Pacific Lamprey

2023 Regional Implementation Plan

for the

South Coast Sub-Unit of the Oregon Coast Regional Management Unit

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I. Introduction

This is the annual Regional Implementation Plan (RIP) developed for the North Coast Sub-Unit of the Oregon Coast Regional Management Unit (North Coast RMU). RIPs for the North Coast RMU are revised each year as warranted, primarily based on new information provided by North Coast RMU partners. This RIP is not intended to be comprehensive in the information provided, but provide an overview of the RMU and the status of Pacific Lamprey within the RMU, including the primary threats and significant restoration actions that affect this species. This report and earlier versions are available on the Pacific Lamprey Conservation Initiative webpage (www.pacificlamprey.org/rmu/). The 2023 annual meeting notes are appended to this plan (Appendix A).

II. Status and Distribution of Pacific lamprey in the RMU

A. General Description of the RMU

The Oregon Coast Regional Management Unit is separated into two sub-units equivalent to the USGS hydrologic unit accounting units 171002 (Northern Oregon Coastal) and 171003 (Southern Oregon Coastal). The North Coast RMU 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).

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

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

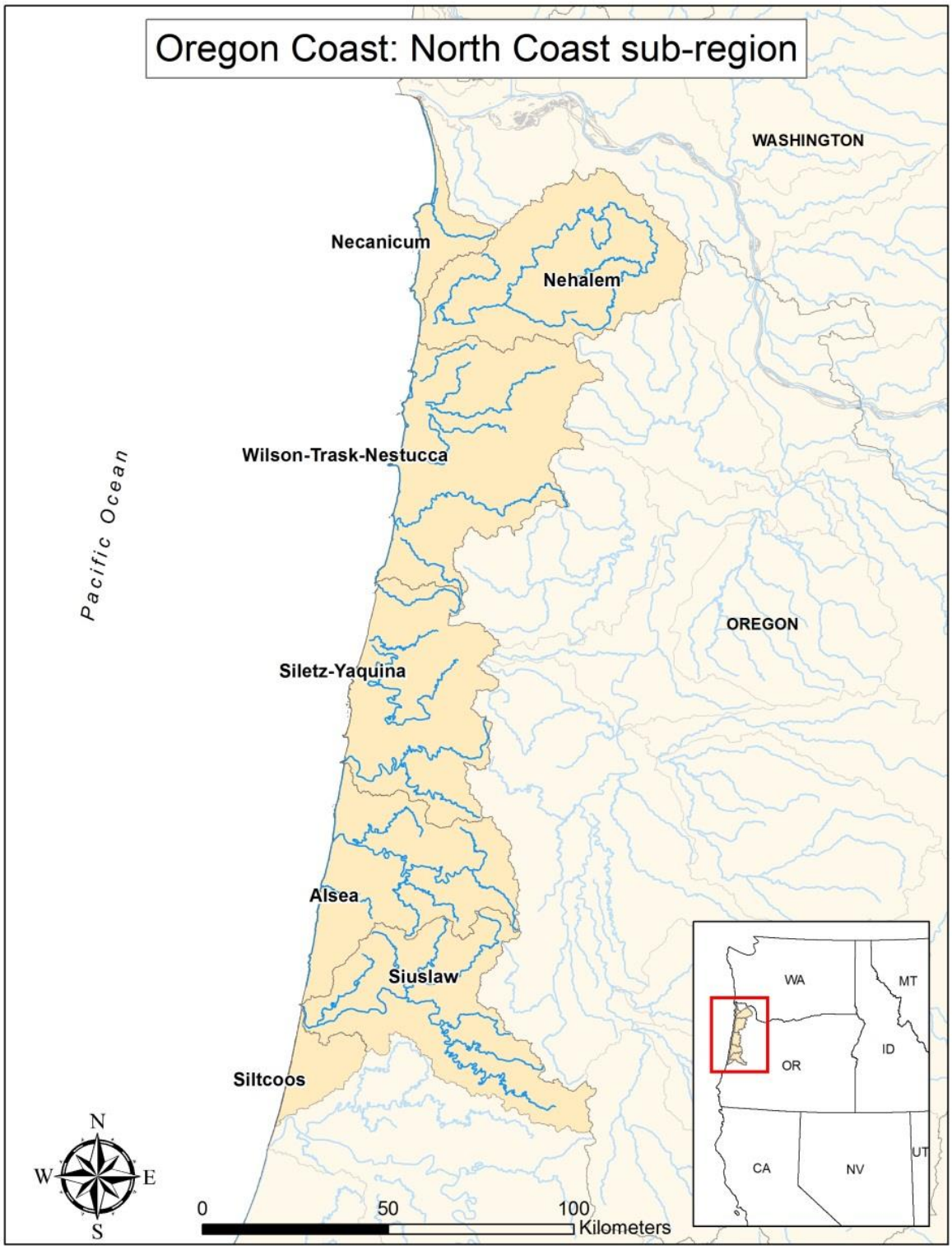

Figure 1. Map of watersheds in the North Coast RMU.

