Pacific Lamprey

2021 Regional Implementation Plan

for the

Oregon Coast

Regional Management Unit

North Coast Sub-Region

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I. Status and Distribution of Pacific lamprey in the RMU

A. General Description of the RMU

North 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 North Oregon Coast sub-region includes all rivers that drain into the Pacific Ocean from the Columbia River Basin boundary in the north to the Umpqua River boundary in the south. It is comprised of seven 4th field HUCs ranging in size from 338 to 2,498 km^2. Watersheds within the sub-region include the Necanicum, Nehalem, Wilson-Trask-Nestucca, Siletz-Yaquina, Alsea, Siuslaw and Siltcoos Rivers (Figure 1; Table 1).

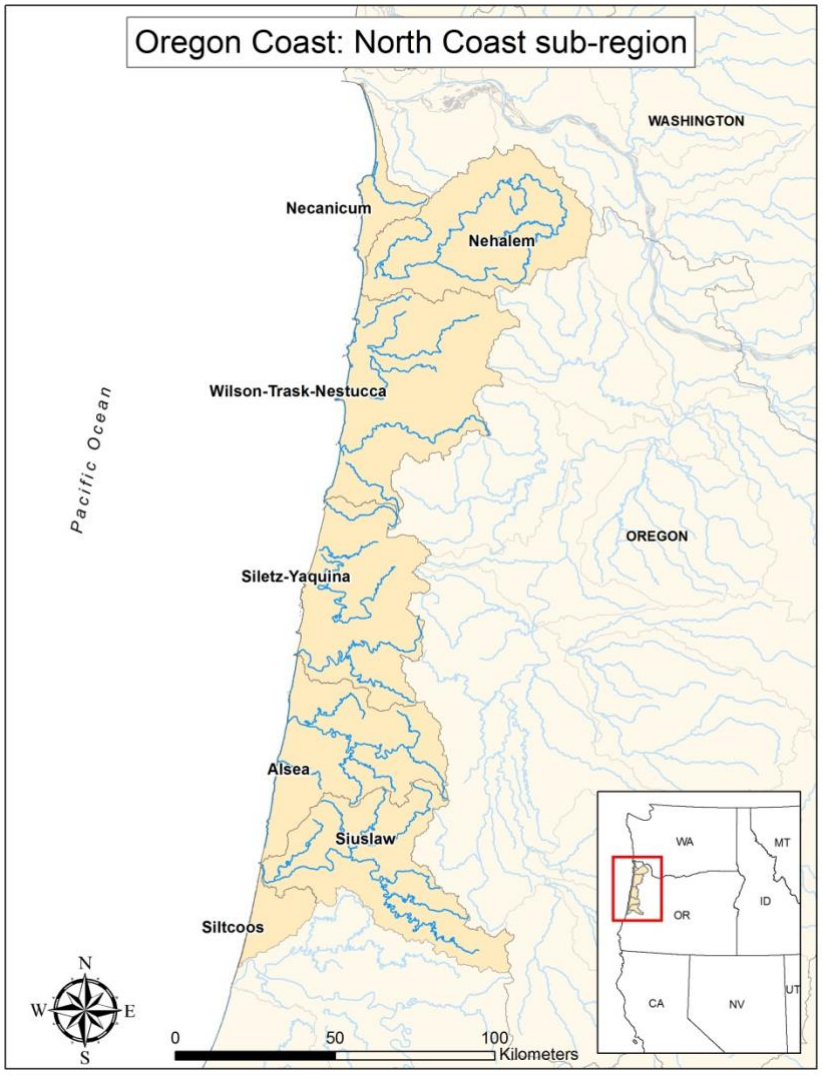

Figure 1. Map of watersheds within the Oregon Coast RMU, North Coast sub-region.

