

# Pacific Lamprey 2019 Regional Implementation Plan *for the* Snake River Region: Lower Snake, Clearwater and Salmon Regional Management Units



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Regional Implementation Plans are written annually to document activities benefiting lamprey that were done in the previous year, activities that will occur in the current year, and to present project proposals seeking funding. They also highlight any changes in status or threats and activities related to those documented in the Pacific Lamprey *Entosphenus tridentatus* Assessment, 2018 (USFWS 2018).

Projects that are proposed and discussed within this Regional Implementation Plan are in accordance with direction provided within the *Conservation Agreement for Pacific Lamprey in the States of Alaska, Washington, Idaho, Oregon and California, 2012*. Cooperative efforts through the Agreement intend to: a) develop regional implementation plans derived from existing information and plans; b) implement conservation actions; c) promote scientific research; and d) monitor and evaluate the effectiveness of those actions.

Projects identified in this Regional Implementation Plan do not imply or intend a funding obligation or any related activity from any of the government agencies, tribes or non-governmental entities discussed within this document.

## I. Status and Distribution of Pacific Lamprey in the RMU

### A. General Description of the RMU

The Snake River Region includes the Snake River and all waters draining into it downstream of Hells Canyon Dam (river km 397) to its confluence with the Columbia River (Figure 1). There are three Regional Management Units (RMUs): the Lower Snake Basin, the Clearwater River Basin, and the Salmon River Basin (Figure 1) with five major tributaries: Imnaha, Salmon, Grande Ronde, Clearwater, and Tucannon rivers. Within these RMUs there are 23 Hydrologic Unit Code (HUC) watersheds in 4 subbasins. The watersheds within this region that are still accessible to Pacific Lamprey range in size from 552-6,242 km<sup>2</sup>.

The HUC 4 subbasins are: Lower Clearwater (17060306), Middle Fork Clearwater (17060304), South Fork Clearwater (17060305), Lochsa (17060303), Lower Selway (17060302), Upper Selway (17060301), Lower Salmon (17060209), Little Salmon (17060210), South Fork Salmon (17060208), Middle Salmon-Chamberlain (17060207), Lower Middle Fork Salmon (17060206), Upper Middle Fork Salmon (17060205), Middle Salmon-Panther (17060203), Lemhi (17060204), Pahsimeroi (17060202), Upper Salmon (17060201); Lower Snake-Asotin (17060103), Lower Grande Ronde (17060105), Upper Grande Ronde (17060104), Wallowa (17060105), Mainstem Snake Hells Canyon (17060101), and Lower Snake Tucannon (17060107).

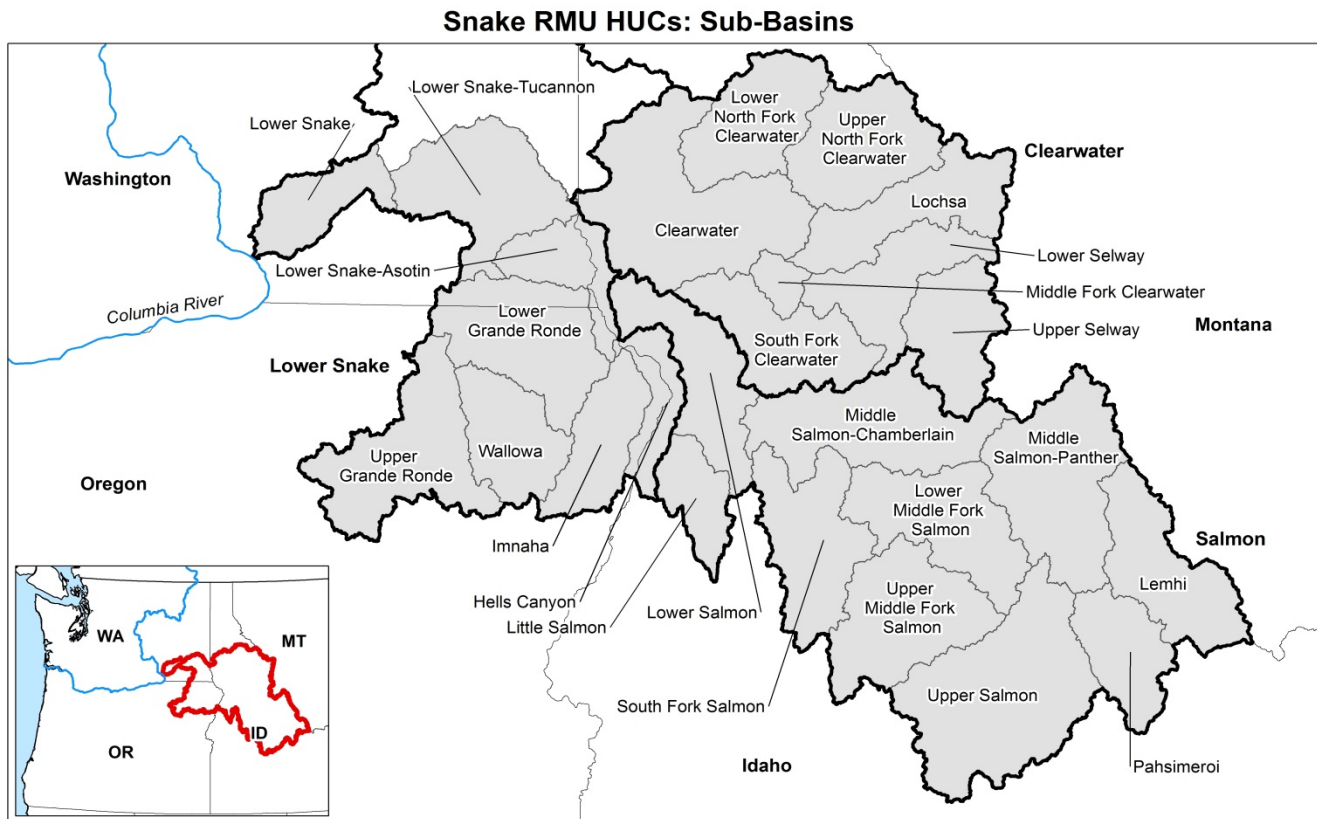


Figure 1. Map of 4<sup>th</sup> Code watersheds within the Snake River Region.

## B. Status of Species

### Conservation Assessment and New Updates

Historic occupancy of Pacific Lamprey is believed to have been extensive in all watersheds depicted in Figure 2 as well as the Snake River up to Shoshone Falls, and all major tributaries between the Hells Canyon Dam Complex and Shoshone Falls (Weiser, Payette, Bruneau River, Owyhee, Malheur, Burnt, Powder rivers). Current population size is still unknown in most areas of historic occupancy, but the current distribution is reduced from historic ranges (Luzier et al. 2011; USFWS 2018). The knowledge of current lamprey distribution has come from an increase in recent sampling effort as well as an active supplementation program ongoing by the Nez Perce Tribe (NPT) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) whereby adult lamprey collected from locations downstream in the Columbia River are released into Snake basin tributaries. Current information describing known occurrences of Pacific Lamprey is displayed in Figure 2 (a product of the U.S. Fish and Wildlife Service (USFWS) data Clearinghouse

<https://www.sciencebase.gov/catalog/item/53ad8d9de4b0729c15418232>).

