Pacific Lamprey

2025 Regional Implementation Plan

for the

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

Primary Authors		Primary Editors
Jen Poirier	U.S. Fish and Wildlife Service	
Travis Mackie	Cow Creek Band of Umpqua Tribe of Indians	

Contents

I. Introduction 1

II. Status and Distribution of Pacific Lamprey in the RMU 1

A. General Description of the RMU 1

B. Status of Species 3

Distribution 3

Abundance 4

Population Trend 4

Distribution and Connectivity (Passage) 7

C. Summary of Major Threats 8

Climate Change 9

Water Quality 9

Lack of Awareness 10

Stream and Floodplain Degradation 10

Dewatering and Flow Management 11

Predation 11

Conservation and Restoration Actions 12

III. References 16

IV. Appendix 1. 2025 RMU Meeting Notes 19

Appendix 2. NatureServe Conservation Status Rank Definitions 24

I. Introduction

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). This is the annual Regional Implementation Plan (RIP) developed for the South Coast Sub-Unit of the Oregon Coast Regional Management Unit (herein, "South Coast RMU"). RIPs for the South Coast RMU are revised each year as warranted, primarily based on new information provided by South Coast RMU partners. This RIP is not intended to be comprehensive; rather, it provides an overview of the RMU and the status of Pacific Lamprey within the RMU, including the primary threats and significant conservation actions affecting this species. This plan and earlier versions are available on the Pacific Lamprey Conservation Initiative webpage (www.pacificlamprey.org/rmu/). The 2025 annual meeting notes are appended to this plan (Appendix 1).

II. Status and Distribution of Pacific Lamprey in the RMU

A. General Description of the RMU

The South Coast RMU 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 Coast RMU include the North and South Umpqua, Umpqua, Coos, Coquille, Sixes, Upper, Middle and Lower Rogue, Applegate, Illinois and Chetco (Figure 1).

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

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

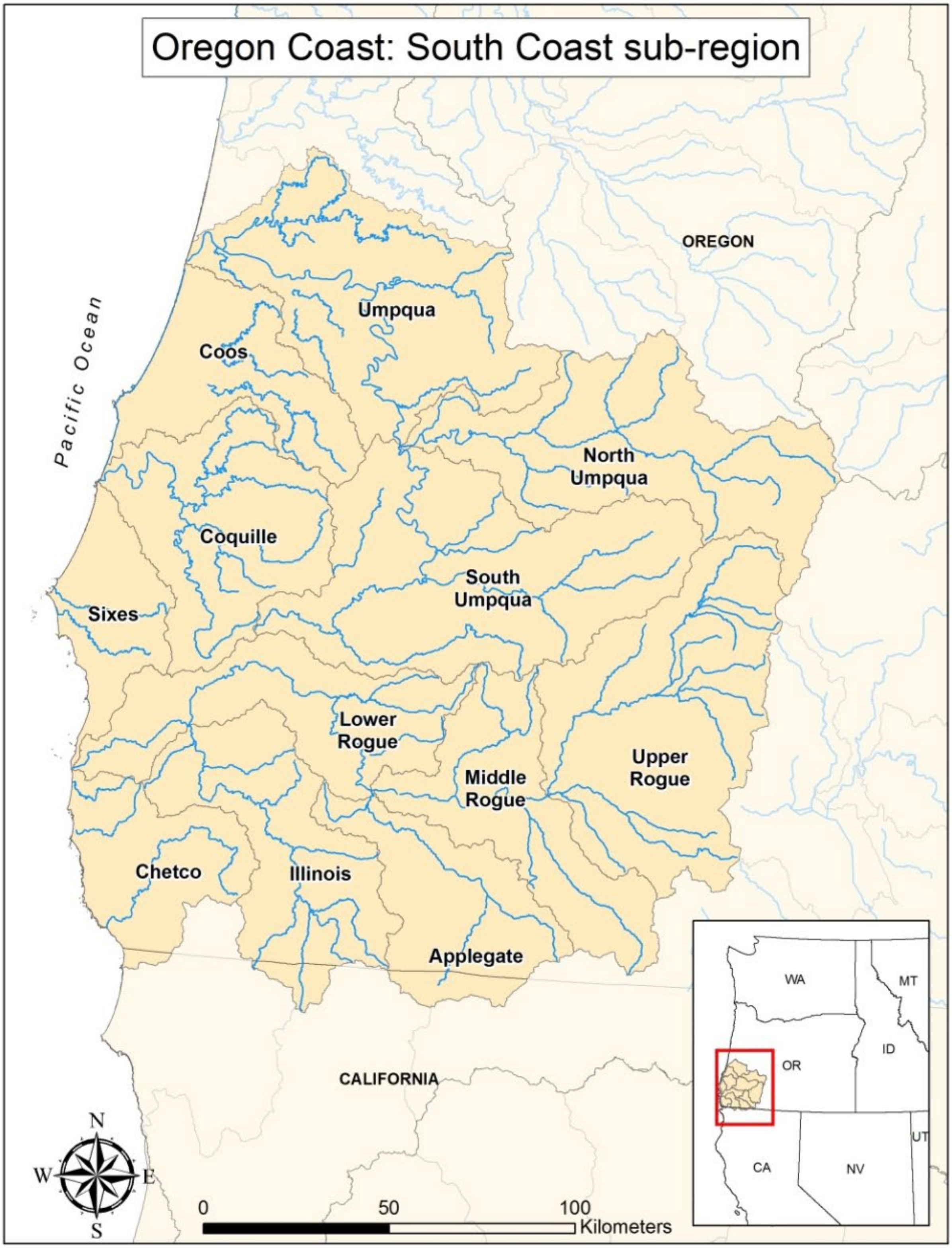

Figure 1. Map of watersheds in the South Coast RMU.

B. Status of Species

2022 Pacific Lamprey Assessment

Approximately every five years the Pacific Lamprey Conservation Initiative (PLCI), through the Regional Management Units, revise the Pacific Lamprey Assessment (e.g., USFWS 2019; PLCI 2024). 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 South Coast RMU through an online Assessment questionnaire and virtual meeting held on March 31st 2022. The following is a brief summary of key findings from the 2022 Pacific Lamprey Assessment, available online at https://www.pacificlamprey.org/wp-content/uploads/2024/06/PacificLamprey_2022Assessment_FINAL_06_27_2024.pdf.

