FINAL Pacific Lamprey

2020 Regional Implementation Plan

for the

Lower Columbia/Willamette

Regional Management Unit

Willamette Sub-Unit

Submitted to the Conservation Team July 31, 2020

Primary Authors		Primary Editors
Jen Poirier	USFWS	
Ann Gray	USFWS	
Ben Clemens	ODFW	

This page left intentionally blank

I. Status and Distribution of Pacific Lamprey in the RMU

A. General Description of the RMU

Willamette River Sub-Unit

The Willamette Sub-Unit of the Lower Columbia River/Willamette Regional Management Unit is comprised of twelve 4th field HUCs that are situated within three Environmental Protection Agency (EPA) Level III Ecoregions: Coast Range, Willamette Valley and Cascades (Figure 1, Table 1).

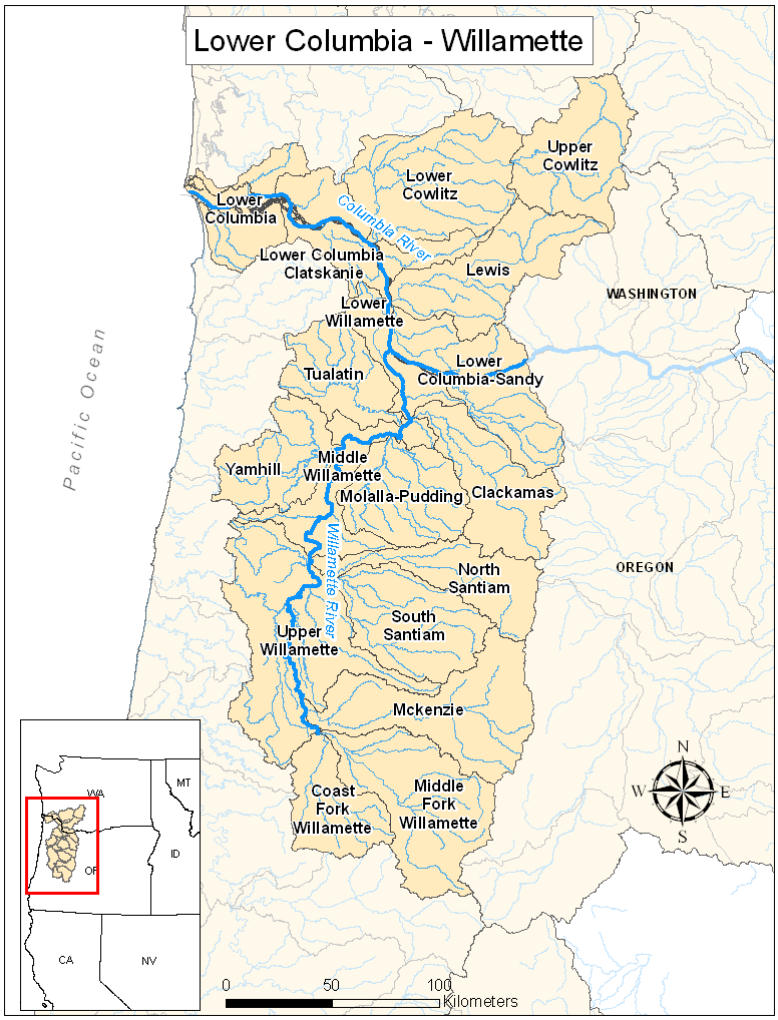


Figure 1. Map of watersheds within the Lower Columbia River/Willamette Regional Management Unit.

Table 1. Drainage Size and Level III Ecoregions of the 4th Field Hydrologic Unit Code (HUC) Watersheds located within the Willamette Sub-Unit.

Watershed	HUC Number	Drainage Size (km2)	Level III Ecoregion(s)
Middle Fork	17090001	3,540	Willamette Valley
Coast Fork Willamette	17090002	1,726	Coast Range
Upper Willamette	17090003	4,850	Willamette Valley
McKenzie	17090004	3,468	Willamette Valley, Cascades
North Santiam	17090005	1,979	Willamette Valley, Cascades
South Santiam	17090006	2,696	Willamette Valley, Cascades
Middle Willamette	17090007	1,841	Willamette Valley
Yamhill	17090008	1,999	Coast Range
Molalla-Pudding	17090009	2,267	Willamette Valley, Cascades
Tualatin	17090010	1,836	Coast Range, Willamette Valley
Clackamas	17090011	2,442	Willamette Valley, Cascades
Lower Willamette	17090012	1,668	Willamette Valley

B. Status of Species

Conservation Assessment and New Updates

Increased attention on Pacific Lamprey has increased our understanding of this species in the Willamette Basin. Monitoring efforts, in which lamprey are either the target species or information is collected during other species' monitoring, have expanded the amount of information available and the quality of this information.

Previous studies have suggested a lack of genetic population structure (e.g., Goodman et al. 2008; Spice et al. 2012). However, these studies have focused on large geographical areas and have not controlled for time. Recently, two independent studies on adult Pacific Lamprey, conducted in different years and utilizing different genetic tools have reported evidence for some genetic differentiation among a relatively small body size, early migrating run, and a larger, later migrating run of adult Pacific Lamprey at Willamette Falls (Hess et al. 2015; Clemens et al. 2017a). Moderate genetic differentiation of adult Pacific Lamprey also occurred across years in the Willamette River Basin (Clemens et al. 2017a).

Abundance, Distribution and Connectivity

Since 2010, the Confederated Tribes of Warm Springs Reservation of Oregon have collected information to estimate the abundance of Pacific Lamprey adults at Willamette Falls (Falls) and the number passing the Falls through the fishways. Average estimates for this six year period are 182,224 adults (abundance at the Falls) and 65,446 adults (passing above the Falls; Table 2).

Historical occupancy of Pacific Lamprey was extensive throughout the Lower Columbia/Willamette RMU. From the previous threats assessment, Luzier et al. (2011) estimated that the current distribution was reduced 50-70% from historical ranges. Current distribution of lamprey in the Willamette Sub-Unit is strongly related to physical migration barriers. Twenty large dams are present within the Willamette Sub-Unit; 13 are owned and operated by the U.S. Army Corps of Engineers' (Corps or USACE) and collectively referred to as the Willamette Valley Project; at this time, none have successful upstream lamprey passage.

Other large dams are for either non-federal hydropower production or water supply. See "Passage" for more discussion on dam passage.

Of the estimated 371 dams present in the Willamette Basin, approximately 148 are privately owned and used primarily for the purposes of irrigation. The greatest concentration of dams can be found in the Tualatin (82) and Yamhill (65) watersheds (Hulse et al. 2002). Culverts are also widespread throughout the watersheds of the Willamette Sub-Region and impact Pacific Lamprey distribution to an unknown extent.

Recent information collected during the 2017 Threats Assessment and Regional Implementation Plan meetings will be used to determine the percentage of historical distribution still currently occupied. The intrinsic potential historical distribution for Winter Steelhead or Spring Chinook was used as a surrogate for Pacific Lamprey historical distribution.

Table 2. Estimated Pacific Lamprey adult abundance, and numbers passing Willamette Falls and Bonneville Dam, 2010-2017, percent of total that were harvested, percent of total numbers that passed Willamette Falls (Baker and McVay 2018).

Year	Total Abundance At Willamette Falls	Percent Harvested	Numbers Passing Willamette Falls Fishway	Percentage Passing
2010	64,388	2.5%	27,043	42%
2011	107,383	4.0%	46,819	44%
2012	243,048	2.7%	111,559	46%
2013	173,821	4.3%	49,365	28%
2014	336,305	1.1%	125,778	37%
2015	168,398	1.3%	32,112	19%
2016	115,682	2.3%	32,148	28%
2017	277,577	2.3%	80,848	29%
Average	**185,825**	**2.6%**	**63,209**	**34%**

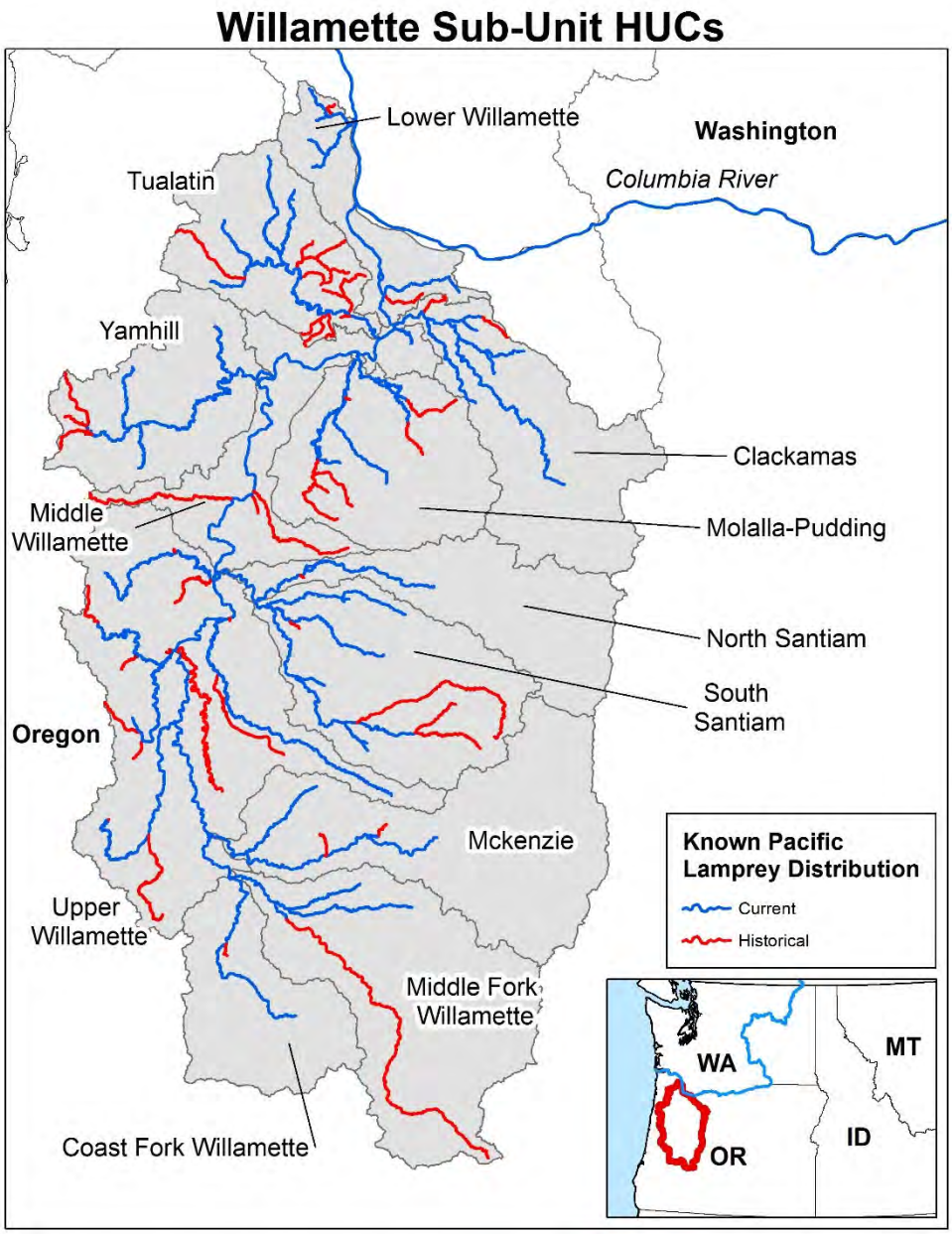


Figure 2. Current and historical distribution for Pacific Lamprey (based on known observation data): Lower Columbia and Willamette Regional Management Unit (USFWS Data Clearinghouse 2018).

C. Summary of Major Threats

The key threats within the Willamette Sub-Unit were identified by RMU participants during the 2017 Risk Assessment revision meeting in February 2017 (Table 3), to update the 2011 Risk Assessment. Key threats are defined as those threats in which the average scope and severity across all HUCs was greater than 2.5 on a scale from 1- 4 (>3.5 = High, 2.5- 3.49 =Moderate, 1.5- 2.49=Low and <1.5= Insignificant; U=Unknown). Risk Assessments are revised approximately every 5 years.

Stream and floodplain degradation (non-dam), water quality (non-dam) and dam-related flow alterations[1] are the highest priority threats in the Willamette Sub-Unit, followed by dam-related stream and floodplain degradation and dam-related passage (Table 3). The "dam-related" threats refer to those threats primarily caused by large dams, which affect multiple parameters (passage, water quality, seasonal baseflows and flood flows (timing, magnitude and duration), floodplain dynamics, habitat (e.g. inundation of habitat, loss of coarse sediment supply), and species composition (e.g. habitat suitability, predator/prey dynamics). Given the prevalence of large dams in the Sub-Unit, this distinction was made to better identify the cause of the threats, and ensure some threats were not masked by the presence of these dams.

Stream and Floodplain Degradation.—Nearly 70 percent of Oregon's population resides in and around the Willamette Basin. Human settlement and development has greatly altered the physical habitat and hydrology of the Sub-Unit. In upland areas, forestry is the predominant land use. Fire suppression and timber harvest practices have altered the diversity and age/size composition of riparian vegetation. Many watersheds in the Willamette Sub-Unit are lacking mature conifers that play a pivotal role in bank stability, water quality protection, thermal cover, and the provision of large woody debris. In the valley, extensive agriculture and urban development have reduced the quality and complexity of aquatic and riparian habitats. Efforts to reduce flooding (dikes, levees, riprap, dams) and improve navigation (dredging, large wood clearing), have straightened and scoured streambeds, eliminated side channels and cut off flood plains. Cultivation, riparian clearing and conversion of land for crops, pastures, vineyards and development have filled and/or drained wetlands, increased soil erosion and sedimentation, and promoted the establishment and spread of invasive plant species. Simplification of the river channel and flow regulation and simplification of the mainstem Willamette have been hypothesized to be a cause of the decreased numbers of adult Pacific Lamprey harvested by Tribal members at Willamette Falls (Clemens et al. 2017b).

Water Quality.—Elevated water temperature, low dissolved oxygen, bacteria, and toxic pollutants such as herbicides, pesticides, heavy metals and flame retardants, are some of the water quality concerns in the Willamette Sub-Unit. These threats may be attributable to a number of human activities including riparian clearing, water withdrawals, failing septic systems, sewer overflow, and urban and agricultural run-off. Warm summertime temperatures (greater than or equal to 20^{o}C) during July-August may prevent adult Pacific Lamprey from surviving, reproducing, or migrating far up into the Willamette Basin (Clemens 2017; Clemens et al. 2016; Clemens et al. 2012a; Clemens et al. 2009). These summertime temperatures have resulted in large die-offs, skewed sex ratios, documented testicular atresia (damaged testes) in

[1] "Flow Alterations" were formerly referred to as "Dewatering and Flow Management" in Luzier et al. (2011).

males, and faster maturation rates. Toxins may be particularly harmful to Pacific Lamprey because larvae burrow and feed in mud and fine substrates where toxins accumulate (Nilsen et al. 2015; Clemens et al. 2017b). Monitoring efforts to improve and protect water quality for fish, wildlife, and human health are ongoing in the Willamette Sub-Unit.