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

Watershed	HUC Number	Drainage Size (km^2)	Level III Ecoregion(s)
Necanicum	17100201	355	Coast Range
Nehalem	17100202	2,212	Coast Range
Wilson-Trask-Nestucca	17100203	2,498	Coast Range
Siletz-Yaquina	17100204	1,964	Coast Range
Alsea	17100205	1,786	Coast Range
Siuslaw	17100206	2,006	Coast Range, Willamette Valley
Siltcoos	17100207	338	Coast Range

B. Status of Species

Conservation Assessment and New Updates

Increased attention on Pacific lamprey has improved our understanding of this species in the North Coast sub-region. 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 in most watersheds.

Current Pacific Lamprey distribution in the North Coast sub-region is greatly reduced from historical range (Table 2; Figure 2). The 2018 Pacific Lamprey Assessment ranking of current distribution was reduced from 2011 rankings in all HUCs except the Necanicum. The decline 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).

Population abundance was estimated within all HUCs using information provided by Oregon Department of Fish and Wildlife (ODFW). ODFW estimated a range of Pacific Lamprey population abundance using extrapolations of published information on the number of Pacific Lamprey per redd, average peak redd counts per mile, multiplied by the number of miles surveyed for Pacific Lamprey (Table 3; Table 4). As part of the monitoring for winter steelhead spawning populations, the Oregon Adult Salmonid Inventory and Sampling (OASIS) field crews have recorded counts of lamprey spawners and redds since 2009. These estimates are considered conservative abundance indices, as the surveys are focused on steelhead, and end before the completion of Pacific lamprey spawning (Jacobsen et al. 2014; Jacobsen et al. 2015; Brown et al. 2017, ODFW 2017).

There was consensus that lamprey populations have declined significantly from historical numbers approximately 50-60 years ago (i.e. Downey 1993). However, short-term population trend which is defined as the degree of change in population size over 3 lamprey generations, was not ranked (determined "unknown") because there is insufficient data available over the past 27 years. Abundance indices have generally increased over the 3 to 5 years (Table 3), but without a longer term data set it is unknown whether this apparent increase is simply an upswing in a larger cyclical trend.

Based on the ODFW data, and noting this information is limited, the Wilson-Trask-Nestucca, Siuslaw and Nehalem HUCs appear to support greater numbers of lamprey than the other HUCs in the North Coast (ODFW 2017).

Table 2. Population demographic and conservation status ranks (see Appendix 1) of the 4th Field HUC watersheds located within the North 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)
Necanicum	17100201	S2↑	250-1000	20-100	250-1000	Unknown
Nehalem	17100202	S2	1000-5000	100-500	1000-2500	Unknown
Wilson-Trask-Nestucca	17100203	S2	1000-5000	100-500	1000-2500	Unknown
Siletz-Yaquina	17100204	S2	1000-5000	100-500	1000-2500	Unknown
Alsea	17100205	S2	1000-5000	100-500	1000-2500	Unknown
Siuslaw	17100206	S2	1000-5000	100-500	2500-10,000	Unknown
Siltcoos	17100207	S1↓	250-1000	20-100	50-250	Unknown

Table 3. Minimum, mean, and maximum abundance indices for adult Pacific Lamprey in the North Coast RMU (ODFW 2017). Estimates are considered conservative.

Year	**MIN**	**MEAN**	**MAX**
2009	1,113	4,271	7,831
2010	289	1,109	2,032
2011	736	2,828	5,184
2012	758	2,911	5,337
2013	2,335	8,968	16,441
2014	1,162	4,459	8,175
2015	2,456	9,429	17,287
2016	2,500	9,597	17,594
2009-2016 MEAN	**1,419**	**5,447**	**9,985**

Table 3. Mean abundance indices for adult Pacific lamprey by HUC from 2009 to 2016 in the North Coast RMU (ODFW 2017). Estimates are considered conservative.

HUC	Mean
Necanicum	177
Nehalem	923
Wilson-Trask-Nestucca	1,178
Siletz-Yaquina	885
Alsea	487
Siuslaw	1,157
Siltcoos	18

Figure 2. Current and historical known distribution for Pacific Lamprey: Oregon Coast Regional Management Unit, North Coast sub-region (USFWS Data Clearinghouse 2021). Historical Pacific Lamprey distribution depicted in map was obtained from published literature, tribal accounts and state and federal agency records.

