Pacific lamprey

2016 Regional Implementation Plan

for the

Lower Columbia/Willamette

Regional Management Unit

Lower Columbia Sub-Unit

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Primary Authors		Primary Editors
C. Wang, H. Schaller, R. Rhew J. Poirier	U.S. Fish and Wildlife Service	

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I. Status and Distribution of Pacific lamprey in the RMU

A. General Description of the RMU

Lower Columbia Sub-Unit: Within the Lower Columbia River/Willamette Regional Management Unit (RMU) the Lower Columbia River Sub-Unit includes the Sandy, Lewis, Upper and Lower Cowlitz, Clatskanie, and Lower Columbia watersheds. It is comprised of four Level III Ecoregions described by the Environmental Protection Agency (EPA) (http://www.epa.gov/wed/pages/ecoregions/level_iii.htm). The watersheds within this sub-region range in size from 1,740 to 3,781 km2 for the 6 HUCs. The spatial arrangements of these HUCs are displayed in Figure 1 and sizes of HUCs are in Table1.

Figure 1. Map of watersheds within the Lower Columbia River/Willamette Region (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 Lower Columbia Sub-Unit.

Watershed	HUC Number	Drainage Size (km^2)	Level III Ecoregion(s)
Lower Columbia-Sandy	17080001	2,875	Willamette Valley, Cascades
Lewis	17080002	2,797	Puget Lowland, Willamette Valley, Cascades
Upper Cowlitz	17080004	2,668	Puget Lowland
Lower Cowlitz	17080005	3,781	Puget Lowland, Cascades
Lower Columbia-Clatskanie	17080003	2,321	Coast Range, Willamette Valley
Lower Columbia	17080006	1,740	Coast Range

B. Status of Species

Conservation Assessment and New Updates

During the development of the USFWS Conservation Assessment (Luzier et al. 2011), there was a high level of uncertainty in population status. According to the Conservation Assessment, historic occupancy was extensive in Sandy, Lewis, Clatskinie, Cowlitz and other tributaries of the Lower Columbia. Current population size is still unknown in most areas of historic occupancy, but the current distribution was assessed to be reduced from historic ranges (see table 11-2 of Luzier et al. 2011). The present state of knowledge on information describing known occurrences of Pacific Lamprey are displayed in Figure 2, which is a product of the USFWS data Clearinghouse (http://www.fws.gov/pacific/fisheries/sphabcon/lamprey/lampreyCI.html).