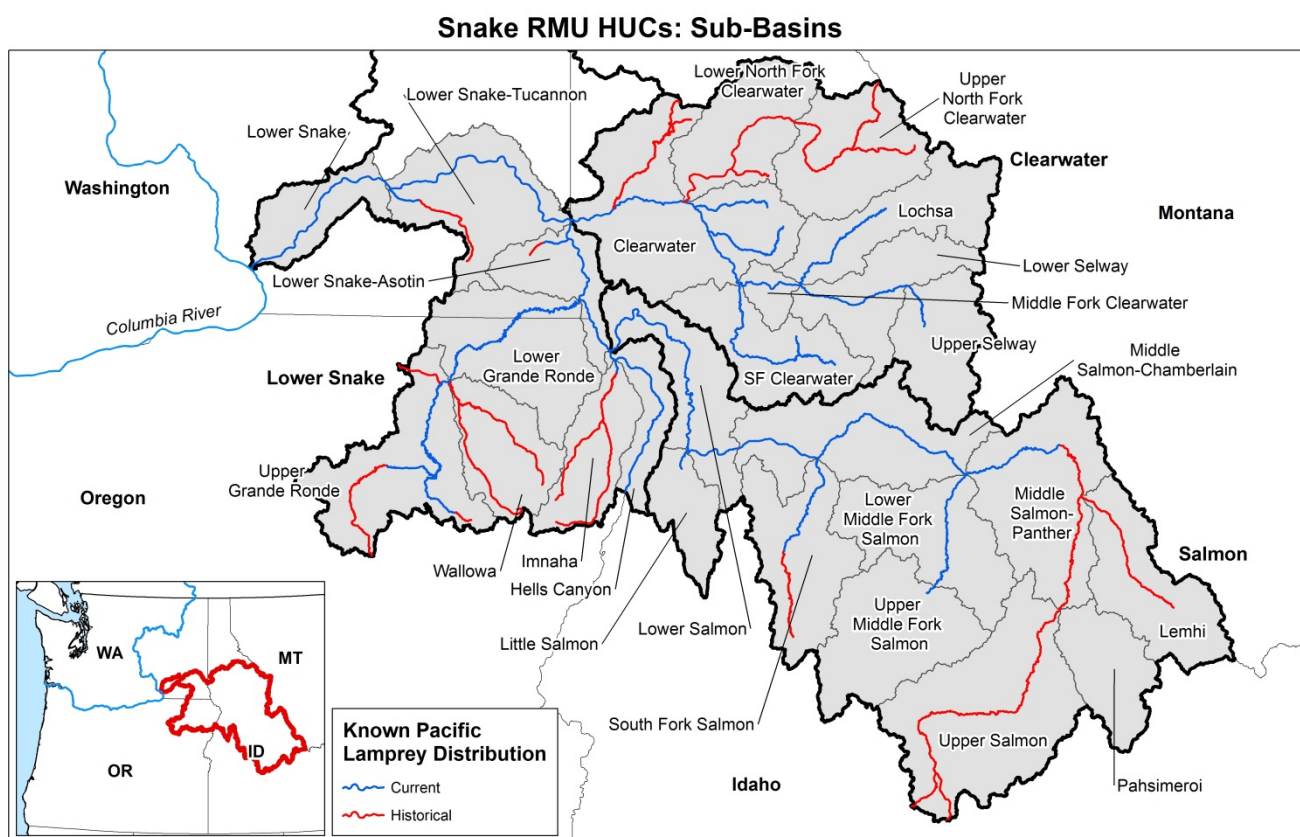


Figure 2. Current and historic known distribution for Pacific Lamprey in the Snake Regional Management Units: Lower Snake, Clearwater and Salmon (USFWS Data Clearinghouse 2018). Not depicted is historic distribution in the Snake River and tributaries above the Hells Canyon Dam Complex to Shoshone Falls.

## Distribution and Connectivity

Upstream passage to the Snake River Region is restricted by four Federal Columbia River Power System (FCRPS) dams in the Columbia River (Bonneville, Dalles, John Day and McNary). Within the Snake River Region another four FCRPS dams on the Snake River (Ice Harbor, Lower Monumental, Little Goose and Lower Granite) impede upstream passage in the lower portion of the basin. The Hells Canyon Complex (Brownlee, Oxbow and Hells Canyon dams) on the Snake River as well as Dworshak Dam on the North Fork Clearwater River completely block upstream access for all native aquatic species. Culverts, irrigation diversions and smaller dams are widespread throughout the watersheds of the Snake River Region.

The combined impacts from this series of passage impediments are the most significant threat on the natural distribution and connectivity for Pacific Lampreys in most of the HUCs. Recent (since 1996) annual counts of adult lamprey at Ice Harbor Dam are low, ranging from 5 to 1,702 with even fewer adults observed at Lower Granite Dam (Figure 3).