Flow Alterations – (formerly "Dewatering and Flow Management"). —Flow alterations were ranked as a Moderate key threat. Low flow conditions occur naturally in many watersheds of the Willamette Sub-Unit during summer months. These conditions may be aggravated by water withdrawals for municipal, industrial, commercial and agricultural use. In several tributaries, the large storage dams augment seasonal low flows, and some alter natural temperature and flow regimes. Water releases from thermally stratified reservoirs generally result in cooler water temperatures downstream of the dam in summer and warmer water temperatures in fall and winter. Abnormal seasonal temperature fluctuations may impact the behavior, development, and fitness of adult and juvenile lamprey. In 2005, the USACE completed a water temperature control tower at Cougar Dam on the South Fork McKenzie River, which has alleviated much of the dam-induced seasonal abnormalities in the McKenzie River. Such temperature control structures are still needed elsewhere in the Willamette Basin to return to more normative temperature regimes (e.g. North Santiam River, the Middle Fork Willamette).

Water diversions and impoundments alter the quantity and timing of flow events, which may impact adult and juvenile lamprey migration cues, decrease spawning habitat availability, prevent access to backwater or side channel habitats, create low water barriers, and contribute to mortality if incubating eggs or burrowing larvae are dewatered or exposed to a high temperature or low oxygen environment (Clemens et al. 2017b). Some improvements to flow regimes have occurred in the Willamette Basin. Since 2002, the USACE has largely operated their Willamette Valley Project dams according to minimum flows and ramping rates that were formalized under the Willamette Project Biological Opinion issued by the National Marine Fisheries Service (NMFS 2008) for the protection of anadromous salmonids. Further, through the Willamette Valley Sustainable River Project, The Nature Conservancy and the USACE and numerous other agencies and organizations are working to ensure that Willamette River flows are managed to benefit fish and wildlife habitats as well as local communities (https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/oregon/placesweprotect/wv-fact-sheet.pdf?redirect=https-301).

Table 3. Summary of the assessment results for the main threats of the Willamette Sub-Unit. Key Threats are those that rank Moderate or High (2.5 or greater). Threats ranked less than 2.5 are not listed.

Watershed	Dam-Related Passage		Dam-Related Flow Alterations		Dam-Related Stream & Floodplain Degradation		Dam-Related Water Quality		Dam-Related Predation	
	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity
Willamette Sub-Unit										
Middle Fork Willamette	4	4	4	4	4	4	4	4	3	3
Coast Fork Willamette	4	4	4	4	4	4	4	4	2.5	2.5
Upper Willamette	2	4	4	4	3	4	3	4	2	4
McKenzie	3	3	3	3	3	3	3	3	2	2
North Santiam	4	4	4	4	4	4	3	3	1	1
South Santiam	4	4	4	4	4	4	4	4	2	4
Middle Willamette	2	4	4	4	4	4	3	3	1	U
Yamhill	2	2	2.5	2.5	2	2	2.5	2.5	1	1
Molalla-Pudding	2.5	2.5	2.5	2.5	2	2	2.5	2.5	3	3
Tualatin	2.5	2.5	2	2	2	2	2	2	3	3
Clackamas	3	3	1	2	1	1	1	1	3	U
Lower Willamette	1	2	3	3	4	4	4	4	4	4
Average Scope/Severity	2.8	3.3	3.2	3.3	3.1	3.2	3.0	3.1	2.3	2.8
Rank	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**L**	**M**
Mean		3.0		3.2		3.1		3.0		2.5
Overall Threat Rank		**M**		**M**		**M**		**M**		**M**

Table 3 (continued). Summary of the assessment results for the main threats of the Willamette Sub-Unit. Key Threats are those that rank Moderate or High (2.5 or greater). Threats ranked less than 2.5 are not listed.

Watershed	Flow Alterations (non-dam)		Stream & Floodplain Degradation (non-dam)		Water Quality (non-dam)		Predation (non-dam)	
	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity
Willamette Sub-Unit								
Middle Fork Willamette	1	1	3.5	3	2	2	1	1
Coast Fork Willamette	3	2.5	2.5	2.5	3	3	2.5	2.5
Upper Willamette	3.5	3	4	3.5	4	3.5	1.5	U
McKenzie	2	2	3	3	2	1	1	1
North Santiam	3	3	2.5	3	2	3	1.5	3
South Santiam	3.5	3	3	3	3	3	1	U
Middle Willamette	3.5	3	4	4	3.5	4	4	U
Yamhill	3	3	4	4	4	4	3	3
Molalla-Pudding	4	4	4	4	4	4	3	3
Tualatin	2.5	2.5	4	4	4	4	3	3
Clackamas	1	2	3	3	3	3	3	U
Lower Willamette	2.5	2.5	4	4	4	4	4	4
Average Scope/Severity	2.7	2.6	3.5	3.4	3.2	3.2	2.4	2.6
Rank	**M**	**M**	**H**	**M**	**M**	**M**	**L**	**M**
Mean	2.7		3.4		3.2		2.5	
Overall Threat Rank	**M**		**M**		**M**		**M**	

Passage- The current distribution of Pacific Lamprey is largely determined by the many large dams throughout the Willamette Basin that do not provide passage (Clemens et al. 2012b; Schultz et al. 2014; Table 4). The USACE Willamette Valley Project dams were primarily built to reduce flood risks, but also generate electricity and provide water storage for irrigation, recreation and drinking water. The structures range in size from 49 feet (Fern Ridge) to 519 feet (Cougar) tall and provide little or no fish passage for Pacific Lamprey. Largely constructed in the early 1960s, the USACE dams block hundreds of miles of historical, anadromous spawning and rearing habitat and have adversely affected native fish populations in the basin. Consequently, the Willamette Valley Project Biological Opinion, issued by the National Marine Fisheries Service (NMFS 2008), requires the Corps to improve adult and juvenile salmonid passage at several high priority dams.

USACE's adult fish trap and haul facilities located at the base of these dams are primarily designed for anadromous salmonids, which are trapped and transported by truck and released upstream of the dams. Some of the recent upgrades include features (e.g. rounded walls at fishway entrances and orifices) that may increase the ability to capture and haul adult lamprey if additional infrastructure (such as ramps and collection boxes) was added. Work to date has included the construction or upgrade of adult fish collection facilities at Cougar, Detroit (Minto), Foster, Dexter and Fall Creek Dams to improve trap and haul conditions for salmonids (i.e., improved attractant flows, larger holding areas, less direct handling of fish). At this time, Fall Creek Dam has the only experimental ramps for upstream lamprey passage at these USACE dams.

Downstream fish passage solutions for salmonids at the USACE dams are still under evaluation. No permanent downstream fish passage collection facilities for any of the USACE dams have been completed. Juvenile fish (all species) must pass through turbines, spillway gates, or other routes of water passage as they migrate downstream. USACE has tested a small, experimental, floating surface collector at Cougar Dam for downstream passage of salmonids. Other studies to determine downstream passage solutions at Detroit and Lookout Point Dams continue. It is unclear if passage improvement measures will ultimately restore access to the habitat above these dams for Pacific Lamprey.

Although most passage projects in the Willamette Sub-Unit are focused on improving conditions for ESA-threatened spring Chinook salmon and winter steelhead, a growing number of projects are providing passage for Pacific Lamprey. In conjunction with Federal Energy Regulatory Commission relicensing, Portland General Electric (PGE) has installed three lamprey passage structures at Willamette Falls Hydroelectric Project (Lower Willamette River), rebuilt the existing fish ladder at River Mill Dam (Clackamas River) and made modifications to the fishway that traverses the Faraday and North Fork Dams (Clackamas River) to improve upstream passage of adult Pacific Lamprey. PGE is also monitoring the downstream migration of juvenile lamprey with two, new surface collectors at River Mill and North Fork Dams. These facilities are collecting and enumerating lamprey outmigrants. The collection efficiency of the downstream passage structures are unknown, but thousands of ammocoetes and macrophthalmia have been collected each year since construction. PGE is also trapping and hauling adult Pacific Lamprey into the Clackamas above North Fork Dam to increase larval production (and the pheromones they produce) in the upper basin in an effort to increase adult attraction to this area. In the future, PGE will perform a multi-year radio telemetry study that will assess migration and passage success of adult Pacific Lamprey through the fish ladder at North Fork Dam.

Table 4. Passage conditions at most large dams located in the Willamette Sub-Unit.

Dam / ***Ownership***	**River**	**Passage Conditions for Pacific Lamprey**
Dexter, Lookout Point, and Hills Creek *USACE*	Middle Fork Willamette	A trap and haul facility for anadromous salmonids occurs below Dexter Dam, the lower-most dam on the Middle Fork Willamette. Future upgrades may increase the ability to capture and haul adult lamprey upstream of these dams. Permanent downstream passage facilities are not present.
Fall Creek Dam *USACE*	Tributary to Middle Fork Willamette below Dexter Dam	A trap and haul facility for anadromous salmonids occurs below Fall Creek Dam, and USACE has installed a ramp/collection box specific for lamprey. Future upgrades may increase the ability to capture and haul adult lamprey upstream of these dams. CTGR are conducting a reintroduction/translocation of adults captured at Willamette Falls above this dam. Downstream passage facilities are not present; "passage" for downstream migrant salmonids is provided by annual 1-2 week drawdown of the reservoir- typically in December or January each year.
Dorena Dam *USACE*	Row River-Tributary to Coast Fork	No fish passage facilities are present or planned at this dam.
Cottage Grove Dam *USACE*	Coast Fork Willamette River	No fish passage facilities are present or planned at this dam.
Fern Ridge Dam *USACE*	Long Tom River	No fish passage facilities are present or planned at this dam.
Leaburg Dam *EWEB*	McKenzie River	Two upstream fishways are located at Leaburg Dam (~10 feet tall). Lamprey passage efficiency is unknown, but Pacific Lamprey are found above this dam. EWEB's diversions are screened to NMFS criteria, which are adequate for larger outmigrants, but may allow the smallest larvae to pass through the screen, and intermediate sized larvae may become impinged or wedged in the gaps of the screen material.
Cougar Dam *USACE*	South Fork McKenzie River	A trap and haul facility for anadromous salmonids occurs below Cougar Dam; recent upgrades may increase the ability to capture and haul adult lamprey upstream if additional infrastructure was added. Permanent downstream passage facilities are only in the design phase, but may be installed in 2020.
Blue River Dam *USACE*	Blue River (tributary to McKenzie River)	No fish passage facilities are present or planned at this dam.

Table 4 continued.

Dam / ***Ownership***	**River**	**Passage Conditions for Pacific Lamprey**
Trail Bridge Dam *EWEB*	McKenzie River	No fish passage facilities are present at this dam. Future upgrades in the next ~5 years will include a trap and haul facility that includes design considerations for trap and haul of adult Pacific Lamprey. Downstream passage will be provided by spill and powerhouse shut-down, which will occur year-round.
Minto, Big Cliff and Detroit Dams *USACE*	North Santiam	A trap and haul facility for anadromous salmonids occurs below Big Cliff Dam, the lower-most dam, at Minto. Recent upgrades may increase the ability to capture and haul adult lamprey upstream if additional infrastructure was added. Permanent downstream passage facilities are not present.
Foster and Green Peter Dams *USACE*	South Santiam	A trap and haul facility for anadromous salmonids occurs below Foster Dam, the lower-most dam. Recent upgrades may increase the ability to capture and haul adult lamprey upstream if additional infrastructure was added. Permanent downstream passage facilities are not present.
Scoggins Dam *BLM*	Tualatin River	No fish passage facilities are present or planned at this dam.
River Mill, Faraday, and North Fork Dams *PGE*	Clackamas River	A new fishway at the lower-most River Mill Dam was constructed in 2006 and provides 90% passage efficiency for Pacific Lamprey. PGE has recently modified the North Fork Fishway, which traverses both Faraday and North Fork dams, and is currently evaluating passage here. Permanent downstream passage facilities, which are collecting and enumerating lamprey outmigrants, are at North Fork and River Mill dams. The collection efficiency is unknown, but thousands of ammocoetes and macrophthalmia have been collected each year since construction.
Willamette Falls Dam *PGE*	Willamette River	Modifications to the existing fishway to improve lamprey passage have been completed. Additionally, seasonal lamprey ramps are installed annually to provide upstream egress for lamprey upstream passage. Modifications to improve downstream salmonid passage have been completed, including improved spill conditions, which are likely to improve passage conditions for lamprey.

Predation. Predation (both dam-related and not dam-related) was ranked as a moderate threat to lamprey. Predation on lamprey likely occurs throughout the Willamette Basin: sea lion and white sturgeon activity is commonly seen immediately below Willamette Falls, and many warm-water predatory fish species are common throughout the basin in the large reservoirs and lower tributaries of the Willamette. These non-native fish are able to overwinter and survive in the basin largely because of large reservoirs or other modified habitats. At this time, there is very little direct study of predation in the Willamette Basin; thus, while there may be many potential predators of lamprey present, in many areas it is uncertain what the severity of such predation is

to the lamprey population.

Other.—Predicted trends in human population growth, increased development, and anticipated effects of climate change (i.e., elevated water temperatures, increased demand for consumptive surface water use, altered flow regimes) will likely compound existing threats to Pacific Lamprey throughout the Willamette Sub-Unit.

2017 Nature Serve Values:

Based on the scores provided above, the following rankings were determined using a modified NatureServe ranking model to assess the current threats and extinction risk to Pacific Lamprey. The use of the NatureServe model is described in Luzier et al. 2011, and the following updated ranks will be further detailed in the 2018 update to that document (*Pacific Lamprey Assessment and Template for Conservation Measures*), expected to be completed in summer 2018.

Table 5. NatureServe Rankings by HUC. S1 = Critically imperiled in the jurisdiction because of extreme rarity or because of some factors such as very steep declines making it especially vulnerable to extirpation; S2 = imperiled in the jurisdiction because of rarity due to very restricted range, very few occurrences, steep declines, or other factors making it vulnerable steep declines making it especially very vulnerable to extirpation; S3 = vulnerable in the jurisdiction due to restricted range, relatively few occurrences, recent and widespread declines, or other factors making it vulnerable to extirpation.

NatureServe Ranking	HUC
S1- Critically Imperiled	Middle Fork Willamette
S1- Critically Imperiled	Coast Fork Willamette
S1- Critically Imperiled	Upper Willamette
S2 – Imperiled	McKenzie
S1- Critically Imperiled	North Santiam
S1- Critically Imperiled	South Santiam
S1- Critically Imperiled	Middle Willamette
S1- Critically Imperiled	Yamhill
S1- Critically Imperiled	Molalla-Pudding
S1- Critically Imperiled	Tualatin
S3- Vulnerable	Clackamas
S1- Critically Imperiled	Lower Willamette

Restoration Actions

The following work was recently completed or is actively occurring in the Willamette Sub-Unit. Additional detail is provided in the Willamette Sub-Unit Meeting Notes for the 2020 Annual Meeting of the Willamette Pacific Lamprey RMU (see Appendix A to this document).

