Pacific Lamprey

2019 Regional Implementation Plan

for the

Oregon Coast

Regional Management Unit

South Coast Sub-Region

Submitted to the Conservation Team August 27, 2019

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I. Status and Distribution of Pacific Lamprey in the RMU

A. General Description of the RMU

South Oregon Coast Sub-Region

The Oregon Coast Regional Management Unit is separated into two sub-regions equivalent to the USGS hydrologic unit accounting units 171002 (Northern Oregon Coastal) and 171003 (Southern Oregon Coastal). The South Oregon Coast sub-region includes all rivers that drain into the Pacific Ocean from the Umpqua River basin south to the Smith River boundary in California. It is comprised of twelve 4th field HUCs ranging in size from 1,216 to 4,662 km^2 (Table 1).Watersheds within the South Oregon Coast sub-region include the North and South Umpqua, Umpqua, Coos, Coquille, Sixes, Upper, Middle and Lower Rogue, Applegate, Illinois and Chetco (Figure 1).

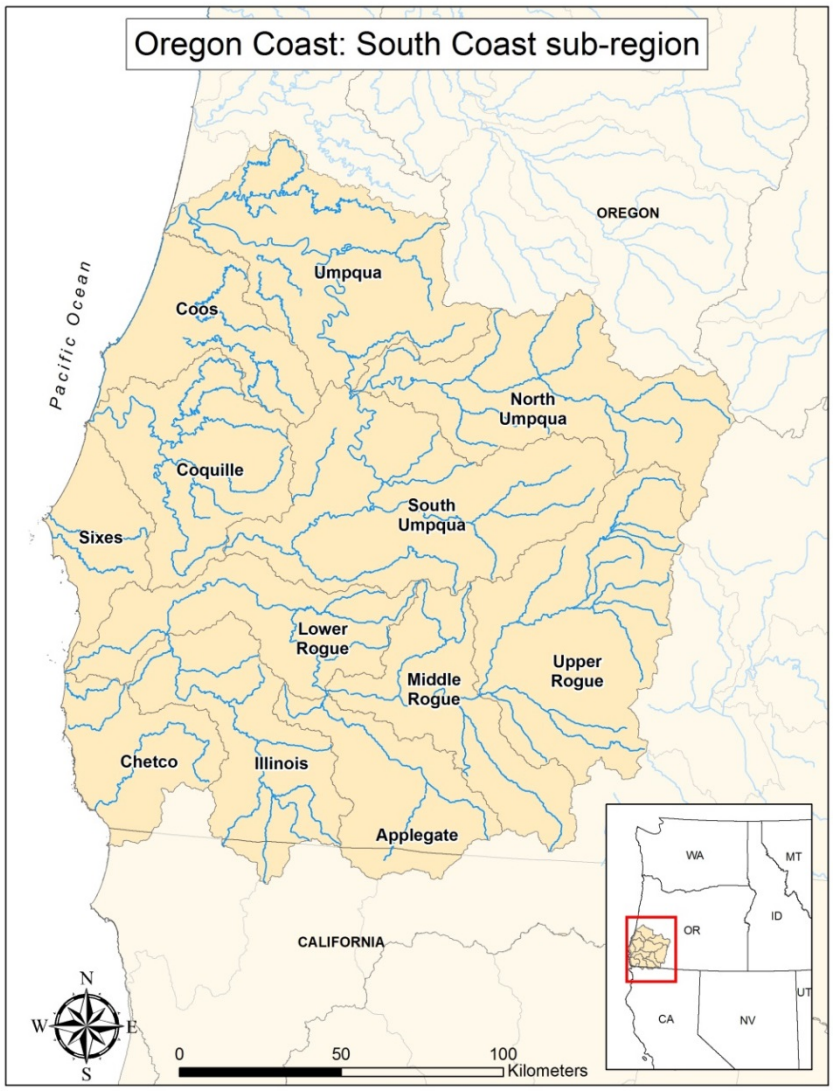


Figure 1. Map of watersheds within the Oregon Coast RMU, South Coast sub-region.

Table 1. Drainage Size and Level III Ecoregions of the 4th Field Hydrologic Unit Code (HUC) Watersheds located within the South Oregon Coast sub-region.

Watershed	HUC Number	Drainage Size (km^2)	Level III Ecoregion(s)
North Umpqua	17100301	3,544	Cascades, Klamath Mountains
South Umpqua	17100302	4,662	Coast Range, Cascades, Klamath Mountains
Umpqua	17100303	3,918	Coast Range, Cascades, Willamette Valley, Klamath Mountains
Coos	17100304	1,909	Coast Range
Coquille	17100305	2,736	Coast Range, Klamath Mountains
Sixes	17100306	1,216	Coast Range
Upper Rogue	17100307	4,180	Cascades, Klamath Mountains, Eastern Cascades Slopes and Foothills
Middle Rogue	17100308	2,283	Cascades, Klamath Mountains
Applegate	17100309	2,005	Klamath Mountains
Lower Rogue	17100310	2,347	Coast Range, Klamath Mountains
Illinois	17100311	2,580	Klamath Mountains
Chetco	17100312	1,654	Coast Range, Klamath Mountains

B. Status of Species

Conservation Assessment and New Updates

Current Pacific Lamprey distribution in the South Coast sub-region is greatly reduced from historical range (Table 2). The 2017 Assessment ranking of current distribution was reduced from 2011 rankings in all HUCs except the Umpqua, Coquille, and Middle Rogue. The decline of the rankings in these areas is a result of more accurately calculating the numeric area of occupancy (versus using a visual estimate), rather than a decline in Pacific Lamprey range (USFWS 2018). Overall, current understanding of Pacific Lamprey distribution has expanded in many watersheds due to increased sampling effort (e.g., smolt trapping, redd surveys, occupancy sampling), and improved recognition of lamprey redds. Distribution information is still limited in the Lower Rogue and Chetco River.

Population abundance was updated in the North Umpqua, Umpqua, Coos, Sixes, and Applegate River using new information from Oregon Department of Fish and Wildlife (ODFW) to estimate a range of Pacific Lamprey population abundance using available redd counts. As part of the monitoring for winter steelhead spawning populations, the Oregon Adult Salmonid Inventory and Sampling (OASIS) field crews record data on lamprey spawners and redds. These estimates are considered minimum population numbers, as the surveys are focused on steelhead, and end before the completion of Pacific Lamprey spawning (see Jacobsen et al. 2014; Jacobsen et al. 2015; Brown et al. 2017). Adult Pacific Lamprey abundance is unknown in the Upper Rogue, Middle Rogue, Lower Rogue, Illinois, and Chetco Rivers

Short-term population trend (defined as the degree of change in population size over 3 lamprey generations or 27 years), was ranked as stable in most watersheds with available abundance information (see above). The only ongoing long-term record of lamprey counts in the South Coast is at Winchester Dam on the North Umpqua. The population has been monitored since 1965 and counts indicate a significant downward trend over time. For example, during 1965 – 1985, the average count of adult Pacific Lamprey at Winchester Dam was 12,343 fish (range: 877 – 46,785), compared with 1986 – 2012, when the average count was only 433 fish (range: 15 – 2,726). However the number of lamprey passing over Winchester Dam has recently shown a slight increase since the lamprey ramp was employed during 2013 – 2018, with an average of 929 lamprey (range: 703 – 1,278) counted passing. It is unclear if the increase in lamprey in recent years is due to the installation of the lamprey ramp and more efficient counting methods, actual increases in the number of adults migrating upstream past the dam, or both. Many watersheds have 3-8 years of high quality data (~2009 – 2016), but information is inaccurate or undocumented before this time. The abundance of lamprey population(s) has generally increased over the last several years, but without a longer term data set it is unknown whether this apparent increase is simply an upswing in a larger cyclical trend.

Table 2. Population demographic and conservation status ranks (see Appendix 1) of the 4th Field Hydrologic Unit Code (HUC) watersheds located within the South Oregon Coast Sub-region. Note – coho salmon distribution was used as a surrogate estimate of historical lamprey range extent in areas where historical occupancy information was not available. Ranks highlighted in Yellow indicate a change from the 2011 Assessment.

Watershed	HUC Number	Conservation Status Rank	Historical Occupancy (km^2)	Current Occupancy (km^2)	Population Size (adults)	Short-Term Trend (% decline)
North Umpqua	17100301	S2↑	1000-5000	100-500	1000-2500	Stable
South Umpqua	17100302	S1↓	1000-5000	100-500	250-2500	30-50%
Umpqua	17100303	S2	1000-5000	500-2000	250-1000	Stable
Coos	17100304	S2	1000-5000	100-500	1000-2500	Stable
Coquille	17100305	S2	1000-5000	500-2000	2500-10,000	Stable
Sixes	17100306	S2	1000-5000	100-500	250-1000	Stable
Upper Rogue	17100307	S1↓	1000-5000	100-500	Unknown	Unknown
Middle Rogue	17100308	S2↑	1000-5000	100-500	Unknown	Unknown
Applegate	17100309	S2	1000-5000	100-500	250-1000	Stable
Lower Rogue	17100310	S2	1000-5000	100-500	Unknown	Unknown
Illinois	17100311	S1↓	1000-5000	100-500	Unknown	Unknown
Chetco	17100312	S2↓	250-1000	100-500	Unknown	Unknown