NatureServe conservation status ranks changed in eight of twelve HUCs in 2022 (Table 2). Status ranks worsened from Imperiled (S2) to Critically Imperiled (S1) in the Sixes, Middle Rogue, Applegate, Lower Rogue, and Chetco. Change in these watersheds was due to a combination of our inability to rank population size (Table 2) and an increase in the Threat score of climate change to 'High' (Table 3). Conservation status ranks also worsened slightly from Imperiled (S2) to Imperiled/Critically Imperiled (S1S2) in the North Umpqua, Umpqua and Coos. This modest decline was a result of uncertainty within the NatureServe model associated with the population size ranking in these watersheds. Stakeholders selected a larger population size range (i.e., two NatureServe ranking bins instead of one) to remain conservative and inclusive of the variation in adult abundance over the last five years (see *Abundance* below). As a result of this ranking selection, NatureServe assigns a 'range' status rank of S1S2 because the calculated status rank falls between an S1 and S2.

Distribution

Current Pacific Lamprey distribution in the South Coast RMU is still greatly reduced from historical range (Table 2). The ratio of current to historical distribution was estimated to be small in the majority of watersheds, ranging from 1% (Applegate) to 29% (Coos) in areas with known Pacific Lamprey occupancy. Although current distribution of lamprey has remained the same in many watersheds since the completion of the 2018 Assessment, distribution expanded modestly in the Coos (+96 km^2), Illinois (+66 km^2) and Chetco (+75 km^2) watersheds due to an improved understanding of occupancy informed by increased sampling effort (e.g., smolt trapping, redd surveys, environmental DNA sampling, fish salvage). Distribution information is still limited in the Upper Rogue and Applegate watersheds. A compilation of known Pacific Lamprey occurrences in the South Coast RMU are displayed in Figure 2 and an ArcGIS Web Map available online at https://fws.maps.arcgis.com/apps/instant/basic/index.html?appid=3a85e0d266834a2aad815a9d2f18ddf5.

Abundance

Pacific Lamprey population abundance was revised in the North Umpqua, South Umpqua, Umpqua, Coos and Coquille watersheds using consolidated data from redd surveys conducted in coastal watersheds by staff from the Oregon Department of Fish and Wildlife (ODFW). ODFW has recorded counts of lamprey spawners and redds since 2007. ODFW has estimated the abundance of Pacific Lamprey 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 adult Pacific Lamprey abundance between 2007 and 2021 has ranged from 33 – 23,241 fish in the Mid-South Coast geographic management area (includes Coos and Coquille Rivers), 81 – 11,933 fish in the Umpqua geographic management area (includes lower, middle and South Fork Umpqua), and 31 – 1,278 fish at Winchester Dam on the North Umpqua (ODFW 2022; Clemens et al. 2021; Ben Clemens, ODFW, personal communication). Pacific Lamprey abundance indices have increased and decreased over time with periodic peaks in abundance every few years (Clemens et al. 2021). 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).

Adult Pacific Lamprey abundance is currently unknown in the Sixes, Upper Rogue, Middle Rogue, Applegate, Lower Rogue, Illinois, and Chetco Rivers (Table 2).

Population Trend

There is consensus that lamprey populations have declined significantly in coastal areas compared to past returns approximately 50-60 years ago (Downey et al.1993; Sheoships 2014). However, short-term population trend which is defined as the degree of change in population size over three lamprey generations (~36 years; Hess et al. 2022), was ranked as 'Unknown' in the majority of South Coast watersheds in 2022 because there is a lack of continuous long-term population trend data in the region. One exception is Winchester Dam on the North Umpqua River. Winchester Dam has maintained a continuous count of adult Pacific Lamprey since 1965. Overall, counts of Pacific Lamprey at Winchester Dam have declined precipitously since the early 1970s. 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 950 fish (ODFW 2025). More recently, the number of adults passing Winchester Dam has shown a slight increase following the installation of a lamprey passage structure in 2013. It is unclear whether the increase 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. Oregon Department of Fish and Wildlife abundance indices in the Mid-South Coast and Umpqua geographic management areas also indicate a possible increase in adult abundance over the last several years (Clemens et al. 2021), but this dataset is not long enough to infer population trend.

Table 2. Population demographic and NatureServe conservation status ranks (see Appendix 2) of the 4th Field Hydrologic Unit Code (HUC) watersheds located within the South 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)
North Umpqua	17100301	S1 S2↓	1000-5000	100-500	250-2500	Stable
South Umpqua	17100302	S1	1000-5000	100-500	250-2500	Unknown
Umpqua	17100303	S1S2↓	1000-5000	500-2000	1000-10,000	Unknown
Coos	17100304	S1S2↓	1000-5000	100-500	250-2500	Unknown
Coquille	17100305	S2	1000-5000	500-2000	2500-10,000	Unknown
Sixes	17100306	S1↓	1000-5000	100-500	Unknown	Unknown
Upper Rogue	17100307	S1	1000-5000	100-500	Unknown	Unknown
Middle Rogue	17100308	S1↓	1000-5000	100-500	Unknown	Unknown
Applegate	17100309	S1↓	1000-5000	100-500	Unknown	Unknown
Lower Rogue	17100310	S1↓	1000-5000	100-500	Unknown	Unknown
Illinois	17100311	S1	1000-5000	100-500	Unknown	Unknown
Chetco	17100312	S1↓	250-1000	100-500	Unknown	Unknown

