

# HABITAT IMPROVEMENT PROGRAM HIP4 2021 ANNUAL MONITORING REPORT

Bonneville  
POWER ADMINISTRATION



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Figure 1: 2021008 Indian Creek Overhead

## SUMMARY

This is 2<sup>nd</sup> 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 summarizes activities completed in calendar year 2021 and summarizes reports on the incidental take resulting from those activities and compares them with previous years.

Annually, Bonneville Power Administration (Bonneville) and partners (sponsors) implement substantial habitat enhancement work in the Columbia River basin to improve tributary habitat as “offsite” mitigation for the impacts the federal hydrosystem and to help meet the Agencies’ obligations under the Endangered Species Act (ESA) by fulfilling commitments begun under the 2008 NMFS Federal Columbia River Power System BiOp (as supplemented in 2010 and 2014) (2008 BiOp) and ongoing commitments under the 2020 NMFS Columbia River System BiOp (2020 CRS BiOp). The 2008 BiOp called for identifying tributary habitat restoration projects and the 2020 CRS BiOp largely continues the tributary habitat restoration program.

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. The HIP is the primary means by which this habitat enhancement work gets reviewed, refined, and then covered under the ESA.

In 2021 Bonneville has been successful in meeting incidental take criteria. However, juvenile mortality was higher than most years. This is likely attributable to a greater number of high risk projects being implemented under category 2f Channel Reconstruction. This action requires the extensive dewatering of entire stream reaches, thus necessitating extensive fish salvage. In addition, temperatures across the Columbia River Basin were extraordinarily high due to high pressure weather events.

In addition to a diverse portfolio of projects, project quality assurance and quality control remain a priority. BPA continues to improve internal capacity to deliver high quality projects through optimizing and refining the HIP Review Process. After nearly 6 years of experience, the HIP Review process has become streamlined and standardized based upon receiving feedback, re-evaluating failures, and capitalizing upon successes.

Engineering Technical Services (ETS) continues to provide a thorough and detailed technical review of all medium and high risk projects. BPA EC leads are well trained in performing a separate functional review. NMFS habitat biologists continue to provide comments to high risk and medium risk projects. Through these multi layered detailed project reviews, BPA can now exercise a higher level of discretionary authority on the type and quality of projects that it funds and shape their outcome. The HIP4 Handbook continues to be refined and has been used as a

tool to provide much needed clarifications, guidance and strives to reflect the current state of science on restoration standards and practice.



Figure 2: 2021008(Indian Creek) Dam Removal Before



Figure 3: 2021008(Indian Creek) Dam Removal After

## HIP4 PROJECTS AUTHORIZED

The HIP4 BOs authorized 133 projects (Table 1, 2, & 3) (FIGURE 1&2) of which 21 were withdrawn leading to a total of 112 projects being implemented in 2021. Each project has 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.

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. Figures 1 & 2 are overlain with USFWS field office and NMFS branch jurisdictions. A majority were low risk (62), 39 were medium risk, and 11 were high risk. 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 the Service Habitat Biologists.

**TABLE 1: HIP4 PROJECT AUTHORIZATIONS (62 LOW RISK) 2021**

HIP_NO#	PROJECT
2021001	Willamette Valley WMA - Sorenson
2021002	Willamette Valley WMA - Herbert Farm and Natural Area
2021003	Willamette Valley WMA - Coyote Creek South and Coyote Creek NE
2021004	Willamette Valley WMA - Palensky Wildlife Area
2021005	Willamette Valley WMA - Flight's End Property
2021006	Willamette Valley WMA - Gail Acherterman Wildlife Area
2021007	Willamette Mission Reforestation Phase 6
2021011	Yakama Action Effectiveness PIT array installation
2021019	Malhuer River Wildlife Restoration Project
2021020	Logan Valley Wildlife Restoration Project
2021024	Upper Salmon Fish Screen O & M
2021026	Valley Creek PIT Tag Array
2021027	Pahsimeroi River Weed Treatment and Hydroseeding
2021028	Lemhi River Restoration Weed Treatment and Hydroseeding
2021029	Oregon Fish Screens Project - Low risk I
2021030	Pine Creek Conservation Area
2021032	Stabler Bend Vegetation Management
2021033	Oregon Fish Screens Project - Low risk II
2021041	Oregon Fish Screens Project - Low risk III
2021042	Oregon Fish Screens Project - Low risk IV
2021043	Oregon Fish Screens Project - Low risk V
2021044	Okanagon Bain BDAs
2021047	Tualatin River NWR Expansion
2021050	Grande Ronde Subbasin Invasive Weed Treatments
2021051	Isquulktpa Watershed Project

2021052	Sagebrush Flat Wildlife Area - Road Repair
2021055	Trout Creek O & M
2021056	Vinegar to Vincent Phase 1.5
2021057	Rainwater Wildlife Area
2021058	Lampson Side Channel Vegetation Planning
2021059	Upper John Day Conservation Lands Program
2021060	Yakima Basin Side Channels - 2021 Veg Management & Indian Creek Wood Placement
2021062	Crooked River PIT Tag Array
2021063	Middle Fork John Day Fencing and Plant Propagation
2021065	Dunstan Preserve Floodplain Enhancement Phase 2
2021066	Trout Creek Noxious Weed Program
2021067	Dead Cow Instream Habitat Complexity
2021068	Bear Creek Invasive Species Control
2021069	Lower South Fork Clearwater PIT tag arrays
2021070	Upper Tea Meadow Restoration Project & Lower Clearwater/Potlatch Watershed
2021078	Hungry Horse Mitigation/Flathead Lake Restoration and RME
2021082	Teepee Creek Riverscape Restoration Phase 1
2021084	Albeni Falls Wildlife Mitigation
2021091	Asotin Creek Wildlife Mitigation O & M 2021
2021092	East Fork South Fork Salmon River Restoration
2021093	Shillapoo Wildlife Area
2021097	Lyle Falls Adult Lamprey Passage Improvements
2021101	Oregon Fish Screens Project - Low risk VI
2021103	Invasive Plant Control Along the Okanogan River
2021107	Willamette Mission Floodplain Reforestation, Phase 7
2021108	Hellsgate Big Game Winter Range
2021109	Upper Salmon Fish Screen Replacements
2021113	Umatilla Passage O&M
2021114	City of Salem Minto Brown Veg Mgmt
2021117	Lemhi River Restoration Weed Treatment and Hydroseeding II
2021118	Pahsimeroi River Weed Treatment and Hydroseeding
2021121	Low-Tech Implementation at IDL
2021123	Last Chance Ranch Stockwater
2021126	WA Estuary MOA Project Scoping & Implementation
2021129	Oregon Fish Screens Projects - Low risk VII
2021130	Upper John Day and Jeff Davis Restoration Phase 1
2021133	John Day Fish Habitat Enhancement



Figure 4: 2021017(Chewuch) Cofferdam

**TABLE 2: HIP4 PROJECT AUTHORIZATIONS (39 MEDIUM RISK) 2021**

HIP_NO#	PROJECT
2021008	Indian Creek Connectivity Project
2021010	Beyeler Ranch Springs Phase I
2021012	Bachelor Hatton Diversion Flow Velocity Enhancement System
2021015	Wallow River Tamkaliks Side Channel and Wetland Complex
2021016	Coleman Creek Fish Passage, Screening and Habitat Restoration Project
2021017	Chewuch RM 4.6 Habitat Enhancement Project
2021018	Little Sawmill Creek Highway 28 Culvert
2021021	Indian Creek Connectivity Project
2021022	Palensky Wildlife Area Restoration Project
2021023	Swauk Creek Fish Passage, Screening & Habitat Enhancement Project
2021034	Columbia Stock Ranch
2021036	Hideaway Creek RM 1.3
2021037	Elochoman 2 Restoration - Weed Treatment
2021038	Klein Floodplain Activation Project
2021040	West Sand Island Habitat Restoration - Phase III
2021045	Trout and Opal Creek Confluence
2021048	Hayden Creek Hermits - BLM Habitat Improvement Project - Phase 1
2021049	Morgan Creek S22 Intercept



2021053	Twisp Ponds Inlet
2021074	Golden Doe Floodplain Enhancement
2021077	Little Springs Habitat Restoration
2021081	Yakima Basin Side Channels - Taneum Creek Rag-Heart
2021083	Wallowa McDaniel Phase III
2021087	North Fork Touchet Empey
2021088	Last Chance Springs Habitat Restoration
2021089	Low-Tech Implementation at Big Creek Ranch
2021095	Tucannon PA-26
2021096	North Fork Teanaway Floodplain Restoration
2021098	Middle Eighteenmile Ellsworth
2021099	Muddy Springs Creek Habitat Improvement Project
2021100	Jim Brown Creek BDAs
2021102	Asotin County Conservation District Habitat Enhancement and Protection
2021115	White Creek 191 Road Crossing Replacement
2021116	Neal Creek Phase I
2021120	Swauk Creek Phase III Part 2 LWD Replacement Project
2021122	YTAHP Parke Creek 1.0 & 1.4 Fish Passage and Screening Project
2021124	Upper Big Springs
2021125	Lower Lemhi Reference Reach Phase 1
2021127	Coleman Creek RM 4.3 - Beard/Leuck
2021131	Lower Elochoman III Vegetation Management



Figure 5: 2021026 (Valley Creek)Pit Tag Array Placement



Figure 6: 2021026 (Valley Creek)Pit Tag Array Placement

FIGURE 1: 2021 MED-LOW RISK HIP4 PROJECT LOCATIONS (NMFS)

