Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon

(*Conservation Plan for Lampreys*)

2020 – 2025 Implementation Report

February 2026

Oregon Department of Fish and Wildlife

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Introduction

The Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon ("Conservation Plan for Lampreys"; ODFW 2020) provides information and management guidance for four lampreys (Table 1) in Oregon. Of these lampreys, the Pacific lamprey is the largest and most widely distributed; it is also the species targeted by Tribes for harvest for cultural use. Pacific Lamprey is also targeted for conservation efforts and status assessments through the Pacific Lamprey Conservation Initiative (PLCI[1]). Although significantly more is known about the biology of Pacific lamprey than the other lampreys, significant data gaps remains with this species.

The purpose of the Conservation Plan for Lampreys (CPL) "…*is to identify, acknowledge, and support actions needed to conserve lampreys in the service of the mission of the Oregon Department of Fish and Wildlife. The CPL identifies management strategies to address factors limiting lampreys, and research, monitoring, and evaluation (RME) needed to fill data gaps and inform future status assessments for them. These management strategies and RME are for ODFW to implement in coordination with other entities and landowners*" (ODFW 2020). The CPL incorporated reviews and input from stakeholders, partners (including Tribes), science reviewers, and the public, and was codified by the Oregon Fish and Wildlife Commission on December 6, 2019.

Lampreys provide myriad ecosystem benefits and are of cultural importance to Native American Tribes (see pp. 116-117 in ODFW 2020). Several actions called for in the CPL are more ambitious than the Oregon Department of Fish and Wildlife (ODFW) has the capacity to do alone. Therefore, ODFW and its statewide lamprey coordinator actively identify, initiate, and participate in collaborations with Tribes, federal agencies, local governments, and non-governmental organizations (e.g., watershed councils and soil and water conservation districts) to implement actions identified in the CPL to adaptively manage Oregon's lampreys (Table 1).

The CPL includes two scales, including seven population strata (Rogue/South Coast, Coastal, Lower Columbia, Willamette, Mid Columbia, Lower Snake, Upper Snake), and one species management unit, which is the entire state of Oregon. Biological status of these lampreys and management and conservation actions on them are determined at the stratum scale, whereas the conservation unit for state listing is determined at the scale of the species management unit.

This is the first implementation report on the CPL. Lampreys are non-game, protected species (OAR 635-044-0430), and the species covered in the CPL are on Oregon's sensitive species list and are listed as native migratory fish (Table 1). ODFW conducts management actions; habitat restoration; RME; education and outreach; and many other activities to benefit lampreys, learn

[1] The PLCI is a partnership-driven conservation strategy created by the U.S. Fish and Wildlife Service (USFWS) to improve the status of Pacific Lamprey throughout its range in the U.S. portion of the West Coast. The PLCI now operates independently of the USFWS. The initiative coordinates and implements conservation, restoration, and research actions to benefit Pacific lamprey and their adaptive management. The initiative includes an assessment and template for conservation, a conservation agreement (of which ODFW is a signatory), and regional implementation plans with collaborations by Tribal, federal, state, and non-governmental partners.

more about them, and educate Oregonians. Many of these activities are done by agency staff in collaboration with other organizations. These efforts are further bolstered by ODFW's contributions to the PLCI. In addition, ODFW's statewide lamprey coordinator is an active participant throughout PLCI, including having served as its state and federal co-chair for two consecutive terms during 2022-2025.

Table 1. Lamprey species covered in the Conservation Plan for Lampreys (ODFW 2020). "–" = no change.

Common name[a]	Scientific name[a]	Scientific name[b]	Status in Oregon	Native Migratory Fish[e]
Pacific lamprey	*Entosphenus tridentatus*	–	Sensitive[c]	Yes
western river lamprey	*Lampetra ayresii*	*Occidentis ayresii*	Sensitive[c]	Yes
western brook lamprey	*Lampetra richardsoni*	*Occidentis ayresii*	Sensitive[c]	Yes
Pacific brook lamprey	*Lampetra pacifica*	*Occidentis pacifica*	Sensitive[c, d]	Yes

[a] Names at the time that the Conservation Plan for Lampreys was codified (ODFW 2020).

[b] Updated names since ODFW (2020), per genetic information that informed taxonomic name changes (Carim et al. 2024; Clemens et al. 2025).

[c] As per OAR 635-100-0040.

[d] Added to the sensitive species list and the native migratory fish list within the last five years.

[e] As per OAR 635-412-0005.

Throughout the world, knowledge on lampreys is lacking (Lucas et al. 2021; Clemens et al. 2021a). This report provides high-level overviews and highlights on the significant amount of knowledge gained on the lamprey species covered in the CPL (Table 1), including their biology, conservation actions, general status trends, and limiting factors and threats (Figure 1). This report focuses primarily, but not exclusively, on progress made by ODFW staff with some high-level summaries and pertinent citations to ongoing work to restore Pacific lamprey in the Snake and Columbia River basins by the Columbia River Inter-Tribal Fish Commission and its constituent Tribes.