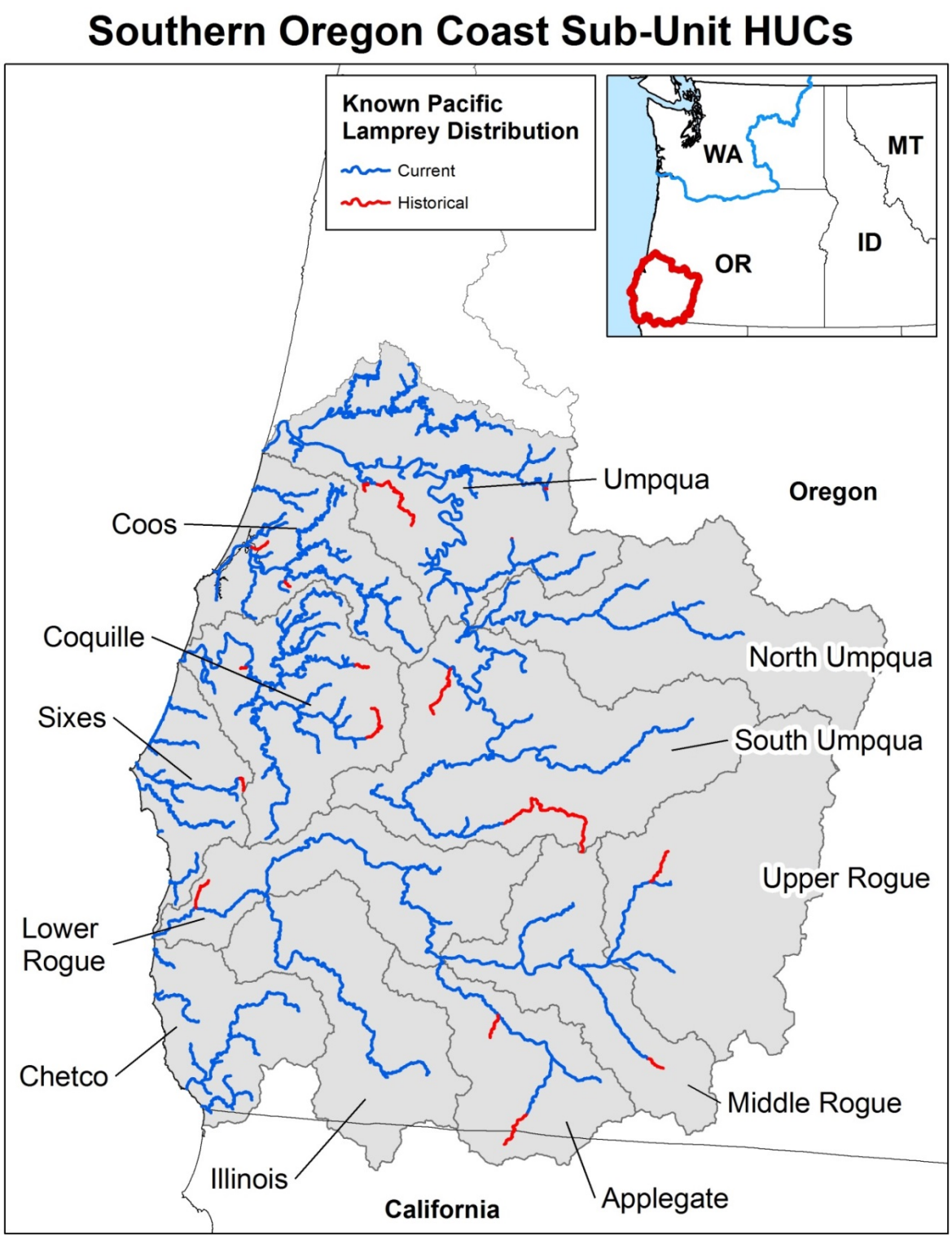


Figure 2. Current and historical known distribution for Pacific Lamprey: Oregon Coast Regional Management Unit, South Coast sub-region (USFWS Data Clearinghouse 2017). Historical Pacific Lamprey distribution depicted in map was obtained from published literature, tribal accounts and state and federal agency records.

Distribution and Connectivity

Threats to passage were considered low in the South Coast sub-region (see USFWS 2018). A number of major passage issues have been addressed in the North Umpqua (e.g., Rock Creek Dam upstream of the hatchery, Soda Springs Dam, Winchester Dam) and an unprecedented four dams have been removed from the Middle Rogue since 2007 (i.e., Savage Rapids, Elk Creek, Gold Hill, and Gold Ray Dam). However, a number of existing structures continue to impede passage or alter the hydrograph to the detriment of fish and aquatic wildlife. Most notably, Applegate Dam and Murphy Dam on the Applegate River, Galesville Dam on Cow Creek (South Umpqua), Emigrant Dam on Bear Creek (Middle Rogue), and Lost Creek Dam on the Upper Rogue completely block upstream passage and access to historical spawning and rearing habitat.

Private and municipal water diversions are abundant within the South Coast sub-region. Contemporary structures are required to operate and maintain screening or by-pass devices to protect fish from impingement or entrainment. Unfortunately there are still a large number of aging or obsolete diversions with inadequate screening and open irrigation ditches that may harm or entrap fish.

Faulty tidegates are numerous in tidally-influenced areas of the Coos and Coquille Rivers. The Coquille Watershed Association completed a tidegate inventory in the Coquille watershed in 2015 and is working with The Nature Conservancy, ODFW, and landowners to prioritize the removal and/or replacement of failing structures. Barrier culverts were also identified as a threat in the South Umpqua, Coos and Coquille Rivers. Stakeholder groups are working to systematically remove or replace problem culverts to restore fish passage.

C. Threats

Summary of Major Threats

The following table summarizes the key threats within the South Coast sub-region as identified by RMU participants during the Risk Assessment revision meeting in March 2017.

Table 3. Summary of the Assessment results for the key threats of the South Oregon Coast sub-region.

	Dewatering and Flow Management		Stream and Floodplain Degradation		Water Quality		Lack of Awareness		Climate Change	
Watershed	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity
South Oregon Coast										
North Umpqua	4	3	2	3	3	2.5	4	2	4	3
South Umpqua	3	4	4	3	4	3	4	2	4	4
Umpqua	3	3	3	3	3	3	4	2	4	4
Coos	2	2	3	3	3	3	4	2	3	3
Coquille	2.2	2	3	3	3.5	3	4	2	3	3
Sixes	1	2	3	3	3	3	4	2	2	2
Upper Rogue	3	3	3	2.5	3	3	4	2	2.5	2.5
Middle Rogue	3	3	3	3	3	3	4	2	3	2.5
Applegate	3	3	3	2.5	3	3	4	2	3	2.5
Lower Rogue	1	1	1	1.5	1	1	4	2	2	2
Illinois	4	4	3	3	4	4	4	2	4	3.5
Chetco	1	2	1	2	1	2	4	2	2	2
Average Scope/Severity	2.54	2.67	2.67	2.71	2.88	2.79	4.00	2.00	3.04	2.83
Rank	**M**	**M**	**M**	**M**	**M**	**M**	**H**	**M**	**M**	**M**
Mean	2.60		2.69		2.83		3.00		2.94	
Drainage Rank	**M**		**M**		**M**		**M**		**M**	

Current Threats

Dewatering and Flow Management

Water withdrawals for irrigation, municipal, or residential purposes leave many watersheds in the South Coast sub-region dewatered or with inadequate flow during summer and fall months. Low flow conditions are most severe in the Illinois River and Umpqua Basin. In recent years early cessation of rains, below average snow packs, and above average air temperature have further contributed to reduced stream flows in much of the region. The proliferation of marijuana farms and potential impacts from climate change may exacerbate this situation in the future as well. Low flow conditions may reduce spawning habitat availability, prevent access to backwater or side channel habitats, create low water barriers, and may contribute to mortality if incubating eggs or burrowing larvae are dewatered or exposed to a high temperature or low oxygen environment.

Stream and Floodplain Degradation

Stream and floodplain degradation is widespread throughout the South Coast sub-region. Within lowlands, wetlands and side channels have been channelized, diked, diverted or drained to prevent flooding, create farmland or pastures, and provide land for commercial and residential development. In upland areas, historical and ongoing timber practices, agriculture, road construction, and urbanization have deforested or altered the function and diversity of riparian vegetation. Suction dredge mining is of particular concern in the South Umpqua, Umpqua, and Illinois River. This practice may increase sedimentation and turbidity, alter stream channel topography, disturb and destabilize spawning and rearing habitat, kill incubating eggs and larvae, and may re-suspend contaminants such as mercury or other heavy metals in the water body.

Water Quality

Current water quality conditions are impaired in many watersheds; and elevated water temperature remains a widespread issue throughout the South Coast sub-region (https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Approved-by-EPA.aspx). Excessive temperatures are likely associated with heavy water withdrawals and extensive floodplain degradation. Chemical and herbicide inputs from agriculture and industrial forest practices were also noted as problematic in the Umpqua Basin and Chetco River.

Lack of Awareness

Scientific understanding of Pacific Lamprey life history characteristics, habitat needs, physiological limitations, and awareness in terms of Best Management Practices when conducting instream work has improved over the last 5-10 years. Nevertheless, there is still a large portion of the human population that is not aware of lamprey, its importance to freshwater ecosystems, and how to avoid impacts to them.

Climate Change

Some watersheds in the South Coast sub-region may be more resilient to impacts of climate change (Upper Rogue, Applegate, Sixes, North Umpqua), while others may be at greater risk from potential change (Illinois, Umpqua, South Umpqua) based upon the underlying geology,

impoundments, and other factors. Climate models predict increasing water temperatures, which may restrict habitat availability. Increased high intensity storm events and more precipitation falling as rain at higher elevations could cause flooding, which may lead to erosion and scouring of lamprey habitat. Earlier melting of snow pack due to warmer ambient temperatures may alter flow regimes during periods of lamprey spawning.

The impacts of relatively warm water temperatures (e.g., ≥20°C) on the embryonic development, physiology, adult migrations, reproductive capability and evolutionary pressures can be multitudinous and substantial (Clemens et al. 2016).

Predation

Although not considered a 'key threat', predation of lamprey ammocoetes by non-native fish species is a known issue in the South Coast sub-region. Smallmouth bass predation on juvenile lamprey has been documented in the Umpqua Basin (Schultz et al. in press) and is also believed to occur in the Coquille River. Furthermore, the introduction of the non-native Umpqua pikeminnow to the Applegate, Illinois, Chetco, and Rogue Rivers has likely increased predation of ammocoetes in these basins. Dams and diversions can increase habitat suitability for warm water fish species and may contribute to the decline of lamprey by delaying juvenile migration or exposing fish to increased predation. In addition stream temperature increases predicted with climate models may impact regulated and non-regulated rivers as well, increasing the upstream extent of habitat for non-native species (Lawrence and Olden 2013; Lawrence et al. 2014).