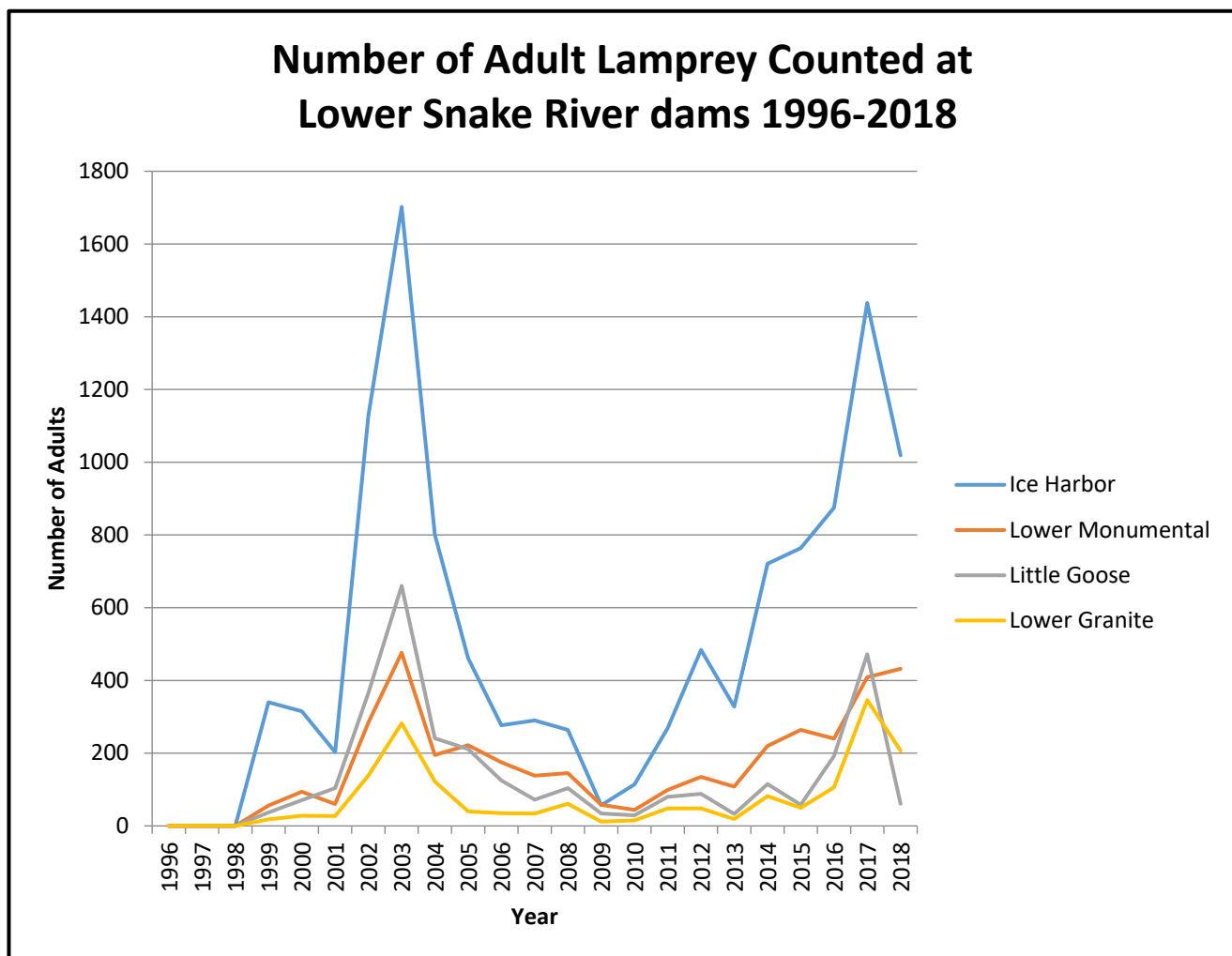


Figure 3. Number of adult Pacific Lamprey counted at Lower Snake River dams, 1996-2018. Data obtained from <http://fpc.org> on June 13, 2019.

Since 2000, surveys for larval Pacific Lamprey have been conducted in the Clearwater, Salmon, Selway and Lochsa subbasins of Idaho. Recent (2015-2018) surveys have confirmed the continued presence of larvae in the Mainstem, Middle and South forks of the Clearwater River, the Lochsa and Selway rivers (Figure 2).

Beginning in 2007, the NPT began releasing adult Pacific Lamprey, collected from downstream areas in the Columbia River, into tributaries of the Snake River as a means to supplement natural production (Table 1; see Ward et al. 2012). Subsequent stream surveys confirm the presence of larvae in locations that receive adult lamprey but had previously not contained larvae in recent years. These sites include Lolo, Orofino, and Newsome creeks in the Clearwater River Basin, Asotin Creek, the South Fork Salmon River and the Wallowa River. In 2015 the CTUIR initiated releases into the Upper Grande Ronde River and its tributaries (Table 1). In late 2018 the NPT started releasing adult Pacific Lamprey directly into the mainstem Clearwater river, the number of which is not presented in Table 1.

## **C. Threats**

### **Summary of Major Treats**

The highest priority threat in the Snake River Region is the Federal Columbia River Power System dams on the mainstem Snake and Columbia rivers, which results in small effective population size in each of the watersheds still accessible to Pacific Lamprey (USFWS 2018). Table 2 summarizes the known key threats that ranked Medium and High within the Snake River Region tributaries. The Supplement to the Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan (NPCC 2004) recommends improving dam passage for Pacific Lamprey. Translocation is now called Supplementation, to better represent the range of actions that occur when Pacific Lamprey are moved from one place to another.

Table 1. Releases of adult Pacific Lamprey into the Clearwater, Salmon, Grande Ronde and Asotin subbasins, 2007-2018, as part of the Nez Perce Tribe (NPT) and Confederated Tribes of the Umatilla Reservation (CTUIR) supplementation program. Asterisk denotes CTUIR releases. Data supplied by the Nez Perce Tribe and The Confederated Tribes of the Umatilla Reservation.

	Year												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
<b>Clearwater River (ID)</b>													
Lolo Cr.	50	28	30	24	0	40	31	10	50	57	65	90	475
Newsome Cr.	50	26	45	23	0	40	30	10	50	56	61	95	486
Orofino Cr.	49	25	30	22	0	40	24	0	51	56	0	90	387
Little Canyon Cr.	0	0	0	0	0	17	12	0	32	41	0	0	102
Red R.	0	0	0	0	0	0	0	0	0	0	0	91	92
Subbasin Total	149	79	105	69	0	137	97	20	183	210	126	366	1542
<b>Salmon River (ID)</b>													
South Fork Salmon R.	0	0	0	0	0	40	30	11	50	56	62	90	339
Johnson Cr.	0	0	0	0	0	0	0	0	51	48	60	89	248
Secesh R.	0	0	0	0	0	0	0	0	0	50	65	90	205
Subbasin Total	0	0	0	0	0	40	30	11	101	154	187	269	792
<b>Snake-Asotin (WA)</b>													
Asotin Cr.	28	27	35	22	29	40	30	10	43	56	61	90	471
<b>Grande Ronde River (OR)</b>													
Minam R.	0	0	0	0	0	0	0	0	25	55	35	90	205
Wallowa R.	0	0	0	0	0	40	30	10	25	55	30	90	280
Chesnimnus Cr (Joseph Cr)	0	0	0	0	0	0	0	0	0	56	64	90	210
Catherine Cr.	0	0	0	0	0	0	0	0	0	167	250	212	629
*Upper Grande Ronde R.	0	0	0	0	0	0	0	0	0	400	201	527	1128
*Lookingglass Cr.	0	0	0	0	0	0	0	0	0	175	150	151	476
*Little Lookingglass Cr.	0	0	0	0	0	0	0	0	0	0	150	0	150
*Indian Cr.	0	0	0	0	0	0	0	0	0	0	0	92	92
*Meadow Cr.	0	0	0	0	0	0	0	0	0	0	0	82	82
*Sheep Cr.	0	0	0	0	0	0	0	0	0	0	0	82	82
Subbasin Total	0	0	0	0	0	40	30	10	50	908	880	1416	3334
Total Snake River Region	177	106	140	91	29	257	187	51	377	1328	1254	2141	6139

Table 2. Summary of the identified key threats of the Snake River Region, by RMU and Watershed, 2018. Harvest, Predation, Supplementation (formerly Translocation), Disease, Lack of Awareness and Climate Change were assessed and ranked Low or Insignificant in most HUC's (USFWS 2018). H – High, M – Medium, L – Low, I – Insignificant.