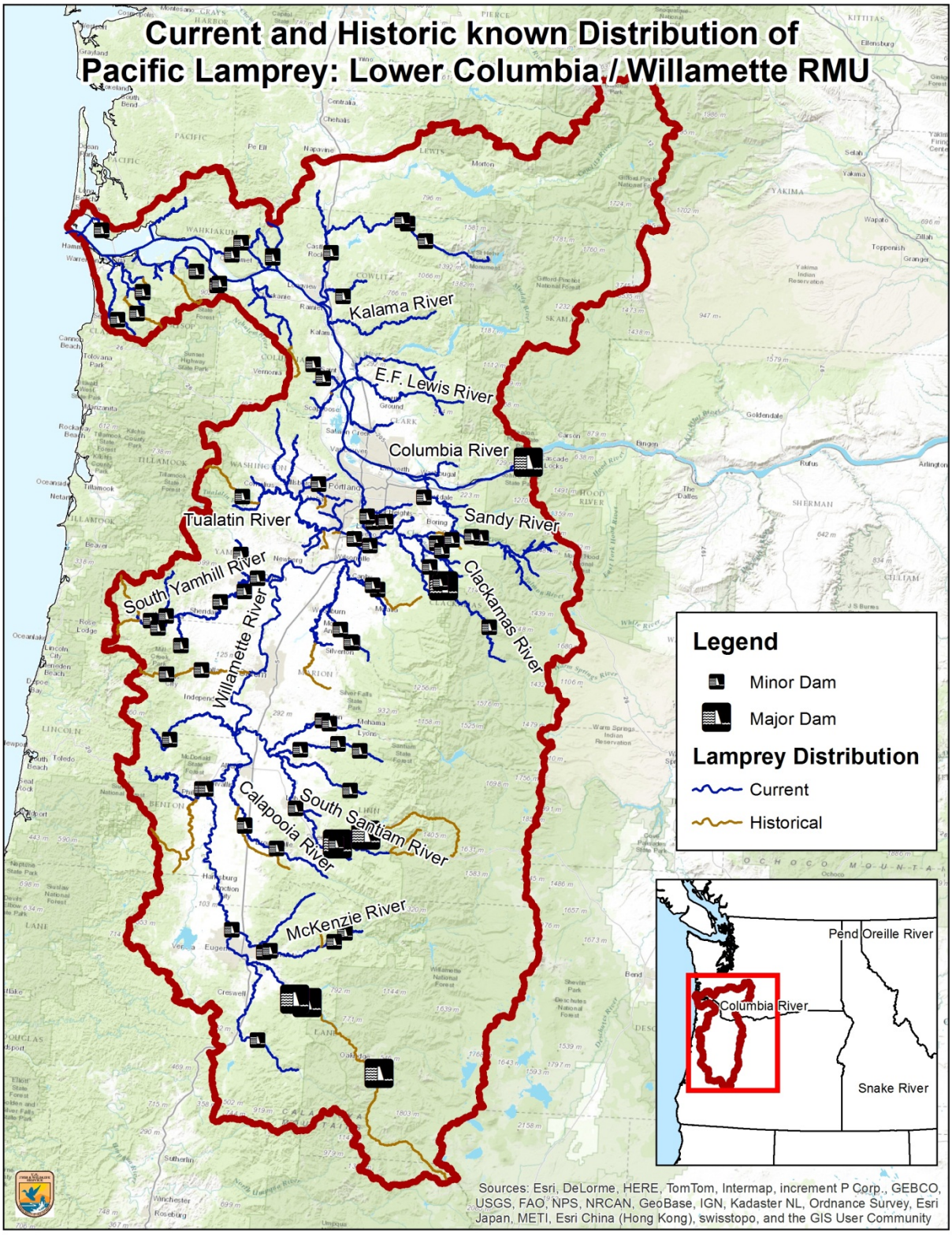


Figure 2. Current and historic known distribution for Pacific Lamprey: Lower Columbia and Willamette Regional Management Unit (USFWS Data Clearinghouse 2016).

Distribution and Connectivity

Passage in the Lower Columbia Sub-Unit is not impeded by dams of the Federal Columbia River Power System. However, Lamprey in these HUCs are affected by other dams including Swift, Yale, and Merwin (none of which have fish passage) in the Lewis Basin, and Barrier, Mayfield, Mossy Rock and Cowlitz Falls in the Upper and Lower Cowlitz Basins. Culverts and private hobby and push up dams are widespread throughout the watersheds of the Lower Columbia.

The combined impacts from this series of passage impediments appear to impose a significant impact on distribution and connectivity for Pacific lamprey in most of the HUCs.

Very few new larval lamprey surveys have been performed in most of these sub basins. However, a compilation of all larval and adult lamprey occurrences has been assembled through the USFWS data clearing house project (web link), and is displayed in Figure 2. In the Lower Columbia River Sub-Basin Plan of the NPCC (2004) and the Supplement to the Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan; Appendix C "Species' Use of Habitat Types in the Columbia River Estuary and Lower Mainstem" identifies Pacific Lamprey as a focal species and that ammocoetes or macrothalmia use of Riverine/Estuarine Habitat and Transition Habitat year round. The supplement recommends that there is additional research that assesses Pacific lamprey habitat use in the lower mainstem.

A number of recent studies have been conducted in the mainstem Willamette, Columbia and Snake rivers to document use by larval lamprey (Jolley et al. 2012; Jolley et al. 2014).

High survival of larval Pacific lamprey was observed in laboratory simulated tidal experiments where salinity oscillated between freshwater and saline waters (up to 12 ppt and 15 ppt), suggesting the potential for larval occupancy in tidally-influenced areas in the natural environment. Distribution of larval Pacific lamprey in Ellsworth Creek, a tributary of the Naselle River (Willapa Bay) was found to include tidally-influenced habitats where salinity intrusion exceeded 10 ppt about once per day at high tide. Similar patterns of larval Pacific lamprey occurrence in tidally-influenced habitats may be possible across the range of Pacific lamprey, including portions the lower Columbia River estuary and its associated tributaries (Silver 2015).

C. Threats

Summary of Major Treats

The following table summarizes the known key threats within the Lower Columbia Sub-Unit tributaries (H – High, M – Medium, L – Low). The highest priority threat in the Lower Columbia watersheds is tributary passage, followed by dewatering and flow management, stream and floodplain degradation, and water quality (USFWS Assessment Luzier et al. 2011, and has not been fully vetted by the RMU – Team.) The Supplement to the Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan (NPCC 2004) in Strategy to Protect and Restore Habitat; also recommends to improve dam passage for Pacific lamprey.