Restoration Actions

Pacific Lamprey conservation work in the South Coast sub-region is currently focused on adult passage improvement, expansion of occupancy surveys, habitat assessments, predation studies, and numerous projects to restore degraded habitat. The following conservation actions were initiated or recently completed by RMU partners in the South Coast sub-region from 2012-2018.

HUC	Threat	Action Description	Type	Status
RMU	Stream Degradation	Implementation of instream and floodplain habitat restoration activities (e.g. large wood placement, side channel and floodplain reconnection, channel reconstruction, bank stabilization, gravel recruitment, etc.).	Instream	Ongoing
RMU	Population	Conduct spawning ground surveys in mainstem and principal tributaries to monitor Pacific Lamprey distribution, timing, and number of redds to develop relative abundance indexes.	Survey	Ongoing
RMU	Stream Degradation	Senate Bill 838 imposed 5-year moratorium of suction dredge mining on all Oregon streams with designated	Instream	Underway

		Essential Salmon Habitat (ESH). Also restrictions on specific USFS and BLM waterways (e.g. Rogue, Illinois)		
RMU	Population	Environmental DNA sampling to fill distribution gaps on Rogue River Siskiyou National Forest Land.	Survey	Underway
RMU	Population	Oregon Department of Fish and Wildlife Conservation Plan for Lampreys in Oregon	Other	Complete
RMU	Other	Formation of South Coast Lamprey Working Group	Coordination	Ongoing
North Umpqua	Passage	Passage improvement at Soda Springs Dam.	Instream	Complete
North Umpqua	Passage	Pacific Lamprey spawning and rearing habitat suitability above Soda Springs Dam	Survey/ Assessment	Complete
North Umpqua	Passage	Passage improvement at Rock Creek Hatchery diversion dam fish ladder.	Instream	Complete
North Umpqua	Passage	Installation of Lamprey Passage Structure at Winchester Dam.	Instream	Complete
North Umpqua	Passage	Installation of video monitoring camera on Winchester Dam lamprey ramp	Instream	Underway
North Umpqua	Population	Conduct native fish inventory to establish baseline lamprey distribution dataset	Survey	Proposed
Umpqua	Predation	Smallmouth bass predation evaluation in lower Elk Creek and Umpqua R.	Assessment	Complete
Umpqua	Other	Formation of Umpqua River Basin Lamprey Working Group.	Coordination	Ongoing
Umpqua & Rogue Basins	Population	Lamprey distribution mapping, occupancy and environmental DNA sampling.	Survey	Ongoing
Umpqua & Rogue Basins	Lack of Awareness	Provide education and outreach to stakeholders, resource managers and community members	Coordination	Ongoing
Rogue Basin	Passage	Rogue Basinwide Priority Barrier Removal Analysis - project characterized and prioritized 38 passage barriers in basin.	Assessment	Complete
Rogue Basin	Passage	Low cost passage retrofits at irrigation diversion dams.	Assessment/ Instream	Proposed
Upper & Middle Rogue	Population	Distribution surveys in principal tributaries.	Survey	Complete

Middle Rogue	Passage	Removal of Fielder and Wimer dams on Evans Creek	Instream	Complete
Lower Rogue	Stream Degradation	Rogue River Estuary Strategic Plan and Lower Rogue Watershed Action Plan - to identify and prioritize conservation and restoration actions in lower Rogue and tributaries.	Assessment	Complete
Applegate & Illinois	Population	Distribution surveys in principal tributaries	Survey	Complete
Applegate & Illinois	Predation	Umpqua pikeminnow predation evaluation	Assessment	Proposed
Coos	Passage & Population	Evaluation of passage constraints and baseline presence/absence of lamprey within the Eel Lake basin	Assessment	Underway/ Complete
Coos	Passage	Installation of lamprey passage ramp/trap at Eel Creek Dam.	Instream	Underway
Coos	Population	Telemetry to monitor movement and distribution of Pacific Lamprey through Eel Lake Basin.	Assessment	Underway
Coos	Stream Degradation	Implementation of instream and floodplain habitat restoration activities (e.g. East Fork Millicoma Oxbow project, Ross Slough Project)	Instream	Complete
Coos	Population	Comparison of e-shocking and eDNA sampling (sediment & water samples) in the Coos Estuary (South Slough)	Assessment	Underway
Coos	Population	Development of eDNA citizen science network in greater Coos targeting Pacific and western brook lamprey	Assessment	Underway
Coos/ Coquille	Passage	Multiple culvert replacement or removal projects where lamprey salvage efforts occurred.	Instream	Ongoing
Coquille	Population	Expansion of lamprey spawning ground surveys in South Fork Coquille River.	Survey	Proposed
Coquille	Climate Change	Water quality monitoring in lower Coquille River to identify cold water refuge.	Survey/ Assessment	Underway

II. Selection of Priority Actions

A. Prioritization Process

Participating members of the South Coast sub-region had a conference call on May 1st, 2019 to discuss completed and ongoing conservation actions and identify specific projects and research needed to address threats and uncertainties within the region. Project proposals were submitted online and sent to RMU members for review. The following projects were submitted by RMU partners for the South Coast sub-region in 2019:

- Larval Lamprey ID Workshop
- Twelvemile Creek Restoration
- Understanding Pacific Lamprey distribution and habitat use in smaller streams with no passage barriers
- Lamprey Passage for Small Dams in the Applegate Watershed

B. High Priority Proposed Project Information

Project Title: Larval Lamprey ID Workshop

Project Applicant/Organization: Coquille Indian Tribe- and South Coast Lamprey Working Group (SCLWG)
Contact Person: Helena Linnell; Benjamin Clemens
Email: helenalinnell@coquilletribe.org; ben.clemens@oregonstate.edu
Phone: Helena Linnell: 541-756-0904; Benjamin Clemens: 541-757-5113

Project Type: Outreach & Education

Lamprey RMU population: South Oregon Coast Sub-Region
Watershed (5th HUC Field): Oregon Coast
NPCC Subbasin (4th HUC Field) name: 19 basins in the Oregon Coast
Project Location*:* Classroom portion to take place at The Mill Casino Hotel (North Bend, OR)

Total Requested funds: $18,179.28

Short Project Summary (200 words or less):

The Coquille Indian Tribe and the SCLWG have identified a need to provide a one day Larval Lamprey ID Workshop with emphasis on field identification. This workshop will provide biologists and conservationists with hands-on training to enable identification of larval lampreys on the Oregon Coast. The cost will provide nominal funds to a lamprey expert, Dr. Stewart Reid, and for breakfast for workshop attendees (free attendance). Dr. Reid has decades of field experience and numerous publications, including identification of larval lampreys (Goodman et al. 2009). He has conducted previous larval lamprey ID workshops during 2011 – 2014.

1. *Detailed Project Description (500 words or less):*

The Coquille Indian Tribe and SCLWG have identified a need to provide a one day Larval Lamprey ID Workshop with emphasis on field identification as a refresher for seasoned professionals and an introduction to newer lamprey biologists and other field biologists.

The workshop would entail about two to three hours of classroom instruction on basic lamprey biology and life histories, with an emphasis on hands-on instruction of how to identify larval lampreys. The remainder of the day will include field sampling and identification of specimens in the field. The workshop would be open to 50 to 125 people for one day on the southern Oregon coast in the spring of 2020.

Lamprey are a first food, a significant species for Tribal communities. As such, we are also proposing to offer a scholarship for a representative of each of the nine federally recognized

Tribes in Oregon to attend the workshop. In addition to the general announcement to biologists and conservationists, the Coquille Indian Tribe staff will reach out to the nine Tribes, with an opportunity to attend this workshop with financial assistance for travel and lodging. For Tribes, often travel and other associated costs can be a significant barrier to furthering education of their Tribal staff.

2. ***Descriptive Photographs-illustrations-Maps*****:** N/A

3. ***Linkage of actions to Identified Threats in RMU (300 words or less):***
   - *What threat(s) does this project address?* **Lack of Awareness**
   - *Project scope: Does this project address threat(s) specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?*
     Single RMU ☒, Multiple RMUs ☐ list additional RMUs:
   - *How does this project address key threat(s) within the HUC where project is proposed?*
     - Education of seasoned and newer biologists on lamprey biology and identification is important for project specific, in-water work (e.g. fish salvage) and monitoring to share that information with the public.

4. ***Species/Habitat Benefits (200 words or less):***
   - *How will the project provide meaningful measureable results to improve lamprey populations and/or their habitat conditions?*
     - The workshop will provide an opportunity for biologists to learn the keys to identifying larval lampreys in the field. This will allow them to better participate in in-water work projects and other activities that may have an effect on lampreys, and to identify potential impacts to them.
   - *What life stage or stages will benefit from action? How?*
     - The emphasis will be on the life stage most commonly encountered in the wild: larvae. However, this workshop will address all life stages will be incorporated into both the classroom and field identification portions of the workshop. This will benefit attendees (and lamprey) in proper understanding of the biology/life history and identification for projects that they will be involved with.
   - *What other species may benefit from action?*
     - In addition to Pacific Lamprey, this project will address other lampreys that co-occur with this species: Western Brook Lamprey (*Lampetra richardsoni*) and Western River Lamprey (*Lampetra ayresii*).