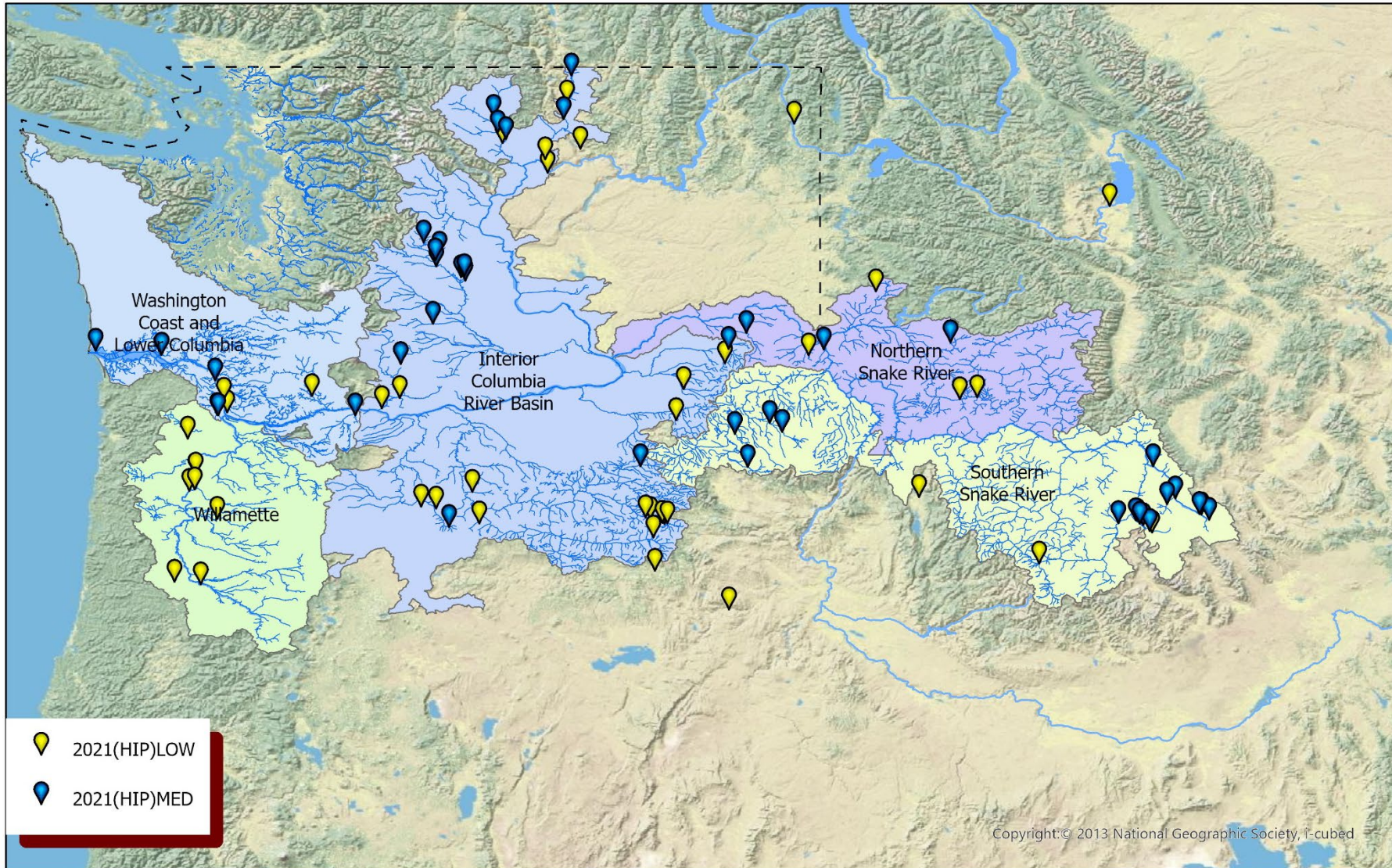
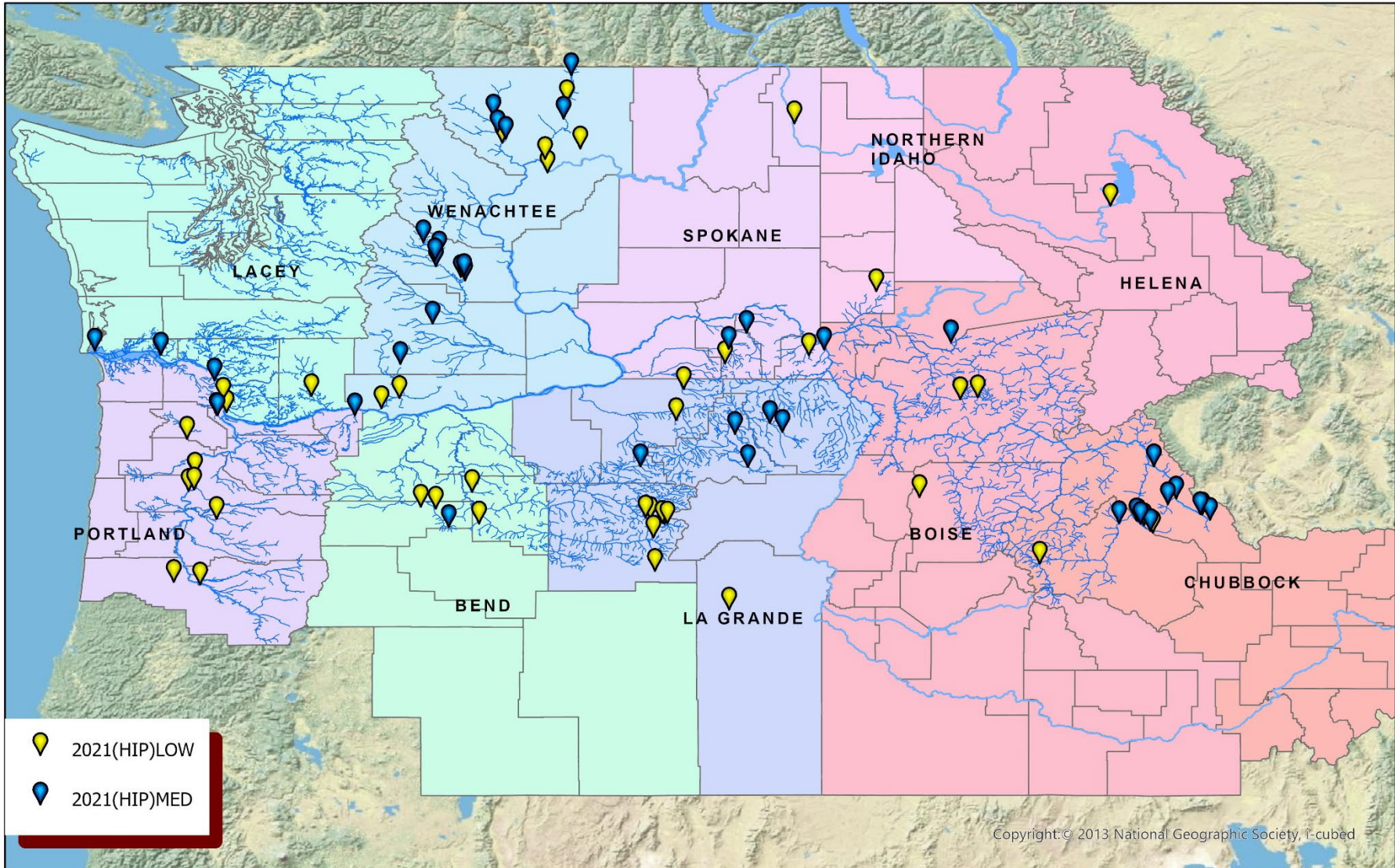


FIGURE 2: 2021 MED-LOW HIP4 PROJECT LOCATIONS (USFWS)



### HIGH RISK PROJECT SHOWCASE:

These projects are BPA’s most significant achievements towards salmon restoration in 2021 (Table 3). Most of them are a continuation of previous years contracts that were designed and approved in previous years. These are complex projects that require extensive collaboration, funding, design and planning. Locations of these projects are shown in Figure’s 3 & 4. All of these projects were considered high risk and involved both USFWS and NMFS interagency review and final approval. While BPA was the funding entity and provided extensive technical assistance, the project sponsors were essential in creating and maintaining landowner relationships and negotiations.

**TABLE 3: HIGH RISK PROJECTS (11)**

HIP4 NO#	PROJECT	SPONSOR	DESCRIPTION
2021009	Eagle Valley Ranch Habitat Improvement Project Subreach 1, Phase 1, Part 1	IDFG	Phase 1 of a 1.5 mile project that consisted of efforts to enhance channel complexity, roughly doubling the existing total channel length and reconnecting over 100 acres of disconnected floodplain.
2021035	Stiegerwald Floodplain Restoration Project	USFWS	Construction Year #2 (2021), the project focused on removal of 2.2 miles of the Columbia River Levee, completion of the east and west setback levees, excavation of the three floodplain channels, removal of Gibbons Creek diversion structures, elevated channel and fish ladder along with reconnecting Gibbons creek through the site and out to the river.
2021054	Barkley Bear Implementation Phase 2	Methow Valley Irrigation District (MVID).	This phase of the project removed rip-rap bank armoring historically placed to protect the Barkley Canal from seasonal high water on the Methow River. The project also removed a concrete head gate at the Barkley Canal point of diversion. The project also included construction of habitat features designed to provide and improve rearing habitat for target species.
2021071	Eagle Valley Ranch Habitat Improvement Project Subreach 1, Phase 1, Part 2	IDFG	Phase 1, part 2 of this project the sponsor activated a floodplain and channels, and did some more floodplain grading, fencing, and clean up. Phase 1 included over 98,000 cubic yards of cut and approximately 66,000 cubic yards of fill to create the proposed complex features, which included approximately 0.6 miles

			of existing channel at the most upstream end of the project reach.
2021072	Middle Lemhi River Henry Reach Phase 2	IDFG	IDFG proposed to realign the mainstem river to increase sinuosity and reduce slope and energy within the channel by extending it out into an adjacent pasture. This added approximately 1000 ft. of wetted channel to the project that contains several types of wood structure. Riffle grade control structures were constructed to provide channel diversity and to raise surface water height so that lateral channels and floodplain habitats will be more effectively inundated with flow. An existing irrigation diversion that serves the L 36/37 canal was moved to a meander of the main channel.
2021076	Beyeler Ranch, Upper Lemhi Enhancement Upper Phase	Trout Unlimited	The project constructed 7 pools, 16 islands, 7 point-bars, and 22 riparian benches to improve channel geometry in the project reach.
2021079	Longley Meadows Fish Habitat Enhancement Project Phase 2	USFS/BOR/CTUIR	Year 2 of the project consisted of enhancing floodplain functionality and connectivity (~35 acres), installing wood structures, 4,400 ft. bioengineered bank treatments, applying native grass seed to approximately 20 acres ground disturbance, and installing 7500 willow cuttings within instream wood structures and bioengineered bank treatments.
2021104	Fox Creek Upper Reach 10 (McGirr)	Grant Soil and Water Conservation District (GSWCD) with	GSWCD aimed to improve floodplain connectivity by activating 0.2 miles of relic meanders. Existing channel and wetland/floodplain habitat within and around these meanders were enhanced through the placement of large wood to improve complexity. Plantings were installed and wildlife exclosures were implemented to protect the new plantings from wildlife browse.
2021106	Lower Fry Meadow Restoration	IDFG	The projects goals were to improve spawning, summer rearing, and overwintering habitat for ESA-listed steelhead ( <i>Oncorhynchus mykiss</i> ) in a 1.2-mile (4.9 acres of streambed) reach of the East Fork Potlatch River. This was done by wood loading with large trees felled from adjacent timber, construction of three channel spanning log jams, excavation of remnant side channel

			inlets, and four constructed rock riffle structures to elevate water surface and promote aggradation
2021110	Granite Creek RM 7.5 Restoration Project	CTUIR	The project included stream channel remeandering, side channel development, floodplain grading, and LWD/rock feature development. During 2021 work included the development of two meander bends, eight riffles, two alcoves, three side channels and associated wood structures.
2021119	Tucannon PA- 27/28.1 Phase 0.5-1.0	CTUIR	The primary objectives of the project were to increase floodplain connectivity through: removing channel confining features (relic spoils piles), reconnecting side-channels (pilot channel excavation), raising incised portions of the channel to promote floodplain engagement; and improving channel complexity through construction of large wood apex jams and single-log wood placements.



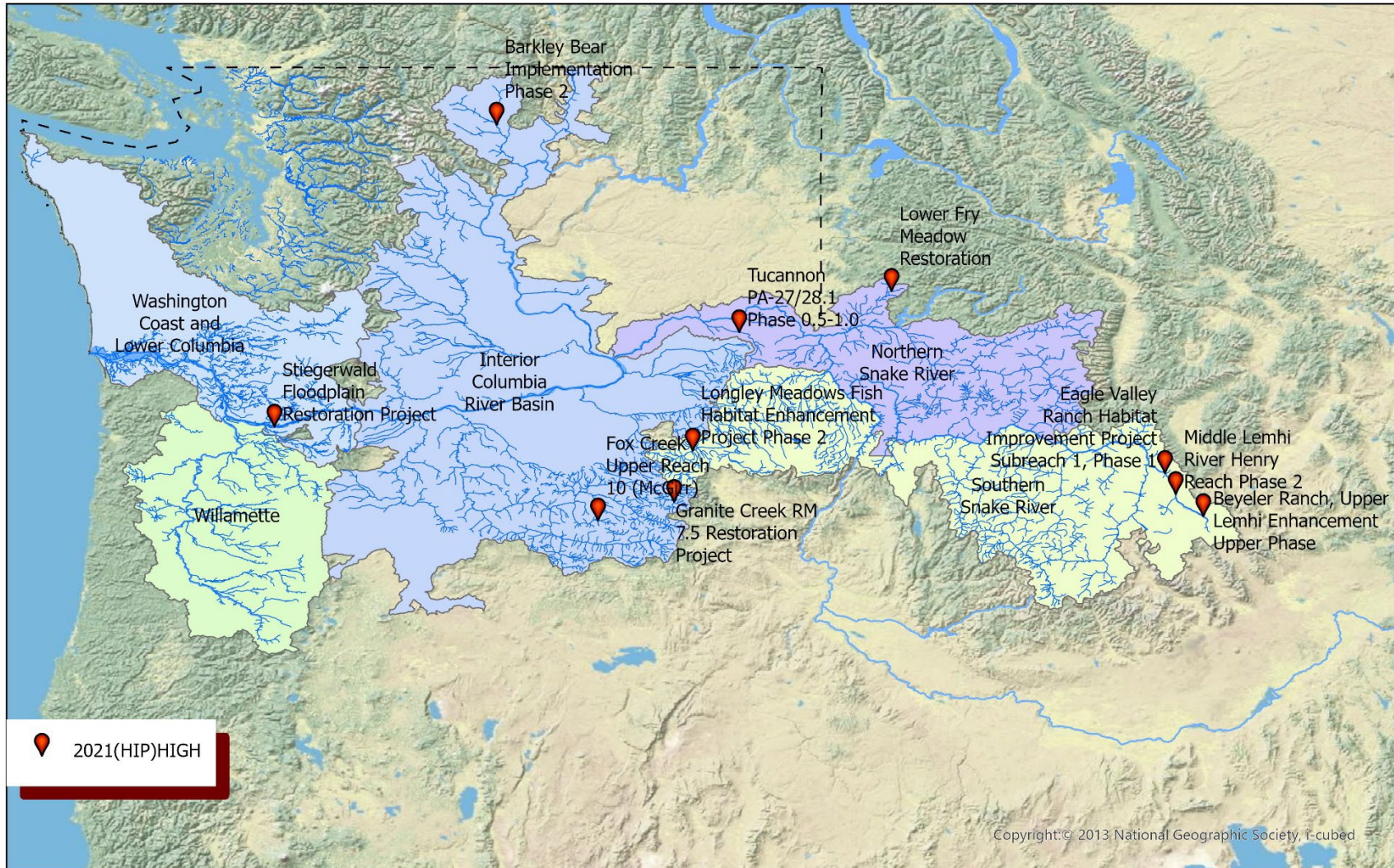
Figure 7: 2021045 (Trout Opal Creek) Remeandering Stream Channel