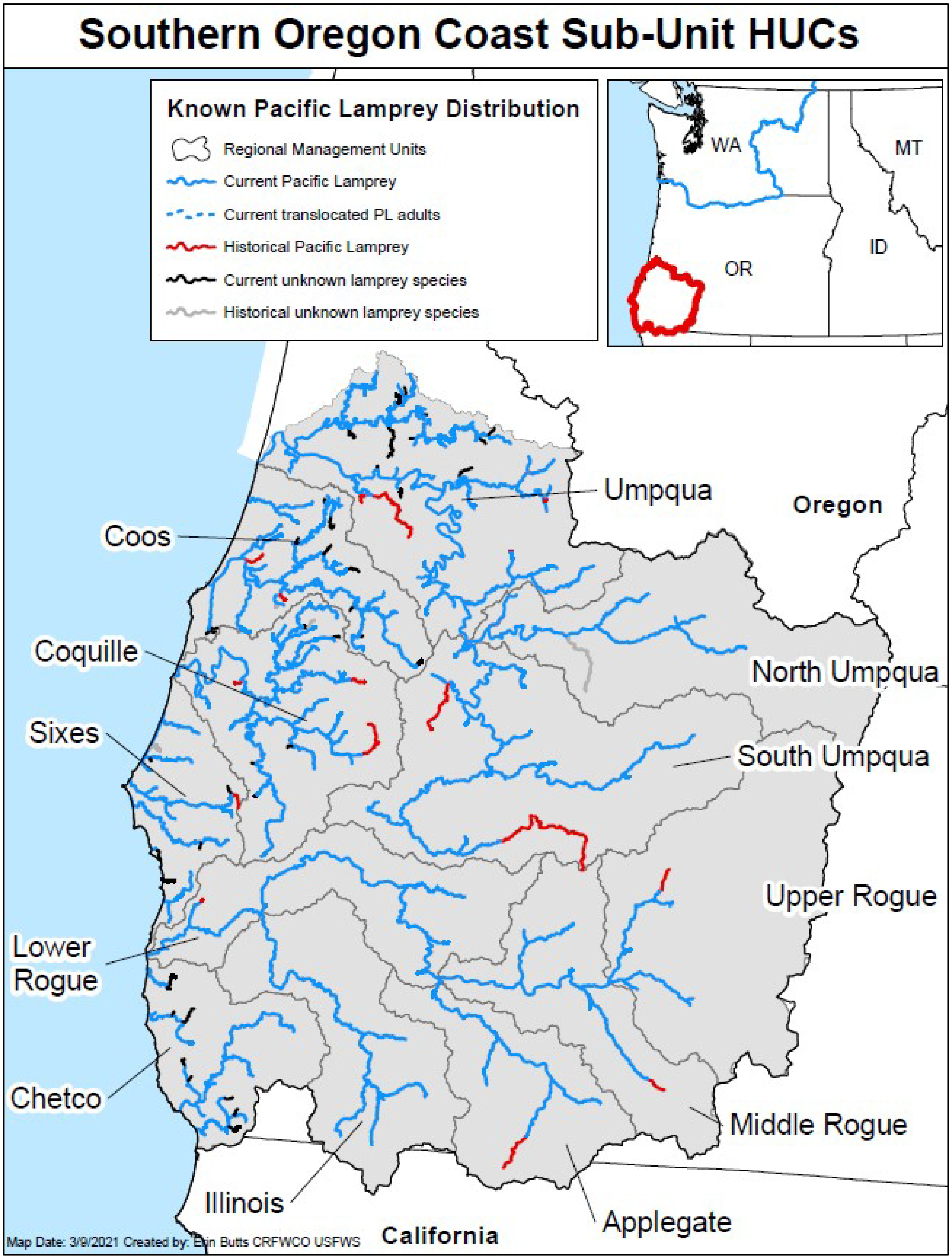

Figure 2. Current and historical known distribution for Pacific Lamprey: South Coast RMU (https://fws.maps.arcgis.com/apps/instant/basic/index.html?appid=3a85e0d266834a2aad815a9d2f18ddf5). Historical Pacific Lamprey distribution depicted in map was obtained from published literature, tribal accounts and state and federal agency records.

Distribution and Connectivity (Passage)

Fish Passage was ranked a High threat in the North Umpqua (mean Scope/Severity 3.75), a Moderate threat in the South Umpqua, Upper Rogue, Middle Rogue, and Applegate (mean Scope/Severity 3.0) and a Low threat in all other watersheds (mean Scope/Severity ≤ 2.0). 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) 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. Passage at Winchester Dam is still a limiting factor for Pacific Lamprey in the North Umpqua watershed.

Smaller dams and water diversions for municipal, irrigation, livestock and other uses are abundant within the South Coast RMU. Contemporary structures are required to provide passage for migratory fish and maintain screening or by-pass devices to protect fish from impingement or entrainment, though most screens are designed to protect/exclude salmonids and not lampreys. Unfortunately, there are a large number of older structures that predate current screening and fish passage requirements. Additionally, active water rights associated with diversions make them difficult to upgrade or remove. Water diversion structures with inadequate screening or open irrigation canals can harm or entrap larval and juvenile lampreys while channel spanning concrete dams may delay or impede adult Pacific Lamprey passage given their difficulty navigating over or around sharp edges (e.g., 90° angles), especially in areas with high velocity (LTWG 2022).

Faulty tide gates are numerous in tidally-influenced areas of the Umpqua, Coos, and Coquille Rivers (see CoqWA, TNC and TEP 2024). The Coquille Watershed Association completed a tide gate 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. The Oregon Tide Gate Partnership also recently completed an inventory of existing tide gates throughout the Oregon Coast and is working with stakeholder groups to facilitate the removal, repair or replacement of failing structures and restore more natural conditions. Although physical and ecological effects of tide gates are well documented, more research is needed to better understand how tide gates may influence the migration and passage of Pacific Lamprey (PLCI 2021). Barrier culverts were also identified as a threat in the North Umpqua, South Umpqua, Coos and Coquille Rivers. Poorly designed or installed culverts may fragment aquatic habitat and prevent access to miles of potential habitat. Culverts with excessive water velocity (>0.86 m/s), inadequate attachment points, perched outlets, or abrupt 90 degree angles (e.g., baffles, fish ladder steps, outlet aprons) may obstruct passage of adult lamprey (Moser et al. 2002; Mesa et al. 2003; Keefer et al. 2003; Stillwater Sciences 2014; Crandall and Wittenbach 2015; LTWG 2020a). Stakeholder groups are working to systematically remove or replace problem culverts to improve passage conditions for Pacific Lamprey and other native fish in the South Coast RMU.