RMU/Watershed	Mainstem Passage	Small Population Size	Tributary Passage	Dewatering and Flow Management	Stream and Floodplain Degradation	Water Quality	Lack of Awareness	Climate Change	Predation
<b>Lower Snake RMU</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>M</b>	<b>L</b>
Lower Snake-Asotin	H	H	L	L	M	M	H	H	M
Lower Grande Ronde	H	H	L	I	L	L	H	H	L
Upper Grande Ronde	H	H	M	M	H	M	H	M	L
Imnaha	H	H	M	M	H	M	H	M	L
Wallowa	H	H	M	M	M	M	H	M	M
Lower Snake-Hells Canyon	H	H	M	M	L	L	M	M	M
Lower Snake-Tucannon	H	H	M	L	M	M	H	M	L
<b>Clearwater RMU</b>	<b>H</b>	<b>H</b>	<b>L</b>	<b>I</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>I</b>
Lower Clearwater	H	H	L	L	M	M	M	M	L
Middle Fork Clearwater	H	H	L	L	L	L	M	L	L
South Fork Clearwater	H	H	L	L	M	L	M	L	L
Lochsa	H	H	L	I	L	I	L	I	I
Lower Selway	H	H	I	I	I	I	L	L	I
Upper Selway	H	H	I	I	I	I	L	I	I
<b>Salmon RMU</b>	<b>H</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>L</b>
Lower Salmon	H	H	L	L	L	L	M	L	L
Little Salmon	H	H	L	L	L	M	M	L	L
South Fork Salmon	H	H	L	I	L	L	M	L	L
Middle Salmon-Chamberlain	H	H	I	I	L	L	M	L	L
Lower Middle Fork Salmon	H	H	I	I	I	I	L	I	I
Upper Middle Fork Salmon	H	H	I	I	I	I	L	I	I
Middle Salmon-Panther	H	H	M	M	M	L	M	L	I
Lemhi	H	H	M	M	M	M	M	L	I
Pahsimeroi	H	H	M	M	M	L	M	I	I
Upper Salmon	H	H	L	L	M	L	M	I	I



## **D. Restoration Actions**

### **Idaho Department of Fish and Game (IDFG)**

2018: The IDFG conducted electrofishing surveys targeting Pacific Lamprey during float trips to the Salmon River, Middle Fork Salmon River, and Selway River during summer 2018 (Figure 4). A total of 17 sites in the Salmon River, 32 sites in the Middle Fork Salmon River, and 60 sites in the Selway River were surveyed. The majority of sites were index sites which were selected by biologists leading float trips to be surveyed each time the river is surveyed. These sites were selected because they have been sampled in previous Pacific Lamprey surveys in Idaho. Biologists also randomly selected “roving” sites to survey additional habitat. Six additional “roving” sites were surveyed in the Selway River on the 2018 sampling trip.

Electrofishing was conducted using Smith-Root LR-24 and ETS AbP-2 “Wisconsin” backpack electrofishing units on the Selway River. Only the Smith-Root LR-24 unit was used on the Middle Fork Salmon River. Recommended settings for larvae sampling included two wave forms: 1) a primary, low frequency wave to draw larvae out of substrate, and 2) a secondary, high frequency wave form to immobilize larvae once drawn out of the substrate. Conventional lamprey settings for the two stages include a primary waveform with 125V direct current, 3 Hz pulse frequency, 25% duty cycle and 3:1 Burst Pulse Train, and a secondary waveform with 125V direct current, 30 Hz pulse frequency, and a 25 % duty cycle. The recommended settings were used at all sites on the Selway River, but biologists reported these settings worked poorly on the Middle Fork Salmon River, and concluded that adjusting the voltage to 300 V for both primary and secondary waveform produced better results.

Pacific Lamprey were present at 58 of 60 sites (97%) surveyed in the Selway River (Figure 4). Catch per unit effort ranged from 0.2 fish/min to 11.3 fish/min with a mean of 3.1 fish/min. Pacific Lamprey were present throughout the sampled portion of the Selway River, although selected sites were limited to the lower portion of the river where fish were typically detected in recent surveys. A total of 1,000 larvae were measured in the Selway River and lengths ranged from 24 to 140 mm (Figure 5). Crews observed very small lamprey (< 15 mm) during surveys in the late summer (August-September), but did not net these fish to avoid injuring them.

Pacific Lamprey were present at 6 of 17 sites (35%) sites surveyed in the Salmon River (Figure 4). All sites sampled during 2018 were upstream of the Middle Fork Salmon River, and most detections occurred at furthest downstream sites, although one detection occurred at the furthest upstream site.

Pacific Lamprey were present at 20 of 32 sites (63%) surveyed in the Middle Fork Salmon River (Figure 4). Detections were concentrated in approximately the lower one-half of the Middle Fork Salmon River.

# IDFG Lamprey Sampling 2018

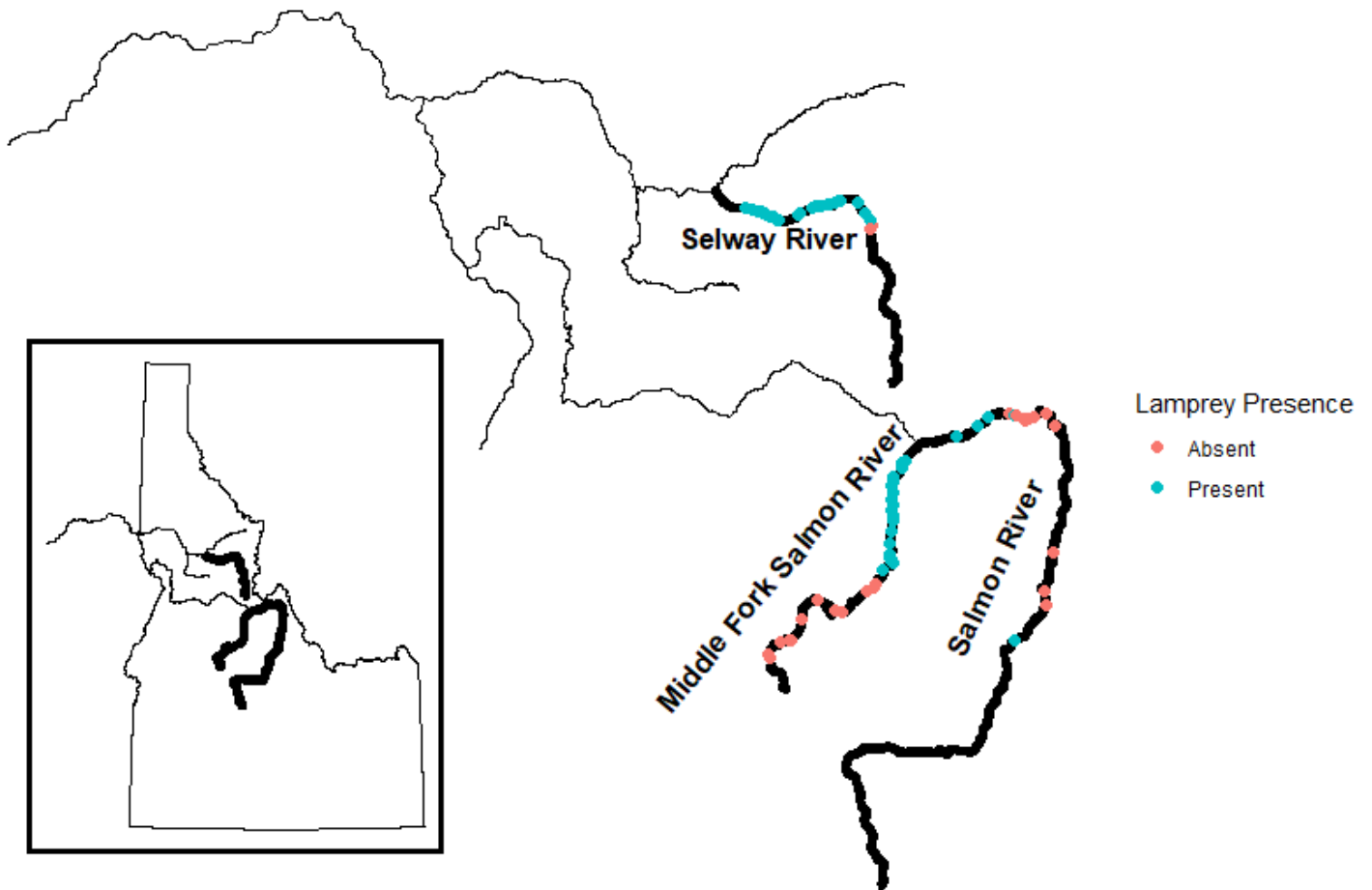


Figure 4. Sampling locations for lamprey larvae in the Selway River, Salmon River and Middle Fork Salmon River as surveyed by the Idaho Department of Fish and Game, 2018.