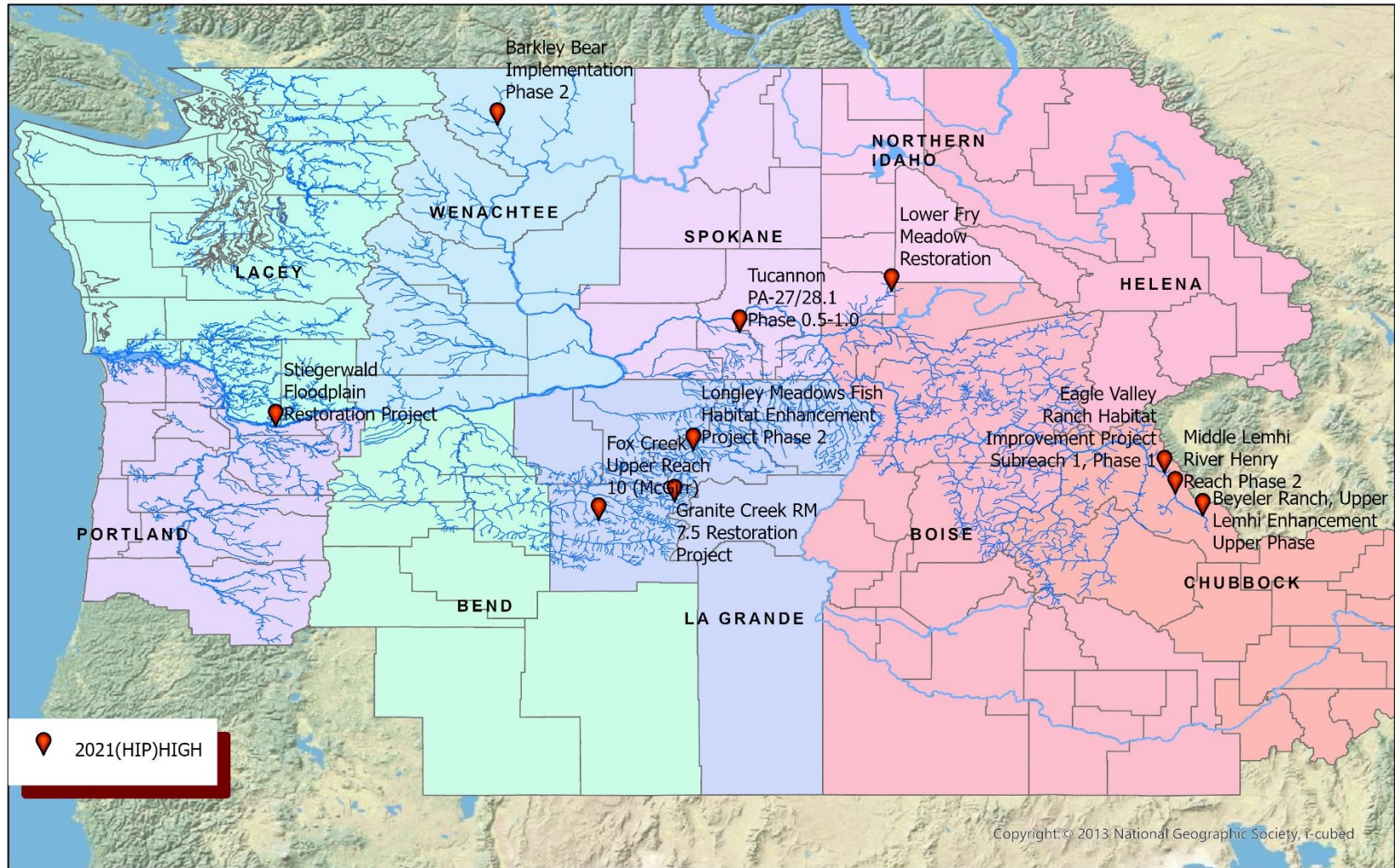
Figure 8: 2021017(Chewuch) Coho spawning in newly created side channel



**FIGURE 3: 2021 HIGH RISK PROJECT LOCATIONS (NMFS)**



**FIGURE 4: 2021 HIGH RISK PROJECT LOCATIONS (USFWS)**



**Table 4: Eagle Valley Ranch Habitat Improvement High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021009	IDFG	Lemhi River	<ul style="list-style-type: none"> <li>• Consolidation Irrigation Diversion</li> <li>• Grade Stabilization</li> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Levee Setback</li> <li>• Bioengineering Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> </ul>
Fish Capture	195 captured 0 killed		

**Description:**

The Eagle Valley Ranch Habitat Improvement Project is located on the lower Lemhi River. Subreach 1 is located between river miles (RM) 11.25 and 12.7. This 1.5-mile habitat improvement project is located entirely on private lands whose owners have agreed to work with the project sponsor, the Idaho Department of Fish and Game (IDFG). The project will restore natural processes to the reach, including new channels and floodplain habitats that will benefit fish and wildlife with an emphasis on salmonids. The project generally consists of efforts to enhance channel complexity, roughly doubling the existing total channel length and reconnecting over 100 acres of currently disconnected floodplain. 2021 activities are specific to Phase 1, which includes approximately 0.6 miles of existing channel at the most upstream end of the project reach. The remaining phases will be completed in future years, with timing and scale dependent on available implementation funds.



**Figure 9: 2021009(Eagle Valley) New Meanders**

**Primary project features:**

- Increase channel structure, complexity, and dynamism.
- Increase floodplain connectivity and function.
- Develop a robust riparian corridor for long-term stability, shading, and future large wood recruitment.
- Improve channel substrate condition.
- Moving and/or maintaining a working diversion (L10) and associated ditch on river left, preserving existing mature riparian vegetation (especially large cottonwoods).



Figure 10: 2021009(Eagle Valley) Bank Treatments

**Table 5: Stiegerwald Floodplain Restoration High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021035	BPA, BOR, USFWS	Lower Columbia River (Gibbons Creek)	<ul style="list-style-type: none"> <li>• Dams, water control or legacy structure removal</li> <li>• Headcut and Grade Stabilization</li> <li>• Bridge and Culvert removal or replacement</li> <li>• Set back of berms, dikes, levees</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> </ul>
Fish Capture	274 captured 110 killed		

**Description:**

A multi-year, \$25 million dollar restoration project, that took seven years of planning. It involves the restoration of the approximately 1,000 acre project site will be achieved by removing 2.2 miles of existing Columbia River levee and constructing channels between the Refuge and the river, as well as restoring Gibbons Creek and its alluvial fan. New setback levees

will be constructed at the east and west extents of the project to maintain flood protection for the Port and other adjacent properties and infrastructure. The project proposes to reforest 199.5 acres of the floodplain to restore the site as close as practical to its historic condition.

Fish Salvage during 2021 was extensive in order to de-fish the uppermost section of Gibbons Creek (south of SR14). This was necessary in order to construct the “new” at-grade Gibbon Creek channel, and to allow demolition of the concrete control structure (overflow weir, fish screen and sluice gate) and removal of the entirety of the elevated channel that carried the “former” Gibbons Creek out to the fish ladder at the Columbia River. In total, the fish salvage efforts yielded 45,044 lamprey (mixed species), 12,046 “bony fish,” primarily those mentioned above, and 274 juvenile salmonids. Fish salvage was performed on 12 separate days during the 2021 construction season, requiring more than 168 full eight (8) hour days of labor. Extreme hot weather resulted in the high incidence of mortality.

### Primary project features:

- Removed a 20,000 CY embankment to reconnect Gibbons Creek to adjacent floodplain and excavated and seeded expanded habitat areas.
- Construction of setback levee, a 290,000 CY embankment.
- Installed 14 instream wood habitat structures constructed from 72 individual logs.
- The project site, including all disturbed riparian areas, was planted with over 350,000 trees and shrubs. This includes 53,000 trees and 297,000 shrubs comprising of 32 native species in all.
- Realigned approximately 800 linear ft of Gibbons Creek.
- Physically removed 0.25 acres bamboo and approximately 1.4 acres English Ivy.



Figure 11: 2021035(Stiegerwald)Fish Salvage at upper gibbons creek



Figure 12: 2020(Stiegerwald)Gibbons Creek



Figure 13:2021(Stiegerwald)Gibbons Creek



Figure 14: 2021(Stiegerwald)Work Area Isolation

**Table 6: M2 Barkley Bear High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021054	Methow Salmon Recovery Foundation	Lower Middle Methow River	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Set Back or Removal of Berms, Dikes, Levees</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> </ul>
Fish Capture	73 captured 1 killed		

**Description:**

The M2 Barkley Bear Project removed rip-rap bank armoring and a concrete head gate at the Barkley Canal point of diversion. The project also includes construction of habitat features designed to provide and improve rearing habitat for target species. This project will be constructed using heavy equipment including tracked excavators, dump trucks, and loaders. Riparian re-vegetation and monitoring efforts will be conducted using a mixture of light construction equipment and hand tools.



**Figure 15: 2021054(Barkley Bear) Work Area Isolation**





Figure 16: 2021054(Barkley Bear) Work Area Isolation

### Primary project features:

- Construction of a new inlet channel paired with an apex logjam to increase the sustainability of the existing and reconnected side channels
- Removal of the concrete and steel Barkley headgate and conversion of the existing intake canal to a side channel feature to increase floodplain connectivity–
- The building of 4 engineered logjams to increase channel complexity in the existing island side channel.
- Construction of multiple small log structures to promote channel development and add help define the island flow path.
- Restoration of a perennial connection between Bear Creek and the Methow River by removing the fish screen and associated infrastructure, filling a portion of the Barkley Canal, and constructing a new outlet channel.
- The building of an engineered logjam in the main stem Methow to increase instream complexity near the outlet of Bear Creek.
- Planting of approximately 3 acres of previously cleared areas with native riparian trees and shrubs to restore a functional riparian forest buffer.
- Removal of 650 feet +/- of riprap on the left bank of the Methow River to increase floodplain connectivity.



Figure 17: 2021054(Barkley Bear) Engineered Log Jam

Table 7: Eagle Valley Ranch Habitat Improvement High Risk Project

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021071	IDFG	Lemhi River	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Set Back or Removal of Berms, Dikes, Levees</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> </ul>
Fish Capture	Reported in 2021009		

**Description:**

Ninety percent of the Eagle Valley Ranch Habitat Improvement project as described above (Table 4) was completed. During part 2 of this project (July 1, 2021 – August 30, 2021) the sponsor activated floodplain and channels, and completed some more floodplain grading, fencing, and clean up.

**Primary project features:**

- Increase channel structure, complexity, and dynamism.
- Increase floodplain connectivity and function.
- Develop a robust riparian corridor for long-term stability, shading, and future large wood recruitment.
- Improve channel substrate condition.

