

Pacific Lamprey

2016 Regional Implementation Plan

for the

Lower Columbia/Willamette

Regional Management Unit

Willamette Sub-Unit



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I. Status and Distribution of Pacific Lamprey in the RMU

A. General Description of the RMU

Willamette River Sub-Unit

The Willamette Sub-Unit of the Lower Columbia River/Willamette Regional Management Unit is comprised of twelve 4th field HUCs that are situated within three Environmental Protection Agency (EPA) Level III Ecoregions: Coast Range, Willamette Valley and Cascades (http://www.epa.gov/wed/pages/ecoregions/level_iii.htm). Watersheds within the Willamette Sub-Unit include the Middle and Coast Forks, McKenzie, North and South Santiam, Yamhill, Molalla-Pudding, Tualatin, Clackamas and Upper, Middle, and Lower Willamette River. Drainages range in size from 655 to 2,945 km² for the 12 HUCs (Table 1).



Figure 1. Map of watersheds within the Lower Columbia River/Willamette Regional Management Unit (taken directly from the USFWS Conservation Assessment, Luzier et al. 2011).

Table 1. Drainage Size and Level III Ecoregions of the 4th Field Hydrologic Unit Code (HUC) Watersheds located within the Willamette Sub-Unit.

Watershed	HUC Number	Drainage Size (km2)	Level III Ecoregion(s)
Middle Fork	17090001	2,172	Willamette Valley
Coast Fork Willamette	17090002	1,069	Coast Range
Upper Willamette	17090003	2,945	Willamette Valley
McKenzie	17090004	2,188	Willamette Valley, Cascades
North Santiam	17090005	1,240	Willamette Valley, Cascades
South Santiam	17090006	1,689	Willamette Valley, Cascades
Middle Willamette	17090007	1,126	Willamette Valley
Yamhill	17090008	1,239	Coast Range
Molalla-Pudding	17090009	1,421	Willamette Valley, Cascades
Tualatin	17090010	1,156	Coast Range, Willamette Valley
Clackamas	17090011	1,505	Willamette Valley, Cascades
Lower Willamette	17090012	655	Willamette Valley

B. Status of Species

Conservation Assessment and New Updates

Population status was difficult to rank in many watersheds during the development of the USFWS Conservation Assessment. Historic occupancy of Pacific lamprey was extensive throughout the Lower Columbia/Willamette RMU. Current distribution is reduced 50-70% from historic ranges (Luzier et al. 2011) (Figure 2). Current population size is unknown in all watersheds of the Willamette Sub-Unit (see Table 11-2 of Luzier et al. 2011).