C. Summary of Major Threats

The following table summarizes the key threats (i.e., mean Scope & Severity ≥2.50) within South Coast RMU tributaries as identified by RMU participants during the Pacific Lamprey Assessment revision meeting in March 2022. The highest priority threat in South Coast watersheds is Climate Change followed by Water Quality, Lack of Awareness, Stream and Floodplain Degradation, and Dewatering and Flow Management.

Table 3. Key threats to Pacific Lamprey and their habitats in the South Coast RMU, 2022.

	Climate Change		Water Quality		Lack of Awareness		Stream & Floodplain Degradation		Dewatering & Flow Management	
Watershed	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity	Scope	Severity
South Oregon Coast										
North Umpqua	4	4	4	3.5	3	2	2	3	4	3.5
South Umpqua	4	4	4	4	4	2	4	3.5	3	4
Umpqua	4	4	4	4	4	2	3	3	3	3
Coos	4	4	3	3	3	2	3	3	2	2
Coquille	4	4	4	3	3	2	3	3	2.5	2
Sixes	4	4	3	3	4	3	3	3	1	2
Upper Rogue	4	4	3	3	4	3	3	3	3	3
Middle Rogue	4	4	4	3	4	3	3	3	3	3
Applegate	4	4	3	3	4	4	3	3	3	3
Lower Rogue	4	4	3	2.5	4	3	1	1.5	1	1
Illinois	4	4	3	3	4	2	2.5	2.5	3	3
Chetco	4	4	2	2	4	3	1	2	1	2
Mean Scope & Severity	4.00		3.21		3.17		2.71		2.54	
Drainage Rank	**H**		**M**		**M**		**M**		**M**	

Climate Change

Climate Change was the highest ranking threat in the South Coast RMU (Table 3). NatureServe Scope and Severity ranks increased to High (4.0) in all watersheds in 2022. 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. Climate change is likely to alter the amount, timing, and type of precipitation with decreases in snowpack and more winter precipitation falling as rain in higher elevations. More severe winter rainfall events may increase the frequency and intensity of flooding that can increase bank erosion and scouring of streambeds. Earlier melting of snowpack and declining summer precipitation may increase the frequency and severity of wildfires and reduce summer baseflows. Warmer ambient temperatures and low summer flows may increase water temperatures to the detriment of Pacific Lamprey. 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). Warm water temperatures can also increase vulnerability to pathogens and predation and may shift or expand the range of nonnative predatory fish, putting further stress on lampreys (Lawrence et al. 2014). Additionally, water withdrawals for irrigation, municipal, or residential uses further depress already low summer stream flows in many South Coast watersheds. 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 (Wang et al. 2020; Justice et al. 2017).

Water Quality

Water quality ranked a moderate overall threat with Scope and/or Severity scores increasing in seven of twelve watersheds in 2022 (Table 3). Elevated water temperature is still the primary water quality concern in the South Coast RMU. Most watersheds report excessively warm water temperatures well above 20°C during summer and early fall months. Factors contributing to high water temperatures generally include increased air temperature, reduced instream flows, and lack of riparian cover attributable to timber harvest, land clearing activities and wildfires. 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 notable water quality concerns in South Coast watersheds include low dissolved oxygen levels, increased sedimentation and turbidity, and presence of bacteria (e.g., fecal coliform, E. coli) or toxic pollutants. Loss of forest and riparian vegetation during recent wildfires in the North Umpqua and Chetco watersheds have contributed to warmer stream temperatures, and increases in runoff and erosion that has elevated sediment loads and turbidity levels in downstream habitats. Sewage inputs from municipality discharge and chemical/herbicide inputs from agriculture and industrial forest practices were noted as problematic in the Coquille, Applegate and upper Illinois Rivers. The South Umpqua and mainstem Umpqua River also experience toxic blue green 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.

Lack of Awareness

Lack of Awareness was ranked a moderate overall threat in the South Coast RMU. NatureServe Scope ranks decreased (from High to Moderate) in the North Umpqua, Coos, and Coquille, while Severity ranks rose (from Low to Moderate or High) in the Sixes, Applegate, Chetco, and Rogue River basin (Table 3). Pacific Lamprey awareness is slowly becoming more widespread among stakeholders and the public. Tribes, state and federal agencies, watershed councils and others have played a significant role in improving awareness through targeted outreach, education events (e.g., ID workshops), publications (e.g., Clemens and Wang 2021) and fact sheets (e.g., https://wdfw.wa.gov/sites/default/files/2025-04/20250313-lampreys-friends-or-foes-final.pdf). 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 landowner 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 LTWG (2020b).

Stream and Floodplain Degradation

Stream and Floodplain Degradation was ranked a moderate overall threat in the South Coast RMU. Although most NatureServe ranks remained unchanged in 2022, Scope/Severity ranks increased moderately in the South Umpqua, Upper Rogue and Applegate and declined moderately in the Illinois (Table 3). Legacy impacts of splash damming, stream cleaning, road building, timber harvest, mining, and agricultural development have contributed to large scale losses in riparian and stream habitat complexity throughout the South Coast RMU. Within lowlands, freshwater and tidal wetlands have been lost to stream channelization and construction of dikes/levees to prevent flooding and facilitate development (e.g., crop production, livestock grazing, urban development) within the floodplain. In upland areas, legacy and ongoing timber harvest, mining, 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). The construction of roads within the active floodplain has further altered sediment, nutrient and large wood recruitment and transport, and cut-off side channels and other important off-channel habitats. RMU partners continue to work hard to implement restoration projects aimed at addressing habitat degradation, water quality issues and impaired floodplain function throughout the South Coast RMU. However, as human populations and associated land use continues to rise, habitat degradation is outpacing restoration efforts in some areas.