- Moving and/or maintaining a working diversion (L10) and associated ditch on river left, preserving existing mature riparian vegetation (especially large cottonwoods).

**Table 8: Middle Lemhi River Henry Reach High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021072	IDFG	Middle Lemhi River	<ul style="list-style-type: none"> <li>• Consolidate or Replace Irrigation Diversions</li> <li>• Installation of Fords</li> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> </ul>
Fish Capture	8 captured 0 killed		

**Description:**

The goal of the Middle Lemhi River Henry Reach project is to expand approximately 0.50 miles of the Lemhi River into more of a natural floodplain while restoring natural river processes and function. The property is well suited to meeting the project goals and objectives. The landowner is allowing development of the entire river bottom portion of his property, with the exception of his house located near Highway 28. The surface water and bank elevations are very conducive to developing a floodplain in a cost efficient manner. A highly functional riparian zone currently exists that is being incorporated into the project, and there are multiple springs that are being developed for summer fish rearing and overwintering.

**Primary project features:**

- Construction of multiple side channels to provide additional complex lateral habitat.
- Realignment of the mainstem river to add 1000 ft of wetted channel to increase sinuosity and reduce slope and energy within the channel by extending it out into an adjacent pasture.
- Relocation of the L36/37 diversion.
- Placement of bleeder log jams to manage flow into channels, and provide floodplain inundation will be constructed in side channels.
- Bank jam constructions to provide roughness for fish, and promote scour and deposition to increase channel complexity.
- Construction of several alcoves.
- Construction of riffle grade control structures to raise surface water height so that lateral channels and floodplain habitats will be more effectively inundated with flow.



Figure 18: 2021072(Henry Reach)Completed Riffle



Figure 19: 2021072(Henry Reach) Isolated Work Area

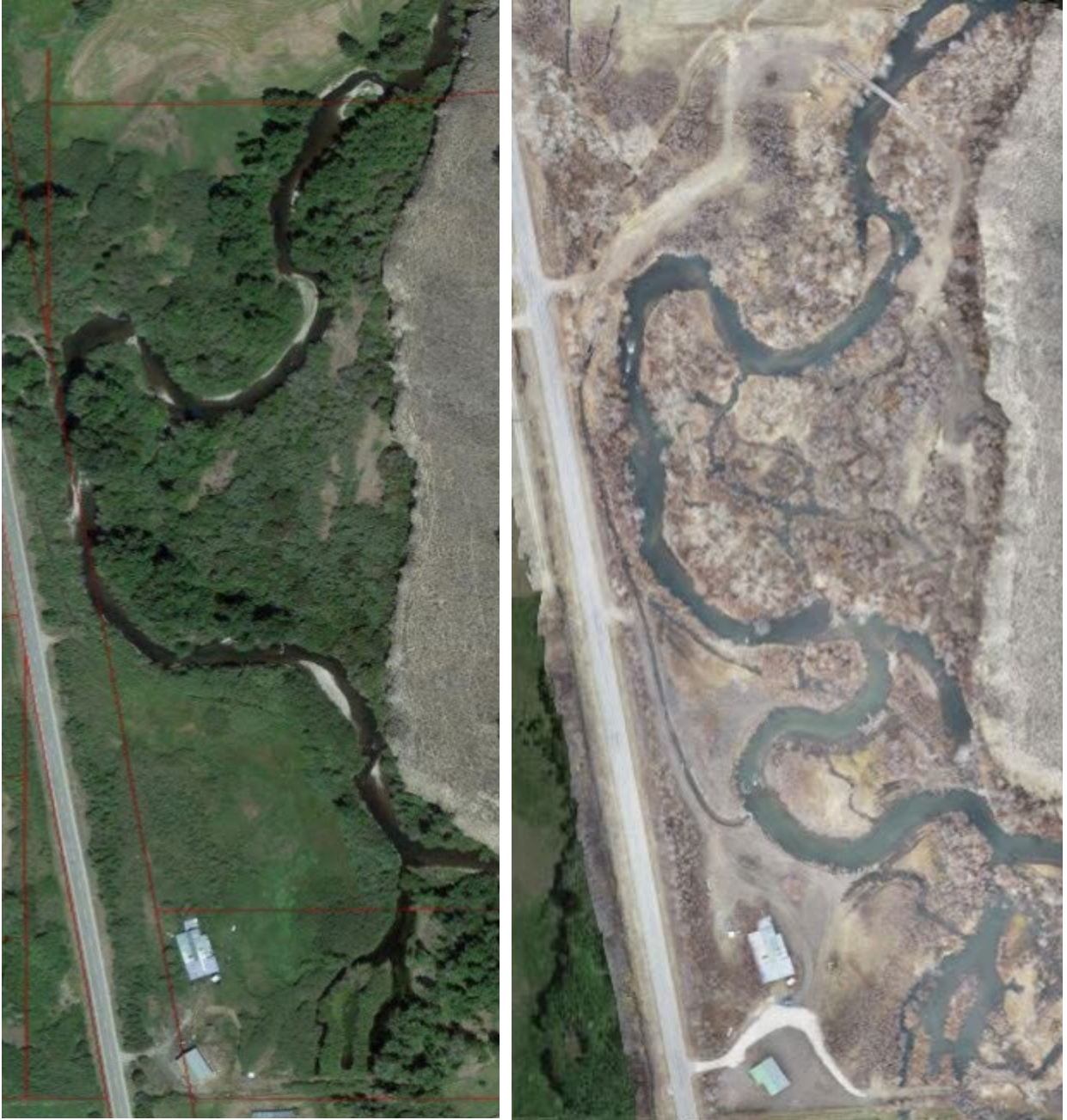


Figure 20: (2021072)Henry Pre and Post Treatment

**Table 9: Beyeler Ranch, Upper Lemhi Enhancement High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021076	Trout Unlimited	Upper Lemhi River	<ul style="list-style-type: none"> <li>• Consolidate or Replace Irrigation Diversions</li> <li>• Installation of Fords</li> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> </ul>
Fish Capture	47 captured 0 killed		

**Description:**

The project constructed 7 pools, 16 islands, 7 point-bars, and 22 riparian benches to improve channel geometry in the project reach. These features were constructed using both cut and fill methods which required localized isolation of the channel at habitat feature locations. This was accomplished by using temporary cofferdams made of sheet piling (and/or bulk bags with plastic sheeting) for pools, and coir logs with sediment fencing for islands, point bars and riparian benches. These methods isolated small areas at a time, allowing for continuous fish passage during construction. Isolating small areas made turbidity management easier and had a smaller impact than constructing a fish bypass channel.

In areas where proposed features span the entire river, the channel was isolated one half at a time for construction. Coir logs also provide stability for features and do not require removal after the feature is built, reducing turbidity. In addition to the isolation methods described above, the L-63 diversion adjacent to the Lemhi project was utilized during the early part of project timing to reduce flows for better channel isolation and turbidity management.

In addition, a variety of wood treatments were installed to improve habitat complexity and diversity throughout the project. Wildlife fencing exclosures, plantings and willow transplants were installed on the Upper Phase, after in-stream work was completed. The Upper Phase was treated for weeds with herbicide application in the spring of 2022.

**Primary project features:**

- Improved channel geometry
- Increased lateral habitat at higher flows
- Increased fish cover
- Improved riparian corridor



Figure 21: 2021021 (Beyler Ranch) Before & After



Figure 22: 2021021 (Beyler Ranch) Before & After



Figure 23: 2021021 (Beyler Ranch) Before & After



• Figure 24: 2021010(Beyeler Ranch) Habitat Complexity



**Table 10: Longley Meadows High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021079	CTUIR, BOR, USFS	Grande Ronde River	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Set Back or Removal of Berms, Dikes, Levees</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> <li>• Road Decommissioning</li> <li>• Fencing for Livestock Control</li> </ul>
Fish Capture	104 captured 0 killed		

**Description:**

The Longley Meadows Project was constructed in two phases with Phase 1 (approximately 30%) completed December, 2020 and Phase 2 completed December, 2021. The area encompasses two miles of the Grande Ronde River between river miles (RM) 143.5 and RM 142.1, 10 miles SW of La Grande, Oregon on the Wallowa-Whitman National Forest, an area that provides critical winter habitat for juvenile spring Chinook salmon and presents a significant opportunity to increase cold water refuge for summer rearing.

The project aimed to address habitat limiting factors including a disconnected floodplain, altered stream channel, lack of large pools and large wood, low stream flows, poor riparian conditions due to livestock grazing and vegetation removal, and an altered thermal regime. Restoration objectives were developed to rehabilitate and restore the reach to achieve immediate and long-term benefits to chinook, steelhead, and bull trout at all life stages.

Objectives include increasing habitat complexity and diversity, improving water temperature conditions, improving riparian vegetation diversity, and reconnecting the floodplain. The restoration plan includes promoting an island braided channel and floodplain system through channel, floodplain, and large pool construction, development of riparian and wetland habitat, and promoting groundwater and hyporheic functions that moderate and improve water quality.

**Primary project features:**

- Construction of riffles that mimic natural features.
- Construction of gravel bar and channel bank features.
- Placement and compaction of native fill material.
- Construction of a network of side channels and connections to existing off-channel features including swales, remnant channel scars, and low areas to create side channels and ponds.
- The construction of meander jams, channel-spanning jams, apex jams and small wood placement.
- The construction of beaver dams, channel margin jams, and deflector jams.
- Placement of individual large wood habitat pieces (e.g., sweepers, floodplain roughness);
- Bioengineered bank treatments; and creation and enhancement of alcoves and oxbows.



Figure 25: 2021079(Longley Meadows) Before and After



Figure 26: 2021079(Longley Meadows) Before and After

**Table 11: Fox Creek Upper Reach (McGirr) High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021104	Grant Soil and Water Conservation District	Fox Creek	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> <li>• Fisheries Surveys</li> </ul>
Fish Capture	0 captured 0 killed		

**Description:**

The existing concrete dam was decommissioned and removed. A series of two engineered rock riffles were installed from the diversion location to a point 120 feet downstream of the concrete dam in order to provide irrigation water to the headgate thereby eliminating the need to artificially check the water. Riffles were sloped to optimize velocity conditions to support fish passage and fine graded material was washed into each riffle to minimize channel losses and preserve passage in low flow conditions. Two apex log jams, using local juniper, were installed in Fox Creek above the diversion in the existing channel to restore proper channel function and provide habitat while sealing off the old channel to encourage flows to activate and preserve the stream alignment. An existing eroding bank was pulled back to stabilize the slope in order to support the installation of the log structures. An anchor log was placed perpendicular to flow and used as a footing for the root wads with six-inch posts driven in the ground to secure the structure.

The existing headgate and irrigation pipe were replaced with a 24-inch headgate and delivery pipe. The headgate was fixed to a pre-cast concrete inlet structure with sheet steel driven in front of the structure and capped. The irrigation delivery pipe will direct water to a pre-cast, concrete flush box, allowing the intake system to be periodically cleaned without the need for heavy equipment in the stream. From the flush box the delivery pipe daylight into the existing ditch. A ramp flume flow measurement device was installed for improved water management. An off-channel water system was installed to curtail the use of the existing water gaps. The stock water system consists of a solar pump to deliver water to sets of stock water troughs, totaling in 6 troughs

**Primary project features:**

- Removal of outdated irrigation infrastructure that serves as a barrier to fish passage
- Improve floodplain connectivity by activating 0.2 miles of relic meanders
- Enhancement of existing channel and wetland/floodplain habitat through the placement of large wood to improve complexity

Figure 27: (2021024)Fox Creek McGirr Diversion to be removed





Figure 28: (2021024)Fox Creek Post Treatment

**Table 12: Lower Fry Meadow Restoration**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021106	IDFG	East Fork Potlatch River (Lower Fry Creek)	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> <li>• Fisheries Surveys</li> </ul>
Fish Capture	38 captured 3 killed		

**Description:**

The project goal was to improve spawning, summer rearing, and overwintering habitat for ESA-listed steelhead (*Oncorhynchus mykiss*) in a 1.2-mile (4.9 acres of streambed) reach of the East Fork Potlatch River. There is little habitat complexity in the Potlatch River basin due to anthropogenic land use (primarily logging and grazing) practices and the primary limiting factor in the upper watershed is a lack of pools and instream habitat complexity. Juvenile steelhead abundance surveys have been conducted annually in this project reach since 2008 with low densities of both steelhead and large wood habitat witnessed.