Distribution and Connectivity

Fish passage was ranked a low threat in the majority of watersheds that were assessed in 2017 (USFWS 2018). However, recent barrier assessments in the Lower Nehalem, Tillamook Bay, Nestucca Neskowin and Sand Lake watersheds have identified a rather large number of barriers at stream-road crossings (for juvenile salmonids). It is likely many more structures could be passage barriers for lamprey given their physiological limitations (i.e. unable to jump, difficulty navigating past sharp angles or through areas with high water velocity, etc.) (see LTW 2020a and references therein). Additionally, in the north fork Alsea River, eDNA sampling results indicate perched culverts are likely preventing lamprey from accessing miles of high quality habitat. Instream structures such as culverts, tide gates and water diversions are prevalent throughout the North Coast sub-region and may restrict or impede lamprey passage to an unknown extent. In light of this new information, the North Coast RMU group believes the rankings for passage scope and severity in the 2018 Pacific Lamprey Assessment are lower than they should be.

An extensive effort is currently underway in portions of the North Coast sub-region to identify and prioritize barrier structures for repair (retrofit), replacement, or removal; though, the focus of these efforts is juvenile salmonids. The following are examples of some of the passage improvement projects implemented by RMU partners in the past several years:

- City of Seaside's Diversion Dam was removed, and intake screens upgraded on the South Fork Necanicum.
- ODOT breached several dikes in the lower mainstem Necanicum near RM5.
- Several tide gates in the lower North Fork of the Nehalem were replaced.
- Culvert removal in tributary of Siletz River (North Creek), opening access to 14 miles of habitat.
- Multiple culverts have been replaced or removed in the Wilson-Trask-Nestuccca HUC over the past several years as part of the Salmon Superhighway Project (SSH). SSH project partners plan to continue efforts to replace barrier culverts in these basins in coming years.
- A substantial barrier dam on the East Fork South Fork Trask River was removed during summer 2016 and another dam removal at Skookum Lake (Tillamook River Basin) was completed during summer 2017.
- Several perched culverts replaced with open bottom culverts in Necanicum (Joe Creek) and Nehalem HUCs, restoring access to over 15 miles of habitat.
- Upgrades at hatchery barriers and the Lord Creek Culvert in the Alsea watershed.
- Upgrade to Cedar Creek Hatchery weir and fish ladder on Three Rivers in the Nestucca Basin.
- Twelve passage projects (including Cedar Creek Hatchery Weir) will be happening in the Tillamook/Nestucca as part of the SSH project in 2021.

For more information about how to provide or improve passage for adult Pacific Lamprey at barriers and road crossings, please refer to LTW (2020a).

C. Threats

Summary of Major Treats

The following table summarizes the key threats within the North Coast sub-region as identified by RMU participants during the Risk Assessment revision meeting in April 2017. Stream and floodplain degradation, water quality, and lack of awareness were all considered a moderate threat in the North Coast sub-region.

Table 3. Summary of the assessment results for the key threats of the North Oregon Coast sub-region.

	Stream and Floodplain Degradation		Water Quality		Lack of Awareness	
Watershed	Scope	Severity	Scope	Severity	Scope	Severity
North Oregon Coast						
Necanicum	3	3	2	2	4	2
Nehalem	3	3	3	3	4	2
Wilson-Trask-Nestucca	3	3	2	2	4	2
Siletz-Yaquina	3	3	3	3	4	2
Alsea	3	3	3	2	4	2
Siuslaw	3	3	3	3	4	2
Siltcoos	4	3	3	2.5	4	2
Mean	3.14	3.00	2.71	2.50	4.00	2.00
Rank	**M**	**M**	**M**	**M**	**H**	**M**
Mean Scope & Severity	3.07		2.61		3.00	
Drainage Rank	**M**		**M**		**M**	

Current Threats

The highest ranked threats in the sub-region are described below. Stream and Floodplain degradation and Water Quality were ranked slightly higher than in 2011; lack of awareness was determined to be a greater concern than 2011. Although not a key threat in 2017 (Mean Scope & Severity = 2.43), dewatering and Flow Management was also ranked higher than in 2011.