- Clackamas Watershed
    - Two new surface collectors for downstream fish passage have been completed by PGE at the River Mill and North Fork Dams over the past few years. Both are collecting many juvenile lamprey outmigrants; however, the collection efficiency of these facilities for lamprey is unknown.
    - PGE began Trap and Haul efforts to transfer adult lamprey above North Fork Dam in 2017, and plan to continue through 2025.
    - Multiple habitat restoration efforts have occurred in the Clackamas Basin (PGE, Metro and others), including the ongoing "Shade Our Streams" efforts by the Clackamas River Basin Council and PGE.
- Fall Creek (Middle Fork Willamette)
    - The Confederated Tribes of the Grand Ronde is leading a multi-year lamprey translocation study on Fall Creek (2012- present).
    - The USACE has completed the newly constructed Fall Creek Adult Fish Collection Facility; it is on line and in process of commissioning. No signs of lamprey at the new adult collection facility yet. The facility was designed with lamprey passage in the ladder in mind, may ultimately assist with a trap and haul program for Pacific Lamprey. USACE hopes to place fyke traps in and around the waterways of the facility this year.
- The Confederated Tribes of Warm Springs Reservation of Oregon continues to assess passage and abundance of adult Pacific Lamprey at Willamette Falls.

- McKenzie
    - In 2018, a current large-scale project is underway to restore floodplain connectivity and function on over 500 acres of historical alluvial delta at the confluence of the South Fork McKenzie River. Project will remove approx. 40 acres of levees and augment sediment (over 200,000 cubic yards) and large wood (3,000-4,000 pieces) on 4.5 miles of the South Fork below Cougar Dam, resulting in 5-10 miles of secondary channel reconnection (up to 400% increase), and improving spawning and rearing habitats for Pacific Lamprey. Implementation of Phase I was partially funded through the RIP process with BPA cost savings funds. Phase I includes restoration of the lower 2.0 miles of the project area (400 acres of floodplain). Project leads: USFS (Kate Meyer), McKenzie Watershed Council (Jared Weybright).

- State-wide
    - Ben Clemens (ODFW) reported that he is working on a **Lamprey Conservation Plan** for the state of Oregon, which will cover 4 species (Western River, Western Brook, Pacific and Pacific Brook lamprey). The status and limiting factors rankings in this plan are being cross-walked with those from the USFWS, is to be consistent with the PLCI. The plan is expected to be completed in 2019.

Selection of Priority Actions

A. Prioritization Process

The highest priority threat in the Willamette Sub-Unit is stream and floodplain degradation (score = 3.4). Several other factors ranked above 3.0: dam-related passage, dam-related flow alteration and water quality. Priority projects identified by participating members of the Willamette Sub-Unit RMU addressed threats to passage, stream and floodplain degradation and uncertainties in Pacific Lamprey distribution and enumeration.

B. High Priority Proposed Project Information

Three proposals were submitted to for consideration of funding within the Willamette Sub-Region RMU (in no particular order):

- Finn Rock Reach Floodplain Restoration (McKenzie River Trust)
- A Citizen Science Project to Assess Lamprey Distribution and Raise Awareness of the Cultural and Ecological Importance of Lampreys (ODFW)
- Responses of Larval Lamprey to Stage 0 Restoration across Space and Time (multi-RMUs: Willamette and North Coast Oregon RMUs) (USFS, USFWS, ODFW)

The detailed proposals for these projects follow on the subsequent pages after .

I. References for RIP

Ackerman, N.K. 2017. Study Plan Proposed Modification: Evaluation of Adult Pacific Lamprey Upstream Passage Effectiveness Through the Clackamas River Hydroelectric Project. Clackamas River Project. FERC No. 2195. Prepared by Portland General Electric.

Ackerman, N.K., M.M. David, and B. Pyper. 2016a. Evaluation of Adult Pacific Lamprey Upstream Passage Effectiveness through the Clackmas River Hydroelectric Project, 2015/2016 Progress Report.

Ackerman, M.W., B.K. Hand, R.K. Waples, G. Luikart, R.S. Waples, C.A. Steele, B.A. Garner, J. McCane, and M.R. Campbell. 2016b. Effective number of breeders from sibship reconstruction: empirical evaluations using hatchery steelhead. Evolutionary Applications. doi: 10.1111/eva.12433.

Baker, C. and C. McVay. 2018. Willamette Falls Lamprey Escapement Estimate, Annual Report to BPA, project number 2008-308-00. Contract # 75473. Confederated Tribes of Warm Springs Reservation of Oregon, Warm Springs, Oregon. 27 pp.

Clemens, B. J., M. G. Mesa, R. J. Magie, D. A. Young, and C. B. Schreck. 2012b. Pre-spawning migration of adult Pacific lamprey, Entosphenus tridentatus, in the Willamette River, Oregon (USA). Environmental Biology of Fishes. 93: 245 – 254.

Clemens, B. J., L. Wyss, R. McCoun, L. Schwabe, I. Courter, S. Duery, J. Vaughn, and C. B. Schreck. 2012a. Migration characteristics and habitat use of the imperiled adult Pacific lamprey in the Willamette Basin: Prelude to estimating requirements for persistence. Final Draft Report to the Columbia River Inter-Tribal Fish Commission. April 2012. 51 pp.

Clemens, B., C. Schreck, S. van de Wetering, and S. Sower. 2016. The potential roles of river environments in selecting for stream- and ocean-maturing Pacific Lamprey, Entosphenus tridentatus (Gairdner, 1836). pp. 299 – 322. In: A. Orlov, & R. J. Beamish (eds.) Jawless Fishes of the World. Cambridge Scholars.

Clemens, B. J., S. van de Wetering, J. Kaufman, R. Holt, and C. B. Schreck. 2009. Do summertime temperatures trigger springtime maturation in adult Pacific lamprey, Entosphenus tridentatus? Ecology of Freshwater Fish. 18: 418 – 426.

Clemens, B. J., and 21 co-authors. 2017b. Conservation challenges and research needs for Pacific Lamprey in the Columbia River Basin. Fisheries. 42: 268-280.

Clemens, B. J., L. Wyss, R. McCoun, I. Courter, L. Schwabe, C. Peery, C. B. Schreck, E. K. Spice, and M. F. Docker. 2017a. Temporal genetic population structure and interannual variation in migration behavior of Pacific Lamprey Entosphenus tridentatus. Hydrobiologia. 794: 223-240.

Goodman, D. H., S. B. Reid, M. F. Docker, G. R. Haas, and A. P. Kinziger. 2008. Mitochondrial DNA evidence for high levels of gene flow among populations of a widely distributed

anadromous lamprey *Entosphenus tridentatus* (Petromyzontidae). Journal of Fish Biology. 72: 400-417.

Hess, J. E., N. R. Campbell, M. F. Docker, C. Baker, A. Jackson, R. Lampman, and S. R. Narum. 2015. Use of genotyping by sequencing data to develop a high-throughput and multifunctional SNP panel for conservation applications in Pacific Lamprey. Molecular Ecology Resources. 15: 187-202.

Hulse, D., S. Gregory, and J. Patterson Baker. (EDS). (2002) Willamette River Basin Planning Atlas: Trajectories of Environmental and Ecological Change. (2nd edition), Oregon State University Press, Corvallis, Oregon 97333. 180p.

Luzier, C.W., H.A. Schaller, J.K. Brostrom, C. Cook-Tabor, D.H. Goodman, R.D. Nelle, K. Ostrand and B. Streif. 2011. Pacific Lamprey (Entosphenus tridentatus): Assessment and Template for Conservation Measures. U.S. Fish and Wildlife Service, Portland, Oregon. 282 pp. http://www.fws.gov/columbiariver/publications.html

NMFS. 2008. 2008-2023 Willamette River Basin Project Biological Opinion. NOAA's National Marine Fisheries Service, Northwest Region, Seattle WA. F/NWR/2000/02117.

Schultz, L., M.P. Mayfield, G.T. Sheoships, L.A. Wyss, B.J. Clemens, B. Chasco, and C.B. Schreck. 2014. The Distribution and Relative Abundance of Spawning and Larval Pacific Lamprey in the Willamette River Basin. Final Report to the Columbia Inter-Tribal Fish Commission for project years 2011-2014. CRITFC Contract number C13-1. BPA Contract number 60877. BPA Project number 2008-524-00.

Spice, E. K., D. H. Goodman, S. B. Reid, and M. F. Docker. 2012. Neither philopatric nor panmictic: microsatellite and mtDNA evidence suggest lack of natal homing but limits to dispersal in Pacific Lamprey. Molecular Ecology. 21: 2916-2930.

Project Title: ***A Citizen Science Project to Assess Lamprey Distribution and Raise Awareness of the Cultural and Ecological Importance of Lampreys***

Project Applicant/Organization:
Contact Person:
Benjamin J. Clemens, Ph.D.
Statewide Lamprey Coordinator, Oregon Department of Fish and Wildlife
Email: Ben.Clemens@oregonstate.edu Phone: 541-757-5113

Project Type:
Assessment & Outreach & Education
Lamprey RMU population(s): Willamette Sub-Region
Multi-RMU project? Please list RMUs

Watershed (5th HUC Field): Willamette
NPCC Subbasin (4th HUC Field) name: Tualatin; Middle Willamette
Project Location:
Tualatin: Rock Creek/Beaverton Creek watersheds (near city of Hillsboro, OR)
Middle Willamette: Pringle Creek (in city of Salem, OR)
Project Coordinates (latitude and longitude, decimal degrees, NAD 1983):
Exact locations to be determined based on further reconnaissance and coordination with school staffs.

Total Requested funds: **$11,484.80**

1. ***Short Project Summary (200 words or less):***
   - *Provide a brief overview of your project including goals*
   - *This information will be used to describe your project to potential funding entities*

Pacific Lamprey is a sensitive species in the state of Oregon (ODFW 2020). Survey data are essential to informing distribution mapping and modeling (ODFW 2020). This project will develop and implement citizen science to document the presence of Pacific Lamprey to fill-in gaps in distribution (as per databasin.org), test existing sampling methods to improve understanding of the utility of these methods under various scenarios, assess water quality, and educate and raise awareness of lampreys.

This will be achieved by:

1. Developing and testing passive, non-lethal methods for sampling larval lampreys using leaf packs and hay bales. Leaf packs and hay bales have been used to capture larval lampreys [Patrick Edwards, unpublished data]. This project will further test and devise recommendations on these non-lethal sampling methods for schools and watershed councils.
2. Developing and implementing educational materials for learning about lamprey biology and cultural significance to Native Americans. Participants will include high school students, teachers and other adult citizen volunteers.
3. Recruiting at least 10 - 20 participants from each of 5 - 10 schools and watershed councils to conduct biological sampling, collect related environmental data, and educate students.
4. Evaluating lamprey data, informing future monitoring efforts and communicating results.

2. Detailed Project Description (500 words or less):

Describe the proposed work including specific objectives (subcomponents of your stated goals)

This project is a partnership between the Oregon Department of Fish and Wildlife (ODFW) and the Student Watershed Research Project (SWRP) at Portland State University. Participating staff at ODFW include the Statewide Lamprey Coordinator (Dr. Ben Clemens), and district biologists. Educational materials and project implementation will be conducted by Dr. Patrick Edwards (SWRP Director). The Columbia River Inter-Tribal Fish Commission has agreed to conduct genetic analysis of lampreys that are too small to identify to species visually.

Goal 1

Objective 1A: Passive, non-lethal sampling using hay bales and leaf packs will be used for sampling larval lampreys. Two to three hay bales or leaf packs (sample unit) will be placed in 5 - 10 streams (experimental unit) for 2 - 3 weeks, removed, and then searched for lampreys by students and other volunteers. The lampreys will be counted, identified, measured, and returned to the stream unharmed. A subset of lampreys will be retained for identification to species.

Objective 1B: Pilot test the non-lethal method and environmental data collection methods in spring 2021.

Goal 2

Objective 2A: Educational materials will be developed and implemented by Dr. Edwards in consultation with an expert on the cultural significance of Pacific Lamprey to Native Americans. Dr. Edwards has > 20 years of experience developing and implementing citizen science programs (e.g., Edwards and Shaloum 2020, Edwards et al 2018, Edwards 2016). Educational materials will include: Lamprey biology, ecology and identification, the importance of lampreys to Native Americans, environmental data collection, and careers in Fisheries Science. Educational curriculum will meet state and national standards for science education.

Objective 2B: The educational components of the project will be implemented in 2021-22 by Dr. Edwards through regional trainings for participants. Teaching and sampling demonstrations will be conducted at select schools and video recorded for training and promotion. If schools are closed due to COVID, we will content videos, virtual experiment videos, and share data with teachers. Dr. Edwards has extensive experience developing online curriculum and virtual experiments (SWRP 2020).

Goal 3

Objective 3A: Dr. Edwards will recruit partners during the spring and summer of 2021 and direct outreach to schools, watershed councils and tribal councils.

Objective 3B: Lamprey sampling will take place during the 2021-22 academic year. A subset of lampreys will be identified to species.

Objective 3C: Relevant environmental data and stream water chemistry will be collected including: stream temperature, latitude/longitude, substrate size and type, depth, flow, dissolved oxygen, conductivity and pH.

Objective 3D: Educational programming will be conducted prior to lamprey sampling and a

post-sampling data analysis activity will also be implemented.

Goal 4

Objective 4A: Lamprey Data will be used to populate distribution maps.

Objective 4B: Relationships between lamprey presence and water quality data will be evaluated using standard analytical techniques to explore ecological relationships (Dr. Clemens).

Objective 4C: Evaluate the use of citizen science and leaf packs/hay bales for studies of lamprey distribution and outreach. Communicate findings through a report and paper submitted to a scientific journal.

5. ***Descriptive Photographs-Illustrations-Maps (limit to three total):***

Sampling will take place in the Willamette Valley. Exact locations to be determined based on further reconnaissance and participation. Currently we have at least three streams where participants have expressed interest in sampling.

1. Tualatin: Rock Creek/Beaverton Creek watersheds (near city of Hillsboro, OR)
2. Middle Willamette: Pringle Creek (in city of Salem, OR)

6. ***Linkage of Actions to Identified Threats for Lampreys in RMU(s) (300 words or less):***

- What threat(s) to lampreys does this project address? (See your RIP(s) for key threats)
  Water Quality Lack of Awareness Choose an item. Choose an item.
- Does this project address threat(s) to lampreys specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?
  Single RMU ☒, Multiple RMUs ☐ list additional RMUs:
  Describe how this project addresses key threat(s) to lampreys within the HUC(s) where project is proposed. This study will measure water quality in concert with sampling larval lampreys for three purposes: 1) to populate gaps in existing distribution maps, 2) to record associated water quality data, and 3) to perform education and outreach via citizen science through #1 and #2.