B. Status of Species

2022 Pacific Lamprey Assessment

Every five years the Pacific Lamprey Conservation Initiative (PLCI), through the RMUs, revise the Pacific Lamprey Assessment (USFWS 2019). The Assessment utilizes local stakeholder knowledge and expertise to evaluate Pacific Lamprey distribution, population demographics and threats at the 4th field HUC watershed level. This information is used to inform NatureServe, a diagnostic tool that characterizes the conservation risk of Pacific Lamprey across their historical range. Information about current Pacific lamprey distribution, population size, trends, and watershed threats were collected from stakeholders in the North Coast RMU through an online Assessment questionnaire and virtual meeting held on February 23rd 2022. The following is a brief summary of key findings from the 2022 Pacific Lamprey Assessment.

NatureServe conservation status ranks changed in five of seven HUCs in 2022 (Table 2). Status ranks fell from Imperiled (S2) to Critically Imperiled (S1) in the Necanicum and from S2 to S1S2 in the Nehalem, Wilson-Trask-Nestucca, Siletz-Yaquina, and Alsea. The decline in ranks was generally due to an increase in the scope or severity of threats facing Pacific Lamprey in these watersheds (see Threats below).

Distribution

Although information on Pacific Lamprey distribution continues to improve through targeted redd surveys, presence/absence or occupancy sampling, fish salvage events, and eDNA sampling, Pacific Lamprey currently occupy a small proportion (21% to 29%) of their historical range (Table 2). A compilation of all known larval and adult Pacific Lamprey occurrences in the North Coast RMU are displayed in Figure 2, which is a product of the USFWS data Clearinghouse.

Abundance

Pacific Lamprey population abundance was estimated using consolidated data from redd surveys conducted in coastal watersheds by Oregon Department of Fish and Wildlife (ODFW) personnel. As part of the annual 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. ODFW has estimated the range of Pacific Lamprey abundance using extrapolations of published information on the average number of Pacific Lamprey per redd, average peak redd counts per kilometer, multiplied by the total length of potential habitat (see Clemens et al. 2021). Pacific Lamprey abundance indices are considered conservative abundance indices, as the surveys are focused on winter steelhead, and end before the completion of Pacific lamprey spawning. Estimated population abundance in the North Coast RMU has ranged from ≈ 323 – 20,051 lamprey per year between 2007 and 2021 (Table 3). Clemens et al. (2021) indicates Pacific Lamprey abundance indices have both increased and decreased over time with periodic peaks in abundance every few years (Table 3). Variation in abundance from year to year and from one watershed to another may be due to natural population cycles, ocean or freshwater conditions, prey abundance/availability, or other environmental factors (Clemens et al. 2019).

Short-term Population Trend

There is consensus that lamprey populations have declined significantly compared to past returns approximately 50-60 years ago (Downey et al.1993; Close et al. 2004; CRITFC 2011; Sheoships 2014). However, short-term population trend which is defined as the degree of change in population size over three lamprey generations (≈36 years), was ranked as 'Unknown' in all North Coast watersheds in 2022 because there is a lack of continuous long-term population trend data in the region. The only ongoing long-term record of lamprey counts on the Oregon 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. The 10-year average count of adult Pacific Lamprey from 1965-1974 was over 22,000 fish, while the recent 10-year average is just over 800 fish (ODFW 2022).

Table 2. Population demographic and NatureServe conservation status ranks (see Appendix B) of the 4th Field HUC watersheds located within the North Coast RMU. 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 2018 Assessment.

Watershed	HUC Number	Conservation Status Rank	Historical Occupancy (km^2)	Current Occupancy (km^2)	Population Size (adults)	Short-Term Trend (% decline)
Necanicum	17100201	S1↓	250-1000	20-100	250-1000	Unknown
Nehalem	17100202	S1S2↓	1000-5000	100-500	1000-10,000	Unknown
Wilson-Trask-Nestucca	17100203	S1S2↓	1000-5000	100-500	1000-10,000	Unknown
Siletz-Yaquina	17100204	S1S2↓	1000-5000	100-500	1000-10,000	Unknown
Alsea	17100205	S1S2↓	1000-5000	100-500	1000-10,000	Unknown
Siuslaw	17100206	S2	1000-5000	500-2000	1000-10,000	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 (Clemens et al. 2021). Estimates are considered conservative.