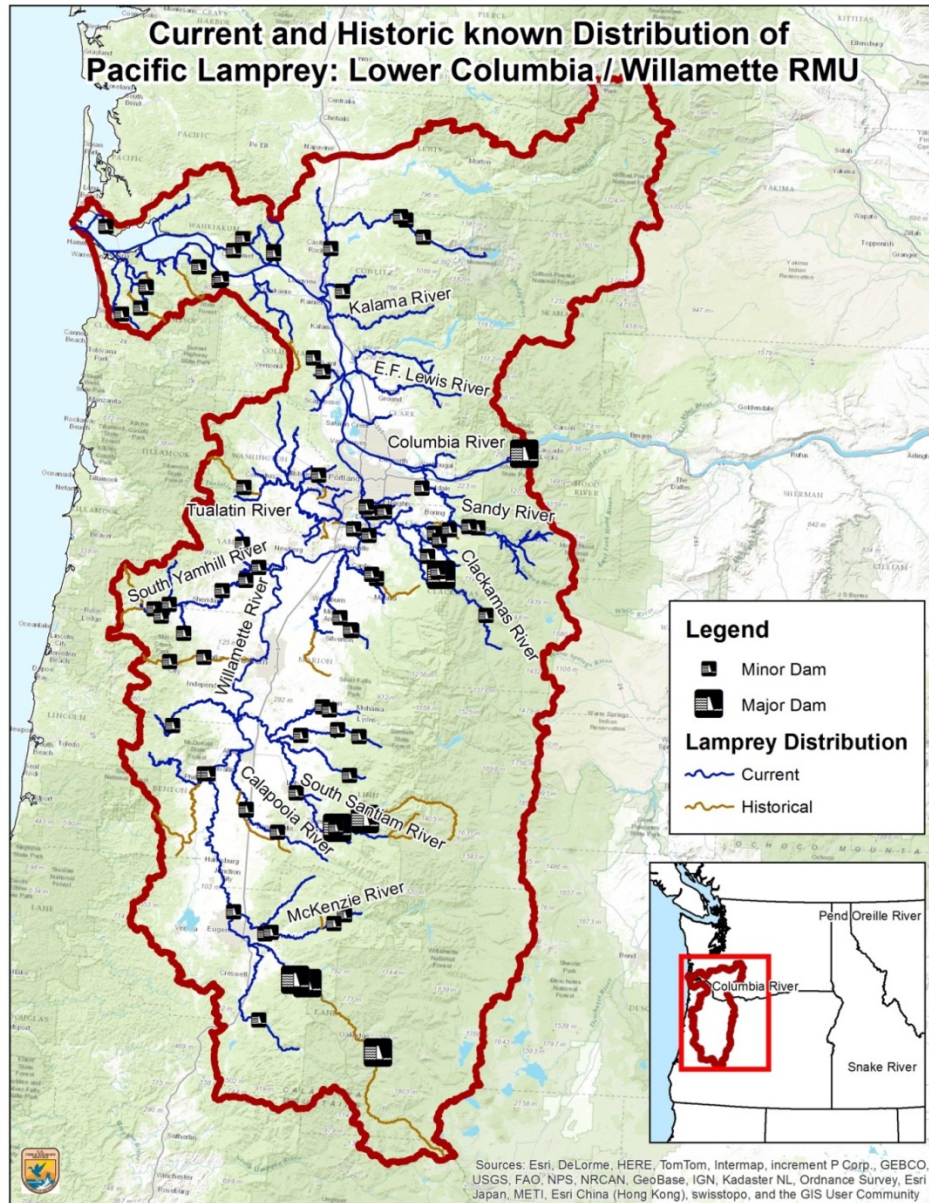


Figure 2. Current and historic known distribution for Pacific Lamprey: Lower Columbia and Willamette Regional Management Unit (USFWS Data Clearinghouse 2016).

Distribution and Connectivity

Current distribution of lamprey in the Willamette Sub-Unit is strongly related to physical migration barriers. Over 20 large dams are present within the region including four on the Middle Fork Willamette River (Dexter, Fall Creek, Lookout Point, and Hills Creek), two on the Coast Fork Willamette River (Dorena and Cottage Grove), one on the Upper Willamette River (Fern Ridge, on Long Tom River), six on the McKenzie River (Leaburg, Blue River, Cougar, and the Carmen-Smith Hydroelectric Project), two on the South Santiam (Foster and Green Peter), two on the North Santiam (Big Cliff and Detroit), one on the Tualatin (Scoggins), and three on the Clackamas River (River Mill, Faraday, and North Fork). The U.S. Army Corps of

Engineers (Corps) operates thirteen of the dams which were built to protect the Willamette Valley from flooding as well as generate electricity and provide water storage for irrigation, recreation and drinking water. The structures range in size from 49 (Fern Ridge) to 519 (Cougar) feet tall and provide little or no fish passage. Instead, adult fish are trapped, transported by truck and released upstream of the dams. Juvenile fish must pass through turbines, spillway gates, or utilize other routes of water passage as they migrate downstream. The Corps dams alone block hundreds of miles of historic spawning and rearing habitat and over time have adversely effected native fish populations in the basin. Consequently, the Willamette Project Biological Opinion issued by the National Marine Fisheries Service (NMFS 2008), required the Corps to mitigate for the Projects' effects and improve adult and juvenile salmonid passage at several high priority dams. Work has included the construction or upgrade of adult fish collection facilities at Cougar, Detroit (Minto), Foster, Dexter and Fall Creek Dams to improve trap and haul conditions for fish (i.e., improved attractant flows, larger holding areas, less direct handling of fish). Floating surface collectors are currently being tested for potential use at Cougar, Detroit and Lookout Point Dams to assist and improve juvenile passage downstream. It is unclear whether or not these passage improvement measures will benefit adult and juvenile Pacific lamprey.

