



Translocation of Adult Pacific Lamprey within the Methow Subbasin, 2015-2016 Broodstock



[Cover Photo: Bernadine Phillips, Colville Tribe Wenatchi Aboriginal Rights Coordinator, transfers an adult lamprey for release into the Methow River (river km 83.8) on September 23, 2015]

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Ralph Lampman

**Confederated Tribes and Bands of the Yakama Nation
Yakama Nation Fisheries Resource Management Program, Pacific Lamprey Project
P. O. Box 151, Toppenish, Washington 98948, USA**

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Abstract

This report is composed of two parts: 1) summary of all 2015-2016 broodstock adult Pacific Lamprey releases within the Methow Subbasin and 2) analysis of migration data from PIT tagged adults. From the 2015-2016 broodstock (adults collected in summer 2015 that primarily mature in 2016), a total of 249 adult Pacific Lamprey were released in the lower to mid reaches of the Methow River. Adults were released at three locations between September 17 and 23, 2016; 1) by Methow Valley Highway bridge in Carlton, WA, at river km 46.3 (n=100), 2) downstream of Twisp River confluence at river km 66.4 (n=75), and 3) downstream of Chewuch River confluence at river km 83.8 (n=74). Female ratio was estimated to be 39.3%, PIT tag ratio was 100.0%, and genetic tag ratio was 98.0%. This is the first year that adult Pacific Lamprey were translocated into the Methow Subbasin. Larval numbers and distribution have steadily been decreasing in recent years and the younger age classes appear to be mostly absent, likely as a result of depressed numbers of adults moving into the subbasin (see Wells Dam passage data). Translocation was implemented in 2015 out of concern for the possibility of species extinction in the near future within the entire subbasin.

From the PITAGIS regional data base (<http://www.ptagis.org/>), using Query Builder2 Reports, the interrogation data of PIT tagged lamprey were summarized. Out of 249 PIT tagged lamprey, 145 lamprey (58.2%) were detected in at least one PIT array site within the Columbia Basin. The highlights from the 2015-2016 broodstock Pacific Lamprey translocation monitoring in the Methow Subbasin are the following:

- Detection efficiency of some of the arrays are quite low for adult Pacific Lamprey (and some sites were likely not fully operational during the release).
- None of the lamprey were detected moving into Twisp River and only one lamprey (0.4%) was detected moving into Upper Methow River (98.9% of the detected adults moved into Chewuch River [n=91]).
- Three lamprey (1.2%) moved back down into the Columbia River; one migrated up the Entiat River; one migrated up the Okanogan River; and one migrated back into the Methow River and moved all the way into the Chewuch River (after being detected at Wells Dam).
- Seven lamprey (2.8%) were detected traveling through the Whitefish side channel during the spring migration (likely during high flow periods).
- Active upstream migration was observed in both fall (mid-September till early November) and spring (mid-March till early August) seasons.
- Downstream migration was observed only in the spring season between early March and end of July.
- The fastest upstream moving lamprey (n=3) traveled at a rate between 15.13 and 15.66 km/day [three lamprey that moved into the Chewuch River (river km 1.6) immediately after release from the lower release site].

Part I: Release Summary

From the 2015-2016 broodstock (adults collected in summer 2015, most of which mature in spring/summer 2016), a total of 249 adult Pacific Lamprey were released in the lower to mid reaches of the Methow River between September 17 and 23, 2015 (Map 1 and Table 1). Overall female ratio was estimated to be 39.3%, pit tag ratio was 100.0%, and genetic tag ratio was 98.0%. All lamprey were originally captured from Bonneville Dam (35.7%), The Dalles Dam (36.9%), or John Day Dam (27.3%) in the Lower Columbia River during the summer of 2014. Total length averaged 656 mm (min. 543 mm and max. 766 mm), weight averaged 450.1g (min. 253.2g and max. 700.0g), and interdorsal length averaged 30.6 mm (min. 14 mm and max. 45 mm) during the PIT tagging operations in Summer 2015.



Map 1. Overall aerial map of 2015-2016 broodstock Pacific Lamprey translocation release sites in the Methow River. “MET” stands for Methow, the number next to the stream name is the river km, and the number in parenthesis is the total number of lamprey released. The red line represents mainstem Methow River, the yellow lines represent its tributaries (Twisp, Chewuch, and Lost rivers from downstream to upstream), and the blue line represents the Columbia River.

Table 1. Summary of 2015-2016 broodstock Pacific Lamprey translocation release in the Methow Subbasin. “F” stands for female, “M” stands for male, and “UN” stands for unknown sex. “(?)” denotes slightly lower certainty with the sex ID. Female Ratio (Est. 1) is based solely on “# F” and “# M”, whereas “Female Ratio (Est. 2)” includes “# F (?)” and “# M (?)” in the estimation.

Stream	River km	Date	Time	Water Temp (C°)	# Total	# F	# M	# F (?)	# M (?)	# UN	# with Pit Tags	# with Genetic Tags	Female Ratio (Est. 1)	Female Ratio (Est. 2)	Pit Tag Ratio	Genetic Tag Ratio
Methow	46.3	9/17/2015	14:25	13.4	100	3	15	29	34	19	100	99	16.7%	39.5%	100.0%	99.0%
Methow	66.4	9/17/2015	16:05	14.1	75	3	9	15	30	18	75	72	25.0%	31.6%	100.0%	96.0%
Methow	83.8	9/23/2015	12:45	11.5	74	7	12	22	22	11	74	73	36.8%	46.0%	100.0%	98.6%
Total	-	-	-	-	249	13	36	66	86	200	249	244	26.5%	39.3%	100.0%	98.0%

Lower Methow Release (River KM 46.3)

A total of 100 lamprey were released at river km 46.3 in Lower Methow River just downstream of the Methow Valley Highway 153 bridge near Carlton, WA, on September 17, 2015 (Map 2). The estimated female ratio was 39.5%, PIT tag ratio was 100.0%, and genetic tag ratio was 99.0%. Water temperature was 13.4°C during the release. Typically, we target approximately 10-12°C for early release. The following week, however, water temperature appeared to decrease by a few degrees, based on temperature from the upper release (11.5°C).