**Primary project features:**

- Wood loading with large trees felled from adjacent timber
- Construction of three channel spanning log jams

- Excavation of remnant side channel inlets
- Four constructed rock riffle structures to elevate water surface and promote aggradation



Figure 29: 2021106(Lower Fry Meadow)Riffle Construction



Figure 30: (2021106)Lower Fry Meadow Completed Riffle

**Table 13: Granite Creek RM 7.5 High Risk Project**

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021110	CTUIR	Granite Creek	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> </ul>
Fish Capture	866 captured 105 killed		

**Description:**

Past placer mining restricted Granite Creek to a narrow corridor and largely removed any potential for distributing stream energy across historic floodplain areas. During 2021 work was completed between Stations 22+40 and 47+00. This included the development of two meander bends, eight riffles, two alcoves, three side channels and associated wood structures. Development of meander bends, riffles, and side channels improves floodplain connectivity and off-channel juvenile rearing habitat. High numbers of salmonid capture (4005) occurred in this reach with the majority being Chinook. However in this system only MCR steelhead is listed, which brings down the number to 866. NMFS was notified of these high numbers on 4/7/22.

**Primary project features:**

- Stream channel remaindering
- Side channel development
- Floodplain grading
- LWD/rock feature development

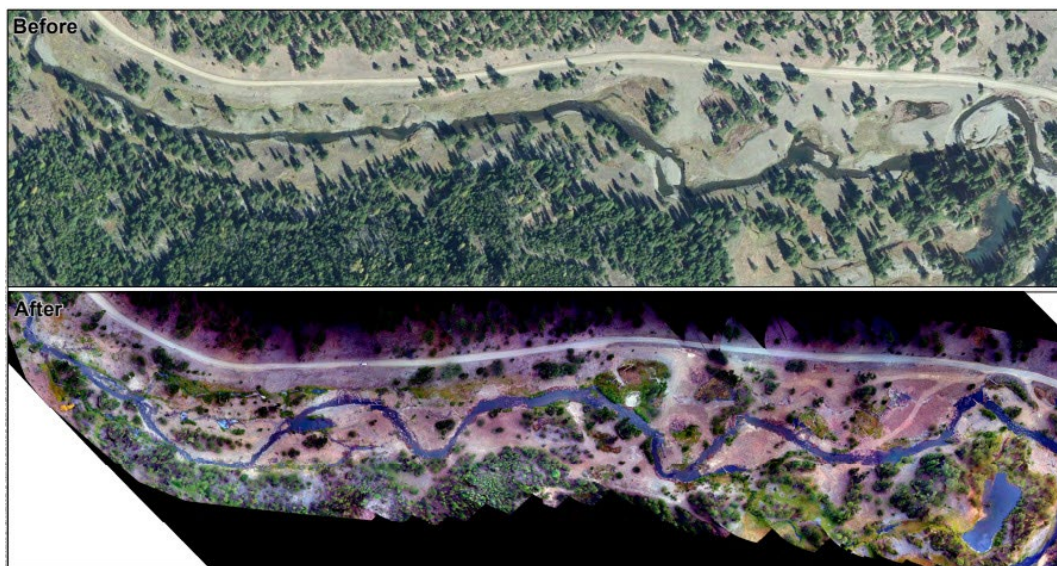


Figure 31: 2021110(Granite Creek)Before After



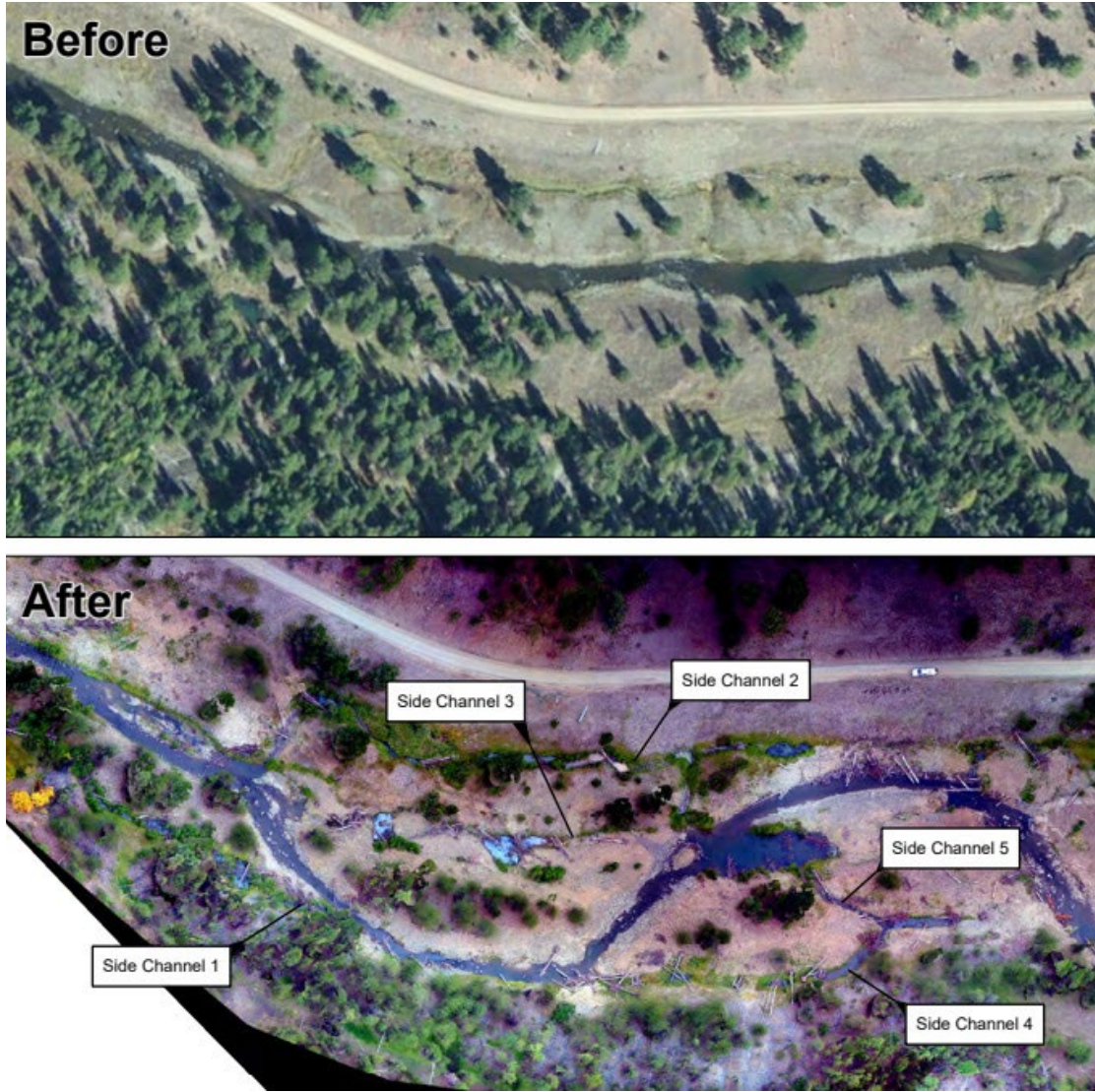


Figure 32: 2021110(Granite Creek)Before & After



Figure 33: 2021110(Granite Creek)Floodplain Rock Placement



Figure 34: 2021110(Granite Creek)Floodplain Wood Placement

Table 14: Tucannon PA-27/28.1 Phase 0.5-1.0 High Risk Project

HIP4 NO#	SPONSOR	LOCATION	HIP CATEGORIES
2021119	CTUIR	Tucannon River	<ul style="list-style-type: none"> <li>• Improve 2ndary Channel and Wetland Habitats</li> <li>• Bioengineered Streambanks</li> <li>• Install habitat forming structures</li> <li>• Riparian Vegetation Planting</li> <li>• Channel Reconstruction</li> <li>• Herbicides</li> <li>• Fisheries Surveys</li> </ul>
Fish Capture	504 captured 52 killed		

### Description:

The primary goal of the project was to increase channel complexity and floodplain connectivity within PA-27/28 of the Tucannon River. The 2021 phase of this restoration project, builds on the first phase of this project which was completed in the summer of 2020 within the middle of this reach. This 2nd phase was designed to complete instream construction on the upper and lower portion of the ~1 mile project area. In this phase, the design team proposed to reconnect floodplain and increase channel complexity, which are the highest priority activities outlined in the updated Tucannon Conceptual Restoration Plan (2021 Plan).

To reconnect floodplain and increase channel complexity in this reach, the team proposed to install apex log jams using 40'-50' logs with root wads to force complexity within the active river channel, reduce velocities, deposit sediment and aggrade the channel. In addition to the in channel work an isolated floodplain terrace and push up berm was identified for removal, to increase floodplain connectivity and lateral channel movement. The high ground feature was lowered to the active floodplain elevation, and the berm lowered to existing natural elevations. Once construction was completed, the river has been left to work naturally on floodplain connectivity, and allow flows to naturally access numerous existing relic high flow channels. Reactivating these side channels will further reduce unit stream power throughout the reach (thereby increasing winter rearing habitat for juvenile salmonids).

### Primary project features:

- Installation of large wood to create engineered log jams
- Movement of on-site alluvium in an effort to reconfigure the channel and floodplain into a Stage 8 riverscape
- An old drain tile (pipe) from a field upstream of the project area was converted into 800 feet of open channel and filled with large wood.



Figure 35: 2021(Tucannon)Stage\_Zero\_Fill\_Placement



Figure 36: 2021(Tucannon)Stage\_Zero\_Fill\_Placement



Figure 37: 2021(Tucannon)Stage\_Zero\_Fill\_Placement

## ACTIVITY CATEGORIES

Within each individual project there are a variable amount of activity categories. BPA generally lumps each set of activity categories by contract which typically share location, project and project sponsor, with the exception of herbicides, fish screens, surveys, and O&M activities which could have multiple locations lumped by program. The activity categories in orange are new and are a recent development of HIP4. The activity categories in red represent deviations from the mean, in these cases significant increases.

**TABLE 15: ACTIVITY CATEGORY SUMMARY**

Category	Subcategory	7-year Average	2021 Totals
<b>1. Fish Passage Restoration</b>			
	a. Dams, Water Control or Legacy Structure Removal.	4	9
	b. Consolidate, or Replace Existing Irrigation Diversions.	4	8
	c. Headcut and Grade Stabilization.	7	11
	d. Low Flow Consolidation.	1	0
	e. Providing Fish Passage at an Existing Facility.	4	6
	f. Bridge and Culvert Removal or Replacement.	9	7
	g. Bridge and Culvert Maintenance.	1	2
	h. Installation of Fords.	2	1
<b>2. River, Stream, Floodplain, and Wetland Restoration.</b>			
	a. Improve Secondary Channel and Wetland Habitats.	15	28
	b. Set-back or Removal of Existing, Berms, Dikes, and Levees.	9	12
	c. Protect Streambanks Using Bioengineering Methods.	9	10
	d. Install Habitat-Forming Instream Structures (Large Small Wood, Boulders	24	48
	e. Riparian Vegetation Planting.	37	58
	f. Channel Reconstruction.	7	13
	g. Sediment and Gravel.	4	7
<b>3. Invasive and Non-Native Plant Control.</b>			
	a. Manage Vegetation using Physical Controls.	31	33
	b. Manage Vegetation using Herbicides (Riverine)	37	43
	c. Manage Vegetation using Herbicides (Estuary)	5	5
	d. Manage Vegetation using Herbicides (Willamette)	0	0
	e. Juniper Burning	1	1
	f. Prescribed Burning	2	6
<b>4. Piling Removal.</b>			
	Pile Removal	1	0
<b>5. Road and Trail Erosion Control, Maintenance, and Decommissioning.</b>			
	a. Maintain Roads.	5	6
	b. Decommission Roads.	2	3
<b>6. In-channel Nutrient Enhancement.</b>			
	Nutrient Enhancement.	1	0
<b>7. Irrigation and Water Delivery/Management Actions.</b>			

	a. Convert Delivery System to Drip or Sprinkler Irrigation.	2		0
	b. Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking	3		1
	c. Convert from Instream Diversions to Groundwater Wells for Primary Water	1		0
	d. Install or Replace Return Flow Cooling Systems.	1		0
	e. Install Irrigation Water Siphon Beneath Waterway.	1		0
	f. Livestock Watering Facilities.	4		3
	g. Install New or Upgrade/Maintain Existing Fish Screens.	830		849
<b>8. Fisheries, Hydrologic, and Geomorphologic Surveys.</b>				
	Surveys	19		7
<b>9. Special Actions (for Terrestrial Species).</b>				
	a. Install/develop Wildlife Structures.	2		2
	b. Fencing construction for Livestock Control	10		15
	c. Plant Vegetation.	5		8
	d. Tree Removal for LW Projects.	12		15
	e. Willamette Valley Prairie Restoration	4		9



Figure 38: Longley Meadows Fish Salvage

## 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 16: 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

**TABLE 17: INCIDENTAL TAKE DUE TO FISH HANDLING (USFWS)**

Bull Trout		
	Capture	Mortality
2014	14	0
2015	29	0
2016	5	0
2017	0	0
2018	4	0
2019	0	0
2020	95	0
2021	11	5

**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 lineal 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). 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. Both of

those occurred in the Willamette Valley Wildlife Management Areas (Herbert Farm and Coyote Creek).