Although most passage projects in the Willamette Sub-Unit are focused on improving conditions for ESA-threatened spring Chinook salmon and winter steelhead, a growing number of projects are being targeted towards Pacific lamprey. In conjunction with Federal Energy Regulatory Commission relicensing in 2007, local utility Portland General Electric has installed three lamprey passage structures at Willamette Falls Hydroelectric Project (Lower Willamette River), rebuilt the existing fish ladder at River Mill Dam (Clackamas River) and made modifications to fishways at Faraday and North Fork Dams (Clackamas River) to enhance upstream passage of adult Pacific lamprey. Portland General Electric is also monitoring the downstream migration of juvenile lamprey with a new surface collector, and is performing a multi-year radio telemetry study that will assess migration and passage success of adult Pacific lamprey through the fish ladder at North Fork Dam.

Of the estimated 371 dams present in the Willamette basin, approximately 148 are privately owned and used primarily for the purposes of irrigation. The greatest concentration of dams can be found in the Tualatin (82) and Yamhill (65) watersheds (Hulse et al. 2002). Culverts are also widespread throughout the watersheds of the Willamette Sub-Region and may impact Pacific lamprey to an unknown extent. An extensive effort is currently underway in a number of watersheds to inventory and prioritize barrier structures for removal, replacement, or retrofit.

C. Threats

Summary of Major Treats

The following table summarizes the known key threats within the Willamette Sub-Unit identified during the USFWS Conservation Assessment in 2011 (H – High, M – Medium, L – Low, and U- Unknown). Passage and stream and floodplain degradation are the highest priority threats in the Willamette Sub-Unit, followed by dewatering and flow management and water quality. (Table 2, from Luzier et al. 2011)

Table 2. Summary of the assessment results for the key threats of the Willamette River Sub-Unit (Luzier et al. 2011).

Key Threats	Middle Fk. Willamette	Coast Fork Willamette	Upper Willamette	Mckenzie	North Santiam	South Santiam	Middle & Lower Willamette	Yamhill	Molalla-Pudding	Tualatin	Clackamas
Passage	H	M	M	H	M	H	M/H	M	L/M	L/M	M/H
Dewatering & Flow Mgmt.	H	M	M	M	M	M	M/H	M	H	L/M	M
Stream & Floodplain Degradation	H	H	H	H	H	M/H	H	H	H	H	H
Water Quality	M	H	H	M	H	M	M/H	H	M/H	H	M
Predation	L	M	M	L	M	L	M/H	M	M/H	M	M
Lack of Awareness	L	L	H	L	L	L	H	H	H	H	L
Climate Change	H	U	U	H	H	H	H	U	U	U	H

New Threats

Stream and Floodplain Degradation.—Nearly 70 percent of Oregon’s population resides in and around the Willamette River Basin. Human settlement and development has greatly altered the physical habitat and hydrology of the Sub-Unit. In upland areas, forestry is the predominant land use. Fire suppression and historic and ongoing timber harvest practices have altered the diversity and age/size composition of riparian vegetation and trees. Many watersheds in the Willamette Sub-Unit are lacking mature conifers that play a pivotal role in bank stability, water quality protection, thermal cover, and the provision of large woody debris. In the valley, extensive agriculture and urban development have reduced the quality and complexity of aquatic and riparian habitats. Efforts to prevent flooding (dikes, levees, riprap, dams) and improve navigation (dredging, large wood clearing), have straightened and scoured streambeds, eliminated side channels and cut off flood plains. Cultivation, riparian clearing and conversion of land for crops, pastures and development have filled and/or drained wetlands, increased soil erosion and sedimentation, and promoted the establishment and spread of invasive plant species.