The primary goal was two-fold: 1) to release them in the lower reach of the mainstem to allow them to determine their preferred spawning reaches; and 2) to get an understanding of the detection efficiency of the instream PIT array located at river km 46.4 (MRC).

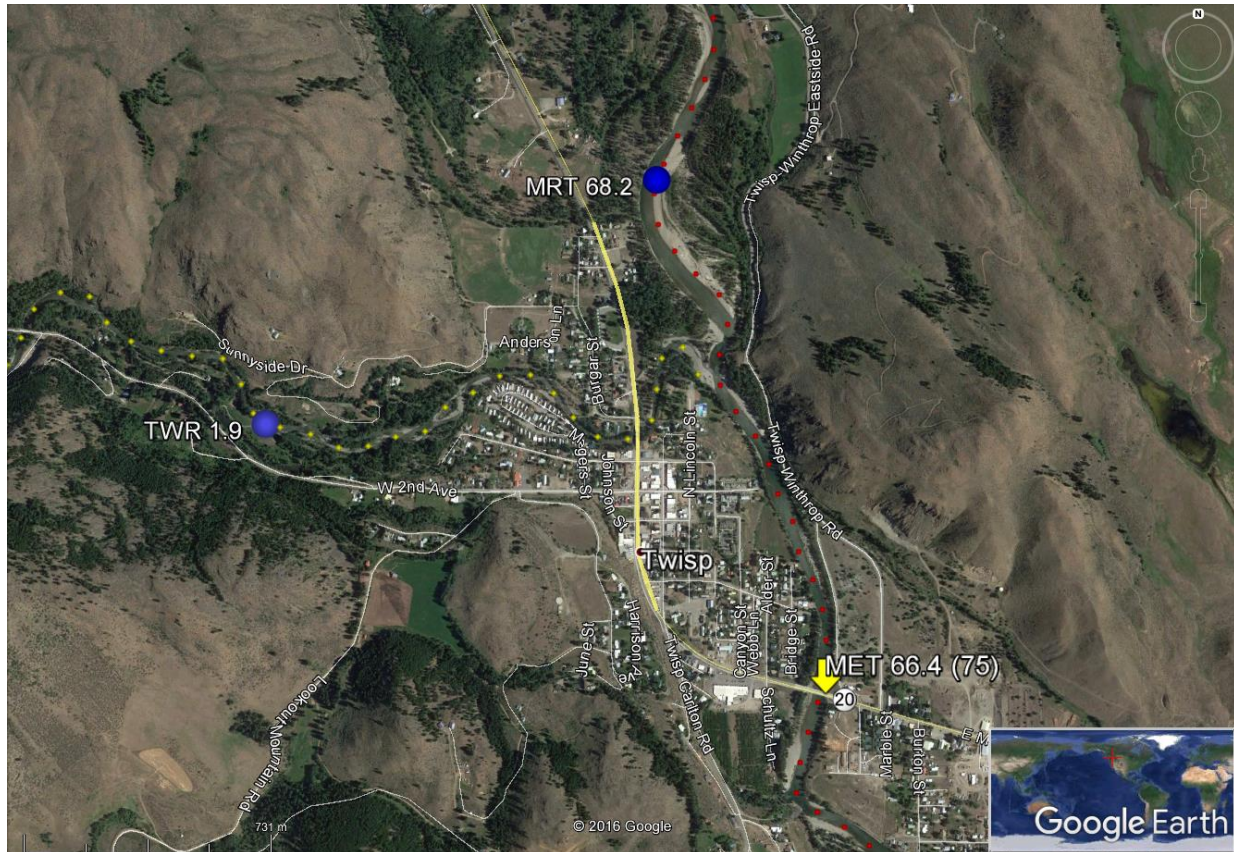


Map 2. Aerial map of 2015-2016 broodstock Pacific Lamprey translocation lower release site at Methow river km 46.3. The number next to the stream name is the stream km and the number in parenthesis is the total number of lamprey released. Shown with the blue circle is the PIT tag array location (MRC). Also, 0.1 km points along the Methow River are displayed as red dots.

Mid Methow Release (River KM 66.4)

A total of 75 lamprey were released at river km 66.4 in middle reach of the Methow River just downstream of the East Methow Valley Highway 20 bridge in Twisp, WA, on September 17, 2015 (Map 3). The estimated female ratio was 31.6%, PIT tag ratio was 100.0%, and genetic tag ratio was 96.0%. Water temperature was 14.1°C. Typically, we target approximately 10-12°C for early release. The following week, however, water temperature appeared to decrease by a few degrees, based on temperature from the upper release (11.5°C).

The primary goal was to understand whether any portion of the adults would migrate into Twisp River on their own, taking advantage of the existing instream PIT array sites just upstream of the Methow/Twisp river confluence (MRT and TWR). No lamprey have been detected in Twisp River in recent years despite annual monitoring efforts through screw trap monitoring (primarily WDFW) and recurring larval lamprey surveys by other agencies (Wild Salmon Conservancy, Methow Salmon Recovery Foundation, and Yakama Nation Fisheries).