5. ***Project Design / Feasibility (200 words or less):***
   - *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?* Yes ☒, No☐

6. ***Partner Engagement and Support (200 words or less):***
   - *What partners are supporting the project?*
     - The Coquille Indian Tribe along with the Steering Committee of the SCLWG are in full support of the project. The Steering Committee of the SCLWG is comprised of: Bureau of Land Management, Coquille Indian Tribe, Cow Creek Band of Umpqua Tribes of Indians, Oregon Department of Fish (ODFW) and Wildlife, South Slough National Estuarine Reserve, and the US Forest Service.
   - *What partners are active in implementing the project?*
     - The Coquille Indian Tribe and ODFW are the active partners in implementing the proposed workshop.
   - *What partners are providing matching funds or in-kind services that directly contribute to the project?*
     - The Coquille Indian Tribe will provide in-kind services (classroom space).
     - Member groups of the Steering Committee of the SCLWG will provide sampling gear (backpack electroshockers, buckets, nets, viewing windows, etc.).

7. ***Monitoring and Reporting (200 words or less):***
   - *How is completion of the project going to be documented?*
     - The final written report will include the number of attendees, organizational affiliation and location of the organization. Also included will be the curriculum that was taught, photographs, and any outstanding questions or comments from attendees.
   - *How will the projects' benefits to lamprey be monitored over time?*
     - This project will provide education and training of resource professionals that is not easily measured into the future. Results will include raising overall awareness and increasing the potential of workshop participants educating and informing other professionals and citizens.

8. ***Project Budget (Including overhead):*** See detailed budget below
   - Total RIP funding requested: $18,179.28
   - Total cost share: $46,938.81
   - Total project cost: $65,118.09

9. ***Timeline of major tasks and milestones:***

Workflow	***Start Date/Month***	***End Date/Month***	***Responsible Party***
Pre-project preparation	*July 2019*	*April 2020*	*SCLWG Steering Committee*
Field surveys	*April 2020*	*April 2020*	
Reporting	*May 2020*	*May 2020*	CIT/ODFW

10. References

Goodman, DH, AP Kinziger, SB Reid, and M Docker. 2009. Morphological diagnosis of *Entosphenus* and *Lampetra* ammocoetes (Petromyzontidae) in Washington, Oregon, and California. Pages 223 – 232 In: Brown LR, Chase SD, Mesa MG, Beamish RJ, and Moyle PB (eds) Biology, management, and conservation of lampreys in North America. Am Fish Soc Symp 72

Project Budget:

	Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	-	-	-	-	-
	a. SCLWG Steering Committee	30	40.00	0.00	1,200.00	1,200.00
	b. Dr. Stewart Reid	1	2,000.00	2,000.00	0.00	2,000.00
B	***Equipment & Supplies:***	-	-	-	-	-
	a. Backpack electroshocker	4	7,286.00	0.00	29,144.00	29,144.00
	b. Various nets	25	10.00	0.00	250.00	250.00
	c. Buckets	25	7.00	0.00	175.00	175.00
	d. Viewing windows	25	20.00	0.00	500.00	500.00
C	***Travel:***	-	-	-	-	-
	a. N/A	-	-	-	-	-
D	***Other:***	-	-	-	-	-
	a. Classroom space (includes IT)	1	425.00	0.00	425.00	425.00
	b. Catering	100	10.95	1,095.00	0.00	1,095.00
	c. Tribal Scholarship	9	1,20.00	9,180.00	0.00	9,180.00
E	***Administrative:***	-	-	-	-	-
	Overhead (%)- N/A	-	-	-	-	-
	Indirect Costs (48.10%)[1]	-	-	5,904.28	15,244.81	21,149.09
	Total (Sum of A - E)	-	-	18,179.28	46,938.81	65,118.09

[1] The Coquille Indian Tribe has a 2019 negotiated indirect cost agreement set at 48.10%. The agreement is attached.

Project Title: *Twelvemile Creek Restoration*

Project Applicant/Organization: Coquille Watershed Association
Contact Person: Kyle Motley
Email: kmotley@coquillewatershed.org
Phone: 541-260-1433

Project Type: Habitat Restoration

Lamprey RMU population: South Oregon Coast Sub-Region
Watershed (5th HUC Field): Middle Fork Coquille River #1710030501 HUC
NPCC Subbasin (4th HUC Field) name: Coquille #17100305
Project Location: Twelvemile Creek

Total Requested funds: $35,065.00

Short Project Summary (200 words or less):

This project will restore channel complexity and floodplain connection in Twelvemile Creek, a 24,000-acre drainage to the Middle Fork Coquille River. Twelvemile Creek provides habitat for coho, Chinook, steelhead, coastal cutthroat trout, and is an important spawning and rearing basin for Pacific lamprey. Primary limiting factors in the sub-watershed include a lack of stream habitat complexity and poor water quality. Historically, Twelvemile Creek was clear-cut and subjected to stream cleaning. Resultantly, most of Twelvemile Creek and its major fish bearing tributaries have disconnected floodplains, large sections of bedrock substrate and lack sufficient large wood structures (LWD) and spawning gravel. To address these limiting factors, the Coquille Watershed Association, Roseburg BLM, ODFW and private timber companies are working towards a shared goal of improving spawning and rearing habitat for Pacific lamprey in the Twelvemile Basin. Project components include placing boulders and LWD into Twelvemile Creek and its tributaries and road improvements for sediment reduction. Roseburg BLM and OWEB are funding wood placement on BLM property and road surveys. Funds from this solicitation will be used to acquire and place boulders and LWD structures on private timber property, resulting in a holistic restoration project across an entire sub-watershed.

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

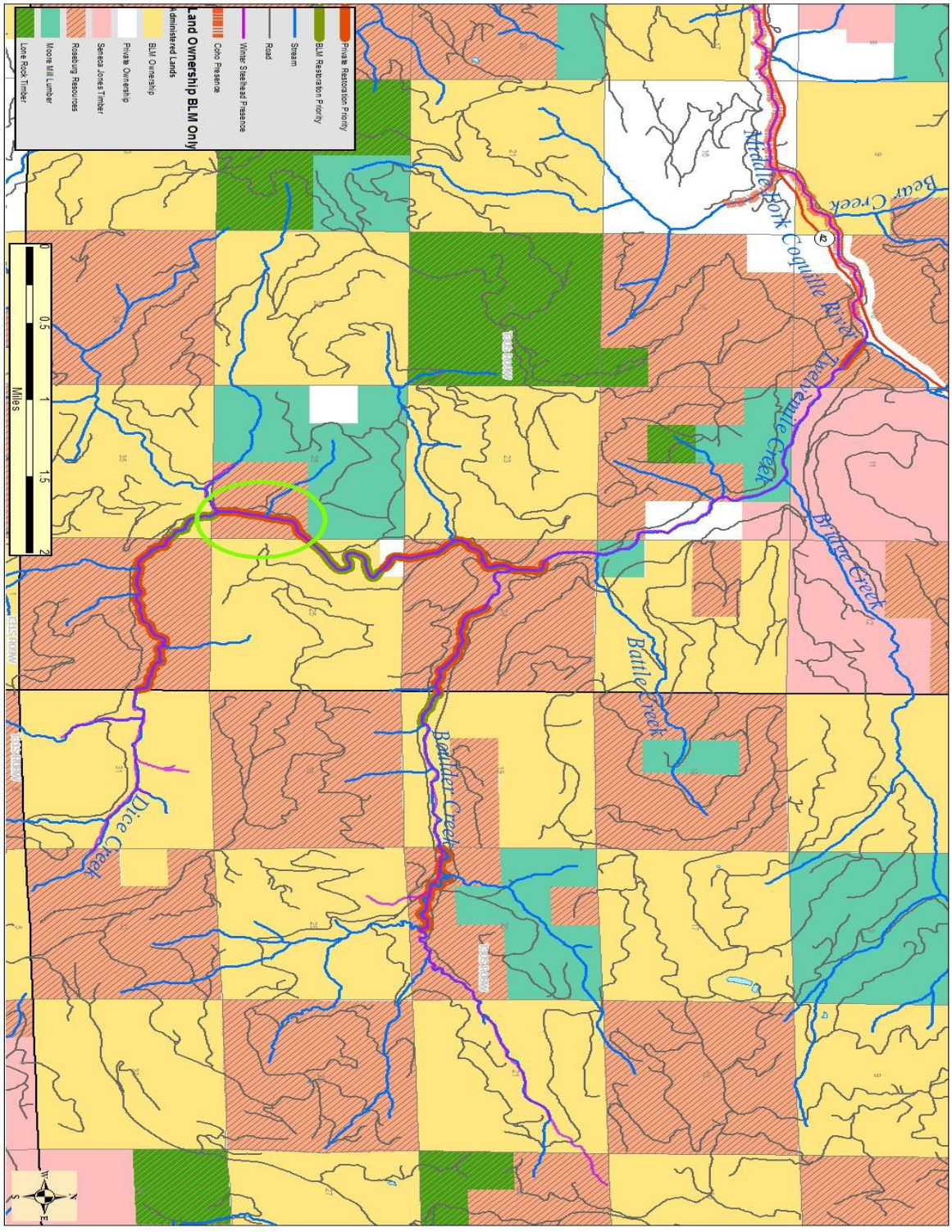
Twelvemile Creek is an important sub-watershed for Pacific lamprey within the Coquille River Basin. Unfortunately, due to past land management, large sections of Twelvemile Creek and its tributaries are lacking LWD, channel complexity and floodplain connection. These changes in habitat have had drastic impacts on native fish throughout the basin and Pacific lamprey have been particularly hard hit. Intensive logging and stream cleaning have led to down- cut channels with large sections of exposed bedrock and little capacity to sort and recruit spawning gravels and fine sediments; resulting in a lack of both spawning and ammocoete habitat.

