

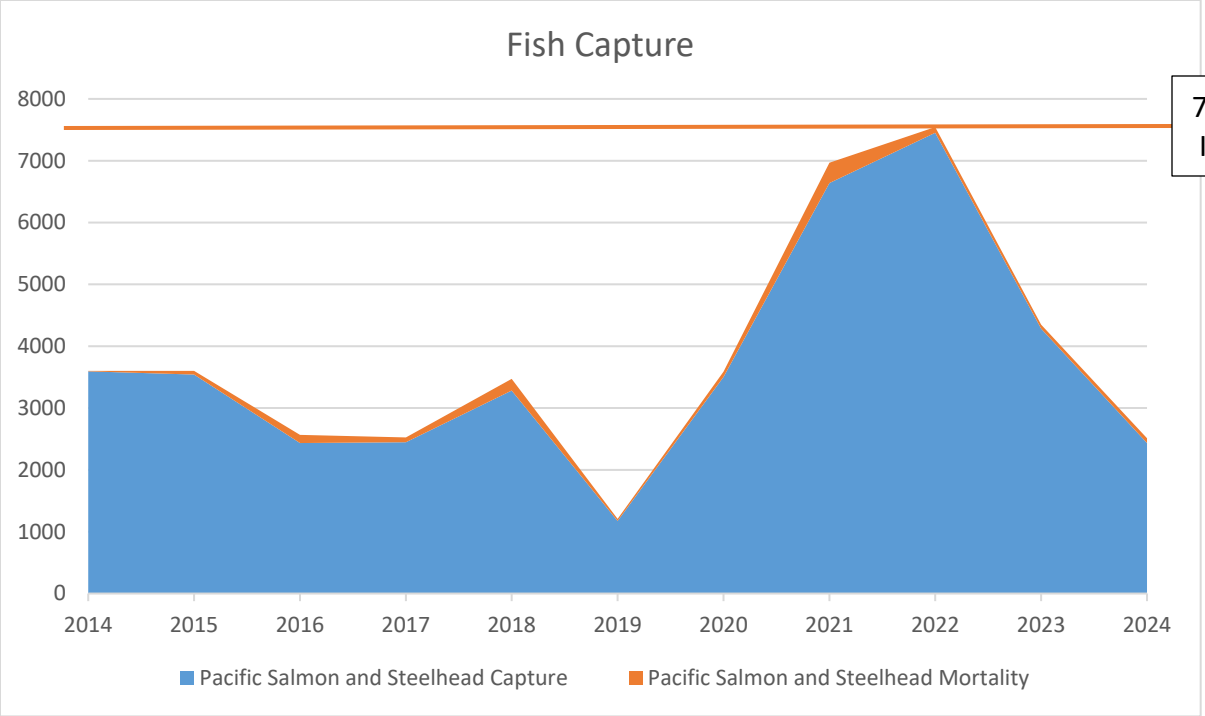


TABLE 18: INCIDENTAL TAKE DUE TO FISH HANDLING (USFWS)

Bull Trout		
	Capture	Mortality
2015	29	0
2016	5	0
2017	0	0
2018	4	0
2019	0	0
2020	95	0
2021	11	5
2022	7	0
2023	8	0
2024	**9**	**0**

2. Harm due to habitat-related effects.

NMFS anticipates a maximum of 150 projects to be implemented each year. USFWS anticipates no more than 90 of these projects requiring near or in-water work (IWW). NMFS estimates that each action may modify up to 300 linear feet of riparian and shallow-water habitat; therefore, the extent of take for construction-related disturbance of streambank and channel areas in 45,000 linear stream feet (8.5 miles) per year partitioned between recovery domains.

USFWS anticipates no more than 4 active Marbled Murrelet (MAMU) nests will be disturbed/displaced per year (2 in Oregon, 2 in WA). Project activities have occurred in areas near managed MAMU habitat. This occurred in the Willamette Valley Wildlife Management Areas (Herbert Farm and Coyote Creek). There have been no project activities near MAMU nests outside of the managed areas. **No MAMU nests have been reported disturbed this year.**

USFWS anticipates no more than 1,100 acres of potential Streak Horned Lark (SHL) habitat may be treated in a single year. Project activities have occurred in areas near managed SHL habitat. This occurred in the Willamette Valley Wildlife Management Areas (Herbert Farm and Coyote Creek).

TABLE 19: INCIDENTAL TAKE DUE TO HABITAT RELATED EFFECTS

	2024	Feet
IWW	39	11,700
Total	88	

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
IWW	35	45	41	40	43	43	52	56	57	47	42
Total	86	96	86	95	92	113	99	96	112	83	80

3. Harm due to construction related disturbance (Turbidity).

The extent of take will be exceeded if the turbidity plume generated by construction activities is visible above background levels, about a 10 percent increase in natural stream turbidity, downstream from the project area source to be measured/observed every four hours, and these conditions persist beyond two consecutive monitoring intervals.