Stream and Floodplain Degradation

Stream and floodplain degradation was ranked moderate in scope and severity throughout all watersheds of the North 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, and urbanization have deforested or altered the function and diversity of riparian vegetation. Many watersheds in the RMU are lacking mature conifers that play a pivotal role in bank stability, water quality protection, thermal cover, and the provision of large woody debris.

Water Quality

Elevated water temperature is the primary water quality concern in the North Coast sub-region. Excessive temperatures generally occur during summer months and may be attributed to increased air temperature, lack of riparian cover, or reduced instream flows associated with water withdrawals for irrigation, municipal or residential use. The impacts of relatively warm water temperatures (e.g., ≥20°C) on Pacific Lamprey embryonic development, physiology, adult migrations, reproductive capability and evolutionary pressures can be multitudinous and substantial (Clemens et al. 2016). Other water quality concerns in tributaries include low dissolved oxygen and presence of bacteria (e.g., fecal coliform, e coli), that may be associated with elevated water temperatures and agricultural or urban runoff. Monitoring and restoration efforts to improve and protect water quality for fish, wildlife, and human health are ongoing in the North Coast sub-region.

Lack of Awareness

Instream water work, whether for restoration activities or maintenance of diversions, can dewater areas or remove sediments in which larval lamprey are burrowed. Such actions without first salvaging lamprey may result in the death of hundreds of larvae. Increasing public and agency awareness about the presence of larval lamprey in the sediments, adult lamprey spawning habitats and timing during in-water work, as well as the effect of water diversions, and education on actions to minimize these impacts, could greatly decrease localized mortality and injury to lamprey populations. For more information about how to minimize impact to native lampreys during in-water work, please consult LTW (2020b).

Dewatering and Flow Management

Stream flow conditions have generally improved in the Necanicum since the completion of the 2011 Assessment, however, the scope and/or severity of this threat has increased in the Alsea, Siuslaw, and Siltcoos basins. Water withdrawals for irrigation, municipal, or residential uses leave many watersheds in the North Coast sub-region dewatered or with inadequate flow during summer and fall months. Low flow levels can reduce habitat availability, prevent lamprey access to backwater or side channel habitats, and may contribute to mortality if incubating eggs or burrowing larvae are dewatered or exposed to a high temperature or low oxygen environment. The projected rise in human population and anticipated effects of climate change (i.e., elevated ambient temperatures, decreased surface water availability, altered flow regimes), may increase the frequency, duration and intensity of low flow conditions in the future.

Restoration Actions

Multiple projects are currently underway to restore floodplain connectivity, relocate or reconnect side channel habitat, enhance damaged riparian areas, and remove, replace or improve barriers to fish passage (e.g. culverts, tide gates, and diversion dams). Assessments that identify and prioritize future restoration work and passage problems are also ongoing in these areas. Although the majority of research and restoration projects are developed and implemented with adult and juvenile salmonids in

mind, a growing number of projects are incorporating benefits for Pacific lamprey and some passage projects are targeting lamprey specifically. The following conservation actions were initiated or recently completed by RMU partners in the North Coast sub-region from 2012-2020.

HUC	Threat	Action Description	Type	Status
RMU	Stream Degradation	Implementation of instream and floodplain habitat restoration activities (e.g. large wood and/or boulder placement, side channel and floodplain reconnection, channel reconstruction, bank stabilization, etc.).	Instream	Ongoing
RMU	Population	Distribution surveys of mainstem and principal tributaries	Survey	Ongoing
RMU	Lack of Awareness	Consideration of lamprey when planning and implementing instream habitat restoration work	Coordination	Ongoing
RMU	Passage	Map, assess and prioritize passage barriers in tributaries and evaluate available lamprey habitat upstream	Assessment	Proposed
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	Population	Oregon Department of Fish and Wildlife Conservation Plan for Lampreys in Oregon *https://www.dfw.state.or.us/fish/CRP/coastal_columbia_snake_lamprey_plan.asp*	Other	Complete
RMU	Stream Degradation	Assessment looking at effectiveness of restoring/reconnecting the floodplain (Stage 0 restoration) and lamprey recolonization of these areas (i.e., SF McKenzie & Fivemile Bell)	Assessment	Underway
Necanicum	Passage	South Fork Necanicum diversion dam removed, and intake screens updated/improved.	Instream	Complete
Necanicum	Stream Degradation	Culvert removal or replacement projects to restore access to spawning and rearing habitat.	Instream	Ongoing
Nehalem &	Stream	Coho Strategic Action Plan – identifies	Instream	Underway