**TABLE 18: INCIDENTAL TAKE DUE TO HABITAT RELATED EFFECTS**

	Average	2021
IWW	44	57
Total	95	112

	2013	2014	2015	2016	2017	2018	2019	2020	Average
IWW	35	45	41	40	43	43	52	56	44
Total	86	96	86	95	92	113	99	96	95

**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 take is exceeded when activities continue to result in visible suspended sediment beyond two consecutive monitoring intervals.

In 2021 there were **1 reported instance** where turbidity was elevated to high levels (250 NTU) however above background. However it appears that the duration was short and appeared to be less than 4-6 hours. This instance involved water coming into contact with newly exposed earth during low flow events.

**TABLE 19: TURBIDITY EXCEEDENCE (2020094)**

HIP4 NO#	PROJECT
2021122	
EXPLANATION	A gravity check dam structure was removed, and the streambed channel was regraded to provide a consistent slope from the top to the bottom of project area. The channel was washed to fill any voids in the streambed simulation material to help keep the water on the surface. The creek water was slowly returned to the creek channel with turbidity readings taken downstream of the work area. The work area water cleaned up quickly, but the water downstream stayed turbid for due to the lack of water velocity in the area to push the turbid water out.





Figure 39: 2021122(Parke Creek)Bulk Bags to divert water



Figure 40: 2021099(Muddy Springs)Habitat Features

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

Therefore, 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	<b>1336</b>	<b>4356</b>

#### NON COMPLIANCE

Aside from some Project Completion Forms being extremely late (IDFG). There appears to be no non-compliance events in 2021.

**TABLE 21: REPORTED NONCOMPLIANCE EVENTS**

2013	2014	2015	2016	2017	2018	2019	2020	2021
NA	6	2	1	0	0	0	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.

FIGURE 5: HERBICIDE APPLICATION (NMFS)

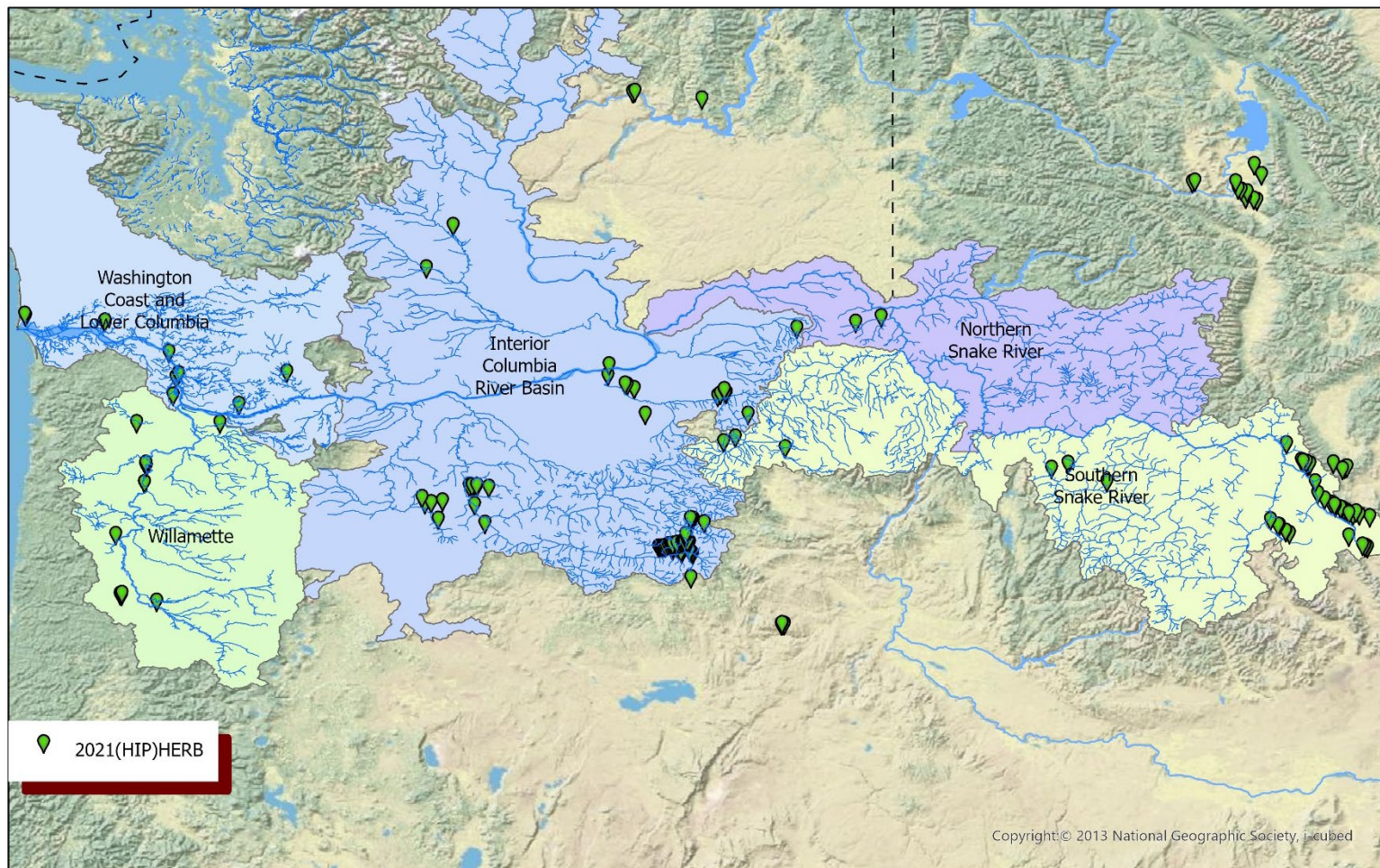
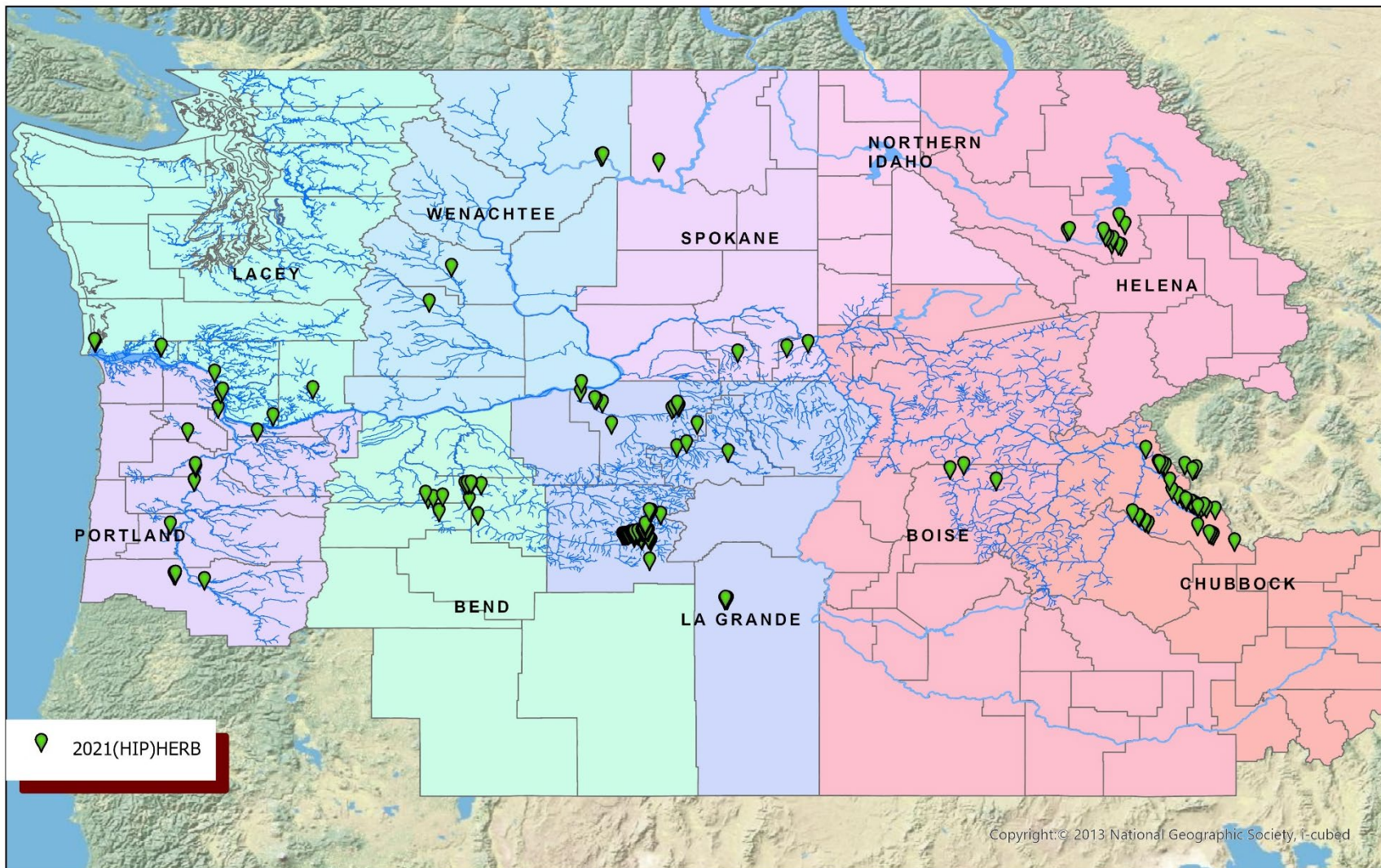


FIGURE 6: HERBICIDE APPLICATION (USFWS)



## 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.

The addition of herbicide treatment in the Estuary and the Willamette is expected to increase the amounts of annual herbicide applied in the upcoming years.