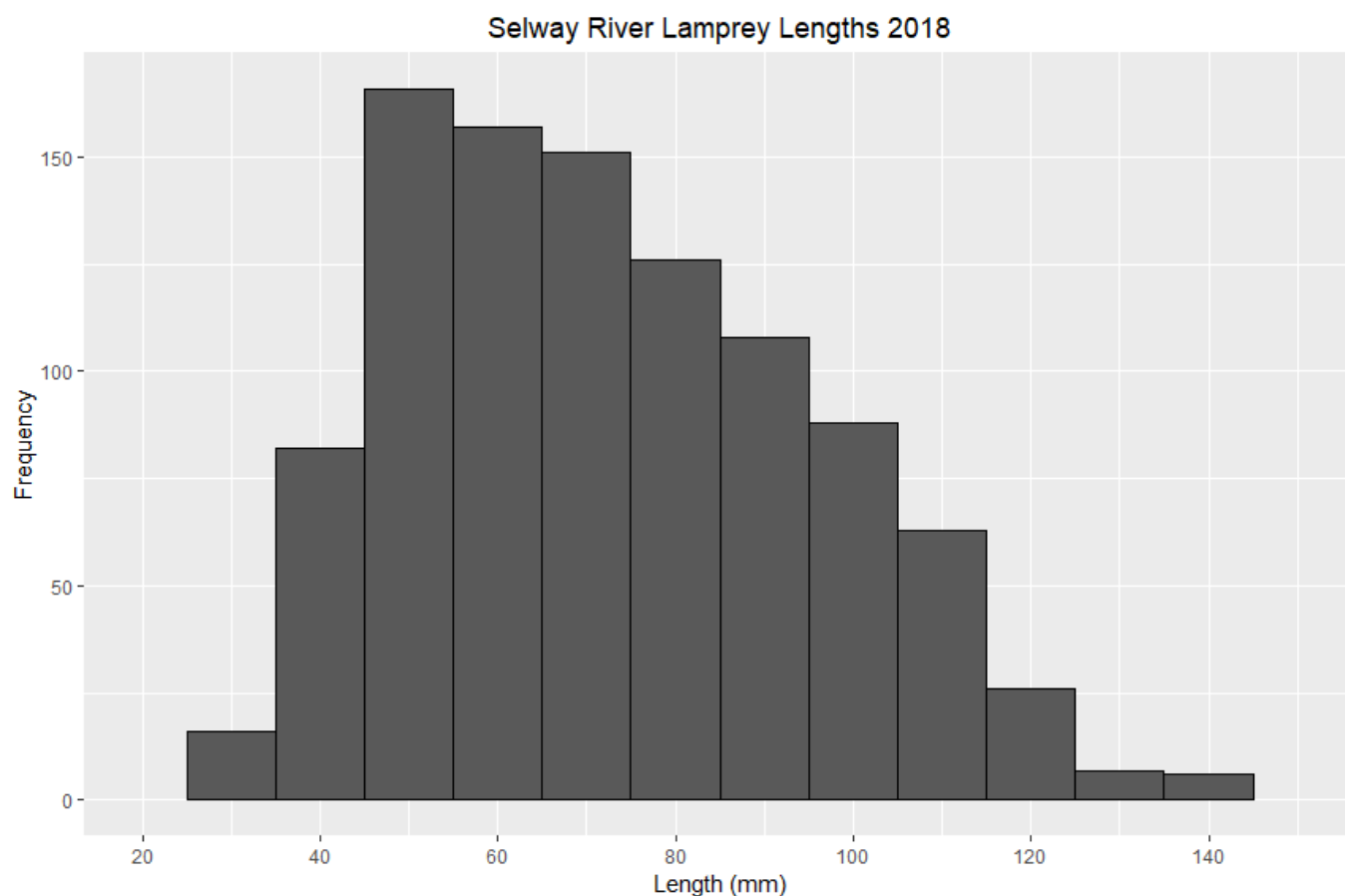


Figure 5. Length frequency of larval lamprey measured during sampling on the Selway River, 2019. Data collected by the Idaho Department of Fish and Game.

2019: Genetic samples from outmigrating larval and juvenile lamprey will be taken in the South Fork Salmon River rotary trap. The Middle Fork Salmon will be sampled using same methods as in previous years.

### **U.S. Fish and Wildlife Service Idaho Fish and Wildlife Conservation Office (IFWCO)**

2018: Larval sampling by the Idaho Fish and Wildlife Conservation Office (IFWCO) had previously been directed to supporting the NPT by electrofishing in tributary streams where adult supplementation occurred. In 2018, after the NPT began releasing adult Pacific Lamprey directly into the mainstem Clearwater River, the IFWCO began an aggressive sampling effort for larvae rearing in areas upstream of systems receiving translocated adults before progeny from those transplants could comele with production from naturally-migrating lamprey.

Three methods were used to sample lamprey larvae in 2018. With the exception of Newsome Creek, captured lamprey were anesthetized in MS-222, measured for length and a caudal fin sample was collected for genetic analysis.

1. Type I or Type II lamprey habitat (Slade et al. 2003) that was visible and accessible from Highway 12 was sampled in the Lochsa, Middle Fork Clearwater, and Clearwater rivers. Sampling was conducted using an ETS ABP-2 lamprey electrofisher at a rate of 60-90 seconds per square meter. Sites were sampled within the previously identified upper limit of rearing in the upper Lochsa River near Weir Creek (Hyatt et al. 2006) downstream to Lewiston, Idaho (Table 3).

There was a high frequency of occurrence of larval lamprey in the Lochsa, Middle Fork Clearwater, and Clearwater rivers, present in 88% of the combined sites sampled in these three rivers. Lamprey larvae were present in 75% of the sites sampled in the Lochsa River and in 100% of the sites sampled in the Middle Fork Clearwater River (Table 3). The distribution of larval lamprey within the Lochsa River were consistent with 2005 IDFG surveys (Hyatt et al. 2006). From these sites, 1,203 fin samples were collected (Table 3) and given to the Columbia River Inter-Tribal Fish Commission for genetic analysis. Multiple size classes of larvae were observed in all river sections, with the highest proportion of suspected age-0 lamprey being collected in the Clearwater River (Figure 6). Small larvae (less than 45 mm) tended to be localized; 85% captured in the Clearwater River mainstem were collected from two sites and 91% of those captured in the Middle Fork Clearwater River were collected from one site. All of the sites sampled in the Lochsa River and some of the sites sampled in the Middle Fork Clearwater River were upstream of tributaries that received translocated adult lamprey from the NPT (Table 4). It is expected that most of the parents of the progeny sampled from these upstream areas were from naturally-migrating adult lamprey. Because all translocated adults are fin sampled for genetic identity prior to release, genetic pedigree analysis will be able to confirm if larvae collected upstream of supplementation sites were progeny of translocated adults or natural migrants.