While turbidity levels have been elevated for some projects**, none have persisted for the amount of time to constitute an exceedance**. Typically, turbidity exceedances occur during the introduction of water to newly constructed channels, however staged rewatering plans, pumps and other sediment BMPs have minimized the duration of downstream turbidity pulses.

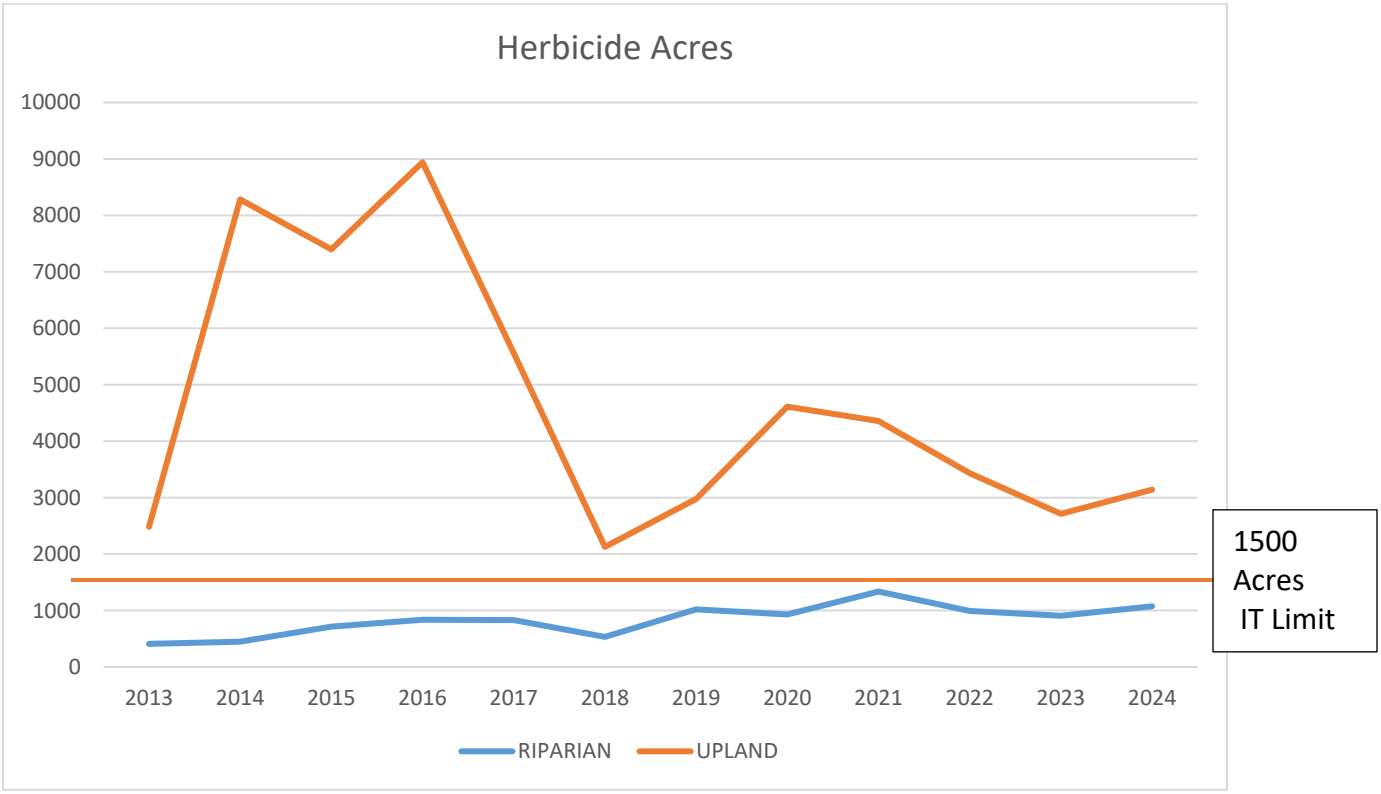
4. Application of herbicides to control invasive and non-native plant species

The best available indicator for the extent of take due to the proposed invasive plant control is the annual limitation on the extent of treated riparian acres. To limit the potential negative effects from herbicide use while still allowing use of herbicides in this restoration program, NMFS limits BPA's take to 1,500 riparian acres of treatment each year.

TABLE 20: ACRES TREATED WITH HERBICIDE

	RIPARIAN	UPLAND
2013	409	2482
2014	449	8282

2015	715	7399
2016	836	8940
2017	831	5561
2018	533	2127
2019	1020	2976
2020	929	4612
2021	1336	4356
2022	991	3433
2023	908	2714
2024	**1075**	**3142**



NON-COMPLIANCE

Instances of non-compliance have significantly decreased over the years.