7. ***Species/Habitat Benefits (200 words or less):***

- Provide citation of literature, distribution maps, and/or surveys demonstrating lampreys are currently and/or were historically present in the project area.
  An examination of the distribution data for Pacific Lamprey at databasin.org reveals that subbasins in the Tualatin and Middle Willamette have gaps in current distribution data. Otherwise Pacific Lamprey was historically in these basins.

- How will the project provide meaningful measureable results to improve lamprey populations and/or their habitat conditions?
  Identification of presence will be used to help populate existing distribution maps. Use of and experimentation with leaf packs and hay bales can inform the utility of these methods for acquiring presence/absence data by watershed councils as a means of simple, cost- and time-efficient monitoring methods. Analyses of the water quality data in concert with larval lamprey presence will shed light on the ecology of larval lampreys. The foregoing will be achieved via citizen science, which addresses a lack of awareness in urban communities in

the Willamette. These are major population centers that would greatly benefit from hands-on, field experience with lampreys and rivers.

- What life stage or stages will benefit from action? Mostly larvae, but all life stages. How? The larval stage will be the targeted for sampling. Hands-on citizen science will naturally avail itself to discussions about the entire life cycle of Pacific Lamprey (and other native lamprey species), which will be included in education materials for participating schools.
- What other species may benefit from action? In addition to Pacific Lamprey, other native lampreys (*Lampetra* spp.).

8. ***Priority Objectives and Goals:***

- Indicate the strategies, and/or restoration/management plans are addressed by this project (when available relevant documents/websites are hyperlinked below for reference):
    - **PLCI Conservation Agreement** ☒
    - National Fish Habitat Partnership National Conservation Strategies ☐
    - USFWS Climate Change Strategies ☐
    - **Bonneville Power Administration Northwest Power and Conservation Council Columbia River Basin Fish and Wildlife Program** ☒
    - **CRITFC Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin** ☒
    - US Army Corps of Engineers Pacific Lamprey Passage Improvement Implementation Plan ☐
    - PUD Management Plan (please name below) ☐
    - **Other (please name below)** ☒

- Clearly describe how the project addresses the goals and objectives in the strategies, restoration/management plans indicated above (200 words or less).
  PLCI Conservation Initiative, CRITFC Tribal Pacific Lamprey Restoration Plan, and the Oregon Department of Fish and Wildlife's Conservation Plan for Lampreys (ODFW 2020): This project addresses the threat of lack of awareness via public outreach (citizen science); it also addresses the threat of water quality by improving understanding of correlates between water quality and presence of larval lamprey; finally, this project informs status by filling information gaps in distribution.

9. Project Design / Feasibility:

- Have the designs for the project been completed already or will they be completed before planned project implementation? **Yes** ☒ **No**☐
- Are the appropriate permits (e.g., ESA consultation, Scientific Collection, fish health/transport, etc.) in place already or will they be in place before planned project implementation? **Yes** ☒ **No**☐
- Can the project be implemented within the defined timeframe? (*See BPA & NFHP requirements in the accompanying PLCI RIP Priority Project Guidance document*). **Yes** ☒ **No**☐
- Please provide a brief description (200 words or less):

This project will develop and use a citizen science-based program to sample larval lampreys, educate students about their ecological and cultural importance, and evaluate the stream conditions associated with lamprey larvae in the Willamette Valley. This will be achieved by working with middle and high schools and watershed councils to develop and implement a lamprey curriculum, conduct student-led lamprey sampling using a non-lethal method, and collect water quality data. This study will also test the efficiency of using leaf packs and hay bales to collect larval lampreys, and thereby inform the utility of the use of these methods for simple, low-tech monitoring by watershed councils. The lamprey presence data will be used to populate distribution maps and to analyze in association with water quality and to improve the ecological understanding of stream ecology and lamprey biology.

10. Partner Engagement and Support (200 words or less):

- What partners are supporting the project?

Jane Goodall Environmental Middle School and Sprague High School in Salem. Additional schools near the Tualatin River Basin will be identified.

- What partners are active in implementing the project?

  Portland State University Student Watershed Research Project (SWRP). Oregon Department of Fish and Wildlife (ODFW), Columbia River Intertribal Fish Commission.

- What partners are providing matching funds or in-kind services that directly contribute to the project?

SWRP will cover travel costs and bus transportation for schools. SWRP and ODFW will coordinate and implement the project; SWRP and ODFW will analyze and write up the results of the project (Drs. Edwards and Clemens).

11. Monitoring and Reporting (200 words or less):

- How is completion of the project going to be documented? (*See BPA and NFHP requirements in the accompanying PLCI RIP Project Proposal Guidance document)*

  This project will generate the necessary reports for BPA in the short term, and within a year or two will also generate a peer-reviewed scientific publication to memorialize the work and make it available to a larger, world-wide audience.

- How will the project's benefits to lampreys be monitored over time?

The project's benefits to lamprey will be traced by immediate updates to the distribution map (databasin.org), and feedback from participating schools and citizens.

12. ***Project Budget (including overhead):***

	Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	-	-	-	-	-
	Dr. Patrick Edwards (PSU)	100 hrs	$50/hr	$5,000		$5,000
	Tribal consultant	10 hrs	$100/hr	$1,000		
	Dr. Ben Clemens (ODFW)	160 hrs	$46.27/hr	0	$8,200	$8,200
	c.					
B	***Equipment & Supplies:***	-	-	-	-	-
	Collecting supplies					
	Leaf pack supplies, conductivity and pH meter, rubber boots, containers, etc.	20 schools/partner	$200 ea.	$4,000		
C	***Travel:***	-	-	-	-	-
	a.	500 miles	$0.57/mi	$285	$300	$585
D	***Other:***	-	-	-	-	-
	a.					
	b.					
E	***Administrative:***	-	-	-	-	-
	Overhead					
	Indirect Costs (28 %)			$1,199.80	0	
	Total (Sum of A - E)	-	-	**$11,484.80**	$8,500	$19,984.80

13. Timeline of major tasks and milestones:

Workflow	***Start Date/Month***	***End Date/Month***	***Responsible Party***
Environmental compliance/permits	*January 2021*	*January 2021*	*Ben Clemens (ODFW)*
Pre-project preparation	*July 2020*	*March 2021*	*Patrick Edwards (PSU)*
Field surveys	*Spring 2021*	*Summer 2021*	*Ben Clemens, Monica Blanchard, Karen Hans (ODFW); Patrick Edwards (PSU)*
Data analysis	*August 2021*	*November 2021*	*Ben Clemens (ODFW); Patrick Edwards (PSU)*
Reporting	*December 2021*	*June 2022*	*Ben Clemens (ODFW)*

14. References:

Edwards, P (2016) The Value of Long-Term Stream Invertebrate Data Collected by Citizen Scientists. PloS one, 11(4), e0153713.

Edwards P, Shaloum G, Bedell D (2018) A Unique Role for Citizen Science in Ecological Restoration: A Case Study in Streams. Restoration Ecology. 26(1): 29-35.

Edwards P, Shaloum G (2020) Citizen Science and Ecological Restoration. Society for Ecological Restoration News. Vol 34 (2).

ODFW (Oregon Department of Fish and Wildlife) (2020) Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon. Final. February 2020. Available: https://www.dfw.*state.or.us/fish/CRP/coastal_columbia_snake_lamprey_plan.asp. Accessed 7 July 2020.*

SWRP (2020) Student Watershed Research Project. https://www.pdx.edu/student-watershed-research-project/

Project Title Responses of Larval Lamprey to Stage 0 Restoration across Space and Time

Project Applicant/Organization: *Paul Burns/USFS, Ann Gray/USFWS; Ben Clemens/ODFW*
Contact Person: *Ann Gray; Ben Clemens, Paul Burns*
Email: *ann_e_gray@fws.gov; ben.clemens@oregonstate.edu; paul.burns@usda.gov*
Phone: *Ann Gray (503- 231-6909); Ben Clemens (541-757-5113); Paul Burns*

Project Type: *Assessment*

Lamprey RMU population(s): Choose an item.
Multi-RMU project? Please list RMUs

- *Willamette Sub-Region*
- *North Oregon Coast Sub-Region*

Watershed (5th HUC Field): Willamette, North Oregon Coast
NPCC Subbasin (4th HUC Field) name: Siltcoos (North Coast) and McKenzie (Willamette)
Project Location: Siltcoos (Fivemile-Bell); Willamette (South Fork McKenzie)
Project Coordinates (latitude and longitude, decimal degrees, NAD 1983):

Fivemile-Bell: 43°50'21" N, 124°00'52" W
South Fork McKenzie: 44°09'35" N, 122°16'25" W

Total Requested funds: $14,152

2. ***Short Project Summary (200 words or less):***
    - Provide a brief overview of your project including goals
    - This information will be used to describe your project to potential funding entities

Goal: To understand the occupancy (presence/absence) of larval Pacific Lamprey to Stage 0 restoration over space (multiple reaches within and between Stage 0 restoration sites), and time (multiple years).

Practitioners question the effects of Stage 0 restoration on this species in particular. Process-based restoration of a depositional valley bottom to pre-disturbance (Stage 0) using Geomorphic Grade Line methodology (Powers et al. 2018) resets a simplified river channel to its natural complexity (Cluer and Thorne 2013; Castro and Thorne 2019). Stage 0 restoration can create exponential increases in wetted with diverse and complex habitat. Anecdotally, Stage 0 restoration appears to increase rearing habitats for Pacific Lamprey (Kate Meyer, Matt Helstab, Paul Burns, U.S. Forest Service). However, the extent to which Stage 0 restoration affects occupancy and relative abundance[2] of larval lampreys has not been assessed.

[2] Estimates of relative abundance will be made through methods to estimate occupancy. Rigorous estimates focused on abundance alone would be too time-consuming and would cover too little area to provide spatially relevant data.

3. ***Detailed Project Description (500 words or less):***
    - Describe the proposed work including specific objectives (subcomponents of your stated goals)

This proposed assessment seeks to answer three questions: How does the probability of occupancy of larval lampreys:

1) Differ between Stage 0 restoration sites and reference sites (i.e., pre-restoration or adjacent, non-restored habitat conditions)?
2) Differ between two sites (coastal and western Cascades) undergoing Stage 0 restoration?
3) Change over time at the two Stage 0 restoration sites (i.e., over the course of the restoration)?

This work will assess occupancy of larval lamprey throughout two study sites undergoing Stage 0 restoration (i.e., South Fork McKenzie and Fivemile-Bell). Sampling will follow established procedures for probabilistic assessment of occupancy of larval lampreys, using lamprey-specific electrofishing field methods and a spatially-balanced, generalized random tessellation survey (GRTS) design to select sampling sites (Harris et al. 2016, 2019). Surveys will be completed in multiple microhabitat types and will allow a rigorous estimation of the probability that larval lamprey will occupy a given microhabitat in Stage 0 restoration sites and adjacent reference reaches. The exact number of microhabitats to be assessed will depend on statistical power analyses, based on habitat area to monitor.

Objectives:

1) Assess the presence/absence (i.e., occupancy) of larval lampreys at the Fivemile-Bell site (North Oregon Coast Sub-Region RMU) in relation to adjacent reference reaches.
    a. Measure and correlate environmental characteristics of each microhabitat surveyed.
        i. Substrate class
        ii. Water temperature
        iii. Water depth
        iv. Water velocity
2) Assess the occupancy of larval lampreys at the South Fork McKenzie site (Willamette Sub-Region RMU) in relation to adjacent reference reaches and extrapolating estimates of larvae per habitat area to pre-project habitat quantity from aerial images.
    a. Measure and correlate environmental characteristics of each microhabitat surveyed.
        i. Substrate class
        ii. Water temperature
        iii. Water depth
        iv. Water velocity
3) Compare and contrast the biological responses (larval lamprey occupancy and associated environmental variables) between the two Stage 0 restoration sites (South Fork McKenzie and Fivemile-Bell).

This project will aid understanding of the effects of Stage 0 restoration on larval lamprey distribution and abundance both generally, as well as, in specific systems (i.e., coastal versus

western Cascades). In addition, this research could help elucidate how differences in in landscape (coastal, mountain) and microhabitat characteristics (water velocity) may affect larval distribution and abundance.

4. Descriptive Photographs-Illustrations-Maps (limit to three total):

The first image below shows the location of the Stage 0 restoration site for Fivemile-Bell. The second image shows a before and after restoration for Fivemile-Bell. The third image shows the post- Stage 0 restoration for the South Fork McKenzie River. The map for the South Fork McKenzie is not shown because of the stated limitation for number of images/maps and because the location is easy to discern from the coordinates provided above.

5. ***Linkage of Actions to Identified Threats for Lampreys in RMU(s) (300 words or less):***
   - What threat(s) to lampreys does this project address? (See your RIP(s) for key threats) ***Stream and Floodplain Degradation Dewatering & Stream Flow Management Lack of Awareness*** Choose an item.
   - Does this project address threat(s) to lampreys specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?

     Single RMU ☐, Multiple RMUs ☒ list additional RMUs:
     - Willamette Sub-Region
     - North Oregon Coast Sub-Region
     - Study results are likely to inform restoration in any RMU where Stage 0 restoration is planned

- Describe how this project addresses key threat(s) to lampreys within the HUC(s) where project is proposed.
  - This project will address a lack of awareness of how a particular type of habitat restoration affects larval lampreys.
  - This project will help managers and biologists to understand larval lamprey responses to a specific type of habitat restoration (the process-based Stage 0 restoration) relative to impacted habitats that have not been restored.
  - Stage 0 restoration addresses stream and floodplain degradation and stream flow management (retains water by slowing and spreading the river channel laterally);

understanding its effects on lampreys may assist in determining the applicability of Stage 0 restoration for lamprey restoration.

6. ***Species/Habitat Benefits (200 words or less):***

Provide citation of literature, distribution maps, and/or surveys demonstrating lampreys are currently and/or were historically present in the project area:

Surveys, salvage, and direct observations by Paul Burns, Matt Helstab, Kate Meyer, Ben Clemens and others indicates that larval lampreys, including Pacific Lamprey occur at both the Fivemile-Bell and the South Fork McKenzie sites. In addition, distribution maps (databasin.org) show Pacific Lamprey currently occupy the restoration sites.

- How will the project provide meaningful measureable results to improve lamprey populations and/or their habitat conditions?

– This project will enable rigorous estimations of the probability of occupancy and relative abundance[1]of larval lampreys within Stage 0 restoration reaches and reference sites (adjacent, non-restored reaches and/or pre-restoration reaches). Comparison between Stage 0 restoration and reference sites will indicate the difference in probability of occupancy. When the difference in the probability of occupancy is compared within sites and between the two sites (Fivemile-Bell and South Fork McKenzie) and over time (years), we will have a better understanding of larval lamprey ecology with regards to Stage 0 restoration — that is, how occupancy of larval lampreys differs, and whether and how it evolves over space and time.