Year	**MIN**	**MEAN**	**MAX**
2007	988	3,793	6,956
2008	1,324	5,085	9,322
2009	885	3,400	6,234
2010	323	11,85	2,268
2011	749	2,876	5,272
2012	1,068	4,103	7,523
2013	2,727	10,468	19,192
2014	1,065	4,089	7,496
2015	2,510	9,635	17,665
2016	2,733	10,493	19,237
2017	1,273	4,887	8,961
2018	2,849	10,937	20,051
2019	1,532	5,880	10,781
2020	1,341	5,149	9,439
2021	2,144	8,236	15,098
MEAN	**1,567**	**6,014**	**11,033**

Figure 2. Current and historical known distribution for Pacific Lamprey: North Coast RMU (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 (Passage)

The NatureServe Assessment ranking of fish passage increased from a low to a moderate threat in 2022. Though passage scope and severity scores rose slightly in three HUCs (Nehalem, Wilson-Trask-Nestucca, and Siltcoos), these increases were the result of new information gained from recent barrier assessments and/or a better understanding of lamprey passage needs, rather than a true increase in the number of barriers within these watersheds. Culverts at stream road crossings have been identified as an important passage concern throughout the North Coast RMU. Many of the perched, undersized and/or aging culverts, which are known to restrict salmonid distribution and abundance, have been removed or are prioritized for removal. However, there are still thousands of culvert barriers in the region and their cumulative impact to Pacific Lamprey are unknown. Recent barrier assessments in the Lower Nehalem, Tillamook Bay, Nestucca Neskowin and Sand Lake watersheds 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 unique swimming capabilities (i.e. inability to jump, difficulty navigating past sharp angles or through areas with high water velocity, etc.) (see LTW 2020a). In addition to culvert barriers, instream structures such as tide gates and water diversions are also prevalent throughout the North Coast RMU and may restrict or impede lamprey passage to an unknown extent. A notable barrier identified within the Siltcoos watershed includes dams on Siltcoos and Tahkenitch Lakes. Both structures have ladders intended to provide passage for migratory coho, but it's unclear whether the ladders provide suitable passage conditions for adult Pacific Lamprey.

Overall, fish passage in these basins is slowly improving, but there are still a large number of impassable or partially impassable barriers that need to be addressed. An extensive effort is currently underway in portions of the North Coast RMU to identify and prioritize barrier structures for repair (retrofit), replacement, or removal. Though the focus of these efforts is primarily salmonids, many projects are beginning to consider the passage needs of Pacific Lamprey. Improving passage through the complete removal of barrier structures (e.g., dams, culverts, tide gates, diversions, etc.), replacing culverts with bridges, or using open-bottom culverts with a stream simulation design will have the greatest benefit to Pacific Lamprey and other native aquatic organisms. 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 (mean Scope/Severity ≥ 2.5) within North Coast RMU tributaries as identified by RMU participants during the Pacific Lamprey Assessment revision meeting in February 2022. Climate change and stream and floodplain degradation were ranked a high threat in the North Coast RMU, while passage, water quality and lack of awareness were ranked a moderate threat in 2022.

Table 4. Key threats to Pacific Lamprey and their habitats in the North Coast RMU, 2022.

	Climate Change		Stream and Floodplain Degradation		Water Quality		Passage		Lack of Awareness	
Watershed	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity
Necanicum	4	4	3	3	2	2	2	2	3	2
Nehalem	4	4	3	3	3.5	3.5	3	3	3	2
Wilson-Trask-Nestucca	4	4	3	3	2.5	2.5	3.5	3	3	2
Siletz-Yaquina	4	4	4	4	3	4	2	2	3	2
Alsea	4	4	4	4	3	3	2	2	3	2
Siuslaw	4	4	4	4	3	3	2	2	3	2
Siltcoos	4	4	3.5	4	3	3	4	3	3	2
Mean Scope & Severity	4.00		3.53		2.93		2.54		2.50	
Drainage Rank	H		H		M		M		M	

The highest ranked threats in the North Coast RMU are described below. Mean Scope/Severity scores for climate change, stream and floodplain degradation, water quality and passage rose (i.e., worsened) in 2022; while the Mean Scope/Severity score for lack of awareness fell in 2022.