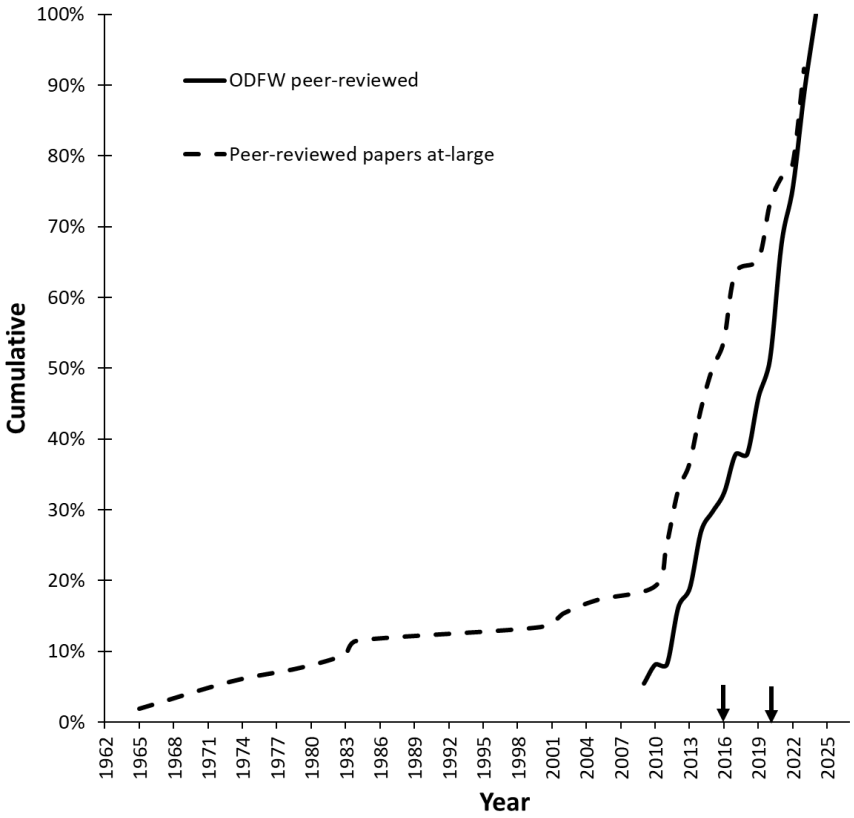

Figure 1. Cumulative percentage of peer-reviewed science papers on native lampreys in Oregon, exemplifying the significant increases in knowledge that have occurred. The year and number of papers and book chapters written by researchers was determined from a Web of Science search, using the terms "lamprey Oregon" in the title or abstract of papers. The first vertical arrow on the x-axis indicates the year in which ODFW's statewide lamprey coordinator position began (i.e., 2016), and the second vertical arrow indicates the year that the ODFW Conservation Plan for Lampreys was finalized (i.e., 2020).

This report provides brief, high-level updates across three topics: RME for lampreys across seven population strata, progress towards desired status, and management actions. Because Pacific lamprey have been extirpated from the Upper Snake population stratum, there is no prior evidence of other lampreys occurring there, and environmental DNA (eDNA) surveys have not identified the presence of *Occidentis* lamprey species (Table 1) in that stratum (Carim et al. 2026), there are no further updates to report on lampreys in this stratum.

Research, monitoring, and evaluation

ODFW and its many different partners from federal agencies, non-governmental organizations, and Tribes, have been productive in RME (Figure 1).

Improve information on distribution

- Improvements in information, documentation, and understanding of the distribution of lampreys includes ongoing updates of ODFW fish distribution documentation, including relaying new field data of lamprey occurrence to ODFW GIS staff, and coordination and synchronization of distribution data with the Pacific Lamprey Conservation Initiative.
- ODFW, in collaboration with partners from Portland State University and the Friends of Tryon Creek, procured external funds to leverage education and outreach opportunities with field surveys to update distribution information for lampreys in the Willamette Basin (Clemens and Edwards 2022[2]).
- ODFW in collaboration with the U.S. Forest Service, procured funds from the Oregon Conservation and Recreation Fund for analyses of eDNA for *Occidentis* lampreys and partnered with 37 other organizations to conduct these surveys to improve our understanding of the distribution of this taxon (Carim et al. 2026).

Prioritize artificial obstructions for passage and screening

- ODFW maintains a fish passage barrier database and prioritization process that includes consideration of whether Pacific lamprey are present.
- ODFW staff authored new research that prioritizes geographical areas on the Oregon Coast where provision of passage would best benefit Pacific lamprey (Anlauf-Dunn et al. 2024).

Improve biological knowledge

- Since the CPL (ODFW 2020), ODFW staff authored or co-authored 23 peer-reviewed science papers pertinent to the CPL[2]. Some examples of this research include:
    - identified a new method for collecting adult Pacific lamprey for research, management, or salvage (Litts et al. 2023)
    - reviewed the biology of *Lampetra* species of lampreys (now *Occidentis*; Table 1; Clemens and Wade 2023)
    - reviewed the biology, threats, international and national statuses, and conservation needs for Pacific lamprey and western river lamprey (and other anadromous lampreys of the world; Clemens et al. 2021a)
    - elucidated the microhabitat used by migrating adult Pacific lamprey (Clemens and Schreck 2021a)
    - reviewed the literature and describes the feeding ecology and behavior of Pacific lamprey, western river lamprey, and other anadromous lampreys of the world (Quintella et al. 2021)
    - reviewed and standardized the terminology for within-species diversity of lampreys (Clemens and Schreck. 2021b).
    - Reviewed and provided guidance on sampling methods and survey designs for larval lampreys (Clemens et al. 2022).

[2] Publications that involved ODFW input, including peer-reviewed science papers, reports, and outreach materials, are also listed in Appendix Table 1.

Estimate take

- ODFW staff continue to require scientific take permits and document reported take/handling/holding/releasing of lampreys of various species and life stages throughout Oregon.
- ODFW staff continue to document harvest by Tribal and non-Tribal members (see pages nine through 10) of adult Pacific lamprey at Willamette Falls, during certain dates and times in the summer (OAR 635-017-0090).

Assess complex, large-scale threats

- The CPL (ODFW 2020) defines threats as:
    - "*…processes or actions (human-induced or natural) that have the potential to act on or create limiting factors that constrain the abundance, productivity, diversity or distribution of populations or species*"
    - "*Three complex, large-scale threats can negatively impact the status of population strata through exacerbation of limiting factors. These threats include climate change, estuarine and ocean conditions, and development relative to human population growth*".
- The CPL provides examples of how climate change can cause many complex and interacting effects across landscapes, rivers, and the ocean that will then impact lampreys (see Appendix nine of ODFW 2020).
- ODFW staff authored or co-authored new research that:
    - identified potential threats to juvenile Pacific lamprey in the ocean, including pollution; climate change; oceanographic regimes that may be unfavorable to lamprey hosts and hence lamprey; and interactions between climate change and oceanographic regimes (Clemens et al. 2019)
    - reviewed other literature that indicates that one of the common marine hosts for Pacific lamprey, Pacific Hake *Merluccius productus* are migrating poleward (Clemens et al. 2019)
    - identified that western river lamprey and Pacific brook lamprey may be more prone to climate change than the larger, anadromous Pacific lamprey (reviewed in Clemens and Wade 2023).
- Research identified the complex effects of climate change and how these may result in Pacific lamprey changing its distribution to track freshwater habitat quality, which is anticipated to contract in lower latitudes and improve in higher latitudes (Wang et al. 2021).
- ODFW's fish Research Evaluation Data and Decision Support (REDD) group is working several different avenues of research to inform applied fisheries management in Oregon that have the potential to inform lamprey conservation, including:
    - a collaboration with ODFW's Water Program on aquatic habitat prioritization for protection and restoration
    - water temperature projections and identification of coolwater habitats with stream networks (e.g., Siegel et al. 2023)