To address these issues, CoqWA, Roseburg BLM, ODFW and private timber companies are addressing limiting factors for lamprey and other native fish by developing holistic watershed level restoration actions. Roseburg BLM will be placing LWD and boulder structures into 8 sites on adjacent BLM property in 2020 to help recruit gravel and develop floodplain connection for native fish. CoqWA is currently performing road surveys to address sediment loading and developing restoration projects from AQI surveys. Funds from this solicitation will be used to improve habitat for Pacific lamprey on a large section of exposed bedrock in Twelvemile Creek (see map). Specifically, this application will accomplish the following objectives:

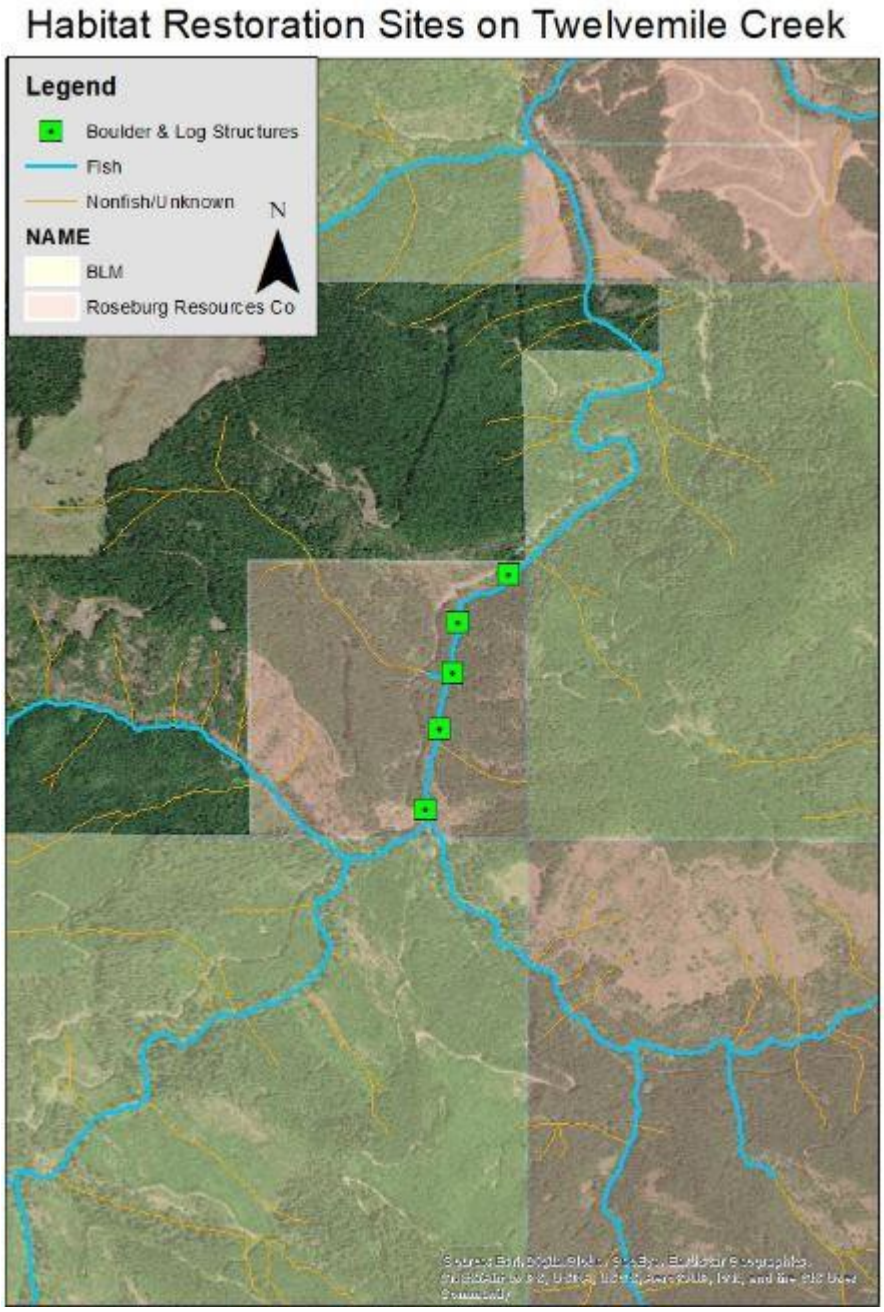
- Deliver 100 boulders and 15 logs to the restoration site before July 1, 2020.
- Construct 5 boulder and log structures to sort gravels and fine sediments for Lamprey habitat during the 2020 In-Water Work Period (IWWP).
- Coordinate with BLM and ODFW to ensure continuity between restoration sites and a cost efficient workflow throughout the IWWP.

Boulders will be acquired from Kincheloe and Sons quarry and delivered in conjunction with restoration activities on BLM property. Hazard trees on BLM property that burned in the 2017 Horse Prairie fire will be donated by the BLM for restoration logs. Felling and transport of logs will be done in conjunction with felling and delivery for concurrent restoration activities. Each site will contain 20 boulders and 3 logs constructed to maximize longevity, sort gravels and fines, and provide habitat complexity for all life stages of lamprey. Each site will be designed based on ODFW specifications, local knowledge and experience, and to maximize habitat benefits at each specific location. Additionally, sites will be designed and constructed to complement restoration sites on BLM property directly upstream and downstream of the project location.

2. Descriptive Photographs-illustrations-Maps:



Map 1. Twelvemile Basin with the proposed restoration site circled in green.



Map 2. Location of lamprey restoration sites on Roseburg Resources property.

Photo 1. Long section of exposed bedrock at the project site. This substrate is typical throughout the project site and across the Twelvemile Basin.

3. Linkage of actions to Identified Threats in RMU (300 words or less):

- *What threat(s) does this project address?* **Stream and Floodplain Degradation**
- *Project scope: Does this project address threat(s) specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?*
  Single RMU ☒, Multiple RMUs ☐ list additional RMUs:
- *How does this project address key threat(s) within the HUC where project is proposed?*

Stream and floodplain degradation is the most critical threat that needs to be addressed in the Twelvemile Basin. Past land use has created a lack of spawning gravel, fine sediments for ammocoetes and floodplain connection/complexity that are limiting the resilience of lamprey populations. By creating boulder and log structures on a portion of Twelvemile Creek that is cut down to bedrock, this project will allow natural processes to address these threats. Specifically, these structures will slow down water to recruit gravel and fine sediments while also facilitating stream complexity and floodplain connection.

4. ***Species/Habitat Benefits (200 words or less):***
    - *How will the project provide meaningful measureable 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?*

This project, along with other restoration activities being performed in the area, will provide measurable improvements to habitat conditions in the Twelvemile Basin which will translate into improvements in lamprey populations. Gravel and fine sediment recruitment will have positive benefits for both the adult and larval stages on lamprey by providing habitat that has been depleted for these life stages in Twelvemile Creek. These processes will also provide habitat benefits for steelhead and cutthroat trout as well.

5. ***Project Design / Feasibility (200 words or less):***
    - *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?* Yes ☒, No☐

Project designs follow the Guide for Placement of Wood, Boulders and Gravel for Habitat Restoration published by OWEB and ODFW. Additionally, past analyses from AQI surveys have determined that the reaches being treated in this project are of the highest priority for habitat restoration in Twelvemile Creek. AQI data and field surveys were used to design five sites with 20 boulders and 3 logs each. Boulders will be 1.5 cubic yards to withstand high flows and logs will be keyed into boulders and trees within the riparian area. Implementation will be supervised by a CoqWA Restoration Coordinator and a BLM Fish Biologist to ensure stability and maximize benefits.

6. ***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?*

CoqWA will partner with the Roseburg BLM and Roseburg Forest Products Co. to implement restoration. Roseburg BLM will be implementing habitat restoration for lamprey and steelhead on BLM property adjacent to the project site and will partner with CoWA for efficient contracting, delivery, staging and implementation. Roseburg Forest Products is supportive of this project and is allowing restoration on their property as well as providing match and support for future projects in the basin. Matching funds will be provided by Roseburg BLM for this specific project, but partners funds from OWEB and ODFW are being used for ongoing technical assistance activities in Twelvemile Creek.

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

- *How is completion of the project going to be documented?*
- *How will the projects' benefits to lamprey be monitored over time?*

Three photo points will be taken at each site. Photos will be taken before restoration, directly after restoration and once a year for 5 years after restoration. Additionally, a CoqWA Program Coordinator will visit each log and boulder placement site during high winter flows to ensure stability of the structures. Ongoing spawning surveys performed by the BLM in the basin will document changes in lamprey usage of restoration sites. Together, these monitoring actions will provide a picture of the total benefits realized during this restoration project.

8. Project Budget:

	Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	-	-	-	-	-
	a. CoqWA Coordinator	400	$35.00	$7,000.00	$7,000.00	$14,000.00
	b. CoqWA Director	40	$37.00	$1,480.00	$0.00	$1,480.00
	c. Roseburg Resources Forester	40	$30.00	$0.00	$1,200.00	$1,200.00
	d. BLM Fish Biologist	20	$40.00	$0.00	$800.00	$800.00
B	***Equipment & Supplies:***	-	-	-	-	-
	a. Boulders for BLM and CoqWA, delivered	100	$70.00	$7,000.00	$0.00	$6,000.00
	b. Trees with rootwads, delivered	15	$300.00	$0.00	$4,500.00	$6,000.00
	c.					
	d.					
C	***Travel:***	-	-	-	-	-
	a. CoqWA office to site, 82 miles round trip	4,100	$0.585	$2,398.00	$0.00	$2,398.00
D	***Contracted Services***	-	-	-	-	-
	a. Boulder and log placement	40	$350.00	$14,000.00	$0.00	$12,000.00
	b. Boulder and log placement on adjacent BLM property	1	$30,300.00	$0.00	$30,500.00	$30,300.00
E	***Administrative:***	-	-	-	-	-
	Overhead (10 %)			$3,187.00	$ 3,000.00	$6,187.00
	Indirect Costs (%)					
	Total (Sum of A - E)	-	-	$35,065.00	$47,000.00	$82,065.00

9. Timeline of major tasks and milestones:

Workflow	***Start Date/Month***	***End Date/Month***	***Responsible Party***
Environmental compliance/permits	***9/2019***	***12/2019***	***BLM***
Pre-project preparation	***2/2020***	***6/2020***	***BLM and CoqWA***
Field surveys	***Finished***	***Finished***	***BLM and CoqWA***
Implementation	***7/2020***	***9/2020***	***BLM and CoqWA***
Data analysis	***Finished***	***Finished***	***CoqWA***
Reporting	***9/2020***	***9/2022***	***CoqWA***