Climate Change

Climate Change was the highest ranking threat in the North Coast RMU (Table 4). Climate change is happening faster and more intensely than anticipated and the combined effects of climate change (e.g., changes to ambient temperature, precipitation, and streamflow patterns) and predicted rise in human population will likely exacerbate other threats within the sub-region. More severe winter rainfall events may increase the frequency and intensity of flooding that can increase bank erosion and scouring of streambeds. Warmer summer temperatures and low summer flows may increase water temperatures to the detriment of Pacific Lamprey. Elevated summer water temperatures have become more commonplace in North Coast watersheds over the last five years. These conditions may restrict lamprey habitat availability, hamper adult migration, reduce reproductive capability, or contribute to increased mortality if incubating eggs, burrowing larvae or migrating juveniles are exposed to warm temperatures (>20°C) for an extended duration (Clemens et al. 2016). Temperature increases could also shift or expand the range of nonnative predatory fish, putting further stress on larval and adult lamprey (Lawrence et al. 2014). In addition to temperature concerns, water withdrawals for irrigation, municipal, or residential uses further depress already low summer stream flows in many North Coast watersheds and these withdrawals may increase as climate warms. 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. Climate change is identified as a critical threat across the range of Pacific Lamprey, but the feasibility of making tangible changes will be challenging and require large scale institutional changes. Focusing stream restoration efforts on actions that improve instream complexity and floodplain connectivity, restore tidal wetland habitats, remove unneeded impoundments, or revegetate riparian areas, can provide multiple benefits to the aquatic ecosystem (e.g., improve water quality, reduce flooding, increase channel stability, etc.) and can help make systems more resilient to climate change in the future (Justice et al. 2017).

Stream and Floodplain Degradation

Stream and floodplain degradation was ranked a high threat in the North Coast RMU. Scope/Severity scores were increased in the Siletz-Yaquina, Alsea, Siuslaw, and Siltcoos. However, changes in these areas reflect an improved understanding of habitat conditions more so than changes on the ground for lamprey. Legacy impacts of splash damming, log drives, road construction, beaver eradication, stream cleaning, fires and other land use practices have contributed to large scale losses in stream habitat complexity throughout the North Coast RMU. Within lowlands, many of the depositional valleys where larval lamprey once reared have been lost to stream channelization and construction of dikes/levees to prevent flooding and facilitate development (e.g., agriculture, livestock grazing, industrial, residential) within the floodplain. In upland areas, legacy and ongoing timber practices, agriculture, and urbanization have deforested or altered the function and diversity of riparian

vegetation. Many watersheds in the sub-region lack mature conifers that play a pivotal role in bank stability, water quality protection, thermal cover, and recruitment of wood into channels. Large wood can benefit streams by influencing the structural complexity of the channel (i.e., creating pools or undercut banks), reducing flow velocities and facilitating the deposition of fine substrate and organic matter important for larval lamprey rearing and feeding (Gonzalez et al. 2017). RMU partners continue to work hard to implement restoration projects aimed at addressing habitat degradation, water quality issues and impaired floodplain function throughout the North Coast RMU.

Water Quality

Water quality was ranked a moderate threat in the North Coast RMU. Assessment scope and/or severity scores increased in the Nehalem, Wilson-Trask-Nestucca, Siletz-Yaquina, Alsea, and Siltcoos. Elevated water temperature is still the primary water quality concern in the North Coast RMU. Lower and mainstem reaches regularly experience prolonged warming often starting in late spring, extending into fall. Factors contributing to excessive water temperatures generally include increased air temperature, lack of riparian cover (in response to past logging, fires and land clearing activities), widening of stream channels, or reduced instream flows associated with water withdrawals. The Siuslaw Basin Strategic Action Plan recently used Netmap to model predicted temperature changes over the next few decades and found that water temperatures in many tributary streams where lamprey spawning is likely occurring will be increasing during the summer low flow period (Siuslaw SAP 2019). The impacts of 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 North Coast watersheds include low dissolved oxygen levels and presence of bacteria (e.g., fecal coliform, e. coli), that may be associated with elevated water temperatures, agricultural or urban runoff, poorly functioning septic systems, wastewater treatment plants, or high aquatic plant density. Siltcoos Lake experiences periodic toxic algae blooms (attributable to warm water temperatures and high nutrient concentrations) that can be harmful to people and wildlife, though impacts to lamprey are unknown.

Passage

A summary of passage issues in the North Coast RMU are described in the previous section (Distribution and Connectivity).