Dewatering and Flow Management

Dewatering and Flow Management was ranked a moderate threat in the South Coast RMU. NatureServe Scope and Severity ranks remained unchanged in the majority of watersheds in 2022. Water withdrawals for irrigation, livestock, and municipal uses leave many watersheds in the South Coast RMU dewatered or with inadequate flow during summer and fall months. In recent years early cessation of rains, below average snowpack, and above average air temperature have further contributed to reduced stream flows in much of the region. Low flow conditions can impact fish by reducing spawning and rearing habitat availability, creating low water passage barriers, or impairing water quality. Water efficiency improvements and other actions to restore and protect diminishing instream flows will require large scale institutional changes involving water rights and will likely require a long-term effort. With predicted trends in population growth, increased water demand, and future effects of climate change, water supply issues will likely be an ongoing problem in the South Coast RMU.

Predation

Although predation was not ranked a key threat during the 2022 Pacific Lamprey Assessment revision, predation of adult and larval lamprey by nonnative fish species was highlighted as a concern in the Umpqua, Coquille and Tenmile Basin (Coos HUC). Smallmouth bass predation on juvenile lamprey is well documented in the Umpqua Basin (Schultz et al. 2017) and a recent assessment conducted by ODFW and the Coquille Indian Tribe found smallmouth bass distributed throughout the mainstem Coquille and present in all main forks of the river. Low flows and warm water temperatures have created optimal conditions for smallmouth bass, striped bass and other nonnative fish, especially in main channels and lower sections of rivers. Dams and diversions can also increase habitat suitability for warm water fish species and may contribute to the decline of lamprey by delaying migration, potentially exposing fish to increased predation. As climate change continues to progress, future increases in stream temperature may facilitate the expansion of nonnative fish to the detriment of native lampreys (Lawrence and Olden 2013; Lawrence et al. 2014; Jones et al. 2020).

Conservation and Restoration Actions

Pacific Lamprey conservation work in the South Coast RMU is currently focused on adult passage improvements, expansion of occupancy surveys, environmental DNA sampling, 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 RMU from 2012-202.

HUC	Threat	Action Description	Status
RMU	Lack of Awareness	Lamprey ID workshop held in 2022	Complete
RMU	Lack of Awareness	Making meaningful connections between the life histories of Pacific Lamprey and Pacific salmon to improve awareness and support for lamprey conservation	Proposed
RMU	Other	Formation of South Coast Lamprey Working Group	Ongoing
RMU	Passage	Evaluation of lamprey passage at culverts, small dams and fishways.	Proposed
RMU	Population	eDNA sampling for Western Brook Lamprey/Western River Lamprey (*Occidentis ayresii*) to create species distribution model	Ongoing
RMU	Population	Study to look at use of lakes for lamprey	Proposed
RMU	Population	Study to look at estuary use by lamprey	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	eDNA sampling to fill distribution gaps on Rogue River Siskiyou National Forest Land.	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	Complete
RMU	Predation	Multi-RMU predation study to determine best methods for removal of nonnative	Proposed

		fish	
RMU	Stream Degradation	Science to Restoration Workshop and future whitepaper about restoration techniques for lampreys	Complete/ Ongoing
RMU	Stream Degradation	Implementation of instream and floodplain habitat restoration activities (e.g. large wood and boulder placement, side channel and floodplain reconnection, channel reconstruction, bank stabilization, gravel recruitment, etc.).	Ongoing
North Umpqua	Passage	Passage improvement at Soda Springs Dam.	Complete
North Umpqua	Passage	Pacific Lamprey spawning and rearing habitat suitability above Soda Springs Dam	Complete
North Umpqua	Passage	Passage improvement at Rock Creek Hatchery diversion dam fish ladder.	Complete
North Umpqua	Passage	Installation of Lamprey Passage Structure at Winchester Dam.	Complete
North Umpqua	Passage	Installation of video monitoring camera on Winchester Dam lamprey ramp	Complete
North Umpqua	Population	Conduct native fish inventory to establish baseline lamprey distribution dataset	Complete
North Umpqua	Population	eDNA sampling on 7-8 tributaries for Western Brook Lamprey and Pacific Lamprey	Ongoing
Umpqua	Passage	Replaced concrete sills with constructed riffles on the West Fork Smith River at Crane and Coon Creeks	Complete/ Ongoing
Umpqua	Predation	Smallmouth bass predation evaluation in lower Elk Creek and Umpqua R.	Complete
Umpqua & Rogue Basins	Lack of Awareness	Provide education and outreach to stakeholders, resource managers and community members	Ongoing
Umpqua & Rogue Basins	Population	Lamprey distribution mapping, occupancy and environmental DNA sampling.	Ongoing
Rogue Basin	Passage	Rogue Basinwide Priority Barrier Removal Analysis - project characterized and prioritized 38 passage barriers in basin.	Complete
Rogue Basin	Passage	Low cost passage retrofits at irrigation diversion dams.	Ongoing

Rogue Basin	Passage	Improving passage at two irrigation diversions on Little Butte Creek (South Fork and North Fork)	Ongoing
Upper & Middle Rogue	Population	Distribution surveys in principal tributaries.	Complete
Middle Rogue	Passage	Removal of Fielder and Wimer dams on Evans Creek	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.	Complete
Applegate & Illinois	Population	Distribution surveys in principal tributaries	Complete
Applegate & Illinois	Predation	Umpqua pikeminnow predation evaluation	Proposed
Applegate	Passage	Removal of large gravel push-up dam on Williams Cr. (RM 0.5) opening 31 miles of habitat for native fish	Ongoing
Applegate	Passage	Improved lamprey passage at four irrigation diversion structures	Complete
Coos	Passage & Population	Evaluation of passage constraints and baseline presence/absence of lamprey within the Eel Lake basin	Ongoing
Coos	Passage	Installation of lamprey passage ramp/trap at Eel Creek Dam.	Complete
Coos	Passage	Installation of new trap box and camera monitoring system in Eel Lake ladder	Complete
Coos	Passage	Replaced aging tide gates on Palouse Creek and Beaver Slough	Complete
Coos	Population	Telemetry to monitor movement, distribution and spawning of Pacific Lamprey through Tenmile Lakes system.	Ongoing
Coos	Population	Comparison of e-shocking and eDNA sampling (sediment & water samples) in the Coos Estuary (South Slough)	Ongoing
Coos	Population	Development of eDNA citizen science network in greater Coos targeting Pacific Lamprey and Western Brook Lamprey	Ongoing
Coos	Stream Degradation	Implementation of instream and floodplain habitat restoration activities (e.g. East Fork Millicoma Oxbow project, Ross Slough Project)	Complete
Coos/	Passage	Multiple culvert replacement or removal	Ongoing