- From 6 cases in 2014, it dropped to 2 in 2015, 1 in 2016, and zero in 2017, 2018, and 2019. In 2020, there were 2 instances (non-authorized herbicide use and lack of reporting data), and 1 in 2022 (over-application of glyphosate). In 2023, there were 2 instances related to sponsors not submitting Project Completion Forms.

- This improvement is attributed to numerous HIP trainings provided across the basin, stressing the use of the HIP Handbook and in-depth technical reviews.

TABLE 21: REPORTED NONCOMPLIANCE EVENTS

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NA	6	2	1	0	0	0	2	0	1	2	0

Figure 42. 2024002: Chiwawa Outlet Fish Habitat Enhancement Project

RIVERINE HERBICIDE APPLICATIONS

The analysis in the BOs affirm that application of chemical herbicides will result in short-term degradation of water quality which will cause injury to fish in the form of sublethal adverse physiological effects. Up to 1,500 total riparian acres may be treated in a calendar year under this programmatic consultation. There are no limits to upland acreage.

Invasive and Non-Native Plant Control: Managing vegetation in fluvial and estuarine systems to improve ecological function. This involves:

Physical Control: Manual methods (hand pulling, grubbing, mulching, shading) and mechanical methods (mowing, tilling, disking, plowing).

Herbicide Use (Riverine and Estuarine Systems): Chemical treatments for invasive plants, including specific guidelines for application in high marsh, low marsh, and tidal flat/aquatic bed areas within estuaries. Herbicide use is the most widely used project activity category under HIP4, often for managing wildlife mitigation areas.

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TABLE 22: PROJECTS WITH HERBICIDE USAGE

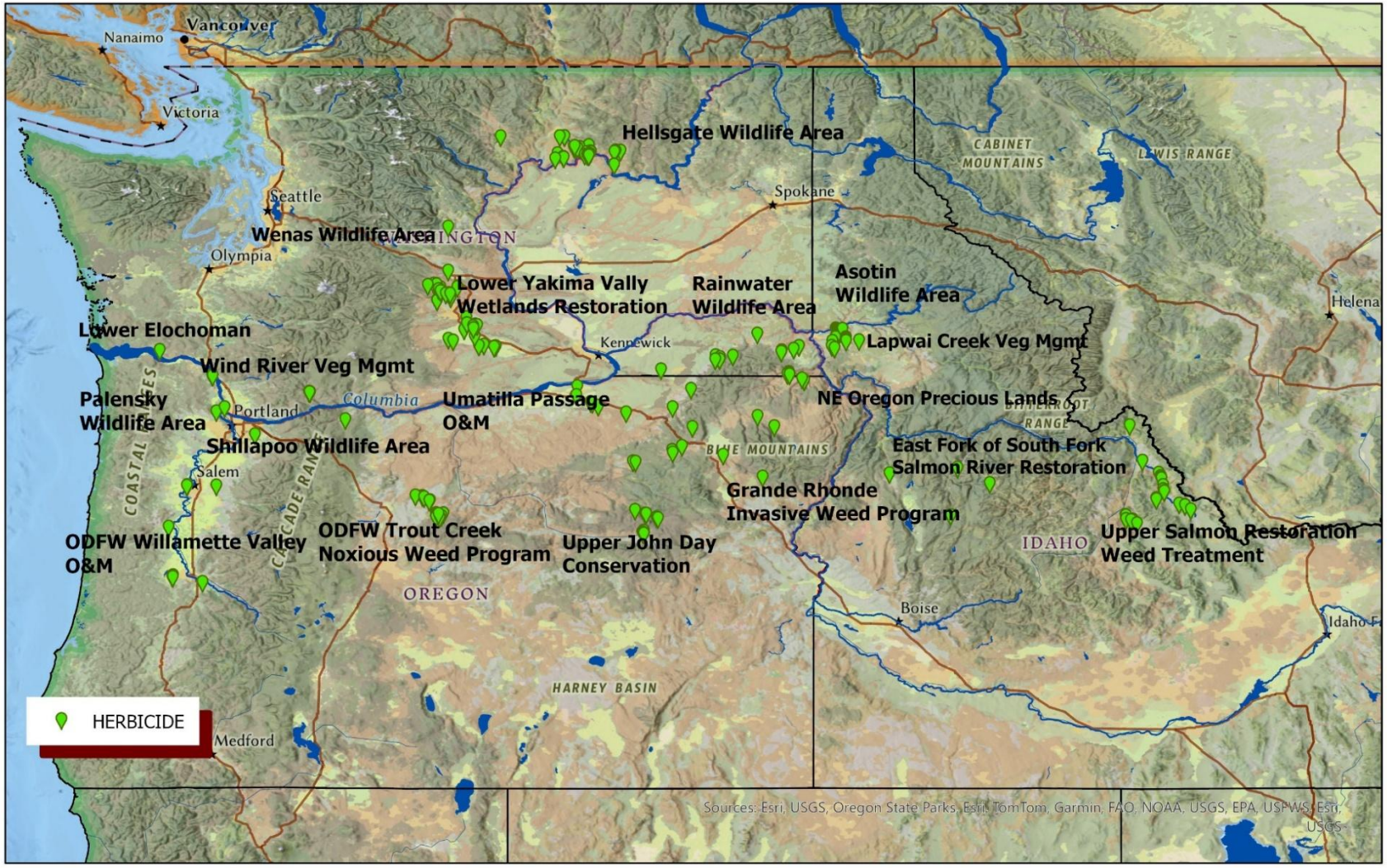
HIP4 NO#	PROJECT	RIPARIAN	UPLAND
2024005	ODFW Willamette Valley O & M	795.86	42.34
2024013	M2 Alder Creek Floodplain 2017-191	0	12
2024026	Upper John Day Conservation	137.05	22
2024034	Hellsgate Big Game Winter Range Veg Mgmt	289.32	49.733
2024037	Yakima Basin Side Channels – Pott Rd Invasive Crack Willow Removal, and Fortune Habitat Protection	6	0
2024040	Palensky Wildlife Area Ludwigia Treatment III	0	0
2024044	CTUIR Grande Ronde Invasive Weed Treatment 2024	0	51.095
2024045	Trout Creek Watershed Noxious Weed Program	30.6	1
2024046	Trout Creek Watershed Noxious Weed Program (ODFW)	45.07	5.43
2024047	Baldwin Creek Fish Passage and Habitat Enhancement - Herbicides	0	5
2024048	Lower Yakima Vally Riparian Wetlands Restoration	573.5	0
2024051	Upper Salmon Restoration Weed Treatment and Hydroseeding	149.72	147.88