Lack of Awareness

Lack of Awareness was ranked a moderate threat, though the severity of this threat was reduced in all North Coast watersheds in 2022. Pacific Lamprey awareness is becoming more widespread among stakeholders and the public. Local watershed councils, the USFS and others in the North Coast RMU have played a significant role in improving awareness through targeted outreach, youth education events and webinars. Nevertheless, it's unclear how improved awareness translates to on-the-ground actions that incorporate or benefit lamprey such as lamprey specific fish salvage, design of fish

screens, passage improvements, habitat restoration, permitting (e.g., Section 404 permits), etc. For example, 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 to thousands 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, 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).

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 RMU from 2012-2022.

HUC	Threat	Action Description	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.).	Ongoing
RMU	Population	Distribution surveys of mainstem and principal tributaries	Ongoing
RMU	Lack of Awareness	Consideration of lamprey when planning and implementing instream habitat restoration work	Ongoing
RMU	Passage	Map, assess and prioritize passage barriers in tributaries and evaluate available lamprey habitat upstream	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.	Ongoing
RMU	Population	Oregon Department of Fish and Wildlife	Complete

		Conservation Plan for Lampreys in Oregon *https://www.dfw.state.or.us/fish/CRP/coastal_columbia_snake_lamprey_plan.asp*	
Multi-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)	Ongoing
Necanicum	Passage	South Fork Necanicum diversion dam removed, and intake screens updated/improved.	Complete
Necanicum	Stream Degradation	Culvert removal or replacement projects to restore access to spawning and rearing habitat.	Ongoing
Nehalem & Siuslaw	Stream Degradation	Coho Strategic Action Plan – identifies high priority conservation areas for restoration and monitoring. Will likely benefit other native aquatic species.	Ongoing
Nehalem	Stream Degradation	Evaluation of lamprey and salmonid response to Beaver Dam Analog stream channel restoration	Ongoing
Wilson – Trask – Nestucca	Stream Degradation	Numerous culvert removal or replacement projects as part of Salmon SuperHwy Project.	Ongoing
Wilson – Trask – Nestucca	Passage	Removal of the East Fork South Fork Trask River Hatchery Dam.	Complete
Wilson – Trask – Nestucca	Passage	Skookum Reservoir Dam removal, Tillamook River Drainage	Complete
Wilson – Trask – Nestucca	Passage	Upgrade to Cedar Creek Hatchery weir and fish ladder on Three Rivers. Ladder will meet lamprey passage criteria	Complete
Siletz	Passage	Evaluation of passage constraints for lamprey at Siletz Gorge Falls fish ladder/trap	Proposed
Siletz	Population	Environmental DNA to assess Pacific Lamprey distribution above Lake Creek Falls & Lobster Creek Wild and Scenic River	Ongoing
Siletz	Stream Degradation	Habitat improvements on mainstem Siletz River to increase habitat complexity and substrate sorting along margins of river	Ongoing

Alsea	Passage	Installation of Lamprey Passage Ramp at water diversion structure upstream from Alsea River Hatchery on North Fork Alsea River.	Complete
Alsea	Passage	Monitoring relative abundance of larval Pacific Lamprey upstream of water diversion structure pre and post lamprey ramp installation	Ongoing
Alsea	Population	Environmental DNA pilot project to assess Pacific Lamprey distribution	Ongoing
Siuslaw	Population	Environmental DNA to assess Pacific Lamprey distribution	Ongoing
Siuslaw	Population	Environmental DNA to evaluate passage of Denil fishway and determine presence/absence of Pacific Lamprey above Lake Creek Falls	Proposed
Siuslaw	Passage	Improve passage conditions for Pacific Lamprey at Lake Creek Falls fishway	Proposed
Siuslaw – Siltcoos	Stream Degradation	Environmental DNA to monitor lamprey occupancy pre/post floodplain reconnection projects	Ongoing
Siltcoos	Passage	Evaluation of passage constraints for lamprey at Siltcoos and Tahkenitch Dam fish ladders.	Proposed
Siltcoos	Stream Degradation	Implementation of several large floodplain reconnection projects (Stage 0; Fivemile Bell)	Ongoing

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IV. APPENDIX

Appendix A. 2023 RMU Meeting Notes

Annual Pacific Lamprey Meeting for the North Coast RMU
May 11, 2023
Co-chairs: Jen Poirier (USFWS) and Ann Gray (USFWS)

Virtual meeting attendees

BLM: Tony Spitzack,
Lower Nehalem Watershed Council: Zachary Mallon
North Coast Watershed Association: Graham Klag
ODFW: Ben Clemens, Michael Sinnott
Tillamook Estuary Partnership: Christer LeBrecque, Conrad Ely
USFWS: Ann Gray, Jen Poirier, Joe Skalicky
USFS: Adriana Morales