Coquille		projects where lamprey salvage efforts occurred.	
Coquille	Passage	Baker Creek culvert removal on SF Coquille – a regional stronghold for Pacific Lamprey	Complete
Coquille	Population	Lamprey spawning ground surveys in South Fork Coquille River.	Ongoing
Coquille	Population	eDNA sampling targeting Western Brook Lamprey and Pacific Lamprey	Ongoing
Coquille	Population	Assessment to study entry timing of Pacific Lamprey into Coquille River	Proposed
Coquille	Predation	Assessment of the nonnative smallmouth bass population in Coquille to determine feasibility of eradication – will include week long fishing blitz and bass suppression efforts	Ongoing
Coquille	Climate Change	Water quality monitoring in lower Coquille River to identify cold water refuge.	Ongoing

III. References

Clemens, B. J., M. A. Weeber, M. Lewis, and M. Jones. 2021. Abundance Trends for Adult Pacific Lamprey in Western Oregon (USA): Historic Declines, Recent Increases, and Relative Contributions from Coastal Rivers. Transactions of the American Fisheries Society 150(6):761-776. doi:10.1002/tafs.10326.

Clemens, B. J., L. Weitkamp, K. Siwicke, J. Wade, J. Harris, J. Hess, L. Porter, K. Parker, T. Sutton,and A. Orlov. 2019. Marine biology of Pacific Lamprey *Entosphenus tridentatus*. Reviews in Fish Biology and Fisheries 29:767–788.

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

Clemens, B. J. and C. J. Wang. 2021. Dispelling misperceptions of native lampreys (*Entosphenus* and *Lampetra* spp.) in the Pacific northwest (USA). Conservation Science and Practice 3(6): e402. https://doi.org/10.1111/csp2.402.

CoqWA, TNC, and TEP (Coquille Watershed Association, The Nature Conservancy in Oregon, and Tillamook Estuaries Partnership). 2024. Tide gate & tidal wetland monitoring: guidance and protocols for estuary practitioners. Coquille, Portland, and Garibaldi, OR: CWA, TNC, and TEP. Prepared for the Oregon Watershed Enhancement Board. Available online: https://www.oregon.gov/oweb/Documents/Tide-Gate-Monitoring-Handbook.pdf.

Crandall, J.D., and E. Wittenbach. 2015. Pacific Lamprey Habitat Restoration Guide. Methow Salmon Recovery Foundation, Twisp, Washington. First edition 54 p.

Downey, T. D. Rilatos, A. Sondenaa, and B. Zybach. 1996. Skwakol: The Decline of the Siletz Lamprey Eel Population during the 20th Century. OSU Chapter, American Indians in Science and Engineering Society (AISES). Oregon State University, Corvallis, Oregon. 90 pp.

Gonzalez, R., J. Dunham, S. Lightcap, and J. McEnroe. 2017. Large Wood and In-stream Habitat for Juvenile Coho Salmon and Larval Lampreys in a Pacific Northwest Stream. North American Journal of Fisheries Management 37:4, 683-699.

Jones, K. L., J. B. Dunham, J. E. O'Connor, M. K. Keith, J. F. Mangano, K. Coates, and T. Mackie. 2020. River network and reach scale controls on habitat for lamprey larvae in the Umpqua River basin, Oregon. North American Journal of Fisheries Management 40:1400-1416.

Justice, C., S. M. White, D. A. McCullough, D. S. Graves, M. R. Blanchard. 2017. Can stream and riparian restoration offset climate change impacts to salmon populations? Journal of Environmental Management 188:212-227. doi:10.1016/j.jenvman.2016.12.005.

Hess, J. E., T. A. Delomas, A. D. Jackson, M. J. Kosinski, M. L. Moser, L. L. Porter, G. Silver, T. Sween, L. A. Weitkamp, and S. R. Narum. 2022. Pacific Lamprey Translocations to the Snake River Boost Abundance of All Life Stages. Transactions of the American Fisheries Society 151:263–296. https://doi.org/10.1002/tafs.10359.

Keefer, M. L., W. R. Daigle, C. A. Peery, H. T. Pennington, S. R. Lee, and M. L. Moser. 2010. Testing adult Pacific lamprey performance at structural challenges in fishways. North American Journal of Fisheries Management 30: 376–385.

LTWG (Lamprey Technical Workgroup). 2022. Practical guidelines for incorporating adult Pacific lamprey passage at fishways, Version 2.0. White Paper. 50 pp + Appendixes. Available online: https://www.pacificlamprey.org/wp-content/uploads/2022/08/2022.06.06-Lamprey-Psg-White-Paper.pdf.

LTWG (Lamprey Technical Workgroup). 2020a. Barriers to adult Pacific Lamprey at road crossings: guidelines for evaluating and providing passage. Original Version 1.0, June 29, 2020. 3199. + Appendices. Available: https://www.pacificlamprey.org/wp-content/uploads/2022/02/LTW_2020_LampreyPassage@RDXings_Final_062920.pdf.

LTWG (Lamprey Technical Workgroup). 2020b. Best management guidelines for native lampreys during in-water work. Original Version 1.0, May 4, 2020. 22pp. + Appendices. Available: https://www.pacificlamprey.org/wp-content/uploads/2024/03/2020.05.04-Lamprey-BMGs-Final-2022-with-appendices.pdf.

Lawrence, D. J., B. Stewart-Koster, J. D. Olden, A. S. Ruesch, C. E. Torgersen, J. J. Lawler and J. K. Crown. 2014. The interactive effects of climate change, riparian management, and a nonnative predator on stream-rearing salmon. *Ecological Applications*, *24*(4), 895-912.