Table 3. Number of sites sampled for lamprey larvae, samples collected, and density range of larvae by stream.

Stream	# Sites Sampled	% of Sites With Larvae	Larvae Collected	Fin Samples Collected	Larva Density Range <sup>a</sup>
Lochsa R.	8	75	1,124	1,003	1.5-38.7
M Fork Clearwater R.	7	<b>100</b>	169	84	0.3-5.9
Clearwater R.	10	90	319	116	0.2- 8.9
Newsome Cr. <sup>b</sup>	21	67	0	0	No Data
Snake R.	5	0	0	0	0

<sup>a</sup> Density range excludes zero catches.

<sup>b</sup> Newsome Cr. was sampled for larva presence only.

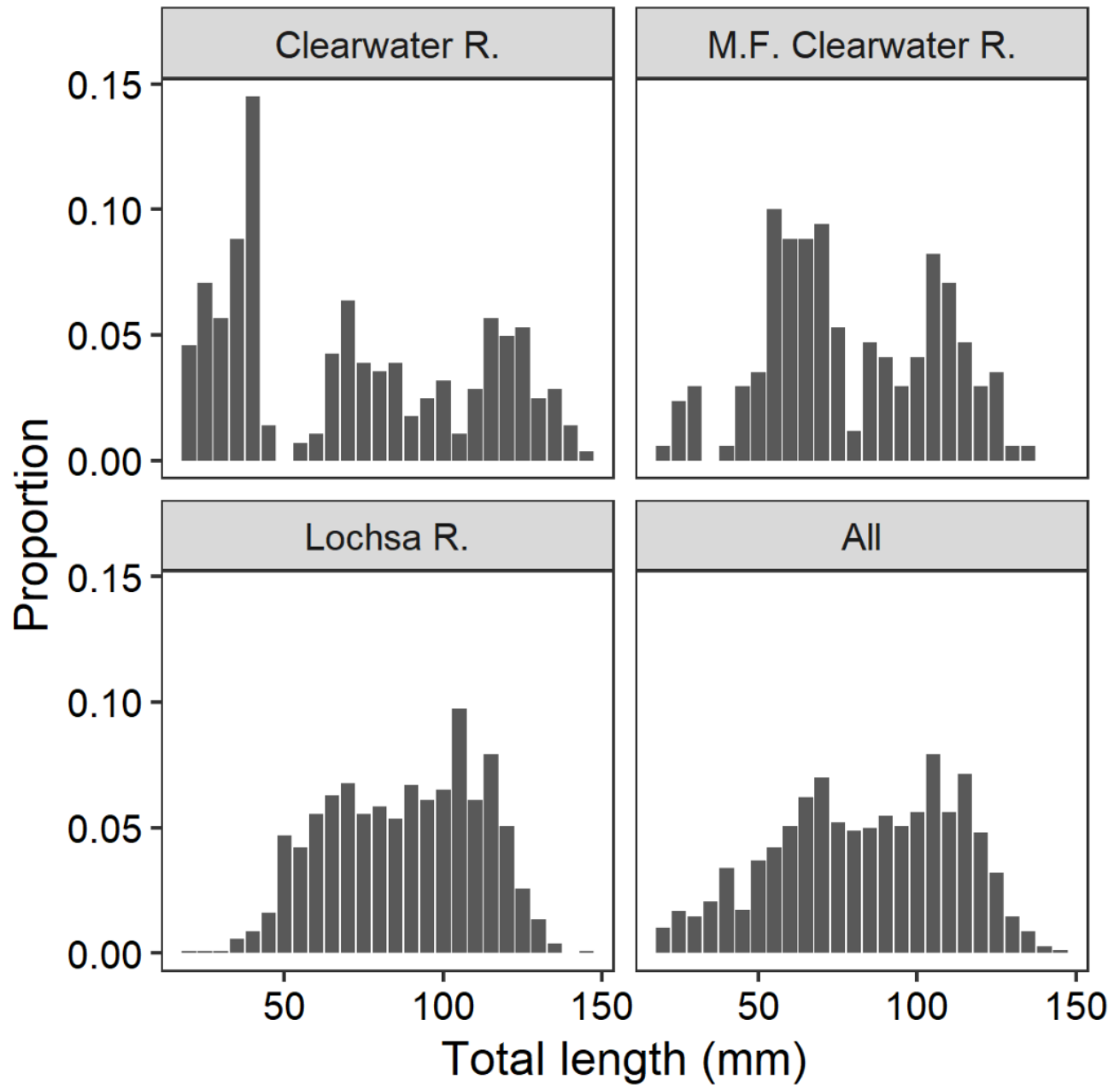


Figure 6. Size distribution (10mm bins) of Pacific Lamprey larvae collected in the Clearwater River Basin during 2018.

Table 4. Stream, date of sampling, larva presence and density by specific location.