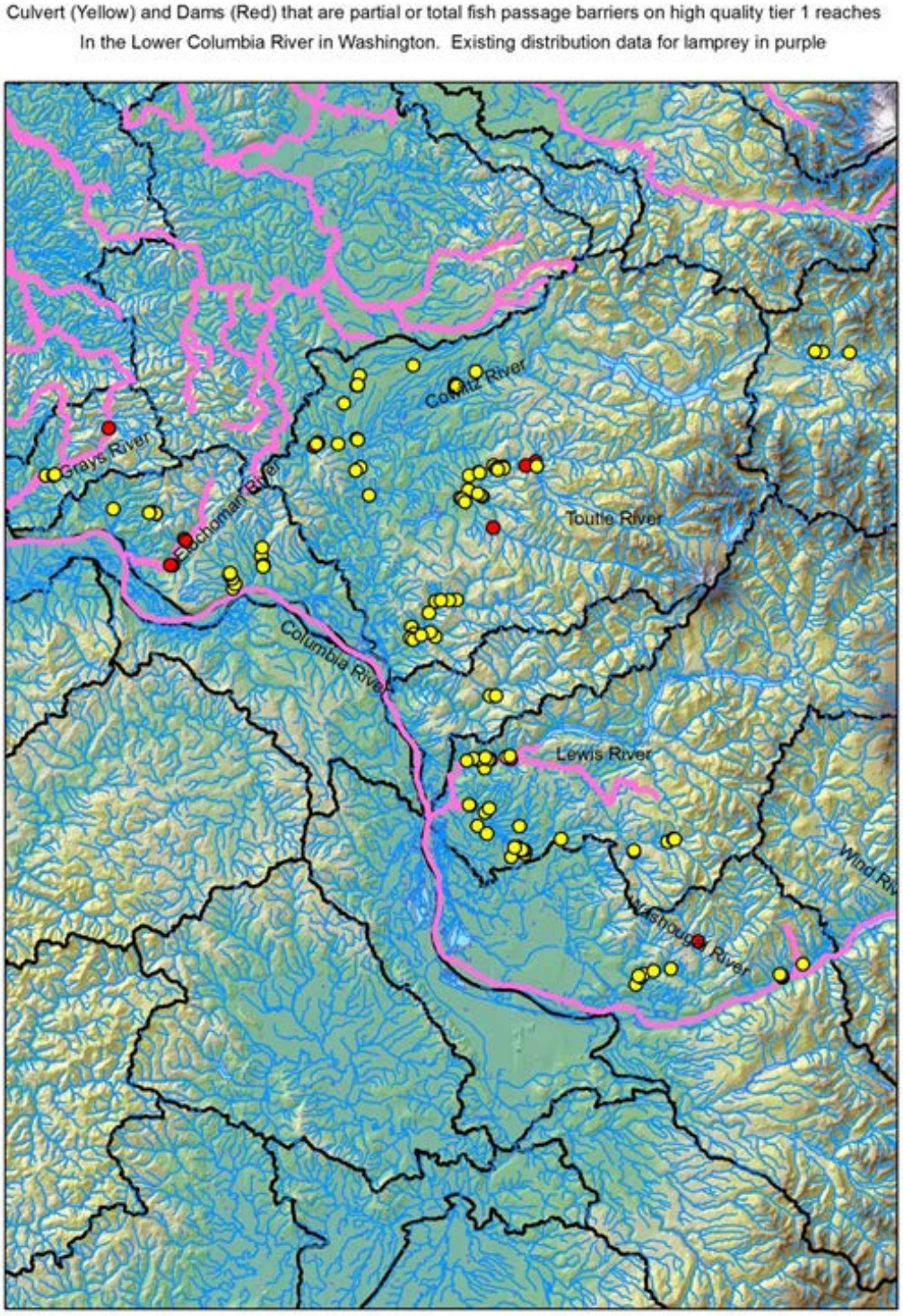
Table 2. Summary of the assessment results for the key threats of the Lower Columbia River Sub-Unit (Luzier et al. 2011).

Key Threats	Sandy	Lewis	Clatskanie	Upper Cowlitz	Lower Cowlitz	Lower Columbia
Tributary Passage	H	M	H	M/H	M	L/H
Dewatering & Flow Mgmt.	L/M	H	M	H	M/H	L
Stream & Floodplain Degradation	M	M	M	M	M	M
Water Quality	M	M	L/U	I/I	I/L	L/U

New Threats

The RMU needs to meet in order to determine if there are newly identified threats since the Luzier et al. 2011 assessment. The compilation on barriers for the Lower Columbia River Sub-Unit in Washington will help identify tributary specific threats and guide priorities for lamprey passage restoration (Figure 3).

Figure 3. Fish passage barriers on high quality tier 1 stream reaches in the Lower Columbia River in Washington overlaid with lamprey distribution data.