**TABLE 22: PROJECTS WITH HERBICIDE USAGE**

HIP4 NO#	PROJECT	RIPARIAN	UPLAND
2021001	Willamette Valley WMA - Sorenson	58.5	1295.3
2021007	Willamette Mission Reforestation Phase 6	79	0
2021020	Logan Valley Wildlife Restoration Project	0	0.7
2021027	Pahsimeroi River Weed Treatment and Hydroseeding	19.89	2.43
2021028	Lemhi River Restoration Weed Treatment and Hydroseeding	94.12	461.89
2021030	Pine Creek Conservation Area	0	145.25
2021032	Stabler Bend Vegetation Management	6.3	0
2021034	Columbia Stock Ranch	50	72
2021035	Stiegerwald Floodplain Restoration Project	106	39
2021036	Hideaway Creek RM 1.3	0	178
2021037	Elochoman 2 Restoration - Weed Treatment	80	0
2021040	West Sand Island Habitat Restoration - Phase III	86.32	34.68
2021041	Oregon Fish Screens Project - Low risk III	0.2	0
2021047	Tualatin River NWR Expansion	442	0
2021050	Grande Ronde Subbasin Invasive Weed Treatments	16.4	5
2021051	Isquulktpé Watershed Project	0.7	61.9
2021055	Trout Creek O & M	0.25	11
2021059	Upper John Day Conservation Lands Program	42.34	25
2021060	Yakima Basin Side Channels - 2021 Veg Management & Indian Creek Wood Placement	4.52	5
2021066	Trout Creek Noxious Weed Program	0.25	11
2021068	Bear Creek Invasive Species Control	0	150
2021078	Hungry Horse Mitigation/Flathead Lake Restoration and RME	12	205
2021091	Asotin Creek Wildlife Mitigation O & M 2021	0	245
2021084	Albeni Falls Wildlife Mitigation	0	697
2021092	East Fork South Fork Salmon River Restoration	12.21	35.99
2021093	Shillapoo Wildlife Area	0.2	250.37
2021103	Invasive Plant control Along Okanogan River	2	0

2021107	Willamette Mission Floodplain Reforestation, Phase 7	21	0
2021113	Umatilla Passage O&M	5	5
2021114	City of Salem Minto Brown Veg Mgmt	24	0
2021118	Pahsimeroi River Weed Treatment and Hydroseeding	61.79	5.86
2021126	WA Estuary MOA Project Scoping & Implementation	0	3
2021131	Lower Elochoman III Vegetation Management	111	44

## ESTUARINE HERBICIDE APPLICATIONS

2021 is the second 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 up with the sponsors CREST and Columbia Land Trust. Additional information was provided via site visits and several herbicide application memo (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 four projects were evaluated:

### 1. West Sand Island Habitat Restoration Phase III (HIP No# 2021040)

CREST’s proposal for Treatment of yellow flag iris on a 85 acre management area that will be using a combination of mechanical, manual, and herbicide methods. The project seeks to establish tidal connectivity between 104 acres of interior wetlands with Baker Bay and the mainstem Columbia River by excavating tidal connections through the berm and into the interior of the island.

### 2. Columbia Stock Ranch – Weed Treatment (HIP No# 2021034)

Project activities for 2021 included weed control, planting, native plant maintenance, future planting site preparation, fence removal, and fence installation. 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. The site contains two treatment areas consisting of a high marsh area and an upland area.

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

### 3. Elochoman 3 Restoration – Weed Treatment (HIP No# 2021130)

Weed control work in 2021 will target re-sprouting blackberry, priority broadleaf species (knotweed), and begin site prep for planting in 2022. The vegetation control work is paramount to project success in terms of recovering ecological integrity and function supporting Columbian white-tailed deer (*Odocoileus virginianus leucurus*) (CWTD), salmonids, and broader ecosystem function.

Target species include Himalayan blackberry (*Rubus bifrons*), reed canarygrass (*Phalaris arundinacea*), and knotweed species (*Fallopia* spp.). Control of these species will be completed with backpack sprayers and/or vehicle-mounted boom or wand sprayers using approved methods and herbicides as outlined in the HIP.

### 4. Elochoman 2 Restoration - Weed Treatment (HIP No# 2021037)

Similar to project 2021130, weed control work in 2021 will target re-sprouting blackberry, priority broadleaf species (knotweed), and begin site prep for planting in 2022. The vegetation control work is paramount to project success in terms of recovering ecological integrity and function supporting Columbian white-tailed deer (*Odocoileus virginianus leucurus*) (CWTD), salmonids, and broader ecosystem function.

Target species include Himalayan blackberry (*Rubus bifrons*), reed canarygrass (*Phalaris arundinacea*), and knotweed species (*Fallopia* spp.). Control of these species will be completed with backpack sprayers and/or vehicle-mounted boom or wand sprayers using approved methods and herbicides as outlined in the HIP and the 2019 technical memorandum.

## 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 of these 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 2022 and beyond.

**TABLE 23: HIP REVIEW WORKLOAD**

FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
------	------	------	------	------	------	------	------	------

Medium Risk	4	14	24	24	23	37	26	64	43
High Risk	2	6	2	3	5	14	6	25	11



Figure 41: 2021075(Longley Meadow)LWD Install



Figure 42: 2021075(Longley Meadow)LWD Installation



## FISH SCREENS

BPA now 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
2021029	<b>Oregon Fish Screens Project - Low risk I</b>	<b>6</b>
2021033	<b>Oregon Fish Screens Project - Low risk II</b>	<b>4</b>
2021041	<b>Oregon Fish Screens Project - Low risk III</b>	<b>816</b>
2021042	<b>Oregon Fish Screens Project - Low risk IV</b>	<b>1</b>
2021043	<b>Oregon Fish Screens Project - Low risk V</b>	<b>1</b>
2021101	<b>Oregon Fish Screens Project - Low risk VI</b>	<b>8</b>
2021129	<b>Oregon Fish Screens Projects - Low risk VII</b>	<b>2</b>
2021109	<b>Upper Salmon Fish Screen Replacements</b>	<b>4</b>

2021 was the fourth 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 7: 2020 HIP4 FISH SCREEN O&M LOCATIONS (NMFS)

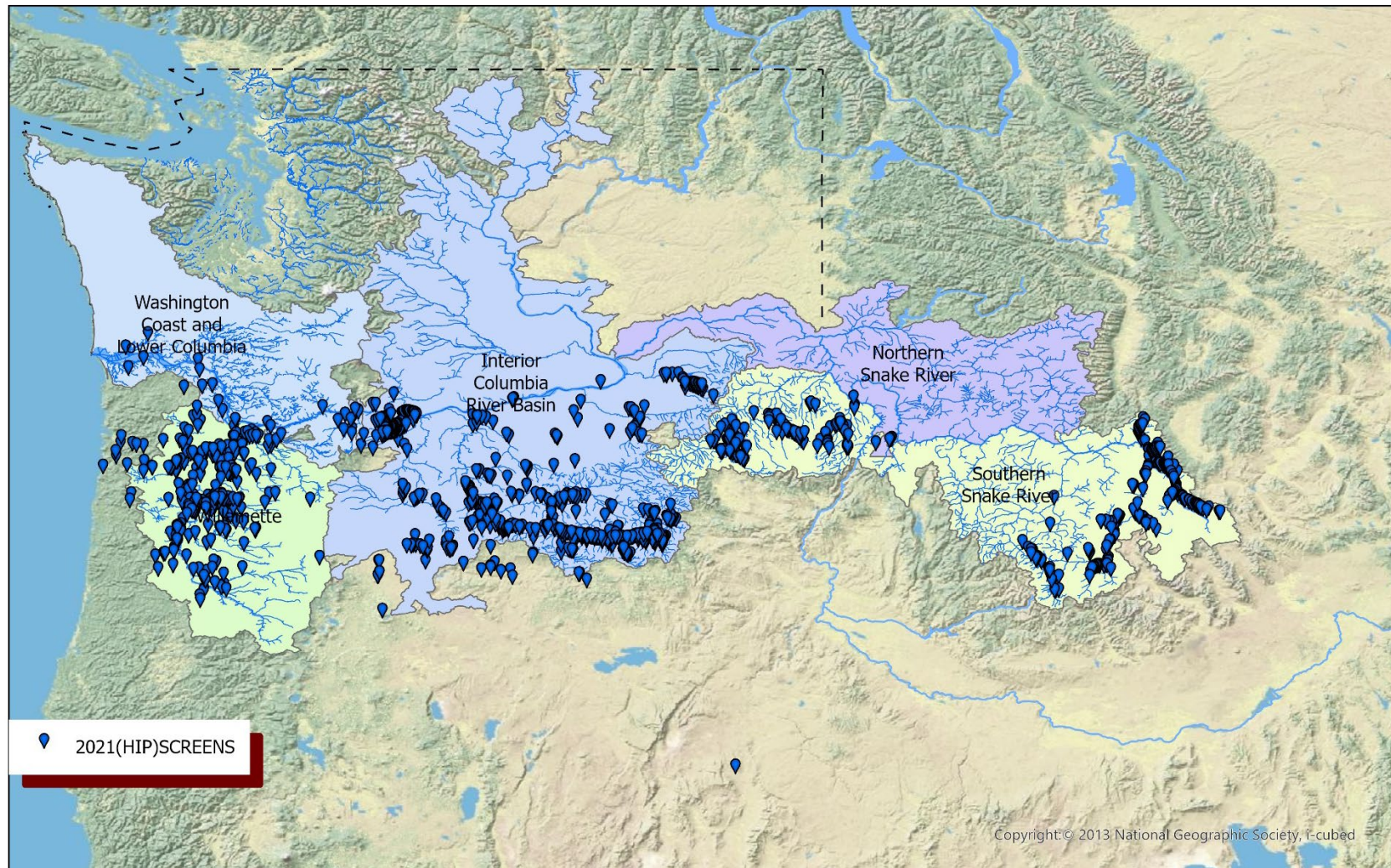
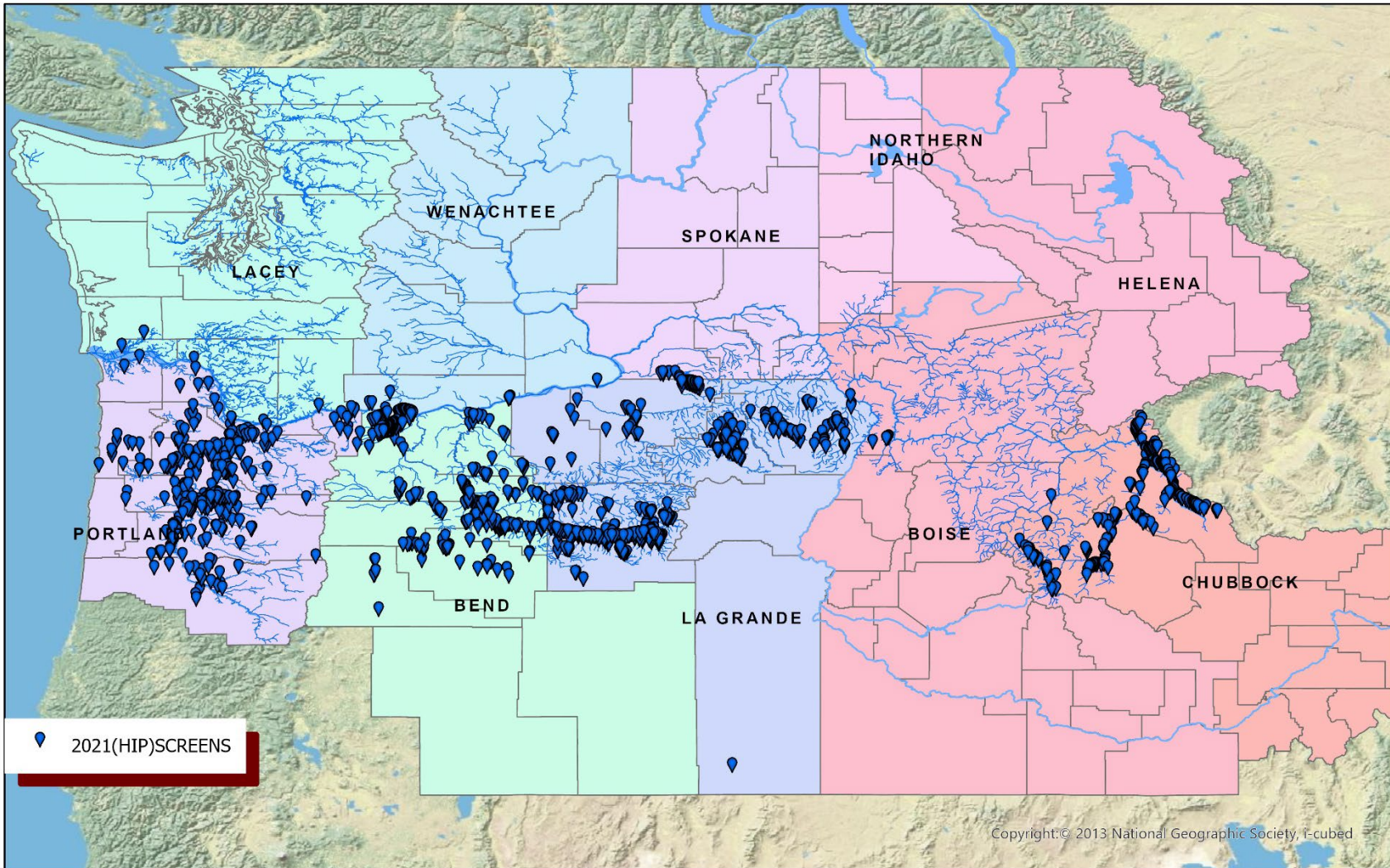


FIGURE 8: 2020 HIP4 FISH SCREEN O&M LOCATIONS (USFWS)



## WILLAMETTE VALLEY WILDLIFE MITIGATION

Category 9e is a new activity category 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 6 projects were covered under this activity category (**HIP No: 2021001, 2021002, 2021003, 2021004, 2021005, 2021006**).