- assessing the vulnerability of coastal basins in Oregon to the establishment of smallmouth bass (*Micropterus dolomieu*; a known predator of larval lampreys; Schultz et al. 2017)
- a collaboration with ODFW's Aquatic Inventories Program to monitor remote streams habitats at the landscape scale
- a collaboration with ODFW's Aquatic Inventories Program to extend eDNA-based monitoring towards broadscale monitoring of species distribution to inform status assessments of species
- use of complementary analytical models to perform hindcasts and forecasts of river flows and temperatures (e.g., Zambory 2023).

Assess translocation

- Tribes are sovereign nations that conduct their own activities. Therefore, assessing and reporting on their translocation programs does not make sense unless Tribes wish to coordinate sharing of their data and collaboration on the analyses and interpretations of those data.
- Assessments of translocation by Tribes are ongoing and are described on pages nine, 11, and 13-14 of this report.

Estimate adult abundance

- Estimates of adult abundance for lampreys have focused on the Pacific lamprey, for which data is available. ODFW has authored and co-authored papers that estimated abundance of adult Pacific lamprey:
  - in the Rogue/South Coast and Coastal population strata, ODFW used redd surveys and counts at dams to estimate abundance (see pages seven through 11 of this report)
  - in the Lower Columbia, Mid Columbia, and Lower Snake population strata, counts of adult Pacific lamprey passing dams are a proxy for abundance of migrating adults (Figure 2)
  - in the Willamette population stratum, harvest at Willamette Falls (Figure 3; Clemens et al. 2023a) is used as a proxy for relative abundance in the lower Willamette Basin, whereas counts of lamprey passing Leaburg Dam on the McKenzie river provides an estimate of relative abundance of migrants in the upper basin (Figure 4; Clemens et al. 2023b).

Monitor diversity

- ODFW staff authored and co-authored research that identified associations of genetic diversity of spawn timing for adult Pacific lamprey with actual spawn timing (Clemens et al. In review).
- Research by other organizations identified region-wide genetic diversity for Pacific lamprey, including maturation timing and body size (Hess et al. 2020). This includes the general conclusion that the ocean-maturing ecotype, which appears to spawn the same year that they enter fresh water, tend to be located more coastward, whereas the stream-

maturing ecotype, which tends to delay maturation for one or more years after entering fresh water, tend to be found more inland (Clemens et al. 2013; Parker et al. 2019; Hess et al. 2020; Clemens et al. In review). In addition, the "dwarf" ecotype (<15 inches) of adult Pacific lamprey tends to be found more coastward, whereas the normal body size ecotype of the species tends to be found inland (Hess et al. 2013, 2020).

Progress towards desired status

Assessment of status of lampreys is scheduled for 2040 in the CPL. Some of the reasons for this lengthy re-assessment period include:

- there are no expected changes to the measurable criteria used to assess the status for lampreys (ODFW 2020). For example, insufficient information exists for Pacific lamprey in some population strata and for other lampreys in all strata (which is slowly changing, see below).
- for Pacific lamprey in strata for which sufficient information exists, there is no expected changes in connectivity.
- efforts over the past five years in documenting lamprey distribution are increasing but are still relatively sparse, particularly in the East side of Oregon. In the next few years ODFW anticipates that the distribution data for lamprey will be richer and will facilitate broader comparisons.
- the abundance of lamprey is driven in part by long life spans (up to 13-15 or more years; Clemens et al. 2017; Hess et al. 2022).

Therefore, an assessment in abundance of Pacific lamprey (the only species for which ODFW has abundance estimates) over the five-year interval for this report is unlikely to detect changes in status and was not conducted. However, ODFW will report on general trends for Pacific lamprey in this report. These trends for Pacific lamprey indicate minor changes in abundance (relative to data from the early 20th century) that show evidence of cyclical trends in increased, followed by decreased adult abundance.

Pacific Lamprey

Rogue/South Coast; Coastal

Data analyses of redd surveys for adult Pacific lamprey by ODFW suggest that focusing habitat restoration and passage in particular rivers of the Coastal and Rogue/South Coast population strata (i.e., Alsea, Siuslaw, Coos, Coquille, and Sixes rivers) with relatively high habitat suitability can be used to prioritize conservation actions for the species (Anlauf-Dunn et al. 2024).

Redd survey data and dam count data for adult Pacific lamprey from the Coastal and Rogue/South Coast population strata led ODFW researchers to conclude "…*that it is no longer accurate to simply indicate that populations of Pacific Lamprey have decreased significantly (as is customarily reported). Rather, evidence from abundance indices for adult Pacific Lamprey in*

western Oregon indicates historic declines and recent, modest increases [emphasis via underlined text added]. *These indices peak in periodicity every few years*". Abundance estimates for adult Pacific lamprey, based on redd surveys, generally showed relatively low trends for the Umpqua geographical management area, within the Coastal population strata (Clemens et al. 2021b).

A few studies suggest that climate change, habitat, and a non-native fish predator may be implicated in the lower abundance trend for Pacific lamprey in the Umpqua River Basin. For instance, a lack of burrowing habitat for larval lamprey has been identified in the Umpqua basin, along with high water temperatures, and distribution overlap with smallmouth bass, which are voracious predators of larval lampreys (Schultz et al. 2017; Jones et al. 2020).