Project Title: Understanding Pacific Lamprey distribution and habitat use in smaller streams with no passage barriers

Project Applicant/Organization: Oregon Department of Fish and Wildlife
Contact Person: Steve Starcevich and Ben Clemens
Email: steve.starcevich@oregonstate.edu, Ben.Clemens@oregonstate.edu
Phone: 541-231-1806

Project Type: Research

Lamprey RMU population: South Oregon Coast Sub-Region
Watershed (5th HUC Field): Coos River, Coquille River, Smith River, Siuslaw River, and their tributaries
NPCC Subbasin (4th HUC Field) name: Coos, Coquille, Smith-Umpqua
Project Location: South Oregon Coast Sub-Region study area

Total Requested funds: $50,894

Short Project Summary (200 words or less):

In coastal Oregon basins, there are thousands of potential fish passage barriers (Figure 1). These typically are culverts at road crossings, which disproportionately affect small streams (Figure 2). Pacific Lamprey distribution is associated with low elevations and large stream size (Pirtle et al. 2002, Gunckel et al. 2009); however, this species is also distributed in smaller stream channels (Torgersen and Close 2004, Dunham et al. 2013, Starcevich and Clements 2013). Given barrier numbers and uncertainty about their effect on Pacific Lamprey in these watersheds, understanding the importance of these channels to this species is a critical research need (Mesa and Copeland 2009).

The main goal of this project is to bolster the information databases on distribution and habitat use of Pacific Lamprey. The second goal is to create an occupancy model for Pacific Lamprey in streams with no barriers. The third goal is to use this model to identify and prioritize barriers for removal based on their potential impact on Pacific Lamprey. Occupancy electrofishing surveys will occur in selected coastal watersheds in streams with no passage barriers. Reach and site characteristics will be used to model occupancy and detection. This model will be used to refine sampling frames for monitoring, evaluate potential barrier effects, and prioritize barrier removal.

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

Objectives

The first objective is to obtain an extensive and representative sample of larval lamprey distribution in streams with no passage barriers in the South Coast Oregon Sub-Region. The second objective is to create an occupancy model that describes the habitat characteristics of stream channels where

larval lamprey are likely to occupy or not occupy when not influenced by passage barriers. Finally, the third objective is to apply the model to streams with passage barriers in this sub-region to identify and prioritize barriers by their potential impact on Pacific Lamprey.

Study Areas

The Coos, Coquille, Smith-Umpqua, and neighboring watersheds in the South Coast Regional Management Unit (RMU) are the proposed study areas for three reasons. First, the Oregon Coast Regional Implementation Plan (RIP) identifies the threat of culvert barriers to Pacific Lamprey as a main concern in the Coos, Coquille, and South Umpqua. Second, the RIP reports relatively high adult Pacific Lamprey abundance in the Coos and Coquille basins, and high abundance has been documented in the Smith River (an Umpqua tributary, see Starcevich and Clements 2013) which suggests there will be relatively high larval seeding of available habitat. Third, these watersheds are adjacent in their respective RMUs and would be logistically easier for a single crew to survey.

Sampling Frame

The sampling frame of streams in Oregon coastal watersheds for this project will be based on the one used by ODFW's Oregon Adult Salmonid Inventory and Sampling (OASIS) monitoring program for estimating salmon and Pacific lamprey status. A subset of candidate streams within the study area will be identified by the main study criterion: no natural or artificial barriers to lamprey movement.

Survey Design

Each sample stream will be divided into 500 m reaches. Basin area for the downstream boundary of each reach will be estimated using GIS and linked to stream width and discharge through hydrological equations and field reconnaissance. Stratified random sampling will be used to select sample reaches at the following stream width stratifications: 10-6 m, <6-3 m, and <3 m. In order to estimate occupancy and detection probability, a subsample of reaches will be surveyed using a spatial revisit occupancy design: Electrofishing surveys of all Type I and Type II rearing habitat will be taken from three different pools in this sample reach. Sampling will occur from July through September.

Field Protocol

The field crew will locate the downstream end of a sampling reach using a GPS, move upstream to the nearest pool channel unit and conduct the electrofishing survey. Captured lampreys >70mm total length will be identified as Pacific Lamprey or Western Brook Lamprey (i.e., Lampetra subspecies). All other lampreys will be counted and recorded. Pools are characterized by relatively high availability of Type I rearing habitat and relatively high densities of rearing larvae (Starcevich and Clemens 2013, Reid and Goodman 2015). A habitat survey will follow the electrofishing survey. Wetted and bankfull channel width and stream discharge will be measured for each reach. Surface area of Type I and Type II larval rearing substrate will be estimated for the sample pool. Pool dimensions will be measured. Reach slope will be estimated for each site using GIS.

Data analysis

Occupancy modeling will be used to evaluate the relationship of covariates to Pacific and Western Brook lamprey occupancy and detection. These covariates will include channel width, pool characteristics, substrate, survey date, and presence or absence of the other lamprey species.

2. Descriptive Photographs-illustrations-Maps:

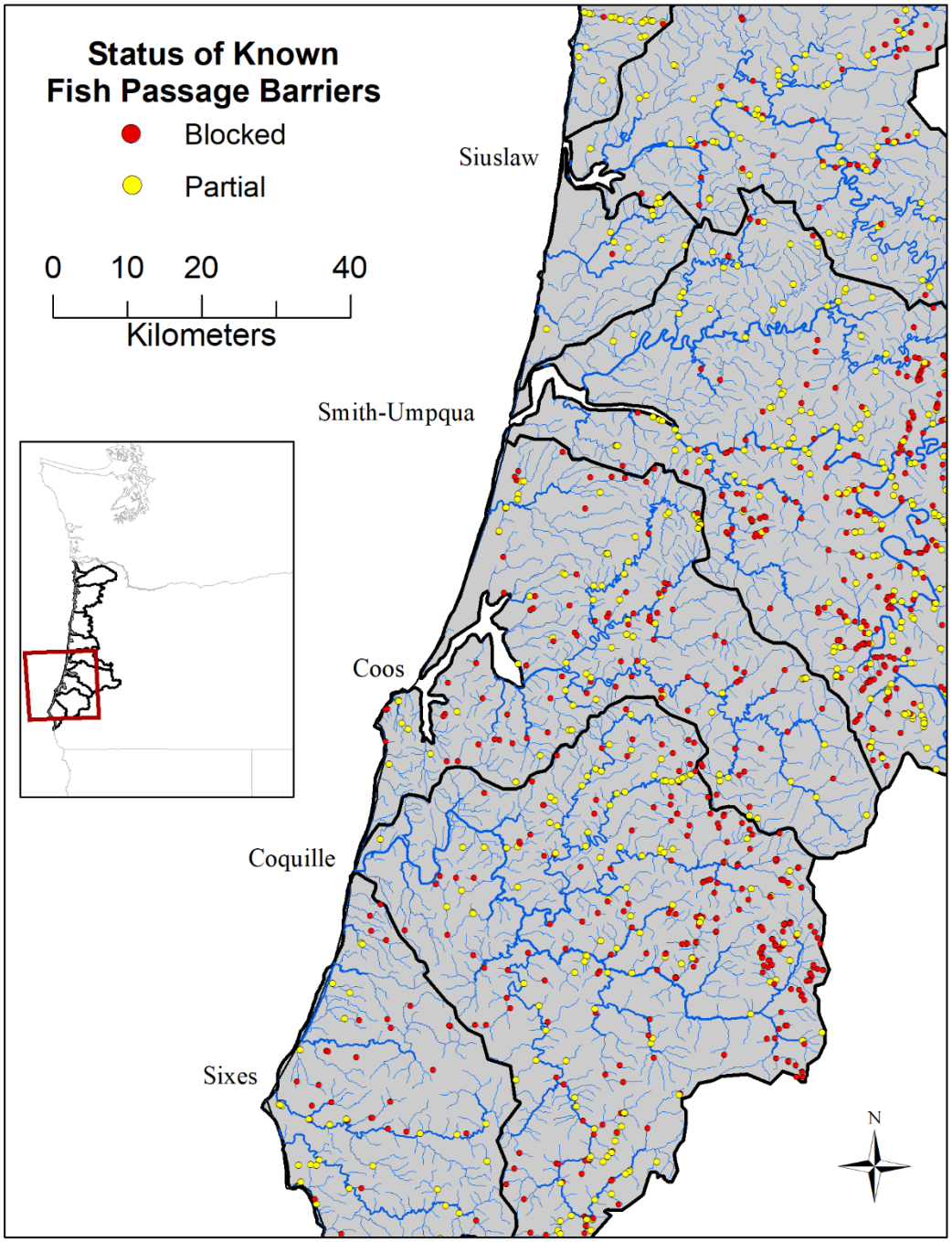


Figure 1. Map of barriers known to block or partially fish passage in South Coast Oregon basins. Point data are from the Oregon Fish Passage Barrier Data Standard dataset, ODFW.