- What life stage or stages will benefit from action? How?

– Larvae. See previous answer.

- What other species may benefit from action?

– Western Brook Lamprey are present at both the South Fork McKenzie and Fivemile-Bell. Western River Lamprey are potentially present at Fivemile-Bell.

7. ***Priority Objectives and Goals:***

- Indicate the strategies, and/or restoration/management plans are addressed by this project (when available relevant documents/websites are hyperlinked below for reference):
  - PLCI Conservation Agreement ☒
  - National Fish Habitat Partnership National Conservation Strategies ☒
  - USFWS Climate Change Strategies ☐
  - Bonneville Power Administration Northwest Power and Conservation Council Columbia River Basin Fish and Wildlife Program ☒
  - CRITFC Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin ☒
  - US Army Corps of Engineers Pacific Lamprey Passage Improvement Implementation Plan ☐
  - PUD Management Plan (please name below) ☐
  - Other (please name below) ☒
    The Oregon Department of Fish and Wildlife's (ODFW) Conservation Plan for Lampreys
  -

- Clearly describe how the project addresses the goals and objectives in the strategies, restoration/management plans indicated above (200 words or less).

– **PLCI Conservation Agreement, NFHP, and CRITFC Plan**- The goals of these documents, in general, are to promote lamprey conservation and tribal harvest via voluntary collaboration and cooperation. To meet these and other goals, this proposal brings together multiple groups interested in lamprey conservation to develop and conduct scientific research to monitor and evaluate larval lamprey response to Stage 0 Restoration, an action previously funded by the PLCI. To date, minimal monitoring of lamprey benefits from a Stage 0 restoration action has been completed. This proposal will assess habitat restoration upstream of Willamette Falls, an important tribal harvest site, and thereby support tribal harvest of lampreys.

– **CCRBFWP** – This proposal addresses two key strategies: "Healthy Ecosystems" and "Accountability" by evaluating restoration that promotes healthy river channels and improving our understanding of restoration's effects on lampreys to aid in conservation efforts.
This proposal addresses these objectives:
  - Ensure effectiveness of ongoing projects
  - Learn from new information and adapt accordingly
  - Improve floodplain habitats
– **ODFW Plan**
  – Informs Management strategy #1 (Education and outreach)
  – Informs Research, Monitoring, and Evaluation strategy #4 (Improve biological knowledge)

8. Project Design / Feasibility:

- Have the designs for the project been completed already or will they be completed before planned project implementation? **Yes ☒ No☐**
- Are the appropriate permits (e.g., ESA consultation, Scientific Collection, fish health/transport, etc.) in place already or will they be in place before planned project implementation? **Yes ☒ No☐**
- Can the project be implemented within the defined timeframe? (*See BPA & NFHP requirements in the accompanying PLCI RIP Priority Project Guidance document*). **Yes ☒ No☐**

- Please provide a brief description (200 words or less):

– The strength of this proposal lies in a two year assessment of larval lamprey responses to Stage 0 restoration at two sites. At least two years are necessary to see the responses of lamprey to restoration over a range of habitat conditions occurring as a result of annual differences in river flow and the concomitant effects this will have on the survey reaches and microhabitats surveyed. Similarly, at least two Stage 0 sites are needed to compare and understand differences in larval lamprey responses to Stage 0 restoration across different locations and ecoregions.

9. Partner Engagement and Support (200 words or less):

- What partners are supporting the project?

– USFWS, ODFW, USFS, McKenzie Watershed Council; Siuslaw Watershed Council; Confederated Tribes of the Siletz Indians, and Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians

- What partners are active in implementing the project?

– USFWS (administration, field support, study design, outreach, report writing), ODFW (coordination, field support, study design, outreach, report writing), USFS (field support)

- What partners are providing matching funds or in-kind services that directly contribute to the project?

– USFWS, ODFW, USFS. Supporting partners will be invited to participate in field work.

10. Monitoring and Reporting (200 words or less):

- How is completion of the project going to be documented? (*See BPA and NFHP requirements in the accompanying PLCI RIP Project Proposal Guidance document)*

Once the study is completed, a final report will be written (and also provided to LTWG for technical review). The authors plan to publish the results of this assessment in a professional journal.

- How will the project's benefits to lampreys be monitored over time?

This is a monitoring proposal to determine the benefit of Stage 0 restoration to larval lampreys, and includes a multi-year (2 years) approach, as described in Sections 2 and 7 of this proposal. Thus, the proposal describes how benefits to lampreys will be monitored over time, and addresses a knowledge gap on Stage 0 restoration effects to larval lamprey.

11. Project Budget (including overhead):

- See table at end of proposal for detailed budget (pp. 9-10 of proposal).
- **Requested Amount : $14,152**
- Agency Match : $161,100

The proposal will include estimates of effort and funding needed to execute monitoring and analyses for both the South Fork McKenzie and Fivemile-Bell sites over the course of 2 years.

12. Timeline of major tasks and milestones:

Workflow	***Start Date/Month***	***End Date/Month***	***Responsible Party***
Environmental compliance/permits	Year 1: Jan 2021 Year 2: Jan 2022	Year 1: Jan 2021 Year 2: Jan 2022	USFWS, ODFW
Pre-project preparation	Year 1: Jan 2021 Year 2: Jan 2022	Year 1: Mar 2021 Year 2: Mar 2022	USFWS, ODFW, USFS

Field surveys	Year 1: Jul 2021 Year 2: Jul 2022	Year 1: Sep 2021 Year 2: Sep 2022	USFWS, ODFW, USFS
Other tasks….			
Data analysis	Year 1: Oct 2021 Year 2: Oct 2022	Year 1: May 2022 Year 2: May 2023	USFWS, ODFW, USFS
Reporting	Year 1: Dec 2021; Jun 2022 Year 2: Dec 2022; Jun 2023	Year 1: Dec 2021; Jun 2022 Year 2: Dec 2022; Jun 2023	USFWS, ODFW, USFS

13. References:

Castro, J. M., and C. R. Thorne. 2019. The stream evolution triangle: Integrating geology, hydrology, and biology. River Research and Applications. 35: 315 – 326.

Cluer, B., and C. Thorne. 2014. A stream evolution model integrating habitat and ecosystem benefits. River Research and Applications. 30: 135 – 154.

Harris, J.E., J. C. Jolley, G. S. Silver, H. Yuen, and T. A. Whitesel. 2016. An experimental evaluation of electrofishing catchability and catch depletion abundance estimates of larval lampreys in a wadeable stream: Use of a hierarchical approach. Transactions of the American Fisheries Society. 145: 1006 – 1017.

Harris, J. E., G. S. Silver, J. C. Jolley, R. D. Nelle, and T. A. Whitesel. 2020. A stepwise approach to assess the occupancy state of larval lampreys in streams. Journal of Fish and Wildlife Management. 11: 226 – 237.

Powers, D. P., Helstab, M., and S. L. Niezgoda. 2018. A process-based approach to restoring depositional river valleys to Stage 0, and anastomosing channel network. River Research and Applications. 35: 3 – 13.

	Stage 0 Restoration Budget Details: Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	-	-	-	-	-
	a. USFWS staff					
	b. Year 1: (3 biologists for 15 days)	45 biologist days	$850/ day	0	$38,250	$38,250
	c. Year 2: (3 biologists for 15 days)	45 biologist days	$850/ day	0	$38,250	$38,250
	d. ODFW staff					
	Year 1: NRS-4	30 days	$370	0	$11,100	$11,100
	Year 2: NRS-4	30 days	$370	0	$11,100	$11,100
	e. USFS staff					
	McKenzie staff, Year 1: GS9/11	10 days	$360	0	$3,600	$3,600
	McKenzie staff, Year 2: GS9/11	10 days	$360	0	$3,600	$3,600
	McKenzie staff, Year 1: GS7	20 days	$230	0	$4,600	$4,600
	McKenzie staff, Year 2: GS7	20 days	$230	0	$4,600	$4,600
	Siuslaw staff, Year 1: crew of 4	10 days	$800	$4,000	$4,000	$8,000
	Siuslaw staff, Year 2: crew of 4	10 days	$800	$4,000	$4,000	$8,000
	Siuslaw staff: Year 1: GS9/11	10 days	$360	$1,800	$1,800	$3,600
	Siuslaw staff: Year 2: GS9/11	10 days	$360	$1,800	$1,800	$3,600
B	***Equipment & Supplies:***	-	-	-	-	-
	a. Backpack electroshockers	3	$10,000	0	$30,000	$30,000

	b. Miscellaneous sampling supplies (GPS units, nets, buckets, measuring boards, aerators, waders, wading staffs, etc.)	Variable	$2,000	0	$2,000	$2,000
C	***Travel:***	-	-	-	-	-
	a. USFWS					
	Year 1			0	$500	$500
	Year 2			0	$500	$500
	b. ODFW					
	Year 1			0	$200	$200
	Year 2			0	$200	$200
	c. USFS					
	Year 1				$500	$500
	Year 2				$500	$500
E	***Administrative:***	-	-	-	-	-
	SUBTOTAL:			**$11,600**	$161,100	$172,700
	Overhead (22%)			**$2,552**		
	Indirect Costs (%)			0		
	Total REQUESTED:	-	-	**$14,152.00**		

Pacific Lamprey Conservation Initiative
FY21 Regional Implementation Plan - Project Proposal Template

Project Title: **Finn Rock Reach Floodplain Habitat Restoration**

Project Applicant/Organization:

McKenzie River Trust

Contact Person: Daniel Dietz
Email: daniel@mckenzieriver.org
Phone: 541-844-6285

Project Type: Habitat Restoration

Lamprey RMU population(s): Willamette Sub-Region
Multi-RMU project? Please list RMUs

Watershed (5th HUC Field): McKenzie
NPCC Subbasin (4th HUC Field) name: McKenzie
Project Location: 50960 Highway 126, Vida OR 97488, Lane County Oregon
Project Coordinates (latitude and longitude, decimal degrees, NAD 1983):
44.14530, -122.36338

Total Requested funds: $187,490

1. ***Short Project Summary (200 words or less):***
   - Provide a brief overview of your project including goals
   - This information will be used to describe your project to potential funding entities

The Finn Rock Reach Floodplain Restoration Project will provide floodplain reconnection and habitat restoration to 85 acres on a side channel of the McKenzie River, near the community of Blue River, Lane County. McKenzie River Trust (MRT) acquired the 278-acre Finn Rock Reach in 2016 with BPA funding through the Willamette Wildlife Mitigation Program.

Decreased habitat complexity caused by the depletion of large woody debris and lack of lateral

floodplain connectivity will be addressed by this project. Large gravel pits, and their attendant access road, channelized the side channel and inhibited connectivity with the mainstem McKenzie River. Bathymetry shows this side channel is incising, contributing to increased flow velocities, and sediment transport.

Goals:

1. Restore ecological processes that maintain diverse and resilient ecosystems by increasing the area of floodplain inundation at base flow conditions and surface roughness elements.
2. Increase low-gradient stream flow and increase wetted surface area to maximize off-channel rearing habitat for Upper Willamette River spring Chinook, rainbow trout, Pacific lamprey, and other species benefiting from depositional reach conditions.
3. Create a complex, dynamic habitat with topographic diversity for native turtles (Western Pond, Painted) and other species.
4. Remove berms and infrastructure that could threaten goals stated above.

2. Detailed Project Description (500 words or less):

- Describe the proposed work including specific <u>objectives</u> (subcomponents of your stated goals

The design approach focuses on altering the morphology and hydrology of the Finn Rock Reach property, including an existing McKenzie River side channel and the 13-acre gravel pit in order to increase wetted surface area in baseflow conditions and encourage the development of a depositional riverine environment. The Project will not design or construct channels. Rather, most of the existing channel configuration, pond footprint and surrounding berm/road structure will be transformed into a broad surface covered with large quantities of roughness elements (i.e. large wood). Large wood will sort sediment, redirect flows and encourage the development of a complex anastomosing channel network within the project area. The design approach is intended to encourage the development and maintenance of complex habitats through a range of natural processes.

The design approach will change flow dynamics from a largely single thread and confined side channel to water spread across the project area. This change in morphology will elicit a response from on-site hydrology that is significant for native aquatic species. Post-project stream flow velocities are much lower, even during higher flows, and energy to move large wood is greatly reduced, relegated to small shifts and racking up of smaller wood in larger buried jams. Meanwhile, leaf material, salmon carcasses, and other debris are collected from upstream and contributes to aquatic insect populations, building a new and complex food web. Native fish and lamprey benefit from not only the food but the velocity cover provided in this new environment. This design approach can generally be described as Stage-8 of Clure and Thorne's (2013) Stream Evolution Model.

The proposed Project will reconnect floodplain habitat through the redistribution of 224,000 cubic yards of floodplain sediment. Infrastructure and barriers to water flow will be removed and areas where the side channel has incised will be aggraded (in some locations up to 7 feet), as will the former gravel extraction pits. The project will encourage the development of channel complexity diverse habitats through the installation of 2,300 pieces of LWD within the 85-acre project area that will span a total of 0.8 miles of the side channel's length.

The amount of wetted surface area will increase from 18.8 acres to 51.1 acres in baseflow conditions, an increase of 270%. This habitat will be available year-round, not just during high flow conditions. The addition of large wood will encourage pool formation with complex cover and the sorting of sediment and bar formation. The increase of wetted surface and reduction in overall stream flow energy will help with the redistribution of sediment and retention of gravels and fine sediment. The removal of streamside berms will restore channel migration and avulsion process enhancing the development of complex slow-water habitat, which is critical for juvenile Chinook Salmon and Pacific Lamprey and provide off channel high-flow refugia for native salmonids and other native fishes. Enhanced floodplain connectivity and wetland formation will create wildlife habitat for native turtles, beaver, and waterfowl. Reduced velocity allows for the retention of large wood within the system.