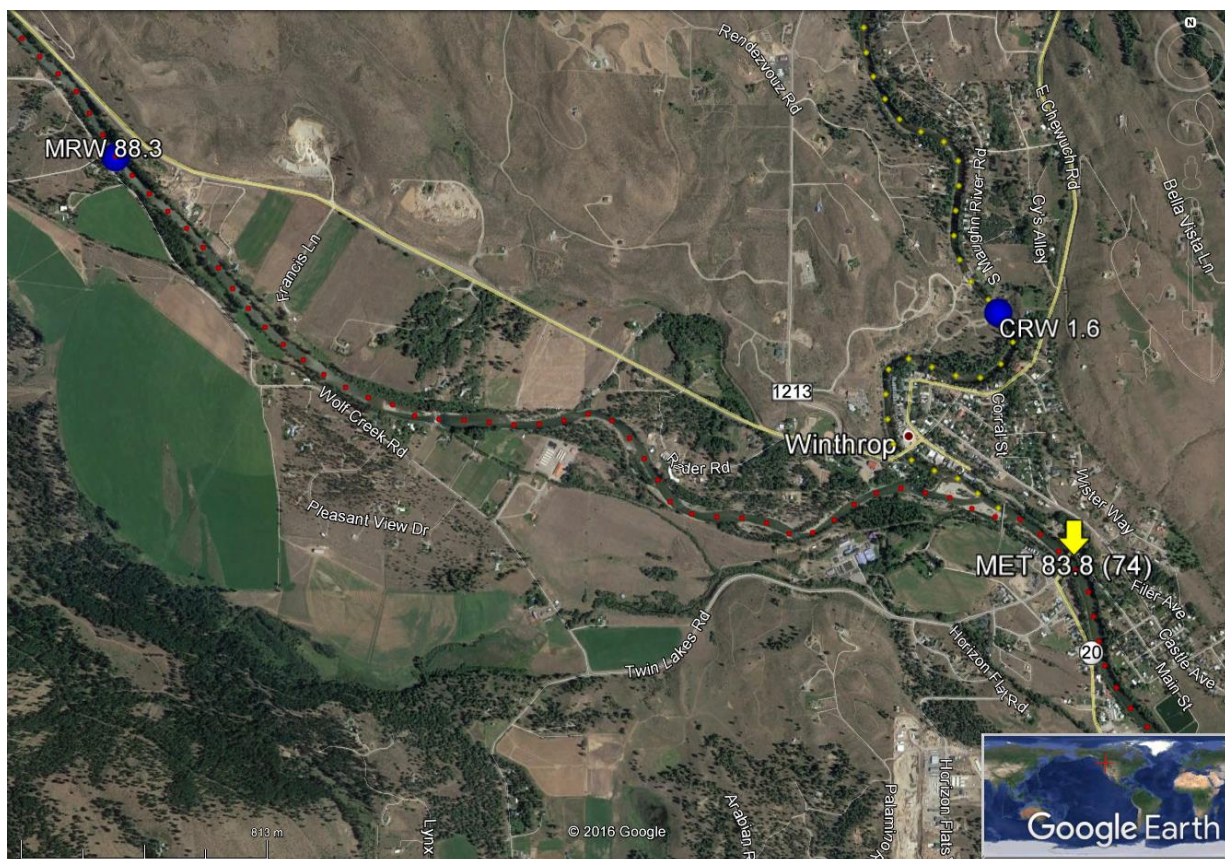


Map 3. Aerial map of 2015-2016 broodstock Pacific Lamprey translocation mid release site at Methow river km 66.4. The number next to the stream name is the stream km and the number in parenthesis is the total number of lamprey released. Shown with the blue circle are the PIT tag array locations. Also, 0.1 km points along the Methow River are displayed as red dots and those along the Twisp River are yellow dots.

Upper Methow Release (River KM 83.8)

A total of 74 lamprey were released at river km 83.8 in middle reach of the Methow River just downstream of the Riverside Avenue (Highway 20) bridge near Winthrop, WA, on September 23, 2015 (Map 4). The estimated female ratio was 46.0%, PIT tag ratio was 100.0%, and genetic tag ratio was 98.6%. Water temperature was 11.5°C. Typically, we target approximately 10-12°C for early release.

The primary goal was to understand whether any portion of the adults would migrate into Upper Methow River on their own, taking advantage of the existing instream PIT array sites just upstream of the Methow/Chewuch river confluence (MRW and CRW). No lamprey have been detected in Upper Methow River in recent years despite annual monitoring efforts through screw trap monitoring (primarily WDFW) and recurring larval lamprey surveys by other agencies (Wild Salmon Conservancy, Methow Salmon Recovery Foundation, and Yakama Nation Fisheries).