Water Quality.—Elevated water temperature, low dissolved oxygen, bacteria, and toxic pollutants such as herbicides, pesticides, heavy metals and flame retardants, are some of the primary water quality concerns in the Willamette Sub-Unit. These threats may be attributable to a number of human related causes including riparian clearing, water withdrawals, failing septic systems, sewer overflow, and urban and agricultural run-off. Toxins may be particularly harmful to Pacific lamprey because larvae burrow and feed in mud and fine substrates where toxins accumulate (Nilsen et al. 2015). Monitoring efforts to improve and protect water quality for fish, wildlife, and human health are ongoing in the Willamette Sub-Unit.

Dewatering and Flow Management.—Low flow conditions occur naturally in many watersheds of the Willamette Sub-Unit during summer months. These conditions may be aggravated by water withdrawals for municipal, industrial, commercial and agricultural use. Large storage dams may augment seasonal low (and high) flows in some areas, but can negatively impact natural temperature and flow regimes. Water releases from thermally stratified reservoirs generally result in cooler water temperatures downstream of the dam in summer and warmer water temperatures in fall and winter. Abnormal seasonal temperature fluctuations may impact the behavior, development, and fitness of adult and juvenile lamprey to an unknown extent. Water diversions and impoundments alter the quantity and timing of flow events which may impact adult and juvenile lamprey migration cues, decrease spawning habitat availability, prevent access to backwater or side channel habitats, create low water barriers, and may contribute to mortality if incubating eggs or burrowing larvae are dewatered or exposed to a high temperature or low oxygen environment.

Other.—Predicted trends in population growth, increased development, and the anticipated effects of climate change (i.e., elevated water temperatures, decreased surface water availability, altered flow regimes) will likely compound existing threats to Pacific lamprey throughout the Willamette Sub-Unit.

Restoration Actions

The following work was recently completed or is actively occurring in the Willamette Sub-Unit.

- Installation of lamprey passage ramp on Fall Creek Dam (Middle Fork Willamette).
- The Confederated Tribes of the Grand Ronde is leading a multi-year lamprey translocation study on Fall Creek.
- The Confederated Tribes of Warm Springs is assessing passage and estimating counts of Pacific lamprey passing Willamette Falls.
- Side channel and floodplain enhancement projects on Crabtree Creek (South Santiam) and Dieckman Creek (North Santiam) – important spawning and rearing areas for Pacific lamprey (Schultz et al. 2014).
- Floodplain enhancement project on Deer Creek (McKenzie). The project will reconnect Deer Creek to the surrounding floodplain and increase the stream's complexity, thus improving habitat for Salmon, trout and lamprey.
- Ongoing distribution and occupancy sampling. Information collected through these surveys will guide conservation actions throughout the Willamette Sub-Unit.

III. Selection of Priority Actions

A. Prioritization Process

The highest priority threat in the Willamette Sub-Unit is stream and floodplain degradation. Passage, dewatering and flow management and water quality all ranked moderate to high for both scope and severity. Priority projects identified by participating members of the Willamette Sub-Unit RMU addressed threats to passage, stream and floodplain degradation and uncertainties in Pacific Lamprey distribution.

B. High Priority Proposed Project Information

Fall Creek Dam Upstream Passage Evaluation

Project Description:

This project would monitor adult lamprey below Fall Creek Dam to determine appropriate location/facilities for passing adult Pacific lamprey above Fall Creek Dam, evaluate the existing trap and haul facility for aiding collection of adult lamprey, and install and monitor fishway improvements for lamprey at Fall Creek Dam.

- **HUC 5:** Middle Fork Willamette
- **Facilities ownership:** USACE
- **Regulatory responsibilities:**
- **Rationale and linkage to the watershed:**
- **Expected outcome (threats addressed):** Improve upstream passage of Pacific lamprey at Fall Creek Dam.
- **Identification and coordination with relevant stake holders:** Tribes, watershed councils, ODFW, USACE
- **Feasibility and expected timeframes:**
- **Proponent Role and Responsibilities:** Coordinate with interested partners to fully develop a plan for funding and implementation.
- **Consensus within the RMU Groups:**
- **Budget and identification of potential funding sources:**

Juvenile Stranding Evaluation during Drawdown in Fall Creek Reservoir

Project Description:

This project would evaluate the potential for juvenile lamprey to be stranded during the annual drawdown of Fall Creek Reservoir.