Lawrence, D. J., J. D. Olden and C. E. Torgersen. 2012. Spatiotemporal patterns and habitat associations of smallmouth bass (Micropterus dolomieu) invading salmon-rearing habitat. *Freshwater Biology*, *57*(9), 1929-1946.

Mesa, M. G., J. M. Bayer, and J. G. Seelye. 2003. Swimming performance and physiological responses to exhaustive exercise in radio-tagged and untagged Pacific lampreys. Transactions of the American Fisheries Society 132:483–492.

Moser, M. L., P. A. Ocker, L. C. Stuehrenberg, and T. C. Bjornn. 2002. Passage efficiency of adult Pacific lampreys at hydropower dams on the lower Columbia River, U.S.A. Transactions of the American Fisheries Society 131: 956–965.

ODFW (Oregon Department of Fish and Wildlife). 2025. Fish Counts – Winchester Dam.

ODFW, Salem. Available: https://www.dfw.state.or.us/fish/fish_counts/winchester_dam.asp. (June 2025).

PLCI (Pacific Lamprey Conservation Initiative). 2024. Pacific Lamprey (Entosphenus tridentatus) Status Assessment. June 2024. 114 pp. + Appendices. Available: https://www.pacificlamprey.org/assessment/.

PLCI (Pacific Lamprey Conservation Initiative, Pacific Marine and Estuarine Fish Habitat Partnership, and California Fish Passage Forum). 2021. Barriers to Tidal Connectivity for Native Lamprey Species. December 2021. 26 pp + Appendix. Available online: https://maps.psmfc.org/media/BTC/Documents/Report_Lamprey_Barriers_Tidal_Connectivity_December_2021.pdf.

Schultz, L.D., M.P. Heck, B. M. Kowalski, C. A. Eagle-Smith, K. Coates and J.B. Dunham. Bioenergetics Models to Estimate Numbers of Larval Lampreys consumed by Smallmouth Bass in Elk Creek, Oregon. *North American Journal of Fisheries Management*, 37:4, 714-723, DOI: 10.1080/02755947.2017.1317677.

Sheoships, G. 2014. Pacific Lamprey *Entosphenus tridentatus*: integrating ecological knowledge and contemporary values into conservation planning, and stream substrate associations with larval abundance in the Willamette River basin, Oregon, U.S.A. Master's thesis. Oregon State University, Corvallis.

Stillwater Sciences. 2014. Evaluation of barriers to Pacific Lamprey migration in the Eel River basin. Prepared by Stillwater Sciences, Arcata, California for Wiyot Tribe, Loleta, CA.

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

Wang, C. J., H. A. Schaller, K. C. Coates, M. C. Hayes and R. K. Rose. 2020. Climate change vulnerability assessment for Pacific Lamprey in rivers of the Western United States. Journal of Freshwater Ecology, 35:1, 29 55, DOI: 10.1080/02705060.2019.1706652

IV. Appendix 1. 2025 RMU Meeting Notes

Annual Pacific Lamprey Meeting for the South Coast RMU

April 15th, 1:00-2:30 PM

Co-chairs: Jen Poirier (USFWS) & Travis Mackie (Cow Creek Tribe)

Virtual meeting attendees:

Applegate Partnership and Watershed Council: Luke Wimmer
Coquille Indian Tribe: Jamie Villa, Natalie Wilson
Coquille Watershed Association: Emily Kolkemo
Cow Creek Band of Umpqua Tribe of Indians: Travis Mackie
ODFW: Ben Clemens, Chris Claire, Laura Green, Evan Leonetti, Steve Mazur
Rogue River Watershed Council: Lance Wyss
South Slough National Estuarine Research Reserve: Jenni Schmitt, Shon Schooler
USFS: Steve Brazier, Steve Burns, Karla Cottom, Sophia Kim, Jeff McPherson, Julia Watson
USFWS: David Hines, Jen Poirier

Agenda

- Introductions
- RMU Questionnaire
- RIP updates
- Lamprey Distribution
- Partner updates
- PLCI updates
- Partner presentation
- Action items

Please fill out the RMU Questionnaire

- Developed by the Pacific Lamprey Conservation Initiative (PLCI) Policy Committee.
- Purpose of Questionnaire is to better understand the different impediments to progress on lamprey conservation within agencies/organizations at the RMU level.
- Responses will be presented to the Policy Committee in fall 2025.

Regional Implementation Plans (RIPs)

- RIPs are a supplementary document to the Pacific Lamprey Assessment https://www.pacificlamprey.org/wp-content/uploads/2024/06/PacificLamprey_2022Assessment_FINAL_06_27_2024.pdf.

- They summarize Pacific Lamprey Assessment results (e.g., population demographics, distribution, threats) and highlight conservation and restoration actions for lamprey in the South Coast RMU.
- The document is used by the Policy Committee and others to inform action items and priorities for Pacific Lamprey. Also used in the PLCI RFP process, where proposal must demonstrate how the project will address specific threats or data gaps within the RMU (highlighted in RIP)
- RIPs are revised annually, but undergo a major revision every five years immediately following the Pacific Lamprey Assessment that will occur in 2027.
- Have there been any major changes to threats in RMUs? Any events that might impact abundance or distribution?
- Please review RIP (specifically pages 7-11) and send any revisions to Jen Poirier by June 20th.
- The 2022 Pacific Lamprey Assessment and RIPs for each of the 18 RMUs are available online https://www.pacificlamprey.org/rmu/.

Changes in threats discussion

Steve Mazur (ODFW) – Do we consider sea lion predation of Pacific Lampreys in the Assessment? Jetty alterations on lower Rogue (estuary) cause a bottleneck that may increase predation.

Chris Claire (ODFW) – As an agency, do we consider natural predation a threat?

Ben Clemens (ODFW) – We know predation occurs (e.g., western river lamprey teeth found in sea lion scat) but it is a difficult metric to categorize lamprey status.

Lamprey Distribution

- Pacific Lamprey distribution information is now available in Arc GIS online
- https://fws.maps.arcgis.com/apps/instant/basic/index.html?appid=3a85e0d266834a2aad815a9d2f18ddf5
- Please contact Jen Poirier (Jennifer_poirier@fws.gov) if you have any new distribution or eDNA information to share (all species) or have any questions regarding the web map.