In addition, Pacific lamprey in the Umpqua Basin are highly vulnerable to climate change, owing to restricted hydrologic timing and high water temperatures (Wang et al. 2020). The effects of high water temperatures are exemplified by the documentation of prespawn mortalities for Pacific lamprey in the South Umpqua during July of 2021, when daily water temperatures averaged 26.6°C (range: 20.8-30.6°C; Clemens 2022).

Lower Columbia; Mid Columbia; Lower Snake

Counts of adult Pacific lamprey passing Bonneville Dam (river mile 145 on the Lower Columbia River) have decreased significantly and have since shown peaks and troughs in abundance approximately every three to seven years. Counts at The Dalles and John Day dams upstream of Bonneville show numbers that generally parallel the counts at Bonneville Dam, albeit at greatly reduced numbers (Figure 2). By contrast, Lower Granite Dam (river mile 429 on the Snake River) averages significantly fewer lamprey passing than the lower and mid-Columbia River dams shown in Figure 2, with an average of only about 118 lamprey passing per year (range: 12-627 lamprey per year) during 1999-2025 (Columbia River DART 2026).

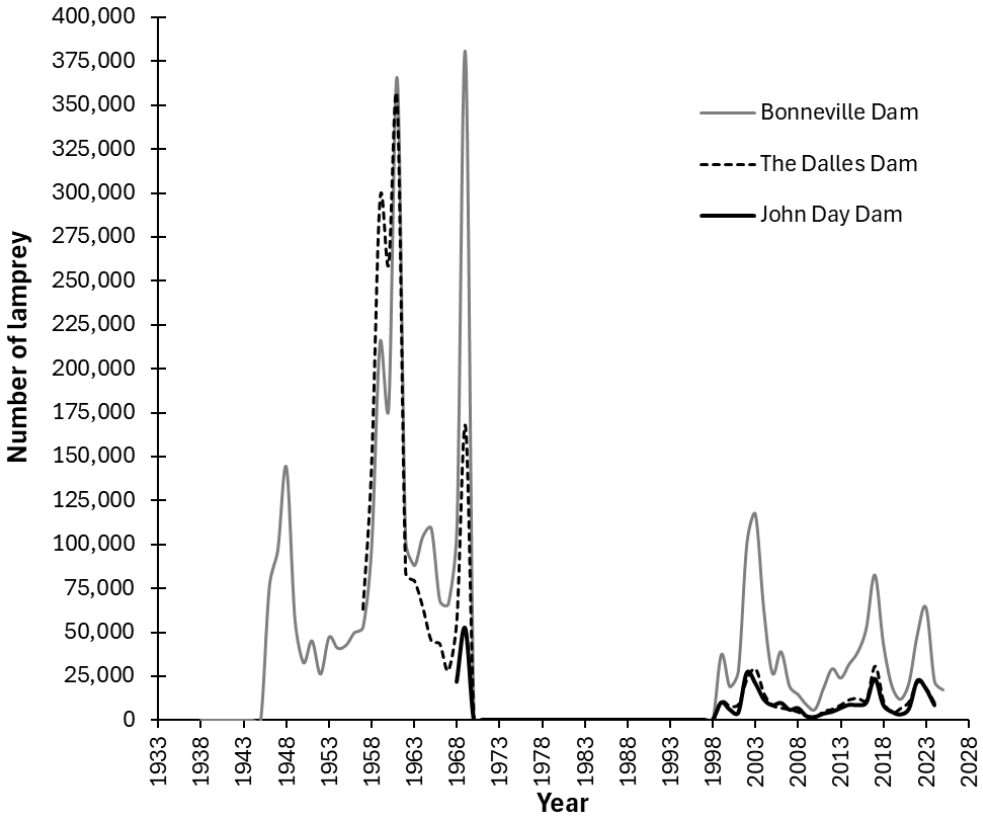

Figure 2. Annual counts (based on annual, cumulative summations of daily counts) of adult Pacific lamprey at the three lowermost dams on the Columbia River, including Bonneville Dam (river mile 145), The Dalles Dam (river mile 192), and John Day Dam (river mile 216). Counts were done during 1946-1969 and 1999 to 2025 for Bonneville Dam, 1957-1969 and 1999 to 2025 for The Dalles Dam, and 1968-1969 and 1999 to 2025 for John Day Dam. These data are from Columbia River DART (2026).

Staff from Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe have been collecting adult Pacific lamprey from the three lowermost, mainstem Columbia River dams (i.e., Bonneville, The Dalles, and John Day dams) and translocating them upstream, past the dams into tributary rivers in Washington, Northeast Oregon, and Idaho from 1999 to present (Close et al. 2009; Ward et al. 2012).

Using genetic monitoring of adults and their offspring, Tribal staff have been able to document that these translocations have added to production by increasing the abundance of larval, juvenile, and adult life stages (Hess et al. 2022, 2023). Furthermore, it is anticipated that "…*the translocations may eventually return enough adult offspring to the Columbia River to replace the annual take of adults for translocations, despite many adults likely returning to other basins*" (Hess et al. 2022).

Willamette

Consistent monitoring of the relative abundance of adult Pacific lamprey in the Willamette population stratum exists through two primary means: annual harvest at Willamette Falls (river

mile 27 on the Willamette River; Clemens et al. 2023a) and daily counts at Leaburg Dam (river mile 35 on the McKenzie River; Clemens et al. 2023b).

Annual harvest of adult lamprey at Willamette Falls is considered a proxy for abundance and has decreased significantly from over 500,000 in 1946 to about 16,000 per year during 1969–1999 (Figure 3). Recent harvest has decreased further to an average of less than 6,000 Pacific lamprey per year during 2000 to present (Figure 3; Clemens et al. 2023a).