2024052	E. Fork of South Fork Salmon River Restoration	27.3	27.2
2024054	Columbia Stock Ranch – Weed Treatment, Fence Installation, Fence Pulling, Tree Planting and Maintenance, and Site Prep.	40	0
2024056	Lower Elochoman Restoration Phase III	0	89.6
2024057	Lapwai Creek Watershed Vegetation Management	19.5	10.85
2024058	Umatilla Passage O&M	5	5
2024059	Lapwai Creek Watershed Vegetation Maintenance	0	4.0682
2024062	Grande Ronde and Umatilla Fish Habitat	2	2
2024063	Chahalpam Floodplain Restoration Phase 2 – Vegetation Management	0	0
2024065	Isquuulktpe Watershed Project	0	1.4
2024071	Rainwater Wildlife Area	8.4	0
2024074	Asotin Creek Wildlife Area O&M 2024	551.5	0
2024075	Wenas Wildlife Mitigation	0	379.69
2024079	Wind River Riparian Vegetation Management	2.3	19.05
2024085	NE Oregon Precious Lands Wildlife Area	289	20
2024087	Peterson Dam	0	0
2024088	Shillapoo Wildlife Area	158.1	0.5
2024095	Eagle Valley Ranch Habitat Improvement Veg Mgmt	0	175.6
2024098	CTUIR Mud Creek and Hideaway Creek Conservation Area Weed Control2000-031-00	0	3.5
2024099	Middle Fork John Day Vegetation Management	3.4	0
2024100	Vegetation Management - Walla Walla River	9.2	0

HERBICIDE USE

Herbicide use continues to be the most widely used project activity category under the HIP4. This is due to the numerous wildlife mitigation areas that BPA purchases and are managed under contract by various entities.

MAP 7: HERBICIDE APPLICATION



ESTUARINE HERBICIDE APPLICATIONS

2024 is the fifth official year of estuarine herbicide application. This process began in the spring of 2019, through technical assistance from Dr. Scott Hecht and Dr. Nancy Munn of NMFS to explore options for herbicide application within the Estuary using proposed HIP4 conservation measures and methodologies as a baseline action and then refining the treatment with respect to the various estuarine zones (high marsh, low marsh and tidal flat/aquatic bed). Specific guidance with respect to type of herbicide applied, method of application, rate of application, frequency of treatment, timing of treatments, and the location and acreage of treatment area.

During the exchange, information needs were relayed to evaluate the action and direct communication was opened with the sponsors CREST and Columbia Land Trust. Additional information was provided via site visits and several herbicide application memos (HAM)s were drafted. The HAM contained aerial site maps showing proposed activities and a Light Detection and Ranging (LIDAR) or another type of topographic map depicting site elevations.

This process is still being refined and will likely undergo changes in the future depending on workload and lessons learned.