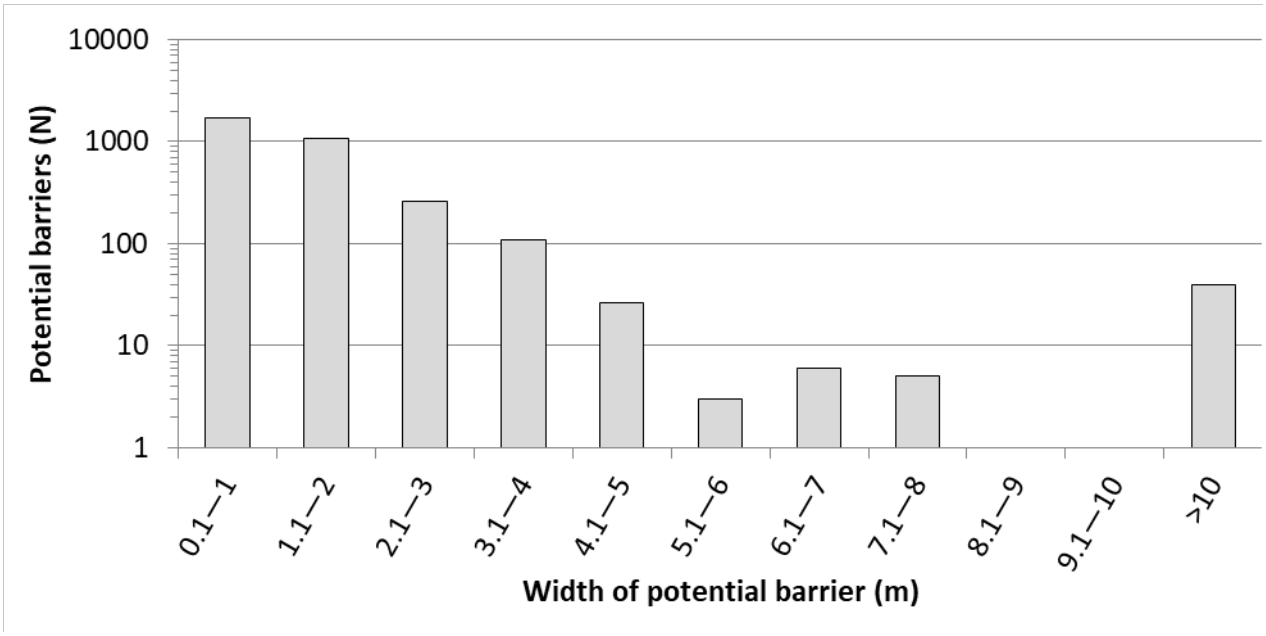


Figure 2. Frequency distribution of barrier width in the coastal Oregon watersheds; 96% of which are culverts (Oregon Fish Passage Barrier Data Standard dataset; figure from Starcevich and Clements 2013). One study in the Siuslaw National Forest provides data that suggest bankfull width of streams with older ("non-replaced") culverts are on average twice as wide as the potential barrier width (Chelgren and Dunham 2015)

3. Linkage of actions to Identified Threats in RMU (300 words or less):

- *What threat(s) does this project address?* ***Passage***
- *Project scope: Does this project address threat(s) specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?*
  Single RMU ☐, Multiple RMUs ☒ list additional RMUs: South Coast Oregon RMU
- *How does this project address key threat(s) within the HUC where project is proposed?*

The threat of culvert barriers to Pacific Lamprey has been identified as an important concern in the Coos, Coquille, and South Umpqua basins. Some of the culvert barriers on larger stream channels, which are known to restrict Pacific salmon and lamprey distribution and abundance, have been removed or are prioritized for removal. However, there are thousands of culvert barriers in smaller streams (<10 m bankfull width) in these RMUs and their impact on Pacific Lamprey is unknown. Pacific Lamprey have been shown to use smaller channels, which suggests that many more culverts than currently recognized may be limiting distribution and abundance of Pacific Lamprey. The extent of this threat is unknown because there is a lack of scientific understanding of how Pacific Lamprey use these stream reaches, which prevents regional managers from adequately evaluating these culvert barriers for their potential impact on distribution. This proposed project addresses this need for information on Pacific Lamprey distribution and habitat use in these stream reaches and will result in a model that can be used to inform culvert removal programs in regard to Pacific Lamprey in these RMUs.

Secondarily, this project focuses its sampling frame in the upper reaches of these watersheds, which may act as refugia from the threats identified in the Oregon Coast RIP of elevated water

temperatures and climate warming. These upper reaches are colder than low elevation reaches and may provide thermally stable spawning and rearing habitat for Pacific Lamprey. This increases the motivation for understanding how Pacific Lamprey use these reaches.

Furthermore, the distribution and habitat use information of this project may be useful in delineating potential Pacific lamprey spawning habitat in other lamprey RMUs and refining the sampling frame of the OASIS monitoring program in the Oregon coastal RMUs to reflect the actual Pacific Lamprey distribution potential.

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

- *How will the project provide meaningful measureable 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?*

This project will improve our understanding of Pacific Lamprey and Western Brook Lamprey distribution and habitat use and provide an occupancy and detection model for larval Pacific Lamprey that can be used as a tool for determining suitable habitat for rearing, and indirectly for spawning, in the upper reaches of watersheds. This model can be used to inform management actions (i.e., culvert removal) and improve monitoring programs.

5. Project Design / Feasibility (200 words or less):

- *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?* Yes ☒, No☒

This project is highly feasible because we have allotted enough time for pre-project planning and preparation and possess the expertise to carry out this study (please see the Budget and Timeline section). We have scheduled an extensive pre-project preparation period because of the large size of our proposed study area and the need to determine the sampling frame through a combination of GIS identification and time-consuming in-situ verification of barrier-less streams. Once the sampling frame is delineated, then we need to identify private landowners and contact them for permission to access study sites on their land prior to conducting field work. As such, our timeframe for completion meets all the dates specified by the NFHP except for the final written report due date. We are proposing to conduct the field surveys from July 1 to September 30, 2021, and we will not have time to conduct the analysis and finalize the report by the due date on October 31, 2021. We project that the final report will be completed by May 30, 2022. Our timeframe does not meet the firm and shorter timeframe for completion required by BPA. Regarding miscellaneous end of year funding, the 2-2.5 year timeframe (depending on when the contract begins) we have specified meets the requirement for project completion of 3 years or less.

6. 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?*

We have begun outreach to the coastal Oregon RMUs and will continue seeking support and active partners from state, federal, and tribal agencies, Oregon State University, and other interested local parties. ODFW will provide in-kind services in the form of sampling frame and study design development, field crew training and supervision, some field gear, data analysis, and summarization of results.

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

- *How is completion of the project going to be documented?*
- *How will the projects' benefits to lamprey be monitored over time?*

The completion of the project will be documented in a final report and may include an annual report, depending on the source of funding and the timeframe of completion.

This project will benefit Pacific Lamprey within this RMU and region-wide by contributing information needed to properly manage and monitor this species. Mainly, it will provide distribution and habitat use information about Pacific Lamprey in small streams, which are disproportionately affected by culvert barriers in this RMU. The effect of culvert barriers on Pacific Lamprey status has been identified as a critical uncertainty in need of research (Mesa and Copeland 2009). The occupancy model developed from this project can be used in this RMU and likely will be useful to managers in other RMUs to identify and prioritize culvert barriers for removal based on their potential impact on Pacific Lamprey abundance and distribution.

8. Project Budget:

Items	Unit	Quantity	Unit Cost	Requested Funds	ODFW	Total Cost
Personnel Services:						
NRS-3 (Project Leader)	Month	2.5	$10,408		$26,020	26,020.00
ODFW Lamprey Coordinator		1	$10,408		$10,408	10,408.00
EBA (Field Technician)	Month	6	$5,154	$30,924		30,924.00
Services and Supplies:						
Employee allowances	Year	2	$300	$600		600.00
Sampling gear & supplies				$1,000		1,000.00
Travel:						
Employee per diem	Day	50	$80	$4,000		4,000.00
Vehicle lease	Month	3.5	$750	$2,625		2,625.00
Adminstrative Overhead:						
Overhead			30%	$11,744.70		11,744.70
		Agency Share		$50,894	$36,428	87,321.70
		Agency Share (%)		58%	42%	100%

9. Timeline of major tasks and milestones:

Workflow	Date completed
Incidental take permits	May 2020 - July 2020
Pre-project preparation	July 2020 - June 2021
Field surveys	July 2021 - Sept 2021
Analysis & summarization	Oct 2021 - May 2022

10. References (If Applicable)

Chelgren, N. D, and J. B. Dunham. 2015. Connectivity and conditional models of access and abundance of species in stream networks. Ecological Applications 25:1357-1372.

Dunham, J. B., N. D. Chelgren, M. P. Heck, and S. M. Clark. 2013. Comparison of electrofishing techniques to detect larval lampreys in wadeable streams in the Pacific Northwest. North American Journal of Fisheries Management 33:1149–1155.

Gunckel, S. L., K. K. Jones, and S. E. Jacobs. 2009. Spawning distribution and habitat use of adult Pacific and western brook lampreys in Smith River, Oregon. Pages 173–190 *in* L. R. Brown, S. D. Chase, M. G. Mesa, R. J. Beamish, and P. B. Moyle, editors. Biology, management, and conservation of lampreys in North America Symposium. American Fisheries Society, Bethesda, Maryland.

Mesa, M. G., and E. S. Copeland. 2009. Critical uncertainties and research needs for the restoration and conservation of native lampreys in North America. Page 311321 *in* L. R. Brown, S. D. Chase, M. G. Mesa, R. J. Beamish, and P. B. Moyle, editors. Biology, management, and

conservation of lampreys in North America Symposium. American Fisheries Society, Bethesda, Maryland.
Pirtle, J., J. Stone, and S. Barndt. 2002. Evaluate habitat use and population dynamics of lampreys in Cedar Creek, Annual Report 2000. Portland, Oregon.
Reid, S. B., and D. H. Goodman. 2015. Detectability of Pacific Lamprey occupancy in western drainages : implications for distribution surveys. Transactions of the American Fisheries Society 144:315–322.
Starcevich, S. J., and S. Clements. 2013. Larval lamprey distribution and habitat use in small stream channels on the Oregon coast. ODFW Progress Report. Corvallis, Oregon.
Torgersen, C. E., and D. A. Close. 2004. Influence of habitat heterogeneity on the distribution of larval Pacific lamprey (*Lampetra tridentata*) at two spatial scales. Freshwater Biology 49:614–630.