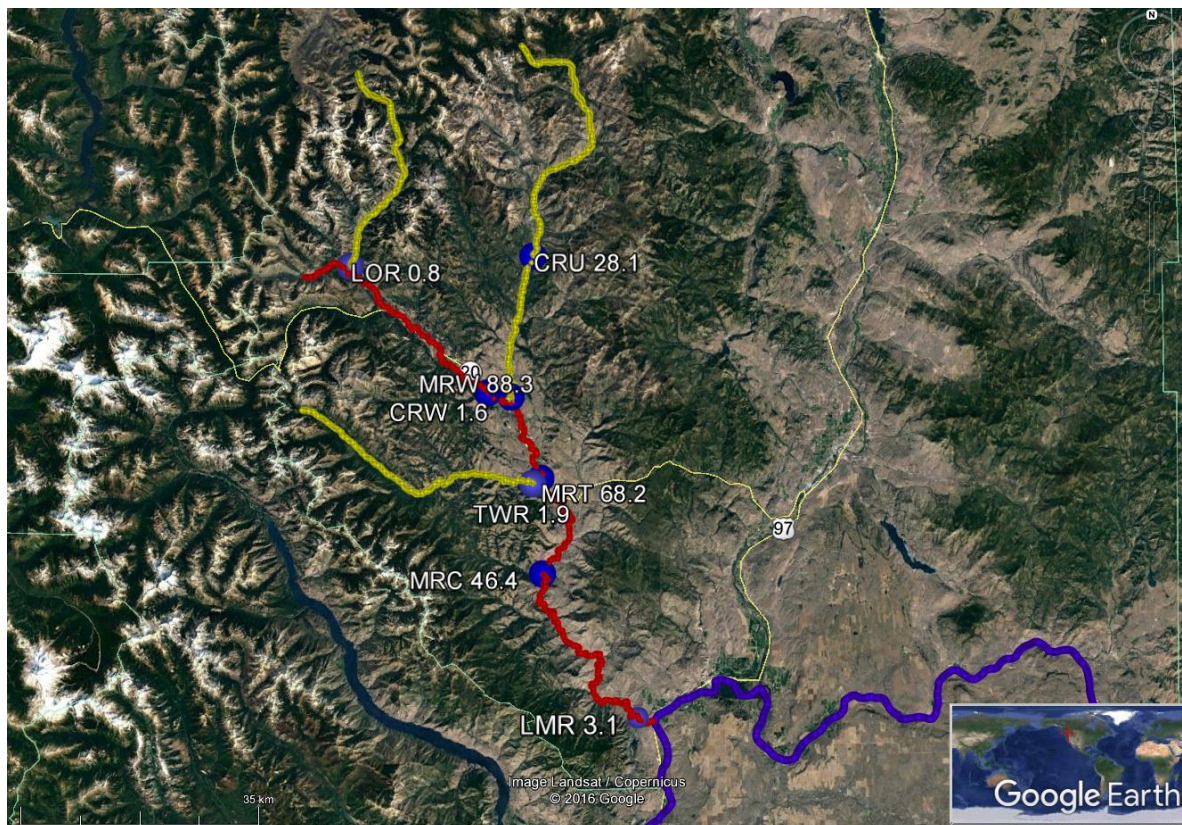


Map 4. Aerial map of 2015-2016 broodstock Pacific Lamprey translocation upper release site at Methow river km 83.8. The number next to the stream name is the stream km and the number in parenthesis is the total number of lamprey released. Shown with the blue circle are the PIT tag array locations. Also, 0.1 km points along the Methow River are displayed as red dots and those along the Chewuch River are yellow dots.

Part II: Pit Tag Detection and Analysis

From the PITAGIS regional data base (<http://www.ptagis.org/>), using Query Builder2 Reports, the interrogation data of individual PIT tagged lamprey is summarized. A total of 145 lamprey (58.2%) out of 249 total PIT tagged lamprey released were detected in at least one PIT array site.

There are a total of four instream PIT array sites located on the mainstem Methow River (river km 3.1, 46.4, 68.2, and 88.3), two sites on the Chewuch River (river km 1.6 and 28.1), and one site each on Twisp (river km 1.9) and Lost (river km 0.8) rivers (Map 5). The array site at river km 68.2 (MRT) is immediately upstream of the Twisp River confluence on the Methow River. The array site at river km 88.3 (MRW) is immediately upstream of the Chewuch River confluence on the Methow River. Most sites have a pair of arrays, consisting of lower (downstream) and an upper (upstream) array, except for MRC (Methow river km 46.4), which only has a single array. MRT (Methow river km 68.2) has two arrays, but only the upper (upstream) array appeared to be in operation during this release season. There are several more instream PIT arrays in side channels and next to acclimation ponds throughout the subbasin, but these represent the primary arrays on the mainstem and key tributaries.



Map 5. Overall aerial map of PIT tag arrays within the Methow Subbasin. The three letter abbreviation and its associated river km is labeled.

At the flow monitoring station near Pateros, WA (river km), Methow River water level was approximately 250 cfs during the release events on September 17, 2016, and September 23, 2016 (Figure 1). High flow discharge was observed primarily between April and July and flow ranged between 2,000 and 16,000 cfs. The last detection was on September 9, 2016, corresponding to the lowest level of water flow period.