2023 Events & PLCI updates

- **Lamprey Information Exchange Webinar Series**
  - 7th Annual Lamprey Information Exchange – early December 2023 (in person).
  - If you are interested in joining our Info Exchange planning group, please reach out to Jen Poirier.
  - More details to come.
  - Recordings of past webinars: www.gotostage.com/channel/plci

- **New PLCI Coordinator**
  - Max Calloway started May 1st
  - Contact at MCalloway@pacificlamprey.org

- **Lamprey Technical Workgroup**
  - Technical advisory committee of PLCI.
  - Multiple subgroups studying a range of topics:
  - Participation in the LTWG and its subgroups is open to all lamprey enthusiasts!
  - Contact the LTWG Chair, Christina Wang (USFWS) for more information (Christina_Wang@fws.gov).

- **Recent LTWG Publications**
  - Many of the Lamprey Technical Workgroup publications are living documents that will be updated as more/better information becomes available.

- *Comparison of Pacific Lamprey and Pacific Salmon Life Histories, Habitat and Ecology (LTWG; 2023)*
- *Review of Factors Affecting Larval and Juvenile Lamprey Entrainment and Impingement at Fish Screen Facilities* (LTWG; 2022)
- *Practical Guidelines for Incorporating Adult Pacific Lamprey Passage at Fishways, Version 2.0* (LTWG; 2022)
- *Barriers to Adult Pacific Lamprey at Road Crossings: Guidelines for Evaluating and Providing Passage* (LTWG; 2020)
- *Best Management Guidelines for Native Lampreys During In-water Work* (LTWG; updated 2022)
- *Overview of eDNA and Applications for Research and Monitoring of Lampreys* (LTWG; 2021)
- *Monitoring and Minimizing Effects of Dredging on Lampreys* (LTWG; 2021)\
- Links to reports above can be found at https://www.pacificlamprey.org/ltwg/

- **Other recent lamprey publications?**
  - **Any new publications you would like to share with the RMU?**

  - Ben Clemens shared his a paper on warmwater effects on lampreys (open access): https://meridian.allenpress.com/jfwm/article/13/2/591/483660/Warmwater-Temperatures-20-C-as-a-Threat-to-Pacific
  - Abundance trends for adult Pacific Lamprey in Western Oregon: https://afspubs.onlinelibrary.wiley.com/doi/full/10.1002/tafs.10326
  - Backpack Electrofishing can be used to Collect Adult Lamprey: https://afspubs.onlinelibrary.wiley.com/doi/10.1002/nafm.10900

2022 Pacific Lamprey Assessment

- One of the primary tasks of RMU is providing information for the Pacific Lamprey Assessment.
- Every 5 years we collect information on Pacific Lamprey distribution, abundance, population trends and local threats to characterize the conservation risk of PCL across their range.
- Most recent revision completed in 2022.
- 2022 Assessment summary report will be available on the Pacific Lamprey webpage in late summer 2023.
- 2012 & 2017 Pacific Lamprey Assessments are available online at www.pacificlamprey.org.

Regional Implementation Plans (RIPs)

- A second important task of the RMU group is to develop and revise RIPs.
- The RIPs summarize the status, distribution, and local threats to lamprey in the RMU and highlight completed and ongoing conservation measures.
- RIPs for each of the RMUs are available online: https://www.pacificlamprey.org/rmu/

New Pacific Lamprey (or other native lamprey) distribution?

- Please report any NEW Pacific Lamprey distribution or eDNA data to our GIS/distribution database manager David Hines (David_Hines@fws.gov).
- See Databasin.org (Pacific Lamprey known observations & distribution) for current lamprey distribution information.
- If you collect information on other native lamprey species (e.g., Lampetra), please send that information to David Hines as well. Please include GPS coordinates of your sample locations if possible.

Lamprey Funding Opportunities

- The Pacific Lamprey Conservation Initiative has two dedicated funding sources for lamprey projects

    1. National Fish Habitat Partnership (NFHP) project funding

    2. Bonneville Power Administration's (BPA) PLCI Columbia River Basin Projects

    - Two separate requests for proposals (RFPs) will be issued for these funding sources.
    - The criteria, guidelines and proposal templates pertaining to each funding opportunity can be found on the PLCI webpage - https://www.pacificlamprey.org/funding/.

    - NFHP RFP will be out in January 2024. Funding is available to projects in any RMU. Total funding ranges from $150-250K.