The following 2 projects were evaluated (down from 6 last year):

1. Columbia Stock Ranch – Weed Treatment (HIP No# 2024054)

Project activities for 2024 included the third year of weed control, planting, native plant maintenance in high marsh area. Chemical applications were aquatic glyphosate at a rate of 2.0 lbs./acre and with use of either Agri-Dex or Hasten as the surfactant.

These actions are all paramount to project success in terms of managing the property in order to recover ecological integrity and function to support Columbian white-tailed deer (*Odocoileus virginianus leucurus*) (CWTD), as well as broader ecosystem function. CWTD timing restrictions were observed with the first chemical application with a 4 hour dry time before tidal inundation (tidal inundation unlikely) and a minimum of 48 hours of dry time before the next anticipated NOAA National Weather Service precipitation event.

Target species include Himalayan blackberry (*Rubus bifrons*), Canada thistle (*Cirsium arvense*), reed canarygrass (*Phalaris arundinacea*), tansy ragwort (*Jacobaea vulgaris*) and other priority species.

2. Palensky Wildlife Area Ludwigia Herbicide Treatment Phase III (HIP No# 2024040)

The project included the third application of aquatic herbicide to control invasive creeping water primrose (*ludwigia*) at the J.R. Palensky Wildlife Area in Multnomah County, Oregon beginning in the summer of 2023. Specifically, ODFW applied the herbicide Glyphosate (Agri-Dex®) in Horseshoe Pond, which discharges into the Multnomah Channel. Repeated applications of

herbicides do not appear to be successful. BPA will be working with the sponsor to determine what is the next course of action.

HIP REVIEW PROCESS (Engineering Technical Services)

Through the HIP Review process, BPA has been conducting thorough technical reviews of all medium and high-risk projects. These technical reviews are conducted by a licensed PE and sometimes involve several iterations of back-and-forth review junctures between the project sponsors. Functional review is done by BPA staff (EC Lead) who review the project for adherence to HIP4 criteria and coordinate information sharing and collaboration amongst project partners. Both reviews together constitute the HIP Review Process.

Project sponsors and other federal partners are actively engaged in the HIP Review process and are submitting projects early. BPA is receiving and reviewing projects that are to be implemented in 2026 and beyond.

TABLE 23: HIP REVIEW WORKLOAD

	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21	CY22	CY23	CY24
Medium Risk	14	24	24	23	37	26	64	43	31	32	50
High Risk	6	2	3	5	14	6	25	11	10	11	29

Figure 43. 2024002: Chiwawa Outlet Fish Habitat Enhancement Project

FISH SCREENS

BPA funds several state fish screen programs: for O&M actions within the John Day River, Grande Ronde, Imnaha River, Walla Walla, Umatilla River, Deschutes, Willamette, and Hood river subbasins in Oregon, and as well as in the Upper Salmon and Little Salmon River Basins in Idaho.

BPA collected PNFs and PCFs with the following number of actions for both ODFW and IDFG fish screen programs. These included activities performed by ODFW & IDFG screen tenders such as the following:

- Replacement of gearboxes, gear motors, and bearings.
- Replacement of solar batteries and timers and installation of circuit breakers.
- Replacement of side and bottom seals.
- Repairs to paddlewheels.
- Removal of debris and sediment from structures.
- Debris and sediment piles removed or leveled.
- Installation of new weir boards.
- Repair pump screens as necessary
- Replacement of dam boards on fish passage structures.
- Replacement of complete system components within the current concrete structure including screens (screen cradle, stainless steel perforated plate, shaft, bearings, seals), gantries, walkways, handrails, trash racks, paddlewheels, drivelines, and gearboxes.

These activities were easily isolated from the water with no impacts to the stream.

TABLE 24: FISH SCREENS

HIP4 NO#	Project Title	No# of Actions
2024006	Fish Passage and Little Creek Irrigation Diversions	1
2024008	Upper Salmon Fish Screen O & M	267
2024014	Oregon Fish Screens Project I	1
2024024	ODFW Gravity Screems (Walla Walla & Bridge Creek)	2
2024027	Oregon Fish Screens Project (O & M)	1413
2024032	Oregon Fish Screens II	17
2024041	Annual Maintenance at Imeques and Thornhollow	1
2024048	Lower Yakima Vally Riparian Wetlands Restoration	1
2024058	Umatilla Passage O&M	1
2024072	Upper Salmon Basin Fish Screens	1
2024077	Beaver Creek Wood Enhancement	1
2024086	Wenas Creek Purdin Ditch Fish Passage	1
2024093	NFJD Fox Creek Reach 18 Irrigation System	1