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	Listed Species Present	HIP Activity Categories
Coyote Creek South (CCS)	Streaked horned lark	Riparian vegetation planting Physical removal Herbicide application (riverine)
Coyote Creek Northeast (CCNE)	Streaked horned lark	Physical removal Herbicide application (riverine)
Flight’s End (FE)	Columbian white-tailed deer Steelhead Chinook salmon Coho salmon Chum salmon	Riparian vegetation planting Physical removal Herbicide application (riverine) Maintain roads
Gail Achterman Wildlife Area (GAWA)	Steelhead Chinook salmon	Add LWD into floodplain Physical removal Herbicide application (riverine)
Herbert Farm and Natural Area (HFNA)	Streaked horned lark Kincaid’s lupine Nelson’s checker-mallow Steelhead Chinook salmon	Riparian vegetation planting Physical removal Herbicide application (riverine)
Palensky Wildlife Area (PWA)	Columbian white-tailed deer Steelhead Chinook salmon Coho salmon Chum salmon	Physical removal Herbicide application (riverine) Maintain roads
Sorenson Meadows (SOR)	Steelhead Chinook salmon	Physical removal Herbicide application (riverine) Prescribed burning

### Description of Activities

**Vegetation Management:** At all seven locations, ongoing vegetation management programs were continued to remove invasive weeds and replant and maintain native species. Vegetation removal included the use of mechanical (mowing, weed whacking, disking), manual (hand pulling), and chemical (herbicide) methods. Following removal, areas in which weeds were removed were re-seeded or re-planted with native grasses and shrubs. These programs are ongoing and will continue for the foreseeable future.

**Road Maintenance:** Roads and trails were maintained at the Flight's End and Palensky Wildlife Area locations. This work included removing encroaching vegetation and small trees, filling potholes, and repairing and replacing signs which were damaged by the elements or vandalism.

**GAWA Large Wood Placement Project:** Finally, placement of large woody debris at GAWA was completed in the late autumn. During high water flows in winter months, the Willamette River overflows its banks and inundates portions of forested floodplain at the wildlife area. A dozen trees with intact rootwads were loosely placed in these lateral channels to introduce roughness and reduce flow velocity. The locations are being monitored to determine their success in establishing seasonal fish and wildlife habitat and the project may be expanded in future years if results are promising. All work was done in the dry during low flow months and caused no negative impacts to fish or wildlife.



Figure 43: 2021102(PALS)

**FIGURE 9: 2021 HIP4 WILLAMETTE VALLEY ACTIONS**





Figure 44: 2021102(PALs) Installation



Figure 45: 2021075(Longley Meadow)Large Wood Transport

## HIP ANNUAL SURVEY

At the end of 2021, Bonneville solicited an anonymous short survey to gauge program effectiveness, usability and seek feedback from HIP users across the Columbia River Basin. An email invitation to participate in the survey was sent out to approximately 960 recipients who have at some point in the past decade have participated in the HIP process and/or trainings. HIP users included regulatory managers from federal and state agencies; project sponsors from state resource agencies, tribes, private organizations, non-profits and conservation districts; as well as Bonneville employees and contractors that work in Bonneville's Fish and Wildlife program. We have received 124 responses to the survey.

The survey was comprised of a total of 8 questions:

1. Since January 2020, I have had a project(s) covered under BPA's Habitat Improvement Project (HIP): Yes/No
2. I am: A) Sponsor B) Other C) COTR D) EC Lead E) Regulator
3. Related to my final project I found the HIP: A) Added Great Value B) Added Some Value C) Did Not Change Value D) Somewhat Reduced Value E) Greatly Reduced Value
4. I found the HIP Review Process to be: A) Reasonable B) Not Sure C) Somewhat Arduous D) Streamlined and Effective E) Arduous and Painful
5. I could use additional trainings in the use of HIP4: Yes/No
6. What would you add, if possible from the HIP Handbook or the HIP Review Process?  
Open ended
7. Any Additional Comments/Questions/Suggestions: Open Ended
8. I could use additional trainings in the use of HIP4: Yes/No

Overall the responses to the questions were positive. Responses to the open-ended questions were reviewed by the HIP Program Lead and Engineering Technical Services. Most were complimentary with several asking for more expedited review times. There were few actionable items.



Since January 2020, I have had a project(s) covered under BPA's Habitat Improvement Programmatic (HIP)

122 out of 124 answered

Yes 79 resp. 64.8%



No 43 resp. 35.2%



I am:

122 out of 124 answered

Sponsor 77 resp. 63.1%



Other 30 resp. 24.6%



COTR 6 resp. 4.9%



EC Lead 5 resp. 4.1%

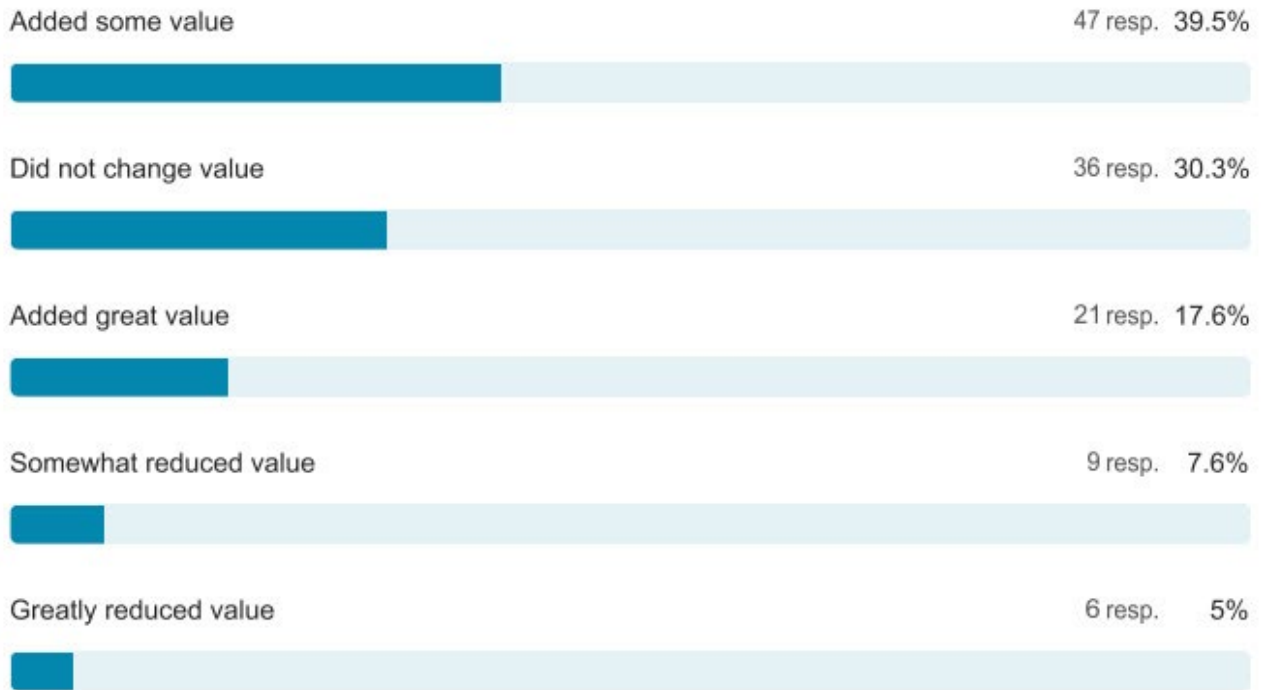


Regulator 4 resp. 3.3%



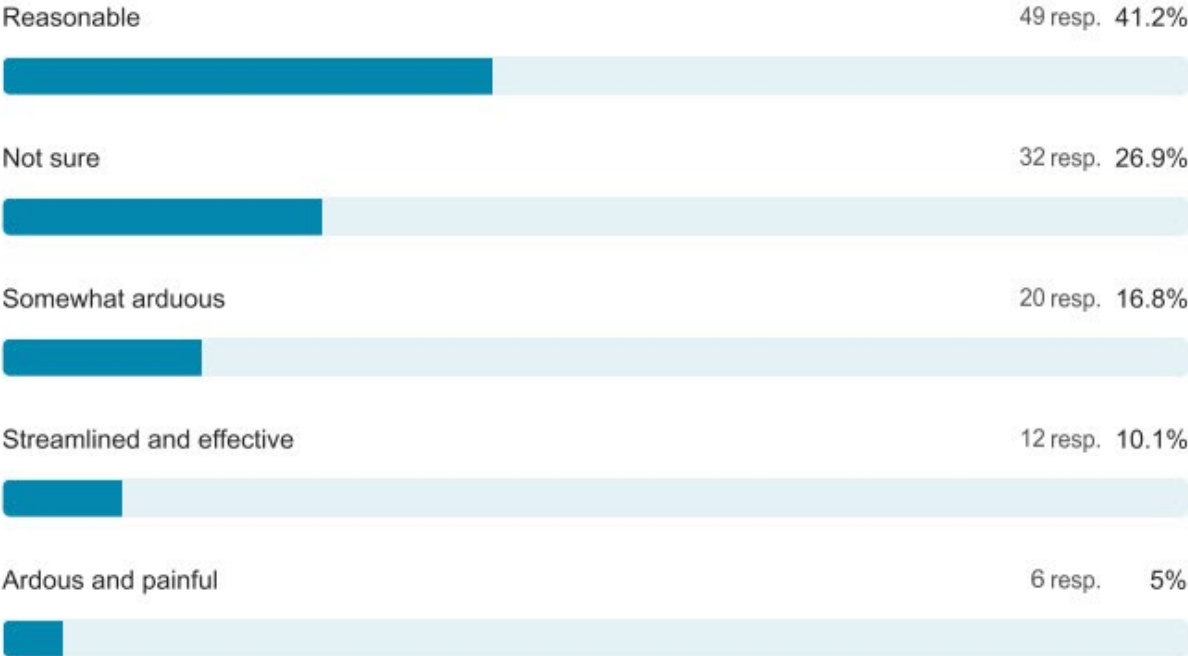
Related to my final project,  
I found the HIP:

119 out of 124 answered



I found the HIP Review Process to be:

119 out of 124 answered



I could use additional trainings in the use of HIP4

120 out of 124 answered

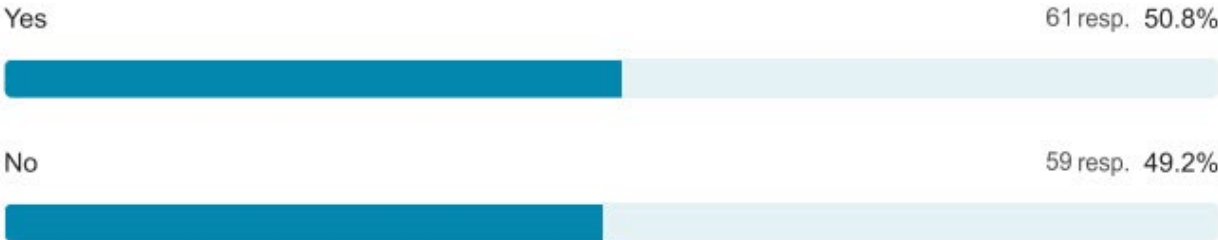




Figure 47: 2022(Yakima Basin) Wood Placement