    - BPA RFP will be out in late September/early October 2023. Funding is available to projects within the Columbia River Basin. Total funding ≈300K

GROUP DISCUSSION RE: eDNA, Funding, Sampling

- **Adriana (USFS)** asked about the potential to fund eDNA analysis of previously collected samples to evaluate presence pre and post-restoration. Samples would be processed at the Rocky Mountain Research Lab. Ben recommended contacting Kellie Carim - USFS, Missoula, MT (kellie.carim@usda.gov).
- **Tony Spitzack (BLM)** noted that other organizations are looking to sample various areas and may be interested in the samples previously collected by the USFS (e.g. USFWS/RMRS looking to sample for Brook lamprey and mussels, ODFW sample for pond turtle). If you can coordinate with them, they might pay for the DNA extraction and their first sample analysis (for whatever species they are interested in) at $85/sample and then each additional species that is tested for, is only $35, so you can get more analysis for less.
- **Ben Clemens (ODFW)**: For eDNA, I'm collaborating with Kellie Carim to analyze existing samples and to acquire new samples to assay for Western Brook Lamprey eDNA throughout

Oregon. The goal is to improve understanding of their distribution. I'm interested in identifying and working with partners to acquire the new water samples. (Benjamin.J.CLEMENS@odfw.oregon.gov; 541-757-5113).

RMU Partner Updates and Group Discussions

Ann Gray (USFWS):

- The Adult Passage and Engineering subgroup is pulling together any case studies pertaining to trap & haul and translocation. This will be used to develop some guidelines for future trap & haul programs. The subgroup will work on this document over the next year. If you know of any case studies, let Ann know!

Graham Klag, North Coast Watershed Council:

- Pacific lamprey outreach project- looking for interested persons to help develop/have input on outreach materials. Contact Graham at northcoastwatershedcouncils@gmail.com - (971) 998-6604
- Looking to develop an educational sticker and trifold brochure for public outreach. Want to provide consistent messaging to public re: Pacific Lamprey (e.g. lamprey as a keystone species, life history, distribution, ecological and cultural importance, and highlighting differences between lamprey and salmon).
- Timeline: Grant closes at the end of the year, so trying to get something pulled together by the end of summer to share for input. Targeting the end of November for a finished product.
- This outreach project is part of the BPA PLCI funded restoration project that improved passage over a barrier dam at the NF Klaskanine hatchery using a roughened channel. Graham conducted some post restoration monitoring and found: 8 adult lamprey, 234 juvenile lamprey, 12 steelhead and a number of cutthroat trout, western brook lamprey and sculpin.

Tony Spitzack, BLM:

- BLM completed an LWD project on the South Fork of the Alsea River in 2019. Additional wood washed into the project this year and created a beaver dam type structure and large depositional area above that, where originally there had been large cobble, boulder and bedrock. Looks like great lamprey habitat and BLM will try to sample this year or next for lamprey presence. See Tony's photo below:


- BLM also completed another large wood restoration project in the Mill Creek watershed (just west of the town of Alsea). Sampling has shown a great salmonid response to the site and BLM hopes to monitor for lamprey in the future.
- Beaty Creek (tributary to Mill Creek) – Weyerhaeuser is putting in a bridge to replace a perched, barrier culvert. Environmental DNA samples collected above the culvert did not detect the presence of Pacific Lamprey. BLM will continue eDNA sampling to see if we can document colonization.
- BLM is developing a comprehensive management plan for the Lobster Creek Wild and Scenic River. BLM will be reaching out to the PLCI for input/review of the plan- stay tuned!

Adriana Morales, USFS:

- The USFS led a salvage of Brook and Pacific lamprey for a culvert replacement project on Alder Creek – a tributary of Three Rivers in Tillamook County. Adriana will send David Hines the GPS coordinates for the site where these were collected. Mike Sinnott commented that it was incredible having USFWS on that Alder Creek salvage. He learned a lot about lamprey specific salvage that he has been able share widely. (Adriana's pictures below):

- Three Rivers/Cedar Creek fishway at ODFW hatchery was completed last year, and included lamprey modifications. A new Obermeyer weir is operated to provide volitional passage as often as possible. See Photo 1.d below for example modifications for lamprey. Contact Joel Watts - Engineer ODFW for more information on lamprey modification at the Fish ladder in Cedar Creek.
    - See also : LTWG passage paper, Appendix A, Case Study 12 in www.pacificlamprey.org/wp-content/uploads/2022/08/2022.06.06-Lamprey-Psg-White-Paper.pdf.