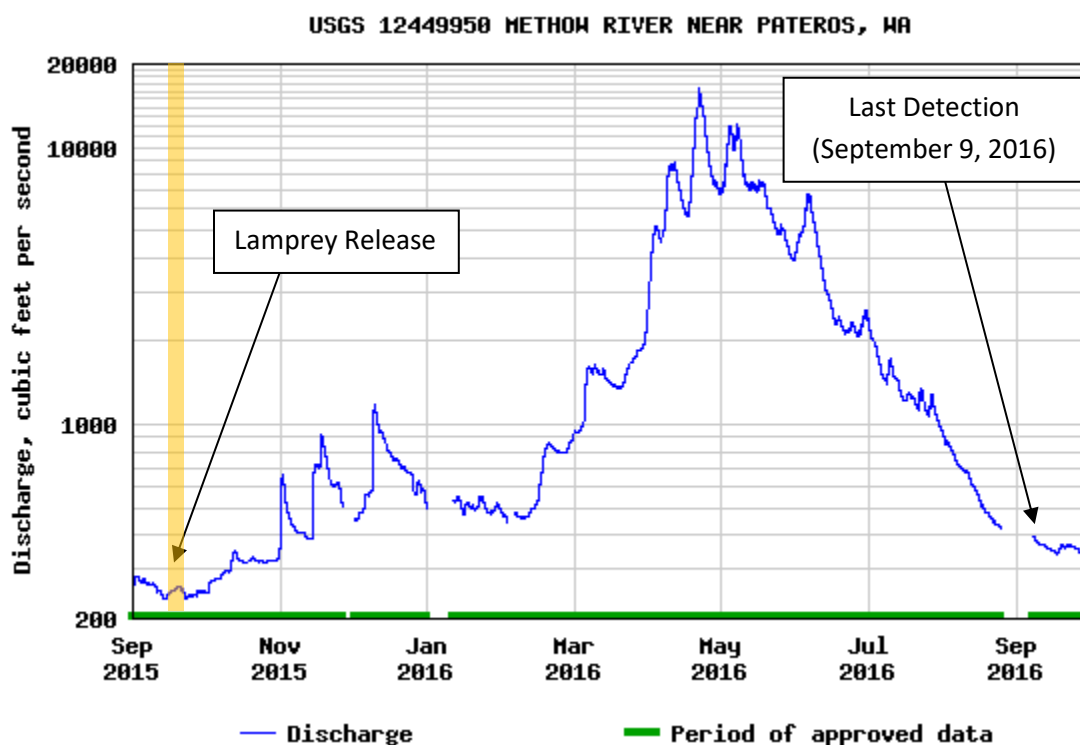


Figure 1. Discharge (cubic feet per second) data of the Methow River near Pateros, WA (river km) between September 1, 2015, and October 1, 2016 (US Geological Survey National Water Information System: Web Interface).

Lower Methow Release (River KM 46.3)

Of the 100 PIT tagged lamprey released in lower Methow River at river km 46.3, 66 lamprey (66.0%) were detected at least once at one of the PIT array sites within the Columbia Basin. Of the 66 lamprey detected, 62 lamprey (93.4%) were detected at a site further upstream compared to the original release site, and four lamprey (6.6%) were detected at a site downstream compared to the original release site. Only 34 lamprey (34.0%) were detected moving upstream at the MRC site (river km 46.4) immediately upstream of the release site. However, a total of 28 lamprey (28.0%) were detected moving upstream at PIT array sites upstream of MRC site without ever being detected at MRC; nine lamprey were first detected moving upstream at the MRT site (river km 68.2), four lamprey were first detected moving upstream at the MWF site (river km 80.2; Whitefish

side channel array), 14 lamprey were first detected moving upstream at the CRW site (Chewuch river km 1.6), and 1 lamprey was first detected at CRU site (Chewuch river km 28.1).

The lack of multiple detections at many of these upper PIT array sites as they travel upstream also showcase that the detection efficiency is quite low for many of these other sites as well (<21.1% detected at the MRT site, and <32.1% detected at the MRC site). In addition, the first lamprey detection at the MRC site (river km 46.4) was detected on November 1, 2015, despite the release event taking place over six weeks prior in mid-September (typically lamprey move upstream on the first few nights after being released). In fact, most of the detection at MRT (river km 68.2) (89%) and CRW (Chewuch river km 1.6) (71.4%) were detected between September 19 and October 15, 2015. These indicate that the MRC site were likely not functioning properly during the release period, and there were many lamprey passing through the MRC site without detection (at least 28 lamprey and potentially many more). At the MRC site, movements were detected starting in the fall (after November 1, 2015) all the way till July 25, 2015, but the most detection was observed in early March to early April, showcasing the active migration during the spring season. The detection through the Whitefish side channel (MWF site, river km 80.2) were only during the spring between April 1 and May 7, 2016 (likely indicating use during higher water conditions).

Four lamprey (4.0%) from the lower release group displayed downstream movement initially. Two lamprey (2.0%) were detected at the lower most PIT array site on the Methow River (LMR, river km 3.1) during early March. One lamprey (1.0%) was first detected at Wells Dam on the Columbia River (left ladder pool 67 and 68) on May 5, 2016. This lamprey later on (in 56 days) moved all the way back up the Methow River to river km 46.2. One lamprey (1.0%) was first detected in the Okanogan River at river km 25.1 on May 1, 2016 (this indicates that this lamprey traveled 46.4 km downstream and then moved upstream by 15.0 km on the Columbia River and migrated another 25.1 km upstream on the Okanogan River). Some lamprey showed downstream movement later in the spring and were detected from the same initial first detection site (perhaps moving / drifting downstream post spawning). Dates for these drifting behavior range from April 1 to July 24, 2016 (57.1% were detected during July). These indicate that many lamprey may be spawning late in the season in July.

Of the 66 lamprey detected from the lower release group, only 18 lamprey (27.2%) were detected at another PIT array site consequently. Of the 34 lamprey first detected at MRC site (Methow river km 46.4), seven lamprey (20.6%) were detected moving upstream to the Chewuch sites (five at the CRW site and two at the CRU site at river km 1.6 and 28.1, respectfully); one lamprey (%) was detected moving upstream through the MWF site at river km 80.2 (Whitefish side channel) along the way. Six of the nine lamprey (66.7%) from the MRT site (Methow river km 68.2) were detected in the Chewuch River at the CRW site (river km 1.6), one of which moved further upstream to the CRU site (river km 28.1). Of the 14 lamprey first detected at CRW site (Chewuch river km 1.6), two lamprey (14.3%) were detected moving upstream to the CRU site (Chewuch

river km 28.1), while one lamprey was detected moving downstream to the MRC site (Methow river km 46.4).