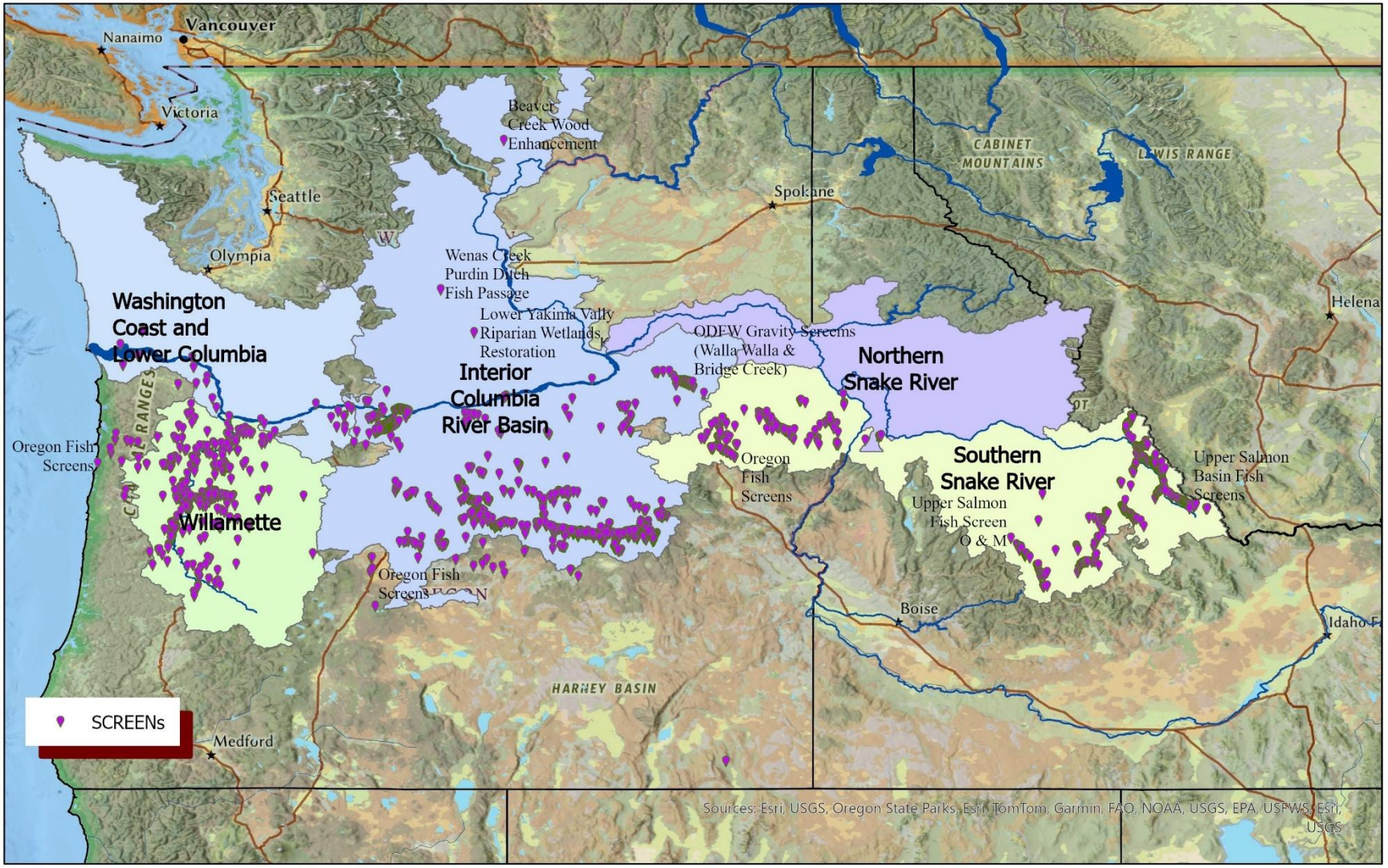
2025 was the eight full year that the HIP4 was used to cover all actions associated with State Fish Screen Programs. BPA worked closely with State Fish Screen Programs to explore how they track the O&M actions throughout the basin. Initially, it was difficult to predict what

specific actions were being taken and the potential impacts to listed species as a result; however, BPA established reporting requirements that included a list of typical actions taken, a list of specific action locations where maintenance was anticipated to occur, and a field form for specific actions that caused reportable impacts (turbidity exceedances and take of listed species).