Photo 1.d. Fishway entry flush with floor with rounded edges and 6" radius. Fishway walls were rounded for lamprey movement and to reduce turbulence

Mike Sinnott, ODFW:

- **Fish Hawk Lake (Upper Nehalem):** A small lake/dam owned by a local Home Owners' Association: The new ladder at Fishhawk Lake dam in the upper Nehalem basin is entering phase 2 and should be completed this summer. New fishway is a large improvement over existing conditions, and downstream passage conditions will also be improved. Re: Lamprey passage - It meets the states criteria, and has lots of rounded walls at the tops of weirs, but could have been better for lamprey if lower orifices could have been provided. Ann Gray reviewed initial fishway designs and recommended lower orifices. Lower orifices were not provided because there is insufficient flow for the ladder to work with those at summer low flows. Thus, lamprey have to do more up and down and climbing instead of swimming straight along the bottom in a more direct route. Lake will still contribute to warming and low DO seasonally, and some dredging in the lake is allowed, which could impact larval lamprey.

Joe Skalicky, USFWS:

- Be aware of historical practices where natural falls were modified by blasting to provide passage for anadromous salmonids (but often do not pass lamprey). Mike Sinnott indicated there are several modified historical falls on the North Coast. One on the North Fork Klaskanine, 2 on the Little Nestucca, 2 on the North Fork Nehalem and 1 on the mainstem Nehalem. While all have fishways, none of them are up to lamprey criteria and likely do not pass lamprey. These could be potential projects to apply for funding in the future. Graham Klag, Zachary Mallon, Joe Skalicky and Mike Sinnott all expressed interest in getting together for a site visit to evaluate these areas.
- Also at some hatcheries, all anadromy was blocked so hatchery's water source would be free of potential pathogens. This is another area where passage could be addressed! Within the North

Coast, partners (ODFW, USFWS, others??) are working to address passage at the low head barrier dams on Big Creek (at the hatchery) and provide lamprey access to upstream habitat.

- Note that ODFW recently updated its fish passage criteria to address many native fish, including brook lamprey. Kudos to the state for updating its criteria!

GROUP DISCUSSION ON OTHER SPECIES OF LAMPREY

What's being done to get more public awareness on River and Brook lamprey?
Joe Skalicky: Difficult to study, especially at larval and juvenile lifestages, because you can't genetically or visually differentiate between Lampetra spp. (e.g. brook and river lamprey). Adults are easier to distinguish by looking at dentition patterns. It's a huge information gap on these species. No one has seen river lamprey spawning; brook lamprey are seen more commonly but not studied.

ODFW has a great **trifold brochure** on its website with all of Oregon's lampreys:
www.dfw.state.or.us/fish/species/docs/lamprey/LampreyTrifold.pdf

GROUP DISCUSSION ON TRAPPING ADULT LAMPREY

- Tony S. expressed interest in a workshop or training on trapping adult lamprey. Information is available, but no official documents. Ben Clemens shared that Backpack Electrofishing can be used to Collect Adult lamprey: https://afspubs.onlinelibrary.wiley.com/doi/10.1002/nafm.10900.

- Ann Gray, Joe Skalicky and others are working on a Trap and Haul guidelines document, but it is likely a year out.

- Joe indicated a specific Trap and Haul guidelines document is needed. Information currently available includes several ways to collect lampreys at barriers using wetted walls and ramp structures etc. Some of these examples are in the LTWG passage paper as Case Studies (see Appendix A in www.pacificlamprey.org/wp-content/uploads/2022/08/2022.06.06-Lamprey-Psg-White-Paper.pdf. Case studies 7, 8 and 11).
- For Collecting Lamprey in general:
    - Ann will send out any information she receives from Ralph Lampman (Yakama Nation) and Doug Garletts (USACE) about different traps used for lamprey and traps used at Fall Creek.
- Collecting Lamprey for Trap and Haul:
    - Tony Spitzack mentioned Mercer Dam on Rickreall Creek in the Willamette Basin (different RMU). The City of Dallas is currently designing a new dam (10 year planning

effort just starting) at Mercer Dam (~60 ft tall), and is considering providing passage above the dam via Trap and Haul, so it would be good to have information on how best to collect lamprey for trap and haul (ODFW contacts: Ben? Greg Apke?) are likely reviewing the designs for ODFW. The habitat above Mercer Dam is really nice looking and passage would greatly benefit anadromous species. ODFW has identified Mercer Dam as a state priority for passage.

- Joe mentioned in Washington there are efforts to look at trap and haul for a rebuild of a dam on the Toutle River.

Appendix B. NatureServe Conservation Status Rank Definitions

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.