Stream	Date	Larva		Water Temp (°C)	Latitude	Longitude
		Present	Density			
Lochsa R.	9/19/2018	No	0.0	10.5	46.44599	-115.09281
Lochsa R.	9/19/2018	No	0.0	10.5	46.44612	-115.09172
Lochsa R.	8/30/2018	Yes	1.5	16	46.16933	-115.56198
Lochsa R.	8/30/2018	Yes	6.1	15	46.16486	-115.58917
Lochsa R.	8/30/2018	Yes	8.1	16.6	46.22908	-115.51839
Lochsa R.	9/26/2018	Yes	5.2	9	46.39128	-115.21739
Lochsa R.	9/10/2018	Yes	26.3	16.5	46.22875	-115.44348
Lochsa R.	9/26/2018	Yes	38.8	9	46.39174	-115.21705
Middle Fork Clearwater R.	8/30/2018	Yes	0.5	15	46.13553	-115.62689
Middle Fork Clearwater R.	8/15/2018	Yes	0.3	21	46.14116	-115.70081
Middle Fork Clearwater R.	8/15/2018	Yes	0.8	20	46.13650	-115.94479
Middle Fork Clearwater R.	8/15/2018	Yes	1.0	20	46.14117	-115.70084
Middle Fork Clearwater R.	8/15/2018	Yes	1.4	21	46.13640	-115.74912
Middle Fork Clearwater R.	8/30/2018	Yes	4.0	16	46.13741	-115.68174
Middle Fork Clearwater R.	8/15/2018	Yes	5.9	19	46.14698	-115.97916
Clearwater R.	9/20/2018	No	0.0	15	46.49959	-116.31176
Clearwater R.	9/20/2018	Yes	0.2	12	46.50275	-116.35139
Clearwater R.	9/20/2018	Yes	0.3	17	46.51410	-116.68014
Clearwater R.	9/20/2018	Yes	0.3	13	46.49635	-116.72725
Clearwater R.	9/19/2018	Yes	0.7	15	46.13741	-115.68174
Clearwater R.	10/2/2018	Yes	1.0	13	46.43473	-116.95514
Clearwater R.	9/20/2018	Yes	1.2	13	46.50932	-116.56361
Clearwater R.	9/20/2018	Yes	1.9	11	46.50636	-116.54961
Clearwater R.	10/2/2018	Yes	5.6	13	46.47940	-116.75262
Clearwater R.	9/20/2018	Yes	8.9	15	46.50054	-116.31812
Clearwater R.	9/19/2018	Yes	5.6	15	46.13741	-115.68174
Snake R.	11/8/2018	No	0.0	9	46.23583	-116.95668
Snake R.	11/8/2018	No	0.0	10	46.16466	-116.92012
Snake R.	11/8/2018	No	0.0	10	46.13459	-116.93645
Snake R.	11/8/2018	No	0.0	10.5	46.07704	-116.95982
Snake R.	11/8/2018	No	0.0	10.5	46.27457	-116.98705
Snake R.	11/8/2018	No	0.0	9	46.27233	-116.98379
Newsome Cr.	7/18/2018	No		11	45.85729	-115.61820
Newsome Cr.	7/12/2018	Yes			45.92183	-115.63364
Newsome Cr.	7/12/2018	Yes			45.87765	-115.61669
Newsome Cr.	7/17/2018	No			45.95127	-115.64554
Newsome Cr.	7/12/2018	No			45.92805	-115.64047
Newsome Cr.	7/18/2018	Yes		11	45.84153	-115.61600
Newsome Cr.	7/12/2018	Yes			45.88535	-115.62696
Newsome Cr.	7/17/2018	No			45.94502	-115.64519
Newsome Cr.	7/12/2018	Yes			45.92522	-115.63526
Newsome Cr.	7/18/2018	Yes		11	45.84403	-115.61842
Newsome Cr.	7/18/2018	Yes		11	45.85925	-115.61866
Newsome Cr.	7/18/2018	Yes		11	45.83703	-115.61599
Newsome Cr.	7/18/2018	Yes		11	45.84132	-115.61852
Newsome Cr.	7/12/2018	Yes			45.86733	-115.61604
Newsome Cr.	7/17/2018	No			45.95873	-115.65009
Newsome Cr.	7/18/2018	Yes			45.84729	-115.62252
Newsome Cr.	7/17/2018	No			45.86575	-115.61688
Newsome Cr.	7/18/2018	Yes			45.83224	-115.61016
Newsome Cr.	7/12/2018	Yes			45.88013	-115.61934
Newsome Cr.	7/17/2018	No		13	45.93724	-115.64043
Newsome Cr.	7/18/2018	Yes			45.85117	-115.61756

2. Newsome Creek (South Fork Clearwater River tributary) was sampled in 21 randomly selected 50m sections (regardless of habitat) for the presence of larval lamprey. This sampling regime was used in order to estimate detection probability for potential future sampling using a probabilistic design. Once a lamprey was observed within a 50m section, further electrofishing ceased at that site.

The NPT has been supplementing Newsome Creek with adult Pacific Lamprey. Of the 21 sites sampled, 67% had lamprey larvae, including a site 2.1 km upstream of the upstream-most adult release site (Table 4).

3. Using a jet boat launched at Asotin, Washington (just upstream of Lewiston, ID), Type I and Type II habitats on the Idaho side of the Snake River were sampled at an electrofishing rate of 60-90 seconds per square meter.

Five sites were sampled in the lower Snake River on the Idaho side on November 8, 2018 and no larvae were observed (Table 4). Water temperatures ranged from 9 to 11 degrees Celsius. To test whether the absence of larvae was due to low water temperatures or the late season, a site on the mainstem Clearwater River (4.4 degrees Celsius) that was known to support larvae was sampled the next day and larvae were captured. Anecdotal observations in the Clearwater basin indicated that larvae avoided living in sandy beach areas (Type II habitat) that were popular swimming, sunbathing, and recreation areas. That may explain the absence of larvae in lower Snake R. beach areas. Additionally, daily water level fluctuations from Hells Canyon Dam operations may constrain larvae to deeper habitat that is not dewatered during hydropower drawdowns.

2019: In late February 2019, 29 adult Pacific Lamprey, held at the NPT hatchery, were surgically implanted with radio tags. They were released on March 4; 14 into the mainstem Clearwater River upstream of Orofino, Idaho at the Zans boat ramp and 15 into the lower Lochsa River at the mouth of Pete King Creek. The lamprey released at the Zans site, if they swim upstream, have the opportunity to swim into Lolo Creek and the South Fork Clearwater River (both watersheds receive translocated adults from the NPT), the Selway River and the Lochsa River. The lamprey released into the Lochsa River are upstream of the aforementioned watersheds. Fixed site receivers have been placed strategically through the watershed and are augmented by mobile tracking every two weeks. This effort will collect information on migration characteristics and spawning areas of Pacific Lamprey in the Clearwater basin.

In the summer of 2019, 10 adult Pacific Lamprey will be radio tagged and half will be released into the lower Clearwater River near the NPT hatchery and half upstream of the confluence with the North Fork Clearwater River. This effort will identify summer, fall, and winter holding areas of adult Pacific Lamprey. By splitting the release groups as described, we will also be able to note if summertime cold water releases from Dworshak Reservoir into the North Fork Clearwater River affect adult lamprey movement.

Other planned efforts in 2019 include: 1. Larval density and fin sampling in the lower Snake River,

Lower Granite Pool, Clearwater and Salmon River basins. 2. Investigation of the relationship between larvae captured on the first pass versus the cumulative captured on subsequent passes (electrofishing catchability). 3. Investigation of larva movement between habitats during declining and low flow periods (i.e., spring through fall).

### **Oregon Department of Fish and Wildlife (ODFW)**

The Draft Snake, Columbia and Coastal Conservation Plan for Lampreys in Oregon has been released for review and comments. The plan covers Pacific Lamprey, Western River Lamprey, Western Brook Lamprey and Pacific Brook Lamprey. It is expected that the plan will be finalized in December 2019.

### **Nez Perce Tribe (NPT)**

2018: The Nez Perce Tribe continues to translocate adult Pacific Lamprey that are collected from mainstem Snake River dams, overwintered at the NPT Tribal Hatchery on the Clearwater River at Cherry Lane, and released into selected areas in the Snake, Clearwater and Salmon basins. See Table 1 for a summary of releases through 2018. A total of 1,166 adult Pacific Lamprey were translocated by NPT in 2018.

2019: In 2019, adult Pacific Lamprey that are collected at mainstem Snake River dams will not be overwintered, but directly released into the mainstem Clearwater River. See the IFWCO summary of radio-tagging that will occur with some of these adults in 2019.

### **University of Idaho**

The University of Idaho's Department of Fish and Wildlife Sciences is involved with several facets of research and evaluation of adult Pacific Lamprey migration and behavior at mainstem Columbia River and Snake River dams.