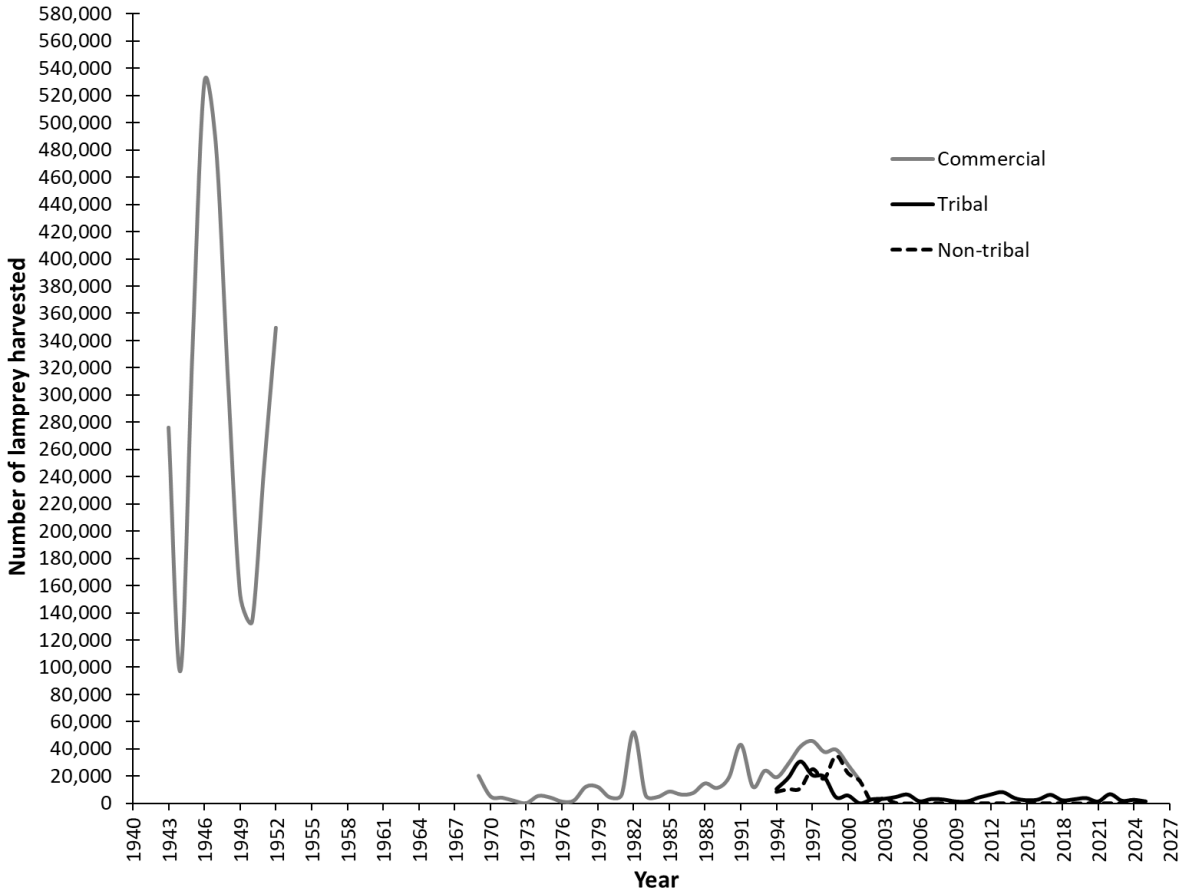

Figure 3. Number of adult Pacific lamprey reported as harvested at Willamette Falls, 1943-2025. There are no known harvest records for 1953-1968. Tribal and non-Tribal harvest were recorded and reported independent of commercial harvest in 1994. Pacific lamprey were first listed as a "sensitive species" in Oregon in 1993, and as a protected species in Oregon in 1996 (Kostow 2002). ODFW enacted a ban on commercial harvest of lamprey in 2002, and a ban on the use of lamprey as bait in 2004.

Daily counts of adult Pacific lamprey passing Leaburg Dam show periodic peaks and troughs. The data were collected using consistent methodology since 2005 and indicates a significant increase in lamprey passing the dam since 2021 (Clemens et al. 2023b; Figure 4). Although ODFW surmises that some year-to-year operational changes in the fish ladders may have caused some of this initial increase in lampreys in 2022, it is unclear what led to the substantial increase to nearly 900 lamprey passing the dam in each of the last two years (2024-2025).