3. Descriptive Photographs-Illustrations-Maps (limit to three total):

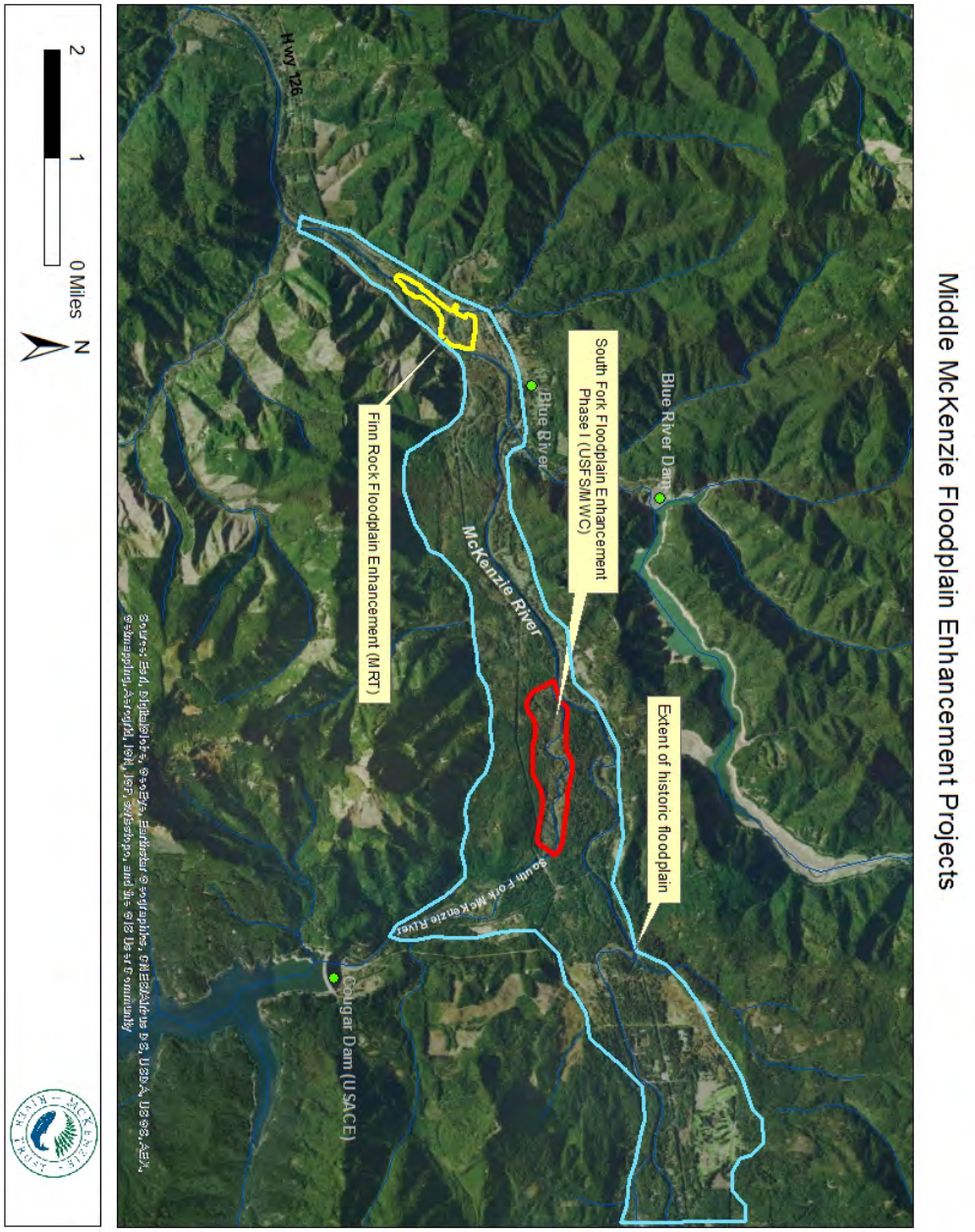
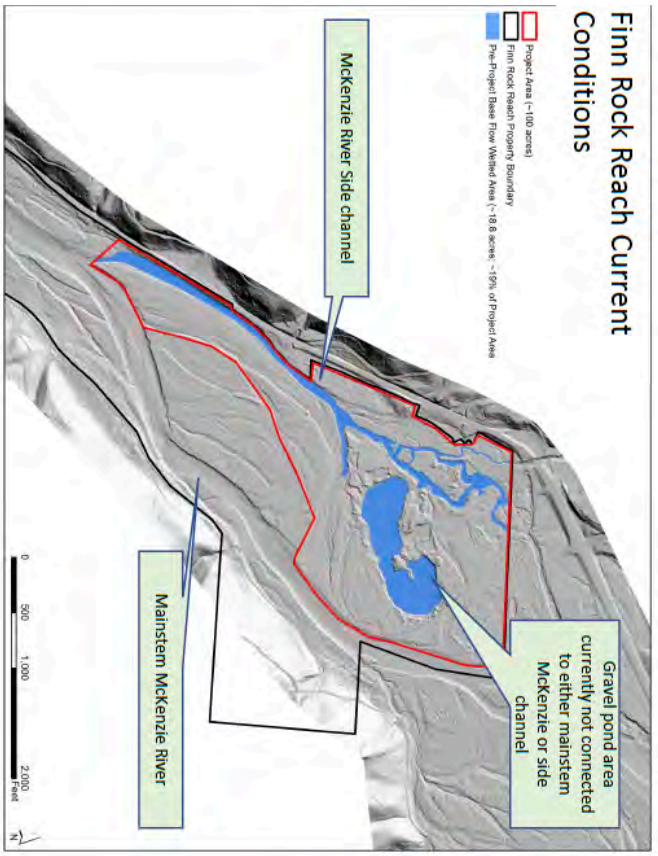


Figure 1: Finn Rock Reach Floodplain Enhancement Project area in relation to the completed South Fork McKenzie Floodplain Enhancement Projects. Both projects utilize a similar design approach and will work together to create ecological uplift for the Middle McKenzie area.


Finn Rock Reach Current Conditions
Project Area (~100 acres)
Finn Rock Reach Property Boundary
Pre-Project Base Flow Wetted Area (~18.8 acres; ~19% of Project Area
McKenzie River Side channel
Gravel pond area currently not connected to either mainstem McKenzie or side channel
Mainstem McKenzie River
0
500
1,000
2,000
Feet
N

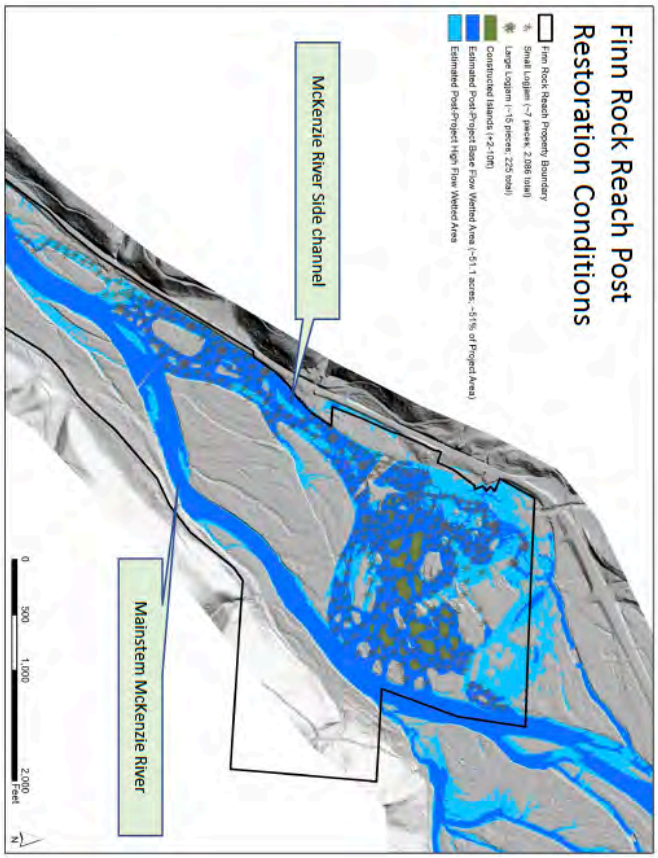

Finn Rock Reach Post Restoration Conditions
Finn Rock Reach Property Boundary
Small Logjam (~7 pieces; 2,086 total)
Large Logjam (~15 pieces; 225 total)
Constructed Islands (+2-10ft)
Estimated Post-Project Base Flow Wetted Area (~51.1 acres; ~51% of Project Area)
Estimated Post-Project High Flow Wetted Area
McKenzie River Side channel
Mainstem McKenzie River
0
500
1,000
2,000
Feet
N

Figure 2: Comparison of area wetted at baseflow conditions pre and post project implementation.

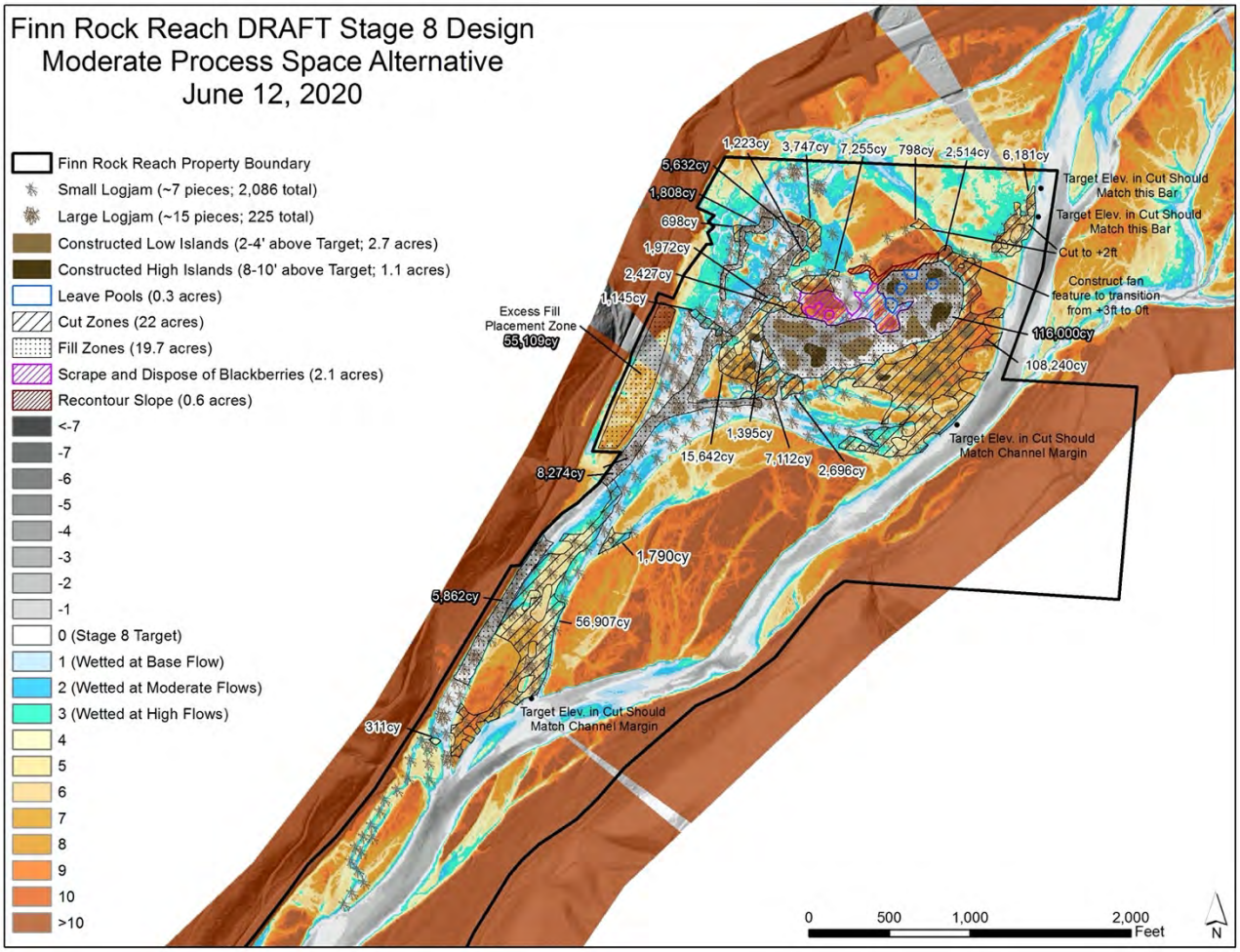


Figure 3: Current restoration design showing cut and fill locations and amounts. Note, most cut areas are areas of overburden related to the gravel quarry and its access road. Fill areas center around the gravel ponds and the incised stream channel.

4. ***Linkage of Actions to Identified Threats for Lampreys in RMU(s) (300 words or less):***
   - What threat(s) to lampreys does this project address? (See your RIP(s) for key threats) **Stream and Floodplain Degradation (non-dam)**
   - Does this project address threat(s) to lampreys specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?
     Single RMU X, Multiple RMUs ☐ list additional RMUs:
   - Describe how this project addresses key threat(s) to lampreys within the HUC(s) where project is proposed.

The Project directly addresses key threats to Pacific lamprey within the Draft Pacific Lamprey 2018 Regional Implementation Plan for the Columbia/Willamette Regional Management Unit

Willamette Sub-Unit. The project is located in the McKenzie Watershed, HUC 1709004, where Pacific Lamprey are ranked as S2-imperiled by NatureServe. The primary threats addressed are "Floodplain Degradation (non-dam)" and "Flow alterations (non-dam)" (RMU threat assessment score of 3 and 2 for the McKenzie, respectively). –The degradation of streams through simplification and removal of large woody debris is a common threat within this HUC. At this site, the construction of gravel extraction pits in the floodplain between the mainstem and a side channel of the McKenzie, and its attendant access road, have created large berms of overburden within the floodplain and disrupted the flow regime within the side channel. Bathymetry conducted by the United States Forest Service, shows that the side channel is incising, increasing flow velocities and transporting sediment. The proposed project will regrade not only the gravel ponds, but much of the side channel itself, and add substantial amounts of large woody debris. The project will transform the 85-acre project area to a depositional environment with increased permanently wetted surface area, greater sediment supply, and greater habitat complexity. The work will have a positive impact on Pacific lamprey spawning and rearing opportunities.

The retirement of the gravel pits and subsequent purchase by the McKenzie River Trust, along with a conservation easement held by the Bonneville Power Administration through the Willamette Wildlife Mitigation Plan has permanently protected this stretch of side channel, ensuring that no further stream alterations will threaten the habitat improvements.

5. ***Species/Habitat Benefits (200 words or less):***
    - Provide citation of literature, distribution maps, and/or surveys demonstrating lampreys are currently and/or were historically present in the project area.
    - How will the project provide meaningful measurable results to improve lamprey populations and/or their habitat conditions?
    - What life stage or stages will benefit from action? How?
    - What other species may benefit from action?

ODFW has verified that adult Pacific Lamprey holding and spawning distribution extends in the mainstem McKenzie River at least as far upstream as far as Forest Glen Boat Ramp (upstream of project area) through mobile tracking data. The 2019 Regional Implementation Plan's distribution map shows the property as being within the upstream extent of the current distribution. USFS staff have documented lamprey in the South Fork McKenzie restoration area, upstream of project area.

Creating 51 acres of low-velocity inundated area with over 2000 pieces of LWD, will improve Pacific lamprey larval and transformer stage habitat. Massive earth movement, will transform the side channel from a transport reach into a depositional environment, with greater habitat complexity, and a greater variety of sediments, including fine sediments and gravel. The project will benefit spawning adults by increasing the quantity of spawning gravel present on site and benefit juvenile lamprey by encouraging development of slow-water habitats and deposition of

fine sediment. The target habitat most closely conforms to "Type I" habitat described in the CPL. Lowering the stream velocity within the side channel will create easier passage for adult lamprey that are migrating upstream.

The project will also benefit Upper Willamette Spring Chinook salmon.