- **HUC 5:** Middle Fork Willamette
- **Facilities ownership:** USACE
- **Regulatory responsibilities:**
- **Rationale and linkage to the watershed:**
- **Expected outcome (threats addressed):** Estimate the potential impact of drawdown on juvenile lamprey survival and help evaluate alternative drawdown operations.
- **Identification and coordination with relevant stake holders:** Tribes, watershed councils, ODFW, USACE
- **Feasibility and expected timeframes:**
- **Proponent Role and Responsibilities:** Coordinate with interested partners to fully develop a plan for funding and implementation.
- **Consensus within the RMU Groups:**
- **Budget and identification of potential funding sources:**

Willamette Tributaries Passage Evaluation(s)

Project Description:

This project would evaluate multiple small dam complexes and/or existing fish passage facilities for adult upstream Pacific lamprey passage efficiency and identify appropriate fixes.

- **HUC 5:** McKenzie (Leaburg Dam), North Santiam (Upper and Lower Bennett Dam, Stayton Canal dam), South Santiam (Lebanon Dam), Upper Willamette (small dams on Long Tom River)
- **Facilities ownership:** Multiple
- **Regulatory responsibilities:**
- **Rationale and linkage to the watershed:**
- **Expected outcome (threats addressed):** Identify, prioritize and address lamprey passage constraints at existing low head dams in Willamette tributaries.
- **Identification and coordination with relevant stake holders:** Tribes, watershed councils, ODFW, USACE, EWEB, SWCD, City of Salem
- **Feasibility and expected timeframes:**
- **Proponent Role and Responsibilities:**
- **Consensus within the RMU Groups:**
- **Budget and identification of potential funding sources:**

Improve Spawning and Rearing Habitat for Pacific Lamprey/Floodplain Enhancement

Project Description:

This project will improve spawning and rearing habitat for Pacific Lamprey in the Lower South Fork McKenzie River. A large-scale project is underway to augment sediment and wood (3,000-4,000 pieces) on 4.5 miles of the South Fork McKenzie River below Cougar Dam. Additional project actions include approx. 40 acres of levee and riprap removal, channel reconstruction, approx. 400 acres of floodplain reconnection, and 5-10 miles of side channel reconnection.

- **HUC 5:** McKenzie, Middle Fork Willamette, Coast Fork Willamette
- **Regulatory responsibilities:** Project is managed by McKenzie Watershed Council and Willamette NF
- **Rationale and linkage to the watershed:**
- **Expected outcome (threats addressed):** Project would restore spawning and rearing habitat for Pacific Lamprey that is easily accessible below impassable dams
- **Identification and coordination with relevant stake holders:** McKenzie Watershed Council and Willamette NF
- **Feasibility and expected timeframes:** Feasibility is high. Implementation may begin in 2017.
- **Proponent Role and Responsibilities:**
- **Consensus within the RMU Groups:** Ranked as high priority project.
- **Budget and identification of potential funding sources:**

Abundance and Distribution Survey

Project Description:

This project includes conducting presence/absence surveys within the Yamhill basin to identify the current range, abundance and distribution of Pacific Lamprey within the Yamhill. Once the range is understood then it would be easier to identify specific limiting factors within the system and develop projects to address those factors.

- **HUC 5:** Yamhill
- **Regulatory responsibilities:** Project is managed by McKenzie Watershed Council and Willamette NF

- ***Rationale and linkage to the watershed:*** Current Pacific lamprey distribution in the Yamhill basin is unknown.
- ***Expected outcome (threats addressed):*** This project would address uncertainties regarding Pacific lamprey presence and distribution in the Yamhill basin.
- ***Identification and coordination with relevant stake holders:*** Confederated Tribes of the Grand Ronde
- ***Feasibility and expected timeframes:*** Feasibility is high.
- ***Proponent Role and Responsibilities:***
- ***Consensus within the RMU Groups:*** Ranked as high priority project.
- ***Budget and identification of potential funding sources:***

References

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