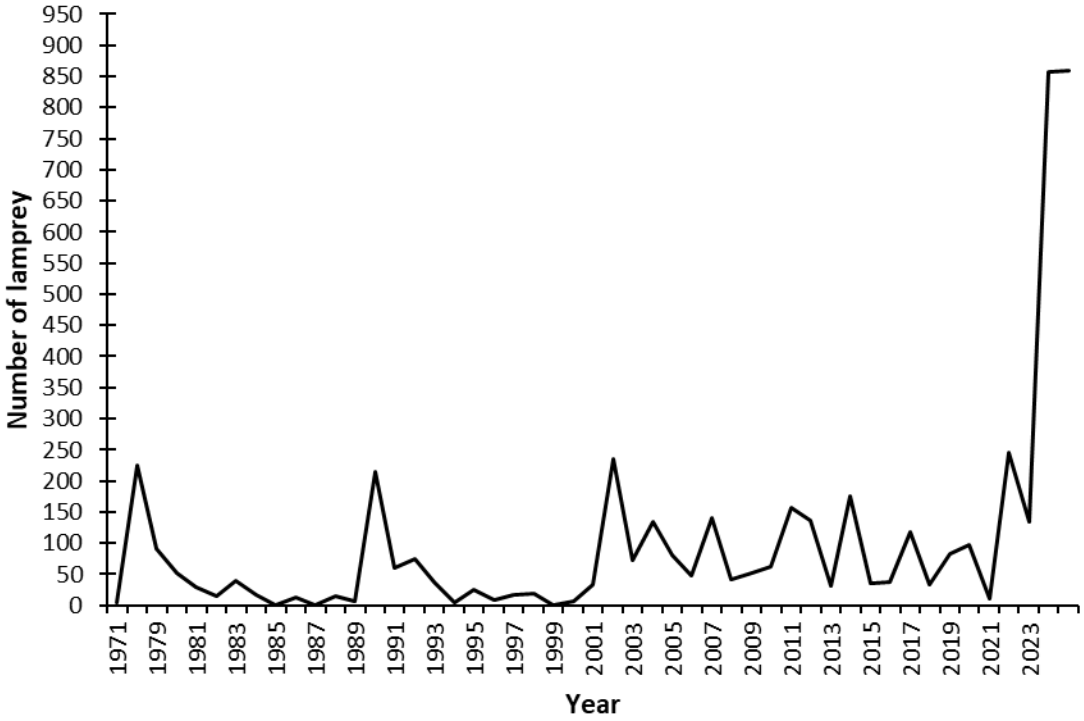

Figure 4. Annual counts of adult Pacific lamprey at Leaburg Dam (river mile 35 on the McKenzie River) within the Willamette Basin. Counts were done during 1971 to 2025; however, the data were collected by different means prior to 2004. The data for 2005 to present were collected by the same methods. These data are collected by ODFW staff (Clemens et al. 2023b).

ODFW staff and partners discovered evidence of a landlocked population of adult Pacific lamprey in the Middle Fork Willamette, upstream of dams, which have either been extirpated or reduced to such low numbers that they are not currently detectable (Larson et al. 2020).

The case has been made for fish passage and restoration of habitat for Pacific lamprey throughout the Willamette Basin (Clemens et al. 2023a). Tribes have taken this argument seriously and translocated about 250 adult Pacific lamprey from Willamette Falls to above U.S. Army Corps of Engineer dams in the middle and upper Willamette Basin in 2025. This included translocating about 50 lamprey to each of five locations, including above Detroit Dam in the North Santiam River; above Green Peter Dam in the South Santiam River; above Cougar Dam in the South Fork McKenzie River; above Hills Creek Dam in the Middle Fork Willamette River, and above Fern Ridge Dam in the Long Tom River. Tribes plan additional translocations for as many as 100 lamprey to each of these same locations in 2026.

Western River Lamprey/Western Brook Lamprey and Pacific Brook Lamprey
Rogue/South Coast; Coastal; Lower Columbia; Willamette; Mid Columbia

ODFW staff secured funds from the Oregon Conservation and Recreation Fund during 2023-2025. For this work, ODFW, along with its U.S. Forest Service Partner, recruited, coordinated, and collaborated with partners from 37 different organizations. A total of 995 samples

representing 970 locations across 51 river subbasins in Oregon were analyzed for the presence of *Occidentis* species (Pacific brook lamprey, western river lamprey/western brook lamprey) DNA. *Occidentis* DNA was detected in samples collected at 125 locations (Carim et al. 2026). The results will improve knowledge of the distribution of these species.

Management actions

Education and outreach

ODFW, in partnership with other organizations, has been productive in creating many different education and outreach opportunities in print, online, and in-person, through various venues (Appendix Table 1). In addition to these products, ODFW's statewide lamprey coordinator organized, convened, and moderated approximately 31 symposia and information-sharing meetings between 2019 and present; led or contributed to 58 oral presentations to various venues (grade school children, watershed councils, natural history and angling clubs, academia, Tribes, and professional meetings); and mentored seven graduate students working on lamprey (including two Tribal students) between 2012 and present.

Passage and screening

- Progress on passage and screening includes ongoing operations, maintenance, and management of existing passage and screening infrastructure, and installation of a relatively new Lamprey Passage Structure at Eel Lake (in Lakeside, Oregon) during 2018.
- Inclusion of Pacific brook lamprey as a Native Migratory Fish (Table 1) and updates on the passage policy (OAR 635-412-0001 through 635-412-0065 that was effective during 2022-2023).
- ODFW contributed to or otherwise reviewed and provided feedback on white papers that:
    - provide guidance on adult Pacific lamprey passage at road crossings (LTWG 2020b) and fishways (LTWG 2022a).
    - provide information and guidance on screening requirements (LTWG 2022b).
- ODFW staff authored and co-authored new research that:
    - identifies the potential benefits to Pacific lamprey and other native fishes of breaching the four lowermost dams in the Snake River (Storch et al. 2022).
    - estimates detection efficiency of adult Pacific lamprey at Leaburg Dam (McKenzie River; Romer et al. 2023)
    - identifies the need for passage for Pacific lamprey throughout the Willamette Basin, approximately 1/3 of which is inaccessible for spawning and rearing (Clemens et al. 2023a)
    - identifies an association of river flow with lamprey migration and passage (Clemens et al. 2023b; Clemens and Wagner 2024).

Protect and restore habitat

- ODFW staff participate in leading and assisting with habitat restoration and water conservation (see next section), both of which promote water quality.
- ODFW, along with staff from other organizations contributed to a new white paper that compares biological and habitat requirements for Pacific lamprey, relative to Pacific salmon (*Oncorhynchus* species; LTWG 2023).
- ODFW staff authored or co-authored new research that:
    - reviews habitat restoration practices and needs for salmon and Pacific lamprey and advocates a process-based restoration approach (Homel et al. 2019)
    - analyzes the occupancy and density of larval lampreys in two streams that were subjected to stage-0 restoration in Oregon and provided evidence to suggest that restoration that increases the quiescent habitats (i.e., minimal flow with lots of fine sediment substrate) could be beneficial for lampreys (Harris et al. 2024).

Water conservation

- ODFW's Water Program regularly pursues instream water rights and uses other mechanisms to legally protect instream water; establishes instream flow needs and develops priority areas for flow protection and restoration; works to minimize impacts from water development; communicates scientific information on instream needs to facilitate development and implementation of water solutions, and implements innovative climate solutions and policy changes to help protect priority habitats and build species resiliency to climate impacts.
- ODFW staff authored or co-authored new research that:
    - assesses the effects of dewatering on behavior, distribution, and abundance of larval lampreys and concludes that dewatering affects the abundance of larval lampreys and mortality directly correlates with the amount of time dewatered (Harris et al. 2020)
    - identifies warm water temperatures (≥20°C) as a threat to adult Pacific lamprey (Clemens 2022)
    - reviews the literature and describes how and why natural flow regimes are important to the conservation of native lampreys (Clemens and Wagner 2024).
- Staff from other organizations have conducted studies that have advanced understanding on the negative effects of dewatering on larval lampreys and how to mitigate these effects (e.g., Liedtke et al. 2023, 2024); how to salvage larval lampreys during and after dewatering (Harris et al. 2023), and how to assess larval lampreys in irrigation canals (Mueller et al. 2021).