Project Title: Lamprey Passage for Small Dams in the Applegate Watershed

Project Applicant/Organization: Applegate Partnership & Watershed Council
Contact Person: Jakob Shockey
Email: jakob@apwc.info
Phone: (541) 890-9989

Project Type: Passage Improvement

Lamprey RMU population: South Oregon Coast Sub-Region
Watershed (5th HUC Field): Applegate 17100309
NPCC Subbasin (4th HUC Field) name: N/A
Project Location: Varies locations throughout the Applegate

Total Requested funds: $29,846

Short Project Summary (200 words or less):

Across the Rogue Basin, there are a large number of small, channel spanning concrete dams. Many of these structures predate current fish passage regulations, and continue to serve as irrigation diversions for active water rights, making them difficult or impossible to remove or modify for salmonid passage. Many of these salmonid barriers may also serve as passage barriers to lamprey, given the right angle concrete lip at the dam's crest over which lamprey are often unable to navigate.

Within this project, our goal is to target 6 of these structures that present a passage issue to lamprey within the Applegate Watershed. Many of these structures can be modified at minimal cost to create a curve in the dam's crest (such that lamprey can suction over) without impacting the water users or their dam's integrity and structure. Due to the minimal impacts of these modifications to the dam itself, these passage retrofits represent "low-hanging fruit" for achieving adult upstream passage for lamprey across our basin at minimal cost. We are leveraging our 2018 distribution survey to focus on barriers within systems know to support lamprey. We have also proposed a video monitoring station for the Murphy Dam.

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

In order to successfully modify 6 low-head dams, we will:

a. Conduct water-user and landowner outreach, based on existing salmonid barrier assessments and partner knowledge, consulting with partners in the Rogue Basin Partnership's Instream and Passage Working Group.

b. Secure cooperative landowner agreements.

c. Design barrier modification. The passage design at every dam will be site specific, and we will contract with our local lamprey passage expert, Stewart Reid, to design and

implement these retrofits. Mr. Reid has successfully retrofitted many such dams and has pioneered many of the low- cost technics using tubing and rounded stainless steel with local input from partners in the Grizzly Peak Working Group and Rogue Basin Partnership's Native Species Working Group. We will also tie in any interested partners at USFWS and ODFW to the design discussions.

d. Implement retrofits with Mr. Reid.

e. Install a video monitoring station at Murphy Dam (Reid, Goodman design).

We will be targeting Murphy Dam and McKee Dam (mainstem Applegate River), Lovelace Dam (Slate Creek), Watts Topin (Williams Creek), Lower Phillips Dam and Gin Lin Dam (Little Applegate River). There are many such dams in our watershed, and if we are unable to move forward with retrofits at any of these structures, we will shift any remaining funds to pursuit of retrofitting another dam.

2. Descriptive Photographs-illustrations-Maps:

Figure 1. SC-Lovelace Dam_20160930 (8)
Lowest most concrete dam on Slate Creek. This dam limits all upstream migration to lamprey in this drainage.

Figure 2. AP-LA Lwr Philips Dam_20181113 (3)
Lowest concrete irrigation diversion dam remaining on Little Applegate River, a main tributary of the Applegate River and a stream with dedicated water right of 10 cfs at the confluence with the Applegate River. This dam is located approximately 5 miles from the confluence and is just below Upper Phillips Dam which we will be improving fish passage on in the near future.

Figure 3. DJI_0035_AP-Mckee_04092018
Mckee Dam on the mainstem Applegate River

3. Linkage of actions to Identified Threats in RMU (300 words or less):

- *What threat(s) does this project address?* **Passage**
- *Project scope: Does this project address threat(s) specific to this RMU only, or does the project address the threat(s) prevalent in multiple RMUs?*
    - This project addresses passage issues within the South Coast RMU.
- *How does this project address key threat(s) within the HUC where project is proposed?*
    - Passage is ranked in the Applegate with a scope/severity 3.0 in the Pacific Lamprey Risk Assessment (Table 12-5, page 171).

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

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

Effectiveness monitoring for lamprey passage if very difficult especially given their nocturnal migration patterns and the site conditions at these barriers. Murphy dam presents a unique opportunity to monitor lamprey numbers at a barrier relatively low in the Applegate Watershed. Based on expert input, we have proposed a video monitoring system to be installed with the passage retrofit at this barrier. This will be the first such monitoring station south of the Umpqua in Oregon, and will contribute valuable data on population. At the other 5 barriers, we will be monitoring retrofit effectiveness through night surveys.

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

This project will benefit upstream passage for migrating adults, through facilitating passage over dams that otherwise present a passage barrier with right angled concrete lips. Lamprey redd surveys by ODFW from 2014-2016 showed (3 year average) redd counts for below Murphy Dam (Fish Hatchery Park to Murphy
Dam) of 46.4 redds/mile. Upstream of this barrier (Murphy Dam to town of Applegate) that average redd counts drop to 9.6 redds/mile, before further dropping (Cantrall Buckley to McKee Dam) to 7.4 redds/mile. We don't have data for above McKee Dam.

- *What other species may benefit from action?*

This project is specific to lamprey, and there will be no other species benefits.

5. Project Design / Feasibility (200 words or less):

- *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?* Yes ☒, No☐

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

- *What partners are supporting the project?*

We will be supported in this project by partners in the Grizzly Peak Working Group and Rogue Basin Partnership's Native Species Working Group (USFWS, USFS, BLM, ODFW, Cow Creek Band of Umpqua Tribe of Indians, Rogue River Watershed Council, Lower Rogue Watershed Council, Western Fishes).

- *What partners are active in implementing the project?*

This will be an effort with Western Fishes and the APWC, in collaboration with the aforementioned agencies and organizations.

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

This project is pending in-kind technical development coordination from ODFW, BLM, USFS, Rogue Basin Partnership WGs, and Cow Creek Band of Umpqua Tribe of Indians.

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

- *How is completion of the project going to be documented*?

Project completion will be documented through a final report, which will include a narrative on each barrier and what was done to facilitate lamprey passage, in addition to the typical sections like Lessons Learned, Outreach Conducted and Recommendations.

- *How will the projects' benefits to lamprey be monitored over time?*

Once we know that the dam retrofit is working, we will work with irrigators and ODFW to create a maintenance strategy. Many of these simple passage retrofits are highly durable (like bolt-on steel plates), but some will need seasonal adjustments (like the tube passage structures). We will establish photo-points for each passage retrofit.

8. Project Budget (Including overhead):

See below

9. Timeline of major tasks and milestones:

Workflow	***Start Date***	***End Date***	***Responsible Party***
Water-user and landowner outreach	***3/01/2020***	***3/31/2020***	***Jakob Shockey***
Secure cooperative agreements	***3/01/2020***	***4/30/2020***	***Jakob Shockey***
Field surveys	***4/15/2020***	***5/31/2020***	***Jakob Shockey***
Design barrier modification	***5/01/2020***	***6/30/2020***	***Jakob Shockey***
Retrofit implementation	***7/01/2020***	***9/15/2020***	***Jakob Shockey***

Effectiveness monitoring, retrofit modification	***7/01/2020***	***9/30/2020***	***Jakob Shockey***
Final Reporting	***10/01/2020***	***10/31/2020***	***Jakob Shockey***

Project Budget:

	Items	# Hours or Units	Cost per Unit ($)	RIP Funds Requested ($)	Cost Share ($)	Total Cost ($)
A	***Personnel:***	**291**		**$11,675**	**$0**	**$11,675**
	a. P.M., Jakob Shockey	275	41			$11,275
	b. APWC Crew Asst., Effect. Mon	16	25			$400
	c.					
B	***Contracted Services:***	**161**		**$8,600**	**$6,250**	**$14,850**
	a. Western Fishes Survey 2018 (RBP)	1	5000		5000	$5,000
	b. Western Fishes Install (20 hrs/site)	120	100			$12,000
	c. Western Fishes Monitoring (5 hrs/site)	16	100			$1,600
	d. Technical Assistance	25	50		1250	$1,250
C	***Equipment & Supplies:***	**6**		**$6,000**	**$0**	**$6,000**
	a. Stainless Steel Retrofit (LUMP)	3	1000			$3,000
	b. Tubing Retrofit (LUMP)	3	1000			$3,000
	c. Video Monitoring Equip. (Goodman-USFWS/Reid Design) (Murphy Dam) (LUMP)	1	3000			$3,000
	d.					
D	***Travel:***	**1480**		**$858**	**$0**	**$858**
	a. APWC Office to Multi Project Sites	1080	0.58			$626
	b. APWC Office to Medford, Supplies	400	0.58			$232
E	***Other:***	**0**		**$0**	**$0**	**$0**
	a.					
	b.					
F	***Administrative:***	**0**		**$2,713**	**$0**	**$3,338**
	Overhead (%)					
	Indirect Costs (10%)			$2,713.34		$3,338
	Total (Sum of A - F)			**$29,846**	**$6,250**	**$36,722**

III. Literature Cited

Brown E, R Jacobsen, J. Nott, M. Weeber and M. Lewis. 2017. Assessment of Western Oregon Adult Winter Steelhead and Lamprey – Redd Surveys 2016. Monitoring Program Report Number OPSWODFW-2016-09. Oregon Department of Fish and Wildlife, Salem, Oregon.

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USFWS (U.S. Fish and Wildlife Service). 2018. Pacific Lamprey Entosphenus tridentatus assessment. February 1, 2019. USFWS, Washington D.C.

Appendix 1

The following are the definitions for interpreting the NatureServe conservation status ranks in Table 2.

SX Presumed Extirpated.—Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. (= "Regionally Extinct" in IUCN Red List terminology).

SH Possibly Extirpated.—Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include: (1) that a species has not been documented in approximately 20–40 years despite some searching or some evidence of significant habitat loss or degradation; or (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.

SU Unrankable. .—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

S1 Critically Imperiled.—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.

S2 Imperiled.—Imperiled in the jurisdiction because of rarity due to very restricted range, very few occurrences, steep declines, or other factors making it very vulnerable to extirpation from the jurisdiction.

S3 Vulnerable.—Vulnerable in the jurisdiction due to a restricted range, relatively few occurrences, recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure.—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure.—Common, widespread, and abundant in the jurisdiction.