1. They are using half duplex (HS) passive integrated transponder (PIT) tags and radio tags to monitor passage rates and escapement of adult lamprey past the lower Columbia River dams. They work with cooperators, using PIT tag detections, to monitor passage at the upper Columbia and Lower Snake dams as well as lower Columbia River tributaries. See Keefer et al 2019 for more information.
2. Using the same tag methodology, they are assessing adult lamprey passage after experimental reductions in nighttime water velocity in fishways and evaluating passage over the new lamprey passage structure in the Washington-shore fishway at Bonneville Dam (Clabough et al 2019).
3. Using experimental flumes where the water velocity and configuration can be manipulated, tests are run to evaluate passage success and motivation of adult lamprey when challenged by



several problematic flow and weir shape scenarios. If the adult becomes fatigued, how likely will it be to continue trying to pass upstream? A pilot study was also conducted using accelerometer telemetry, where lamprey activity levels and energy expenditures were measured. See Hanchett and Caudill 2019 for a more thorough coverage of the research.

### **United States Forest Service (USFS)**

The USFS works with tribal and agency partners as needed to facilitate supplementation efforts as well as eDNA sampling.

The Rocky Mountain Research Station, through the eDNA Basinwide Lamprey Inventory and Monitoring Project (eBLIMP) (<https://www.researchgate.net/project/eBLIMP-The-eDNA-Basinwide-Lamprey-Inventory-Monitoring-Project>) has developed an eDNA marker for Pacific Lamprey and a preliminary set of rangewide occurrence probability maps to assist with future surveys. They have been actively collecting eDNA samples throughout Idaho and the Pacific Northwest to detect presence of lamprey species and map their distribution. They are currently running samples collected in the Snake River RMU region and will be reporting the results in 2019. Figure 7 shows sampling locations and areas with positive results in Idaho since 2016.

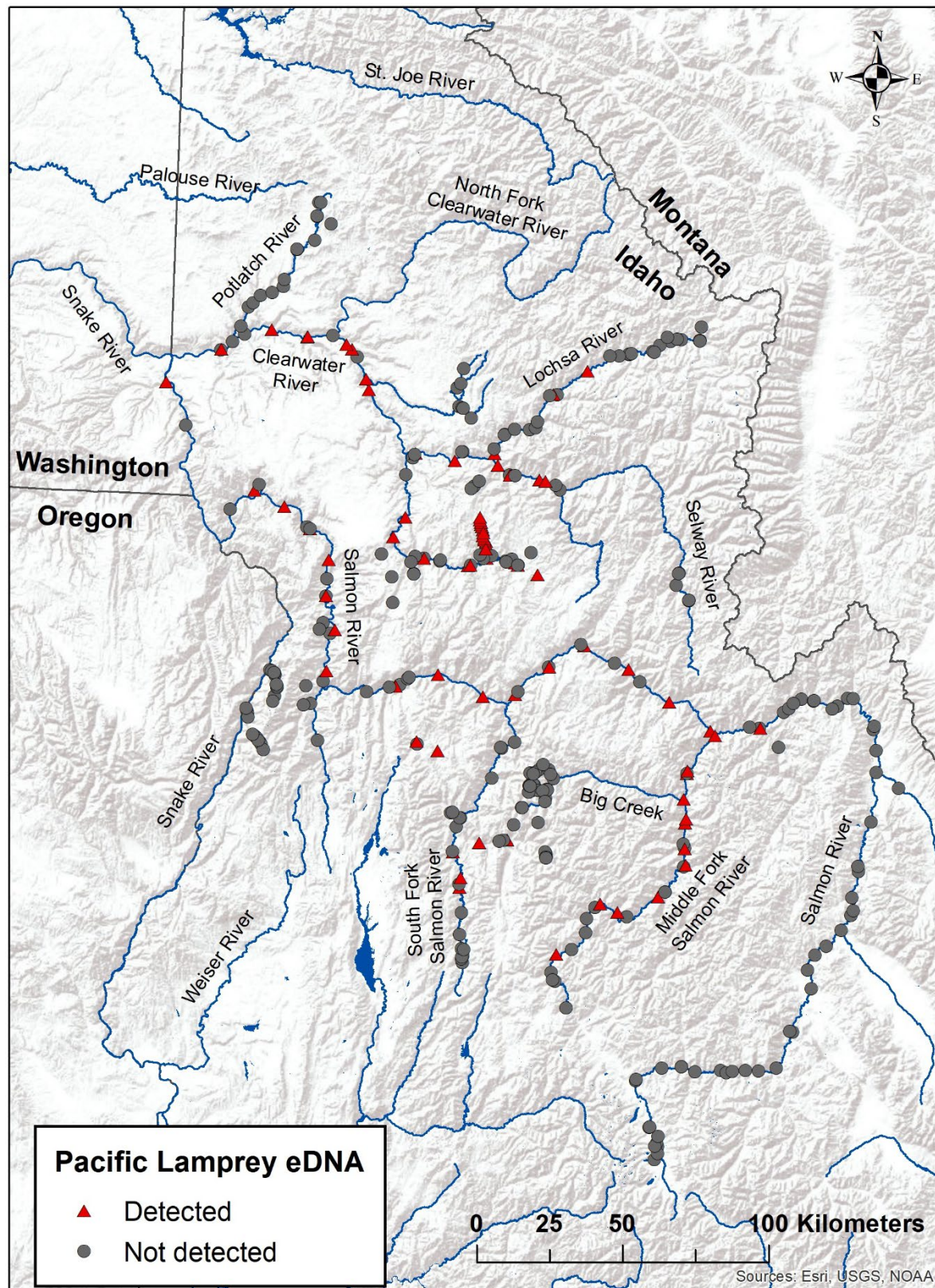


Figure 7. Environmental DNA sampling results for detections of Pacific Lamprey in Idaho analyzed by the National Genomics Center for Wildlife and Fish Conservation.

## **U.S. Army Corp of Engineers (COE)**

Lamprey passage research and improvements have been ongoing by the COE on mainstem Columbia and Snake river dams, and activities are captured in the Columbia and Snake River Regional Management Unit Regional Implementation Plan. Passage improvements have recently been made to Ice Harbor Dam, with the University of Idaho monitoring lamprey passage through the ladder. Lamprey specific improvements, including attachment plates at orifices, flow diffusers, lamprey orifices on weir walls and removal of right angles and hanging structures are being made at several facilities. Changes at the juvenile salmonid bypass facilities are being implemented to facilitate juvenile lamprey return to the river, rather than into barges. If funding allows, research on juvenile distribution in the migration corridor will be implemented.

## **Columbia River Inter-Tribal Fish Commission (CRITFC)**

The CRITFC Hagerman Genetics Laboratory is the primary processor of lamprey genetic samples collected in the Columbia Basin. They conduct genotyping of lamprey collected for supplementation, as well as for juveniles sampled within and outside of supplementation areas and from samples collected at mainstem dam juvenile collection facilities. They are finishing up 2018 Snake River Basin genotyping, and are starting analysis for 2019.

## **E. High Priority Proposed Project Information**

There were no projects identified or submitted for Bonneville Power Administration or Pacific Lamprey Partnership funding for 2019.



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