Translocation

- Some Tribes continue supplementation efforts including translocation and hatchery production of Pacific lamprey in the Columbia River Basin (CRITFC et al. 2018).
- ODFW has not been involved in translocation programs for Pacific lamprey. To-date, translocations have been conducted by the Confederated Tribes of the Umatilla Indian

Reservation, the Nez Perce Tribe, and the Confederated Tribes and Bands of the Yakama Nation in the Columbia and Snake river basins since the 1990s (Close et al. 2009; Ward et al. 2012; Hess et al. 2022, 2023). Please see pages nine and 11 of this report for more details on these translocations.

Establish in-water work Best Management Practices

- ODFW, along with staff from other organizations contributed to a new white paper that provides best management guidelines for lampreys during in-water work, including dewatering and salvaging (LTWG 2020a).

Modify angling regulations for non-native fish

- Based on considerations of the Conservation Plan for Lampreys (ODFW 2020), the Native Fish Conservation Plan (ODFW 2003), and other ODFW fish conservation plans, the Oregon Fish and Wildlife Commission approved sportfishing regulations that removed of all size and bag limits for walleye *Sander vitreus* beginning in 2021 in the lower Willamette River and for bass (i.e., smallmouth bass, largemouth bass *M. salmoides*, and spotted bass *M. punctulatus*) in 2023 in the majority of Oregon streams.
- The reason for this approval was in part to benefit lampreys and other native fishes in Oregon. Prior to the codification of the CPL, size and bag limits had been removed for striped bass *Morone saxatilis*, and for bass and walleye in certain streams. Other warmwater, non-native fishes have been without size and bag limits in streams for many years.

Pinniped management

- Predation by pinnipeds (i.e., California sea lions *Zalophus californianus* and Steller sea lions *Eumatopias jubatus*) on salmon and steelhead (*O. mykiss*) has been a concern for decades in the tailraces of Bonneville Dam (Columbia River) and the Willamette Falls Project (Willamette River; ODFW 2025).
- Since 2020, eligible states and Tribes can more readily seek removal of pinnipeds in specific management areas (ODFW 2025).
- Monitoring and modeling of predation on salmonids generally indicate decreases in both pinnipeds and their predation on salmon and steelhead. This suggests that pinniped removal is associated with less pinniped predation (ODFW 2025).
- Predation events in the Bonneville and Willamette Falls Project tailraces are difficult to assess and interpret, given that many of these events go unseen, under the surface of the river (Braun et al. 2025; Clark et al. 2024), and the impact of pinniped removals on lamprey predation has not been formally assessed by Before-After-Control-Impact studies. However, Pacific lamprey carcasses have been found in the digestive tracts of pinnipeds (Clark et al. 2024), and documentation of predation events can number into the hundreds per year, per site (Braun et al. 2025; Wright et al. 2024).

Other management strategies

- ODFW staff continue to review and comment on Scientific Take Permits with regards to the numbers, types of lampreys species, life stages, and methods. The purpose of reviewing and commenting on these reviews is to work with investigators to minimize the numbers of lamprey to be studied/taken/handled/released and to minimize actions that could cause injury or stress to these lampreys, to the extent practicable.
- ODFW staff continue to allow harvest of adult Pacific lamprey at Willamette Falls during certain dates and times in the summer (OAR 635-017-0090) for Tribal and non-Tribal members.

Summary

ODFW has contributed significantly to RME on lampreys (Figure 1). Education and outreach is a key action identified in the CPL, and numerous education and outreach products have been developed by ODFW and its partners (Appendix Table 1). ODFW continues to conduct core operations that benefit lampreys in terms of passage and screening; protection and restoration of habitat; water conservation; establishing in-water best management practices; modification of non-native fish angling regulations; pinniped management; and other management strategies. ODFW plans to continue making progress on RME and management actions to benefit its native lampreys and their habitats.

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Appendix Table 1. List of lamprey education and outreach products and peer-reviewed science articles created by ODFW staff and partners. This list excludes education and outreach products and peer-reviewed science articles that were completed without ODFW input. The products are organized by the year created.

	Product	Description and availability	Content	Year created
1.	ODFW lamprey web page	Available online here.	Provides access to the Conservation Plan for Lampreys (ODFW 2020), the Miller Lake Lamprey Conservation Plan (ODFW 2005), and other outreach products.	2017 to present
2.	Guidelines for incorporating passage of adult Pacific lamprey in fishways	White paper LTWG (2022a) created by individuals from ODFW and other organizations via the Pacific Lamprey Conservation Initiative.	Provides details on passage requirements for adult Pacific lamprey in salmonid fishways; largely focused on the Federal Columbia River Power System.	2017; updated 2022
3.	Lamprey identification workshop	In-person training in The Dalles, OR, with live fish, led by ODFW, in collaboration with federal and Tribal partners.	Biology and species identification workshop.	2018
4.	Portland State University Lamprey short course	In-person training in Astoria, OR, with one day of presentations and a subsequent day of field surveys by ODFW in collaboration with federal partners.	Biology and species identification workshop.	2019
5.	Paper on standardizing terminology of lamprey life stages	Peer-reviewed paper by Clemens (2019).	Makes the case for standardizing the terminology of lamprey life stages to facilitate clear communication, documentation, and subsequent analyses of trends.	2019
6.	Lamprey Ecology and Management module of Portland State University's Environmental Professionals Program	In-person, part day training by USFWS in collaboration with ODFW	Field course in lamprey biology and management.	2019; 2021-2025
7.	River Restoration Northwest lamprey short course	In-person, one-day training in Stevenson, WA, with presentations by ODFW in collaboration with federal partners.	Biology and species identification workshop.	2020
8.	In-water Best Management Guidelines	White paper (LTWG 2020a) created by individuals from ODFW and other organizations via the Pacific Lamprey Conservation Initiative.	Provides guidelines on pre-monitoring and salvage of lampreys during in-water work.	2020
9.	Paper on "Dispelling misperceptions of native lampreys…in the Pacific Northwest"	Peer-reviewed, open access paper by Clemens and Wang (2021).	Presents rationale and an approach for more nuanced messaging on lamprey outreach to counteract the extensive press and information that stems from the Great Lakes on controlling invasive Sea Lamprey. It was an impetus for #23.	2021