Partner Updates

Travis Mackie (Cow Creek Tribe)

- Working with Ben Clemens (ODFW) and Kellie Carim (Rock Mountain Research Station) to collect eDNA samples on the North Umpqua. Collected samples on 7-8 tributaries looking for *Lampetra*, Pacific Lamprey, coho and a few other species. Unfortunately there were no positive detections of *Lampetra*, and still waiting on results for other species.

Lance Wyss (Rogue River WC)

- Working with partners on several fish passage projects. One of the focal watersheds is Little Butte Creek. It's a large watershed with two irrigation diversions (one on South Fork and one on North Fork) that are terrible for adult lamprey passage.

Shon Schooler (South Slough Reserve)

- Completed an eDNA study along the coastal region and found that *Lampetra* distribution seemed to be limited in elevation (up to about 200 feet) in tributaries. Perhaps that's why *Lampetra* weren't detected in the upper Umpqua area?
- Conducted fish salvage last year during Wasson Creek restoration efforts and found a lot of lamprey. Hope to go back in the next few years as progress continues.
- Continuing to sample lamprey in the South Slough region using eDNA

Chris Claire (ODFW)

- The Coos Coquille fish district has completed a couple fish passage projects. The Coos Watershed Council replaced the tide gates at Palouse Creek and Coaledo (Beaver Slough). Both tide gates previously restricted passage for migratory species. We don't know to what degree lamprey were restricted. Conditions are much better now. Beaver Slough and Beaver Creek are habitat for both Pacific and western brook lamprey.

Ben Clemens (ODFW)

- Per this new paper: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0313911, Western Brook Lamprey are now synonymous with Western River Lamprey. That is, both are now called Western River Lamprey (*Occidentis ayresii*). Think of it as roughly analogous to steelhead and Rainbow Trout.
- A new Lampreys: Friends or Foes fact sheet was developed through a collaborative effort with PLCI, the Great Lakes Fishery Commission, New York Sea Grant, and others. https://www.dfw.state.or.us/fish/species/docs/lamprey/Lampreys%20-%20Friends%20or%20Foes.pdf

Jamie villa (Coquille Tribe)

- The Coquille Tribe will be conducting its annual Pacific Lamprey float in May (dependent on river flows). Please get in touch with Jamie if you are interested in attending or would like more information.

Partner Presentation

Theresa 'Marty' Liedtke (USGS) presented highlights from a lab study looking at how sediments added on top of larval lamprey (e.g., during dredging activities, restoration efforts, or in-water work) may potentially impact burrowed larval lamprey.

You can access Marty's paper here: https://www.cbfish.org/Document.mvc/Viewer/P215582

Joe Skalicky (USFWS) introduction to the Over Burden Paper: Interesting background about why this overburdening work really came about. Several years ago the JEDDI lamprey technical working sub-group put together the BMG's for all things dredging that apply to lamprey, and we found there's not a lot of information out there. Thus, it's a fairly short paper, and we quickly realized that we don't know much about the effects of dredging and disposal on lampreys. Yet, in the Columbia River about 80% of the dredged material is "in-water disposal" and put right back in the river, as it's the easiest way to dispose of the sediment. Sediment can be up to 3-4 m deep in these disposal areas, so this laboratory study examines the effects of sediment deposition on top of already burrowed larval lamprey.

PLCI Updates

Lamprey Information Exchange

- The 9th annual Lamprey Information Exchange will be held December 9-11th in the Portland Oregon area.
- This is a 2-3 day event where we share the latest in Pacific Lamprey research.
- The deadline to submit an abstract is Monday, June 30th 2025. Submit your abstract here https://www.jotform.com/form/250843961910156
- Stay tuned for other details!

PLCI Newsletter

- Sign up for the PLCI newsletter to stay up to date on all PLCI events. You can sign up on the bottom of the homepage on the webpage.

Lamprey Technical Workgroup

- The Lamprey Technical Workgroup is a technical advisory committee of PLCI
- Multiple subgroups studying a range of topics
- Subgroups have produced multiple white papers and BMGs available here: https://www.pacificlamprey.org/ltwg/
  - Adult Passage & engineering
  - Abundance based goals

  - Barriers to tidal connectivity
  - Contaminants
  - Genetics & eDNA
  - Juvenile Entrainment, Dredging and Dewatering Investigations (JEDDI)
  - Lamprey Aquaculture Network
  - Ocean
  - Outreach
  - Restoration
  - Tagging
  - Subgroup on Other Lamprey Species Anadromous and Resident (SOLAR)

- The LTWG and subgroups are always looking for new members. You don't need to be a subject matter expert to join!
- Contact the new LTWG Chair – Julie Harris (julianne_harris@fws.gov) for more information about how to join or co-lead a subgroup.

Lamprey Project Funding Opportunities

- PLCI has two dedicated funding sources
- National Fish Habitat Partnership (NFHP) project funding
- Bonneville Power Administration's (BPA) PLCI Columbia River Basin Projects
- The guidelines and proposal templates pertaining to each funding opportunity can be found on the PLCI webpage. https://www.pacificlamprey.org/funding-nfhp/

- **NFHP RFP will be out in January 2026**. Funding is available to projects in any RMU. Total funding ranges from $150-350K.
  - Eligible projects include: stakeholder outreach (ID workshops), habitat restoration (including passage or infrastructure improvements and design), habitat assessments and monitoring
  - Projects must have 1:1 non-federal match or in-kind support (unless funds going to a tribal organization). 18-24 month project period. Earliest project start date is spring/summer 2027.
- **BPA RFP will be out in late summer 2025**. Funding is available to projects within the Columbia River Basin only. Total funding ≈300K
  - Passage or infrastructure improvements, habitat restoration, assessments that lead to the development of BMPs or Guidance documents, assessments that lead to on the ground projects, or research questions that inform management
  - 12-24 month project period. Earliest project start date is May 2026

Appendix 2. 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.