Restoration Actions

Many instream and floodplain habitat restoration activities have been identified in the Lower Columbia Sub-Unit (Sub basin Plan: www.nwcouncil.org/fw/subbasinplanning/lowercolumbia/plan/). However most of these actions have been designed and funded for salmon recovery, many of these actions have also improved conditions for Pacific Lamprey. The NPCC Lower Columbia Sub-Basin plan (NPCC 2004) recommends the following two strategies and measures:

1) *Evaluate and improve passage conditions at mainstem and tributary dams, ensuring no negative effects on salmonid passage.*
2) *Allocate water within the annual water budget for the Columbia River Basin that simulates peak spring discharge.*

To date, the primary lamprey restoration activities that have occurred or are occurring within this RMU are being executed by organizations focused on salmon and steelhead recovery on both the Oregon and Washington side of the river.

Marmot Dam and the Little Sandy Dam were removed in the Sandy River in 2007 and 2008 respectively. Dam removals and stabilization of sediment movement has significantly addressed passage threats in that basin.

Larval lamprey use of restored habitats is understudied. To understand their effectiveness, actions to restore habitats associated with the Portland Harbor Superfund area remediation necessitate evaluation of Pacific lamprey before and after projects. Jolley et al. (2015) have begun these evaluations in the Lower Columbia River/Willamette RMU.

In Oregon, the primary umbrella organization for identifying, prioritizing, and implementing stream restoration activities is the implementation team for the Lower Columbia River Conservation and Recovery Plan for Oregon Populations of salmon and Steelhead. In their three year implementation schedule for 2015-2017 they have identified the following classes of projects for implementation in 2015:
Tributary Passage: three projects
Stream and Floodplain Restoration: Fourteen projects

In Washington the coordinating organization is the Lower Columbia Fish Recovery Board. Some projects funded were located on streams without confirmed lamprey presences so these were not tallied. In last year's grant round they identified the following projects for implementation in 2015:
Tributary Passage: two projects
Stream and Floodplain restoration: three projects

High Priority Implemented or Funded Project Information:

Tributary Passage

Clear Creek Fish Passage: Clear Creek is a tributary to the Elochman River in Washington. The project will replace an undersized partially buried culvert with a bridge. Some habitat elements are included in the project, such as two large wood jams and boulders for roughness. The project will

restore passage to more than a quarter mile of habitat, and several more once WDFW removes a non-used diversion dam for a closed hatchery. Funded 2014 grant round of Lower Columbia Fish Recovery Board.

Thousand Acres Tide Gate Project: This project will remove a tide gate and water control structure on the lower Sandy River delta in Oregon. In addition it includes 1.2 miles of riparian enhancement, and .15 miles of large wood additions. This project is scheduled for implemented by Lower Columbia River Estuary Partnership in 2015 and primary funds from OWEB and BPA.

Stream & floodplain Restoration:

Happa Habitat Restoration Project: This project will enhance instream and riparian habitat over 6.7 acres of riparian area and 1,100 feet of the mainstem North Fork Lewis River in Washington. The riparian area treatment will remove noxious weeds and re-plant with native trees and shrubs. In-stream treatment will incorporate large wood jams as well as floodplain roughness elements. Funded 2014 grant round of Lower Columbia Fish Recovery Board.

Clatskanie River Floodplain Restoration: This project will restore side channel, riparian, and instream aquatic habitat on the lower Clatskanie River in Oregon. The project will restore 3000 feet of side channel, 0.5 miles of riparian habitat, and incorporate 15 large wood jams in the existing stream channel. Project was implemented by the Lower Columbia River Watershed Council in 2015 & 2016, and primary funds from OWEB and ODFW.

II. Selection of Priority Actions

A. Prioritization Process

Among the threats identified in the Lower Columbia River Sub-Unit of the Lower Columbia/Willamette RMU, some showed a pervasive impact in the entire Sub-Unit, such as, "climate change", "water quality", and" lack of awareness." Other threats were more location specific, but nevertheless showed severe impacts at the local scale, such as "Tributary passage", "stream & floodplain degradation and "dewatering & flow management." Based on the conservation assessment, new monitoring and evaluation and multi-agency coordination meetings the following three projects were selected as priority projects for the Lower Columbia Sub-Unit: "Tributary Passage", Stream & floodplain Restoration" and "Toxicological Evaluations."

"Climate change" is identified as a critical subject for the region, but the feasibility and practicality in making tangible changes for lamprey through restoration actions is somewhat limited and requires large scale institutional changes.

B. High Priority Proposed Project Information

Proposed projects to be determined at upcoming RMU meetings in May 2017

Tributary Passage

Stream & floodplain Restoration

Toxicological Evaluations

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