10.	Lamprey cover photo for the peer-review journal, Conservation Science and Practice, which published Clemens and Wang (2021; see #9)	Available here.	Image by ODFW's Statewide Lamprey Coordinator of Pacific lamprey.	2021
11.	ODFW Beaver State Podcast episode #73: Lamprey	Online podcast with ODFW's Statewide Lamprey Coordinator, available here.	Provides a wide-ranging question-and-answer discussion about lamprey biology and conservation.	2021
12.	Dredging impacts on lampreys	White paper LTWG (2021) created by individuals from ODFW and other organizations via the Pacific Lamprey Conservation Initiative.	Provides details on monitoring and minimizing dredging impacts to lampreys.	2021
13.	Native Lampreys of Oregon brochure	Two-page, trifold (print) available at ODFW offices and two-page electronic document available online here.	Description of what lampreys are (and are not), life cycles, species list and general descriptions of body sizes and natural history with links to further information online.	2022
14.	Lamprey Biology and Identification workshop	In-person, one day training in Charleston, OR, with presentations and identification of preserved species by an independent contractor, in collaboration with ODFW with federal and Tribal partners.	Biology and species identification workshop.	2022
15.	Signage associated with the Eel Lake Lamprey Passage Structure	Two large signs on site at Tugman State Park (Lakeside, OR). Images of these signs can be viewed near the bottom of the Native Lampreys of Oregon Story Map (see #22, below).	The signs provide information on the Lamprey Passage Structure, lamprey biology, and cultural connections of Pacific lamprey with the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians.	2022
16.	Factors affecting lamprey entrainment and impingement	White paper (LTWG 2022b) created by individuals from ODFW and other organizations via the Pacific Lamprey Conservation Initiative.	Reviews screening requirements for larval and juvenile lampreys	2022
17.	Paper on sampling larval lampreys	Peer-reviewed paper by Clemens et al. (2022).	Reviews the extensive world literature on sampling methods and survey designs, highlighting pros and cons for each approach, and provides a framework to align logistics with funding and biological questions to identify the study scope and approach.	2022
18.	Outreach to middle and high school students on lamprey biology	Included educational module for in-class instruction to students in the Willamette Valley, followed by one-day field surveys, done in collaboration with Dr. Patrick Edwards of Portland State University and Gabe Sheoships Tribal member	Covered lamprey species, biology, distribution, and connection to Tribal cultures (Clemens and Edwards 2022).	2022

		and Executive Director of Friends of Tryon Creek.		
19.	Paper on warmwater temperature effects on Pacific lamprey	Peer-reviewed paper by Clemens (2022).	Synthesizes observations from the peer-reviewed literature along with documentation of a fish kill to conclude that water temperatures ≥20°C are a limiting factor to Pacific lamprey.	2022
20.	Lampreys as bait flyer	Electronic page created for easy access and printing, available here, created in collaboration with state and Tribal partners via the Pacific Lamprey Conservation Initiative to raise awareness on the illegality of using lampreys as bait in Washington and Oregon.	Identifies the various life stages of lampreys, contact information for lamprey biologists from WDFW and ODFW, and QR codes for links to ODFW's angling regulations, Oregon Native Lampreys of Oregon brochure (see #13, above), the Pacific Lamprey Conservation Initiative, and WDFW's angling regulations.	2023
21.	Comparison of Pacific lamprey and Pacific salmon	White paper (LTWG 2023) created by individuals from ODFW and other organizations via the Pacific Lamprey Conservation Initiative.	Compares the life histories, habitat and ecology requirements of Pacific lamprey relative to Pacific salmon.	2023
22.	Native Lampreys of Oregon story map	Online story map, available here, that combines images, interactive maps, videos, and links to additional information.	Provides a guide with simple and clear language for Oregonians interested in learning more about the biology, species, RME, challenges and solutions, and education and outreach on lampreys.	2024
23.	Lampreys: Friends or Foes? fact sheet	One page fact sheet, available here, created by staff from the Great Lakes Fishery Commission through encouragement and collaboration with ODFW's Statewide Lamprey Coordinator and with input from the Steering Committee of the Pacific Lamprey Conservation Initiative.	Clearly lines out that of the approximately 40 species of native lampreys worldwide, only the invasive Sea Lamprey (*Petromyzon marinus*) of the Great Lakes is a clear "foe", whereas all the other lampreys are "friends" that provide numerous benefits to their ecosystems.	2025
24.	Paper and software on estimating lamprey abundance through hydropower system	Peer-reviewed paper by Gomes et al. (2025) and associated free, online software (Gomes 2024).	Free, online tool for estimating changes in abundance, by life stage, of Pacific lamprey, given changes in the numbers of barriers, etc.	2025
25.	Outreach on social media platforms	Lamprey images and facts by ODFW have periodically been incorporated into ODFW's externally-facing social media platforms by ODFW staff.		2017 to present
26.	Lamprey taxonomic changes and knowledge-action gaps	Peer-reviewed paper by Clemens et al. (2025)	Presents a new conceptual model on collaboration to produce and disseminate knowledge.	2025
27.	Lamprey eDNA surveys	Worked with 37 different organizations to conduct surveys and educated staff from these organizations about lampreys in the process (Carim et al. 2026).	This included providing the Native Lampreys of Oregon brochures (see #13, above) to them for subsequent distribution to Oregonians.	2023 to 2025