6. ***Priority Objectives and Goals:***
    - Indicate the strategies, and/or restoration/management plans are addressed by this project (when available relevant documents/websites are hyperlinked below for reference):
        - PLCI Conservation Agreement ☐
        - National Fish Habitat Partnership National Conservation Strategies ☐
        - USFWS Climate Change Strategies ☐
        - Bonneville Power Administration Northwest Power and Conservation Council Columbia River Basin Fish and Wildlife Program ☐
        - CRITFC Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin ☐
        - US Army Corps of Engineers Pacific Lamprey Passage Improvement Implementation Plan ☐
        - PUD Management Plan (please name below) ☐
        - Other (please name below) ☐
    - Clearly describe how the project addresses the goals and objectives in the strategies, restoration/management plans indicated above (200 words or less).

The Coastal, Columbia, and Snake Conservation Plan for Lampreys ("CPL") lists protection and restoring habitat as a high priority and is one of the eight management strategies listed within the plan. The restoration improves physical habitat by restoring natural river processes and channel movements with its Stage 8 style design and the installation of numerous log jams.

The National Fish Habitat Partnership National Conservation Strategies lists restoring hydrologic fish conditions as its second strategy and reconnecting fragmented fish habitat as its third strategy. This project reconnects the river to its floodplain and restores habitat conditions in a degraded reach of the river.

"Restoring lamprey spawning and rearing habitats" is part of Objective 6 of the 2012 Conservation Agreement for Pacific Lamprey.

The creation of low velocity sediment-laden habitat for juvenile lamprey-rearing is listed as objective 4.2.2.a of the CRITFC Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin. Creating a low velocity depositional environment is one of the main project goals for the FRR project and is what necessitates one of the main project activities; regrading of the floodplain to remove gravel pit overburden and fill incised channels.

7. ***Project Design / Feasibility:***
    - Have the designs for the project been completed already or will they be completed before planned project implementation? **Yes X** No□
    - Are the appropriate permits (e.g., ESA consultation, Scientific Collection, fish health/transport, etc.) in place already or will they be in place before planned project implementation? **Yes X** No□
    - Can the project be implemented within the defined timeframe? (*See BPA & NFHP requirements in the accompanying PLCI RIP Priority Project Guidance document)*. **Yes X** No□
    - Please provide a brief description (200 words or less):

The conceptual restoration plan was completed by USFS in the summer of 2019, and it has been refined and adjusted based on field observations. The current plan is nearing the 60% design phase, and identifies cut and fill volumes, and log jam placement areas.

USFS staff utilized current LiDAR and river bathymetry to determine the appropriate geomorphic grade line (GGL) that satisfies the relative elevation model (REM) to end up with the Stage-8 elevation that maximizes wetted surface at base flow given the relatively confining boundaries of the mainstem McKenzie River and adjacent infrastructure. The engineering contractor MRT has selected, Wolf Water Resources, Inc. (W2R), is working with USFS to build hydraulic models to show expected velocities and also meet the requirements of a Lane County No-rise Certificate (summer 2020), which is required to obtain a Lane County Floodplain Development Permit (fall-winter 2020-2021). W2R will also obtain other permits. MRT has worked closely with the permitting agencies and the Lane County Planning Dept. to be able to utilize cutting-edge design techniques, such as Stage-8, and bring the Project to fruition in the summer of 2021.

8. ***Partner Engagement and Support (200 words or less):***
    - What partners are supporting the project?
    - What partners are active in implementing the project?
    - What partners are providing matching funds or in-kind services that directly contribute to the project?

The McKenzie Watershed Council (MWC) and USFS are major collaborators on this project. USFS have provided in-kind support for the design, providing the bathymetry, geomorphic grade line analysis, design drawings, cut and fill estimations, and field verification of data. The project budget includes line items for both of these partners to provide support through project implementation. In October of 2019 MRT and USFS entered into a Master Participating Agreement to allow for the transfer of project funding and defined terms of the cooperative partnership.. .

The project has also been supported by a Technical Advisory Group composed of: USFS, MWC, Oregon Department of Fish and Wildlife, Bureau of Land Management, The Nature Conservancy, and the University of Oregon Geography Department.

Other support includes:

- MRT has entered into an MOU with the BLM which allows for the use of BLM trees in the implementation.
- The Confederated Tribes of Siletz Indians is receiving a donation of LWD from the USFS, which they, in turn, are donating to the project.
- The Eugene Water and Electric Board provided $500,000 to the restoration project through MRT's Homewaters Campaign, which raised an additional $250,000 in restoration funding.

9. Monitoring and Reporting (200 words or less):

- How is completion of the project going to be documented? (*See BPA and NFHP requirements in the accompanying PLCI RIP Project Proposal Guidance document)*.)
- How will the project's benefits to lampreys be monitored over time?

MRT has a two-tier monitoring program. The first tier consists of monitoring that is certain to take place, which includes photopoints, and remote sensing (drone imagery) that will be used to analyze the amount of wetted surface located within the project area. The second tier of monitoring includes information likely to be collected, but whose funding is not secured. This includes macroinvertebrate sampling and the collection of temperature, velocity, water elevation levels, and substrate along three transects that MRT and USFS have established within the project area. MRT is also meeting with ODFW's Ben Clemens in late July to discuss pre-project monitoring and other monitoring strategies.

MRT will need to produce project completion reports for funding organizations, and is aware that a final report for BPA is required by December of 2022. At that time, photopoints and initial drone monitoring should be completed. Project monitoring by MRT will extend far beyond this reporting date, to at least 2026.

BMP for monitoring projects utilizing Stage-0 and Stage-8 style projects are still being developed, and MRT will work with its partners, especially USFS and ODFW, to adjust monitoring as they are developed.

10. Project Budget (including overhead):

- See example on last page.

The preliminary design budget for the entire project is $2.8 million. Contracted services comprise the bulk of these expenses. The largest contracted expenses are associated with the large amount earth moving (estimated 222,000 cubic yards of material), and the transportation

and placement of large wood pieces (up to 2300).

The Trust has already secured $918,000, for the project (from the Eugene Water and Electric Board, Oregon Watershed Enhancement Board TA, Patagonia, Drinking Water Protection Program, USFS). A portion of the site is being considered for a Permittee Responsible Mitigation project, which would provide an additional $135,000. A decision on the mitigation funding is expected by August 2020. The Trust will also be requesting funding through the Anchor Habitat Focused Investment Program, OWEB Open Solicitation grant program and other funding programs.

MRT has a Federally Negotiated Indirect Rate of 30.72%, but is only requesting 15% in indirect costs for this project.

The project is scalable. If necessary, the Trust can break the project into two phases, reduce the project's footprint, or reduce the amount of wood placement. The Trust desires to complete the project in one phase to reduce mobilization and project management costs.

Long term maintenance of the project is already secured via stewardship funds granted to MRT by the BPA through the Willamette Wildlife Mitigation Program.

11. Project Budget (including overhead):

The preliminary design budget for the entire project is $2.8 million. Contracted services comprise the bulk of these expenses. The largest contracted expenses are associated with the large amount earth moving (estimated 222,000 cubic yards of material), and the transportation and placement of large wood pieces (up to 2300).

The Trust has already secured $918,000, for the project (from the Eugene Water and Electric Board, Oregon Watershed Enhancement Board TA, Patagonia, Drinking Water Protection Program, USFS). A portion of the site is being considered for a Permittee Responsible Mitigation project, which would provide an additional $135,000. A decision on the mitigation funding is expected by August 2020. PRM funding will not impact the request in this grant application. The Trust will also be requesting funding through the Anchor Habitat Focused Investment Program, OWEB Open Solicitation grant program and other funding programs.

MRT has a Federally Negotiated Indirect Rate of 30.72%, but is only requesting 15% in indirect costs for this project.

Long term maintenance of the project is already secured via stewardship funds granted to MRT by the BPA through the Willamette Wildlife Mitigation Program.

	Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	-	-	-	-	-
	a.Restoration Project Manager	125	40.00	5,000		5,000
	b. Conservation Director	60	50	3,000		3,000
	c.					
B	***Contracted:***	-	-	-	-	-
	a.Earthmoving	12,310	6.50	80,015		80,015
	b.LWD placement	682	110	75,020		75,020
	c.					
	d.					
C	***Travel:***	-	-	-	-	-
	a.					
D	***Other:***	-	-	-	-	-
	a.					
	b.					
E	***Administrative:***	-	-	-	-	-
	Overhead (%)					
	Indirect Costs (15 %)			24,455		
	Total (Sum of A - E)	-	-	187,490		

12. Timeline of major tasks and milestones

Element	Description	Start Date	End Date	Responsible party
Large wood harvest and transport	BLM and USFS harvests and transport to site	1/2019	12/2020 (BLM) 8/2021 (USFS)	MRT/USFS
Project design - USFS	Finalize all project design elements	4/2020	8/2020	USFS/MRT

Monitoring plan development	Finalize monitoring plan	2/2020	7/2020	MRT/Tech Team
Baseline monitoring	Complete baseline monitoring in project area	7/2019	6/2020	MRT
Complete permit process		10/2020	4/2021	W2R/MRT
Public and partner outreach	Complete a range of outreach actions to the public and various partners.	5/2019	05/2022	MRT
Project Implementation	Fish salvage, water diversion, earth movement, tree placement, rewatering	6/2021	8/2021	Contractor/MRT
Implementation monitoring	Monitor and record a range of implementation metrics	6/2021	8/2021	MRT
Effectiveness monitoring	Implement monitoring plan	8/2021	12/2025	MRT
Project reporting	BPA report	5/2022	12/2022	MRT
Invasive vegetation management	Monitor project area for invasive weeds and treat as appropriate.	8/2021	12/2025	MRT
Public tours and project presentations	Conduct a range of public tours and presentations	3/2019	12/2025	MRT
Revegetation planting	Plant native trees and shrubs in a select disturbed area, using a combination of contractors and volunteers.	11/2021	3/2023	MRT

13. References (if applicable):

Clemons, Benjamin; Anlauf-Dunn, Kara; Weeber, Matt; and Tom Stahl (2020). *Final Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon.* Oregon Department of Fish and Wildlife.paci

Cluer, Brian & Thorne, Colin. (2014). *A Stream Evolution Model Integrating Habitat and Ecosystem Benefits*. **River Research and Applications**. 30. 10.1002/rra.2631.

Poirier, Jen; Gray, Ann; and Ben Clements. (2019). *2019 Regional Implementation Plan for the Lower Columbia/Willamette Regional Management Unit Wilamette Sub-Unit.*

Powers PD, Helstab M, Niezgoda SL. *A process-based approach to restoring depositional river valleys to Stage 0, an anastomosing channel network*. **River Research and Applications.** 2018; 1–11. https://doi.org/10.1002/rra.3378

USDA Forest Service. (2017). *Lower South Fork McKenzie Floodplain Enhancement Project Design.*

II. MEETING NOTES

WILLAMETTE RMU- Pacific Lamprey Threats Assessment and RIP Annual Meeting
May 19, 2020

Conference call attendees:

ODFW: Ben Clemens, Alex Farrand, Emma Garner, Jeremy Romer, Jeff Ziller
Confederated Tribes of the Grand Ronde: Brandon Weems
City of Portland Bureau of Environmental Services: Melissa Brown
EWEB: Andrew Janos
Calapooia Watershed Council: Cris Salazar
Coast Fork Watershed Council: Reilly Newman
Greater Yamhill Watershed Council: Luke Westphal
Molalla River Watch: Asako Yamamuro
McKenzie River Trust: Christer LeBrecque
McKenzie Watershed Council: Jared Weybright
Marys River Watershed Council: Kathleen Westly
Tryon Creek Watershed Council: Alexis Barton
TRWC: Scott McEwen
CRITFC: Laurie Porter, Greg Silver
USACE: Terri Berling, Doug Garletts, Chad Helms
USFS: Les Bachelor, Brett Blundon, Kimberly Conley, Olivia Guthrie, Matt Helstab, Doug Larson, Kate Meyer, Jack Williamson
USFWS: Erin Butts, John Erhardt, Ann Gray, Amy Horstman, Jen Poirier, Joe Skalicky

2020 Activities & Events

- **3rd Annual Lamprey Information Exchange**
  - January 12th, 13th, and 14th (half day, full day, half day)
  - Will be held at the Water Resources Education Center in Vancouver, WA
  - Session development currently underway!
  - If you have a poster or presentation you would like to present, contact Ann Gray to get you in touch with the right person.

- **Lamprey Short Course**
  - River Restoration Northwest in partnership with the Portland State University Environmental Professional Program will be offering a short course – *Integrating Lamprey into Restoration*
  - Will be held either fall 2020 or spring 2021
  - We will send out more info as it becomes available

- **New Pacific Lamprey Conservation Initiative Webpage**
  - Development of a new PLCI website is underway – www.Pacificlamprey.org

- New site will be hosted by PSMFC
- Will allow more flexibility and control of content. Easily updated.
- Most of existing content will be brought over to new site with many new features
  - Imbedded webforms that will enable us to solicit for and submit project proposals online, a PLCI list serve signup, etc.
- Webpage will hopefully be live by the end of September (2020)

- **New Best Management Practices & Publications**
  - This is not an extensive list. These documents will be coming out soon and may be of interest to this group
  - ***ODFW Conservation Plan for Lampreys*:** https://www.dfw.state.or.us/fish/CRP/coastal_columbia_snake_lamprey_plan.asp
  - ***Best Management Guidelines for native lampreys during in-water work*** (revision of 2010 BMP). https://www.fws.gov/pacificlamprey/Documents/2020%20Lamprey%20BMG%20Final.pdf
  - ***Best Management Guidelines for evaluating lamprey passage at culverts and other road crossings***. Currently in review. Release date June 2020.
  - ***eDNA White Paper***. Currently in review, released spring 2020
  - ***Barriers to Tidal Connectivity*.** In development. Released end of 2020. Joint partnership with Pacific Marine Estuary Partnership & CA. Fish Passage Forum.
  - ***USGS Lamprey Dewatering Report*** https://pubs.er.usgs.gov/publication/ofr20201026
  - For more lamprey publications, check out the **Data Clearinghouse literature site** on USGS Science Base https://www.sciencebase.gov/catalog/item/53ad8d9de4b0729c15418232
  - Please see four publications provided by Ben Clemens (ODFW) in email from Ann Gray (May 19, 2020) attachment.

Pacific Lamprey Conservation Initiative

- The Willamette River Regional Management Unit group is part of Pacific Lamprey Conservation Initiative (PLCI).
- The PLCI is a collaborative effort developed to promote the coordination and implementation of conservation efforts across the range of lamprey.
- The PLCI is organized into four groups: Policy Committee (i.e., high-level managers, tribal council members), Conservation Team (signatories of Conservation Agreement), Lamprey Technical Workgroup and Regional Management Unit groups.

Regional Management Unit (RMU) groups

- RMU partners include project leads, field biologists, restoration practitioners, natural resource managers and stakeholders familiar with watersheds in region.