Mid Methow Release (River KM 66.4)

Of the 75 PIT tagged lamprey released in the middle reach of the Methow River at river km 66.4, 41 lamprey (54.7%) were detected at least once at one of the PIT array sites in the Columbia Basin. Of the 41 lamprey detected, 34 lamprey (82.9%) were detected at a site further upstream compared to the original release site, and 7 lamprey (17.1%) were detected at a site downstream compared to the original release site. Only 7 lamprey (9.3%) were detected moving upstream at the MRT site (river km 68.2) immediately upstream of the release site. However, 27 lamprey (36.0%) were detected moving upstream at array sites upstream of the MRT site without ever being detected at the MRT site; one lamprey was first detected moving through MWF site (river km 80.2) and 26 lamprey were first detected moving upstream at the CRW site (Chewuch river km 1.6). This suggests that the MRT site likely has very low detection rates.

At the MRT site, movements were detected primarily in the fall between September 17 and November 2, 2015, but one lamprey was detected on April 1, 2016, as well. At the CRW site, 10 lamprey (38.5%) moved upstream in the fall between September 19 and November 1, 2015, and 15 lamprey (57.7%) moved upstream in the spring/summer between March 22 and July 11, 2016; one lamprey moved upstream on September 9, 2016, likely indicating it will overwinter twice (two years) to spawn the following year in 2017.

Seven lamprey (9.3%) from the middle release group displayed downstream movement initially (all during spring). Five lamprey (6.7%) were detected at the MRC site (river km 46.4) between March 6 and June 30, 2016. Two lamprey (%) were detected at the LMR site (river km 3.1) between April 3 and April 26, 2016. Some lamprey showed downstream movement later in the spring and were detected at the same initial detection site (perhaps drifting downstream post spawning). Dates for these drifting range from May 6 to July 15, 2016, demonstrating the potential range of dates for spawning Pacific Lamprey.

Of the 41 lamprey detected from the lower release group, only 8 lamprey (19.5%) were detected at another PIT array site consequently. Of the 7 lamprey first detected at MET site (Methow river km 66.4), one lamprey (14.3%) was detected moving upstream to the MRW site (river km 88.3), which is the one and only detection from Upper Methow River, and four lamprey (57.1%) were detected moving upstream to the CRW site (Chewuch river km 1.6), one of which consequently was detected at the CRU site (Chewuch river km 28.1). Of the five lamprey first detected downstream at MRC site (river km 46.4), two lamprey (40.0%) were detected moving upstream to the CRW site. Of the 26 lamprey first detected at the CRW site, one lamprey (3.8%) was detected at the CRU site.

Upper Methow Release (River KM 83.8)

Of the 74 PIT tagged lamprey released in the middle reach of the Methow River at river km 83.8, 38 lamprey (51.4%) were detected at least once at one of the PIT array sites in the Columbia Basin. Of the 38 lamprey detected, 30 lamprey (78.9%) were detected at a site further upstream compared to the original release site, and 8 lamprey (21.1%) were detected at a site downstream compared to the original release site. Of the 30 lamprey moving upstream, 28 lamprey (93.3%) were detected moving upstream to the CRW site (Chewuch river km 1.6), whereas two lamprey (6.7%) were detected first at the CRU site (Chewuch river km 28.3) further upstream. Upstream migration occurred partially during the fall (33.3%) between September 23 and November 2, 2015, but primarily in the spring (66.7%) between March 22 and July 30, 2016.

Eight lamprey (10.8%) from the upper release group displayed downstream movement initially (all during spring). Four lamprey (5.4%) were detected at the MRC site (river km 46.4) between April 2 and June 5, 2016. Three lamprey (4.1%) were initially detected at the LMR site (river km 3.1) between March 8 and April 7, 2016. One lamprey moved downstream all the way to the mouth of the Methow River, past Wells Dam, and began migrating up the Entiat River and was detected at river km 1.9 and 26.7. The only lamprey that showed downstream movement during the spring at the first detection site was at the CRU site (Chewuch river km 28.3), which occurred on June 13, 2016.

Of the 38 lamprey detected from the upper release group, only seven lamprey (18.4%) were detected at another PIT array site consequently. Six of the seven lamprey (85.7%) were from lamprey that displayed downstream movement initially; five of these six lamprey (83.3%) eventually reached the CRW site (Chewuch river km 1.6), and one of these lamprey (16.7%) also reached the CRU site (Chewuch river km 28.1). One of the lamprey moved downstream all the way to the LMR site (Methow river km 3.1), but made its way back to Chewuch River on July 1, 2016. Of the 28 lamprey first detected at the CRW site (Chewuch river km 1.6), one lamprey (3.6%) was detected moving upstream to the CRU site (river km 28.1) further upstream.

Summary

The highlights from the 2015-2016 broodstock Pacific Lamprey translocation monitoring are the following (Table 2, Figure 1 and Figure 2):

- Detection efficiency of some of the PIT arrays are quite low for adult Pacific Lamprey (and some sites were likely not fully operational during the release).
- None of the lamprey were detected moving into the Twisp River.
- Only one lamprey (0.4%) were detected moving into Upper Methow River. This is only 1.1% compared to the number of lamprey that were detected moving into Chewuch River (n=91).