Figure 44. 2024072: Upper Salmon Fish Screens 1

Figure 45. 2024072: Upper Salmon Fish Screens 2

MAP 8: 2024 HIP4 FISH SCREEN O&M LOCATIONS (NMFS)



MAP 9: 2024 HIP4 FISH SCREEN O&M LOCATIONS (USFWS)

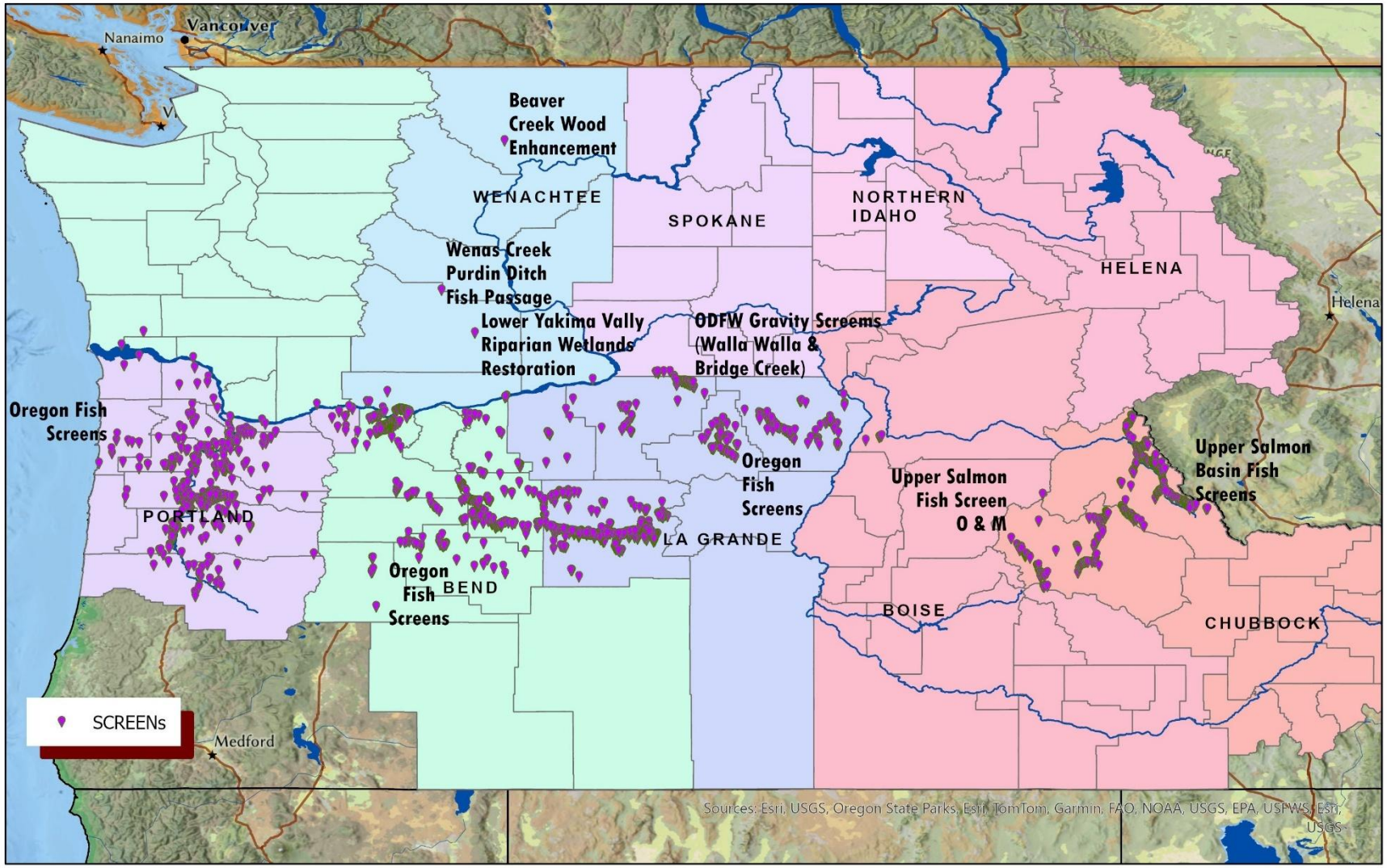


Figure 46. 2024072: Upper Salmon Fish Screens 1

Figure 47. 2024086: Wenas Creek Purdin Ditch Fish Passage

WILLAMETTE VALLEY WILDLIFE MITIGATION

Category 9e is a new activity category under the HIP 4, exclusively for the ODFW Willamette Wildlife Mitigation Program (WWMP). Operations, maintenance, and restoration activities on nine wildlife management areas (WMAs) is conducted by ODFW in the Willamette Valley. Most actions taken under this contract are for routine management and operations of the wildlife areas. The following project was covered under this activity category (**HIP No: 2024005**).

Previously these projects were covered by PROJECTS, however since BPA is the primary funding agency, ESA coverage was transferred over to the HIP. Since the program was already negotiated under PROJECTS, all conservation measures remained intact to ensure consistency and efficiency.