- Partners provide information for Risk Assessment (see below).
- Assist with development of Regional Implementation Plan (see below).
- Support the development and implementation of priority lamprey projects.
- There are 18 RMU groups across range of Pacific Lamprey.

Pacific Lamprey Risk Assessment

- NatureServe modeling exercise that uses our current knowledge of Pacific Lamprey distribution, abundance, population trends and local threats to assess the relative risk of extirpation at the 4th field HUC level.
- Risk rankings used to guide the identification and prioritization of conservation measures in the RMU.

- Risk Assessment will be updated every 5 years or so to monitor progress and change (next revision in 2023).
- Can be found on Pacific Lamprey Conservation Initiative web page under Assessment on blue bar www.fws.gov/pacificlamprey/mainpage.cfm or https://www.fws.gov/pacificlamprey/assessmentmainpage.cfm#2018Assessment

Regional Implementation Plans (RIPs)

- The RIPs summarize the status, distribution and local threats to lamprey, and include on the ground projects (submitted by RMU partners) that address the identified threats to lamprey and their habitats in the region.
- The purpose of the RIP process is to facilitate the funding of high priority lamprey research and conservation actions.
- Completed RIPs for all RMUs can be found on Pacific Lamprey Conservation Initiative web page under *Plans* on blue bar or https://www.fws.gov/pacificlamprey/PLCI_RIPs.cfm.

2018 Regional Implementation Plan Revisions?

- One goal of meeting is to revise the RIP as needed based on new information – since it's not yet time for the full 5-year review, we would like to discuss any new lamprey distribution data, and changes in threats or significant restoration actions.
- Please look at our updated distribution maps (PDF emailed on May 18 from Ann) or the interactive distribution map on Databasin.org (*Pacific Lamprey Known Observations and Distribution*).
- Several edits were suggested during the meeting - Ann will email folks to follow up on those and help coordinate parties (you know who you are!).
- Please report any new distribution data or potential errors to Erin Butts (USFWS) Erin_Butts@fws.gov

DISTRIBUTION CHANGES?

- **Kate Meyer (USFS)** indicated that lamprey are now in the **South Fork McKenzie** where maps currently show they are not present (lower few miles below Cougar Dam).
- **Jeff Ziller (ODFW): McKenzie HUC:** Gate Creek is likely occupied (map indicates historical habitat only); ODFW will try to confirm current occupation by Pacific lamprey.
- **Alex Farrand (ODFW)**: **Middle Willamette HUC**: there is new distribution information in Rickerall Creek. Tony Spitzack (BLM) and Alex should be able to provide more information here from redd surveys and BLM's ongoing eDNA work. Ann will send an email to both Tony, Alex, Kristen Larson and Erin to assist coordination to get maps updated.
- **Alex Farrand (ODFW)**: **Middle Willamette HUC**: ODFW has documented Pacific lamprey spawning in Pringle Creek, and they are also likely in Mill Creek (but no information currently exists for Mill Creek). Both are highly urbanized streams.
- **Doug Larson (USFS)** and **Jeff Ziller (ODFW) and Reilly Newman (CFWC)**: **Coast Fork HUC** – Need to confer and provide information pertaining to Mosby Creek, and Pacific lamprey presence between the 2 reservoirs. ~200 lamprey redds have been seen here. Ann will email Doug, Jeff, Reilly and Erin to assist coordination.
- **Melissa Brown (City of Portland): Lower Willamette HUC-** Melissa indiated there are updates for Johnson Creek, Kelly Creek and Crystal Creek based on eDNA. Ann will email Melissa and Erin.
- **Joe Skalicky (USFWS): Lower Willamette HUC:** Multnomah Channel should be identified as currently occupied.
- **Jeff Ziller (ODFW): Middle Fork Willamette HUC:** Lost Creek below Dexter Dam is likely occupied- ODFW will try to confirm current occupation and extent by Pacific lamprey in this tributary.
- **Doug Larson (USFS):** Middle Fork Willamette HUC: USFS has 2016-2018 data to get to Erin based on eDNA survey information. Ann will email Doug and Erin and Matt to get coordination going.
- **North Santiam HUC:** Ben asked about the dam locations- the 2 dams shown currently are Upper and Lower Bennett Dams- should get Minto, Big Cliff and Detroit Dams on maps.
- **Doug Larson (USFS)**: **North Santiam HUC:** Maps need to be updated with recent eDNA surveys conducted by USFS. Also need to look at Little North Fork Santiam and Salmon Falls. Ann will email Doug, Jeff, Matt and Erin to assist coordination.
- **Upper Willamette HUC:** Ben Clemens and Doug Garletts discussed distribution in the Long Tom. Map appears to have Pacific lamprey above the USACE Dam. Erin to investigate more and correct as needed.

CHANGES IN THREATS?

The top 4 threats as we identified in the Risk Assessment were

- Stream and Floodplain Degradation
- Flow Alterations
- Water Quality

- Passage

No one suggested there were any changes in threats at this time. The RMU Team should discuss this each year, and note changes, but will re-evaluate in ~2022/2023 when the Risk Assessment will be updated.

Status of 2019 RIP Lamprey Project Proposals

Willamette Sub-unit RIP: Last year, no projects were submitted for funding consideration. MRT had written a proposal for the Finn Rock Floodplain Restoration, but withdrew and will re-submit this year- see the 2019 RIP for original proposal.

Lower Columbia Sub-unit RIP: Two projects were submitted to 2019 RIP, both projects were funded in FY20 (BPA Cost Savings Funding)

- *Assessment of larval lamprey use in areas of salmonid restoration vs non-restoration & above and below an electronic weir* (Lower Col.)
    - USFWS, WDFW, WDNR, Cowlitz Tribe, Interfluve, LCRFRB
    - Project will look at abundance and presence of juvenile lamprey in areas with and without restoration in Abernathy Creek watershed. Also looking at distribution along elevation (higher vs. lower in the watershed) and how lamprey distribution overlaps with salmonid habitat. Ben Kennedy (USFWS – Abernathy) is the contact for this project.

- *Pilot test of acoustic telemetry array* (Lower Col.)
    - USGS, YN, CTUIR, NPT, CRITFC, Mainstem Fish Research, PNNL
    - Install array of 12 receivers at Columbia River KM 86, near Oak Point
    - Will run array December 2020 – March 2021
    - Seeking additional funding or may tie in with USACE work to extend operational period.
    - Concern about COVID-19 returning in winter – may delay installation of array
    - Contact: Laurie Porter (CRITFC) for more information.

Lamprey project funding

- There are multiple funding sources that can be used to fund lamprey projects. The *Pacific Lamprey Funding Sources* spreadsheet includes a number of these resources with timelines. Please let us know if we are missing something important!
- **Our new PLCI Coordinator, Alicia Marrs, is available to help match RIP projects to available funding sources: Alicia@pacificlamprey.org**

Three lamprey specific funding opportunities in 2019

- **NWPCC - BPA Cost Savings Funding**
  - Total funding around $300,000 annually
  - Currently, BPA Funding only applies to RMUs in Columbia River basin.
  - Eligible projects include: Passage or infrastructure improvements, habitat restoration, assessments that lead to the development of BMPs or Guidance documents, assessments that lead to on the ground projects, or research questions that inform management (e.g. acoustic tagging & migration, translocation, population structure, etc.).
  - See Power Point presentation for 6 projects funded by Cost Savings Program in 2019.
  - Project implementation period variable depending on project goals (12-18 months)

- **National Fish Habitat Partnership Funding**
  - We will have $20,000 to fund a RIP project in 2020.
  - The Pacific Lamprey Partnership will hopefully begin to receive annual project funding in the next year or two – which would vary from $75,000-$250,000 annually.
  - NFHP funding is available to RIP projects in any RMU (though non-Columbia basin RMUs will be given first priority)
  - Eligible projects include: stakeholder outreach (including workshops), habitat restoration (including passage or infrastructure improvements and design) or habitat assessment projects.
  - 18-month project period

- **Miscellaneous end of year funding**
  - Funding varies, but typically less than $25,000 annually.
  - All project types and RMUs eligible for funding.
  - Project implementation period variable depending on project goals (maximum 3 years)

New (2020) lamprey project proposals- projects mentioned on call

- Christer indicated that MRT will be re-submitting the proposal for Finn Rock Creek Floodplain restoration, which is a site on the mainstem McKenzie.
- In progress-Joe, Ben, Kate, Matt, and several others are communicating and may put together a proposal to evaluate lamprey response to Stage 0 restoration, using a comparative approach. Potentially looking at South Fork McKenzie and Five-Mile Bell (Coast) Restoration projects as study sites.

New (2020) lamprey project proposals- PROCESS

- For those interested in submitting a lamprey project proposal into the 2020 Willamette RIP for funding consideration, we have a revised template (see *FY21 PLCI RIP Project Template Final*).
- Complete the project template and submit your proposal to Ann Gray on or before July 17th.
- Proposals will go out to RMU group for 2-week review then will be presented to Conservation Team August 19th.
- Conservation team will then review and rank projects and begin making project selections (date varies by funding source).
- Changes to the proposal template include more emphasis on how project will directly benefit lamprey
    - Must show lamprey species are present in project area
    - Include monitoring plan to measure project effectiveness for lampreys
- Proposed projects should be focused on lamprey and address a threat or data gap in RMU.
- Project must be ready for implementation (i.e., design and permits completed) when funding contract starts (June 2021) and be completed within the implementation period (including reporting), especially for BPA Cost Saving Funds.
- If you have any questions at all, ask Jen Poirier (Jennifer_Poirier@fws.gov) or Ann Gray (Ann_e_gray@fws.gov).

Partner Project Updates & Announcements

- **Jeremy Romer (ODFW)-** Implementation of BPA Funded project: Improving adult lamprey counts in the McKEnzie River. ODFW tagged and released 29 tagged lamprey below Leaburg Dam. Fish were originally collected with CTGR from Willamette Falls and transported upstream. 15 passed the dam (peak movements in July) and 5 of those went into the South Fork McKenzie and went above the Stage 0 Restoration site. Lamprey were documented passing the vertical slot ladder on North side of river- not the older, half Ice Harbor style ladder on South side. ODFW can currently account for location of 27/29 tags and will continue to monitor tags during spawning this June and get more distribution information.
- **Brandon Weems (CTGR)** indicated the Fall Creek Reintroduction/Translocation study has been completed. The study included 7 years of translocation of ~200 lamprey/year from Willamette Falls to above USACEs Fall Creek Dam. Spawning has been documented and in recent years, many outmigrating eyed juveniles have been collected in the USACE's screw trap operations just below Fall Creek Dam. Hooray! The CTGR are currently looking for new translocation sites above dams.
- **Joe Skalicky (USFWS)** is looking for opportunities to learn more about the best techniques to salvage larval lamprey during dewatering. If you know of any dewatering events (e.g., dam maintenance, restoration work, etc.) please let Joe know about it (Joe_skalicky@fws.gov)

    - Joe also recommends RMU ***partners use the Willamette lamprey RMU email list*** as a resource if you have questions about juvenile identification. Take pictures and send them out to the group!
- **Doug Larson** (USFS) indicated that USFS also has funds for the Interagency Sensitive Species/ Special Status Program (including lampreys), which previously funded the Upper Willamette eDNA work in 2016- 2018: a good funding option to consider if working on USFS lands.
- **Ben Clemens (ODFW)** Oregon Department of Fish and Wildlife has new Conservation Plan for Lampreys (CPL). This plan is available on here: https://www.dfw.state.or.us/fish/CRP/coastal_columbia_snake_lamprey_plan.asp
    - The CPL covers four species of lampreys including Western River, Western Brook, Pacific and Pacific Brook Lamprey.
- **Doug Garletts (USACE):** USACE is operating the Fall Creek and Cougar Adult Passage Trap and Haul Facilties. If they get lamprey, they will pass them upstream, but to date have not gotten any.
- **Laurie Porter (CRITFC):** CRITFC has eDNA work planned for four (artificially propagated) juvenile releases. Waiting on environmental compliance. Work will occur in fall. CRITFC also has ongoing genetics work that Greg Silver and Jon Hess are conducting.
- **Erin Butts (USFWS)**
    - check out the Pacific lamprey story map, if you haven't https://fws.maps.arcgis.com/apps/MapJournal/index.html?appid=34d16fcc9e5d444c87eeab169c829dde
    - Erin is creating a new story map that will focus on recently implemented RIP projects.
    - She is looking for video and photos for completed lamprey projects so send any information her way!
- **Luke Westphal (Greater Yamhill Watershed Council) has p**artnered with BLM and USFS lab for eDNA presence /absence surveys in Yamhill Basin; currently have sampled 40-50 sites in major tributaries. Also received funding from CTGR Spirit Mountain Community to conduct land owner outreach and more eDNA sampling higher in the watershe this summer. Once information has been summarized, report will be sent out. Luke will also coordinate with Erin to update distribution maps.
- For those of you interested in the Natal Origins Study that has been funded, **Julie Harris (USFWS)** submitted this description after the meeting; this study may be delayed due to COVID and inability to collect samples from a wide range:

Patterns of larval Pacific Lamprey occupancy and abundance suggest certain natal areas may be more productive than other areas. What is less clear is whether these productive natal areas act as sources for returning adults. Identifying natal areas that contribute to adult Pacific Lamprey production (and identifying characteristics of those areas) would help guide conservation efforts such as passage and restoration in the Pacific Northwest.

Isotopic signatures in statoliths and eye lenses have the potential to define natal origins of Pacific lamprey. As these structures develop, they store elements from surrounding water; thus, elemental and isotopic composition of the core and early layers of these structures relate to the chemical composition of water at the individual's natal region. The chemical composition of

river water is a function of underlying geology and land use. To identify natal origin from microchemistry in statoliths and eye lenses, chemical signatures must be stable and different among natal areas. Inclusion of multiple elements and isotopic ratios from both statoliths and eye lenses allows for refinement of natal origin.

We plan to remove statoliths and eye lenses from outmigrating juveniles and to conduct analyses to identify elemental composition and isotopic ratios of those structures. The Natal Origin's study has two main goals: 1) we will examine differences in elemental composition and isotopic ratios among natal watersheds to identify what combination would be most effective for classifying natal origin; and 2) we will compare elemental and isotopic composition of statoliths and eye lenses from juveniles to early layers in adults from Willamette Falls to hopefully identify potential sources of adults.

Willamette RMU Review Timelines

- RIP project proposal due date – July 17th
- RIP & project proposal review July 27th- August7th
- Project proposals will be presented to Conservation Team August 19th.
- Conservation team will review and rank projects and begin making project selections October 15th

Contacts for Willamette River RMU sub-region:

Ann Gray – USFWS ann_e_gray@fws.gov
503-231-6909

Erin Butts – GIS Specialist Erin_Butts@fws.gov
360 604-2509

Jen Poirier – USFWS Jennifer_Poirier@fws.gov
360-604-2539

Alicia Marrs – PLCI Coordinator Alicia@pacificlamprey.org
360-319-7916