- Two lamprey (0.8%) moved down into the Columbia River; one entered the Entiat River while the other entered the Okanogan River to continue the spawning migration.
- One lamprey (0.4%) moved down into the Columbia River (down to Wells Dam), but traveled back up the Methow River and migrated all the way up to the Chewuch River.
- Seven lamprey (2.8%) were detected traveling through the Whitefish side channel during the spring migration (likely just for migration due to the detection being limited to early spring prior to spawning season).
- Upstream migration was observed in both fall (mid-September till early November) and spring (mid-March till early August) seasons (Figure 3); though fall migration is the primary migration timing observed at major hydro dams, spring migration appears to be a critical period for migration within tributaries.
- Downstream migration was observed primarily in the spring season exclusively between early March and end of July (Figure 4). Of this period, movement at the end of May till end of July are likely indicative of the spawning and post spawn movement.
- Pre-spawning migration during the spring appears to be influenced considerably by the discharge; the peaks in discharge appear to coincide with small peaks in movements (both upstream and downstream) (Figure 5).
- The fastest upstream traveling lamprey (n=3) detected were between 15.13 and 15.66 km/day (three lamprey that moved up to Chewuch river km 1.6 immediately after release from the lower release site).

Table 2. Summary of 2015-2016 broodstock Pacific Lamprey translocation detection sites from the Methow Subbasin releases.

Stream	River KM	Site ID	# of Lamprey Detected	% Detected
Methow	3.1	LMR	8	3.2%
Methow	46.4	MRC	47	18.9%
Methow	68.2	MRT	16	6.4%
Methow	80.2	MWF	7	2.8%
Methow	88.3	MRW	1	0.4%
Chewuch	1.6	CRW	91	36.5%
Chewuch	28.1	CRU	13	5.2%
Okanogan	25.1	OKL	1	0.4%
Entiat	1.9	ENM	1	0.4%
Entiat	26.7	ENL	1	0.4%
Columbia	823.7	WEA	1	0.4%

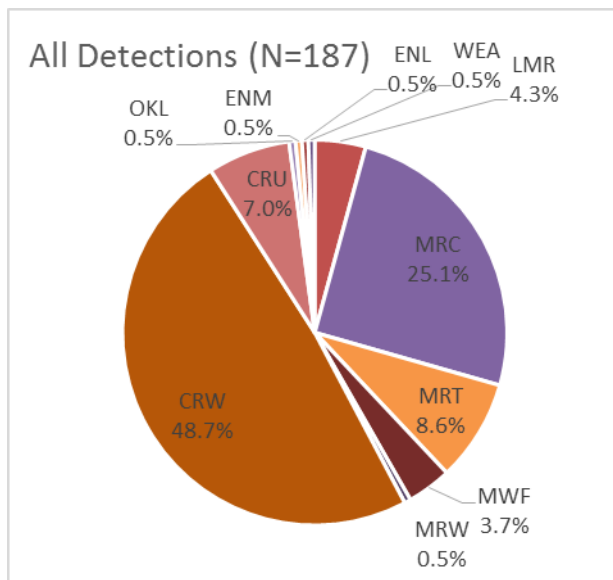


Figure 1. A pie chart detailing all the site detections (N=187) from the 145 lamprey that were detected at least once from the Spring 2016 release in the Methow Subbasin.

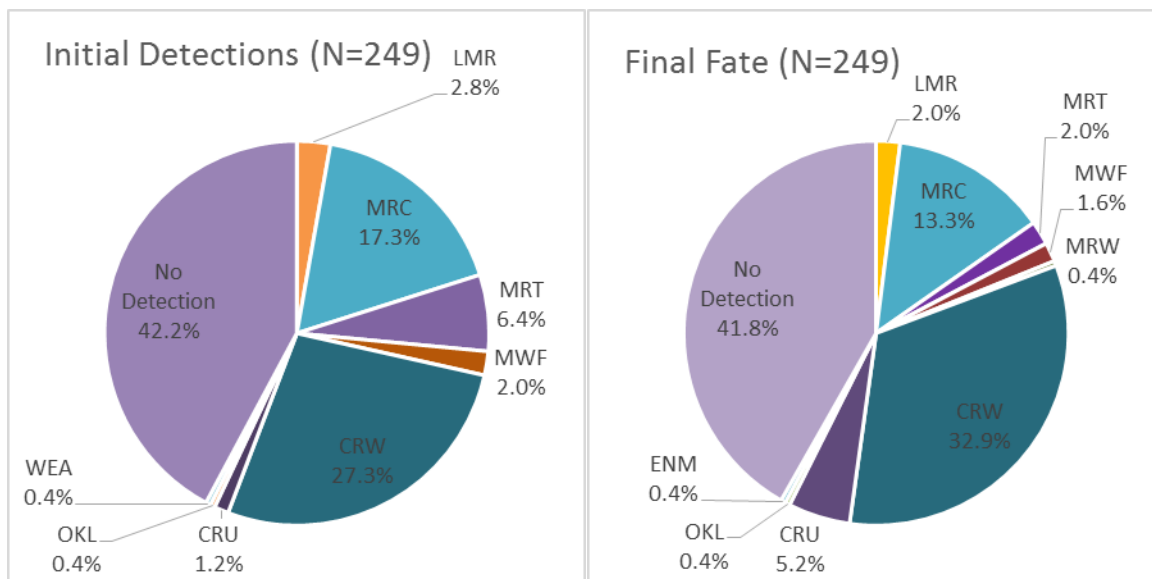


Figure 2. The initial detections (left pie chart) and final fate (right pie chart) of the 249 Pacific Lamprey from the Spring 2016 release in the Methow Subbasin.