Siuslaw	Degradation	high priority conservation areas for restoration and monitoring. Will likely benefit other native aquatic species.		
Nehalem	Passage	Several tide gate replacement projects on lower North Fork	Instream	Ongoing
Nehalem	Stream Degradation	Evaluation of lamprey and salmonid response to Beaver Dam Analog stream channel restoration	Instream	Ongoing
Wilson – Trask – Nestucca	Stream Degradation	Numerous culvert removal or replacement projects as part of Salmon SuperHwy Project.	Instream	Ongoing
Wilson – Trask – Nestucca	Passage	Removal of the East Fork South Fork Trask River Hatchery Dam.	Instream	Complete
Wilson – Trask – Nestucca	Passage	Skookum Reservoir Dam removal, Tillamook River Drainage	Instream	Complete
Wilson – Trask – Nestucca	Passage	Upgrade to Cedar Creek Hatchery weir and fish ladder on Three Rivers. Ladder will meet lamprey passage criteria	Instream	Underway
Siletz	Passage	Evaluation of passage constraints for lamprey at Siletz Gorge Falls fish ladder/trap	Instream	Proposed
Siletz	Population	Environmental DNA to assess Pacific Lamprey distribution above falls & lobster Creek Wild and Scenic River	Survey	Underway
Siletz	Stream Degradation	Habitat improvements on mainstem Siletz River to increase habitat complexity and substrate sorting along margins of river	Instream	Underway
Alsea	Passage	Installation of Lamprey Passage Ramp at water diversion structure upstream from Alsea River Hatchery on North Fork Alsea River.	Instream	Complete?
Alsea	Passage	Monitoring relative abundance of larval Pacific Lamprey upstream of water diversion structure pre and post lamprey ramp installation	Assessment	Underway
Alsea	Population	Environmental DNA pilot project to assess Pacific Lamprey distribution	Survey	Underway
Siuslaw	Population	Environmental DNA to assess Pacific Lamprey distribution	Survey	Underway
Siuslaw	Population	Environmental DNA to evaluate passage	Survey	Proposed

		of Denil fishway and determine presence/absence of Pacific Lamprey above Lake Creek Falls		
Siuslaw	Passage	Improve passage conditions for Pacific Lamprey at Lake Creek Falls fishway	Assessment	Proposed
Siuslaw – Siltcoos	Stream Degradation	Environmental DNA to monitor lamprey occupancy pre/post floodplain reconnection projects	Assessment	Underway
Siltcoos	Passage	Evaluation of passage constraints for lamprey at Siltcoos and Tahkenitch Dam fish ladders.	Assessment	Proposed
Siltcoos	Stream Degradation	Implementation of several large floodplain reconnection projects (Stage 0; Fivemile Bell)	Instream	Ongoing

II. Selection of Priority Actions

A. Prioritization Process

Participating members of the North Coast sub-region had a virtual meeting on May 5th, 2021 to discuss completed and ongoing conservation actions and identify specific projects and research needed to address threats and uncertainties within the region. The following project proposal was submitted by RMU partners for the North Coast sub-region in 2021:

Project Name	Project Proponent and Organization	Project Type(s)	Funding Requested	Brief Description
Green Creek Priority Fish Passage Project	Sarah Zwissler Trout Unlimited	Passage Improvement	$37,263	A culvert at stream mile 0.8 is undersized, deteriorated and perched. The project will replace the undersized culvert with a 36-foot bridge and simulated natural streambed, restoring access to 1.7 miles of habitat in Green Creek.

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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.