TABLE 25: WILLAMETTE VALLEY ACTIONS

WMA	ESA-Listed Species USFWS	ESA-listed Species NMFS	HIP Activity Categories
Coyote Creek South (CCS)	Marbled murrelet Northern spotted owl Streaked horned lark Fender's blue butterfly Taylor's checkerspot Kincaid's lupine Willamette daisy	NA	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Prescribed Burning (3f) Plant Vegetation (9c)
Coyote Creek Northeast (CCNE)	Marbled murrelet Northern spotted owl Streaked horned lark Fender's blue butterfly Taylor's checkerspot butterfly Kincaid's lupine Willamette daisy	NA	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Plant Vegetation (9c)
Flight's End (FE)	Columbian white-tailed deer Northern spotted owl Streaked horned lark Yellow-billed cuckoo Bull trout Nelson's checker-mallow	Steelhead Chinook Coho salmon	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Maintain Roads (5a) Install Wildlife Structures (9a) Plant Vegetation (9c)
Gail Achterman Wildlife Area (GAWA)	Marbled murrelet Northern spotted owl Streaked horned lark Yellow-billed cuckoo Fender's blue butterfly Kincaid's lupine Nelson's checker-mallow Willamette daisy	Steelhead Chinook Coho salmon	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Plant Vegetation (9c)
Herbert Farm and	Marbled murrelet Northern spotted owl	Steelhead Chinook	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using

Natural Area (HFNA)	Streaked horned lark Yellow-billed cuckoo Fender's blue butterfly Taylor's checkspot butterfly Kincaid's lupine Nelson's checkermallow Willamette daisy	Coho salmon	Herbicides (3b) Prescribed Burning (3f) Plant Vegetation (9c)
Palensky Wildlife Area (PWA)	Columbian white-tailed deer Northern spotted owl Streaked horned lark Yellow-billedcuckoo Bull trout Nelson's checker-mallow	Steelhead Chinook Coho salmon	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Maintain Roads (5a) Install Wildlife Structures (9a) Plant Vegetation (9c)
Sorenson Meadows (SOR)	Northern spotted owl Streaked horned lark Fender's blue butterfly Taylor's checkerspot butterfly Nelson's checker-mallow	Steelhead Chinook salmon	Remove Vegetation Using Physical Controls (3a) Remove Vegetation Using Herbicides (3b) Decommission Road (5b) Plant Vegetation (9c)

Description of Activities

Vegetation Management Using Physical Controls (3a): Vegetation removal would be conducted on all WMAs using various mechanical and manual control methods, including mowing, weed whacking, disking, hand pulling, and cutting. Vegetation removal would be focused on controlling the growth of noxious and invasive weed species, particularly reed canarygrass, Himalayan blackberry, English ivy, and knotweed.

Vegetation Management Using Herbicides (3b): Vegetation removal would also be conducted on all WMAs using herbicides. Herbicides would be applied by either boom spraying or spot spraying with backpack applicators as appropriate.

Prescribed Burning (3f): Annual prescribed burning programs at HFNA and CCS would be continued. These are ongoing, phased programs to conduct controlled burns to clear noxious and invasive weed species and mimic natural prairie wildfire cycles. All burns would be conducted outside of bird nesting season and comport with local regulations.

Maintain Roads (5a): Existing roads, trails, and infrastructure (gates, signs, etc.) would be maintained on various WMAs. All road work would be limited to the existing road prisms and include activities such as adding gravel and re -grading to fill potholes, clearing snow and ice during winter months, and removing encroaching vegetation. On WMAs which are publicly accessible, parking lots would be maintained using similar methods. Signs, gates, fences, and other access control. Infrastructure would also be maintained, replaced, and repaired as necessary.

Decommission Road (5b): A neighboring landowner at SOR established an illegal road through a portion of the WMA by trampling and removing vegetation to create a dirt path without the

knowledge or consent of ODFW. ODFW would remove this road by removing the debris left by the trespassers, destroying the pathway, and replanting vegetation in the area. More aggressive exclusion methods (fencing, etc.) to deter the trespassers from accessing the WMA would also be considered for implementation in the future if problems persist.

Install/Maintain Wildlife Structures (9a): Turtle nesting mounds would be established at FEand PWA. These mounds would be constructed of loose soil piled a few feet deep to provide locations for turtles to create nests for their eggs. Wooden basking structures would also be installed to provide space for turtles to rest near the nesting mounds. Existing habitat structures (bird and bat nesting boxes, woody debris habitat structures, etc.) would also be maintained.

Plant Vegetation (9c): ODFW would plant native vegetation in all areas treated for invasive and noxious weeds. This planting would be both seeding using hand or broadcast seeders and hand or mechanical planting of nursey-grown plants, as appropriate for each location. All planting sites would be monitored for regrowth of invasive species, as well as to monitor survival rates of new plantings, which would be fertilized, watered, and mulch as needed.

MAP 10: 2024 HIP4 WILLAMETTE VALLEY ACTIONS