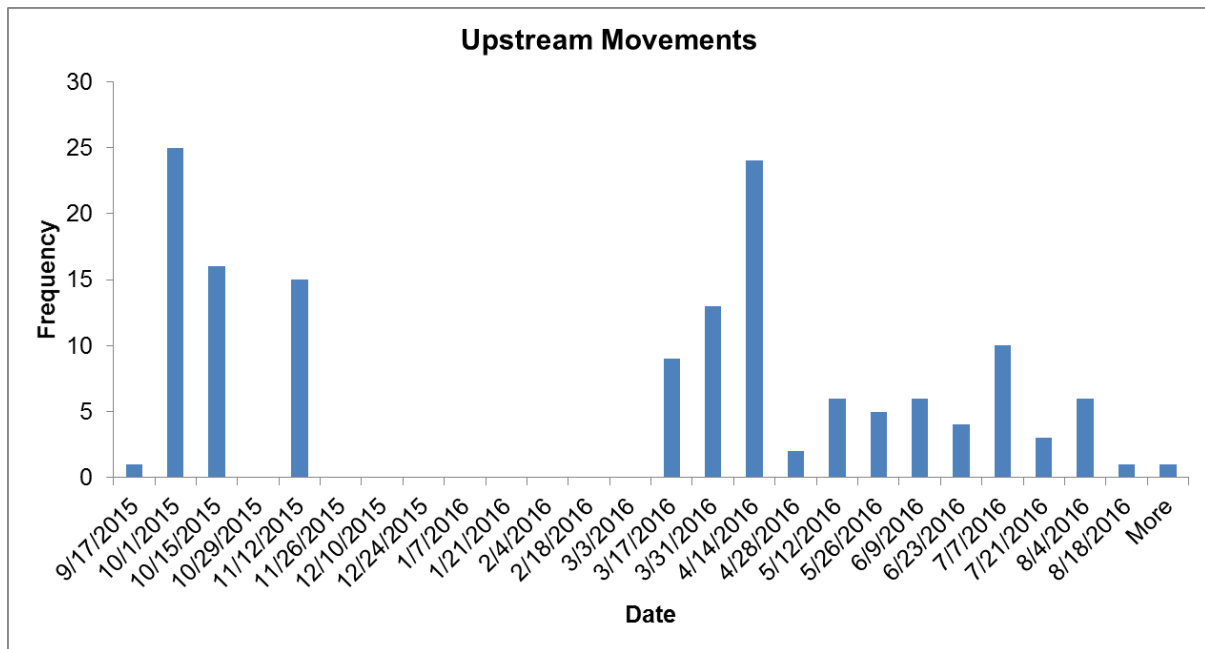


Figure 3. Frequency of upstream movement displayed by Pacific Lamprey from the Fall 2015 release in the Methow Subbasin based on PIT tag data.

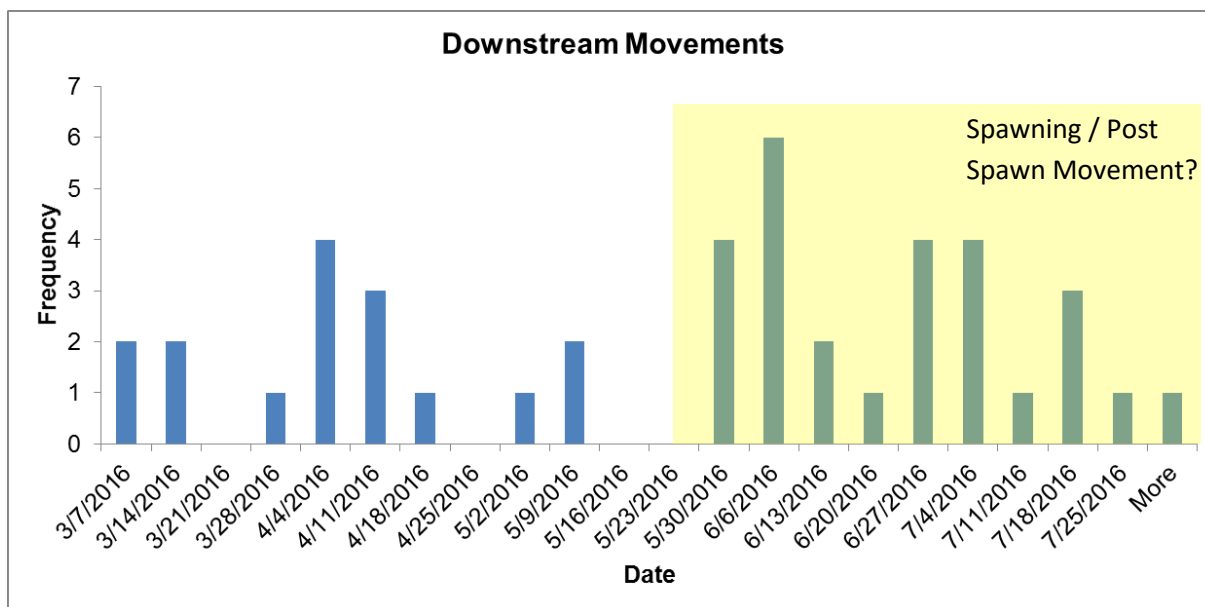


Figure 4. Frequency of downstream movement displayed by Pacific Lamprey from the Fall 2015 release in the Methow Subbasin based on PIT tag date.

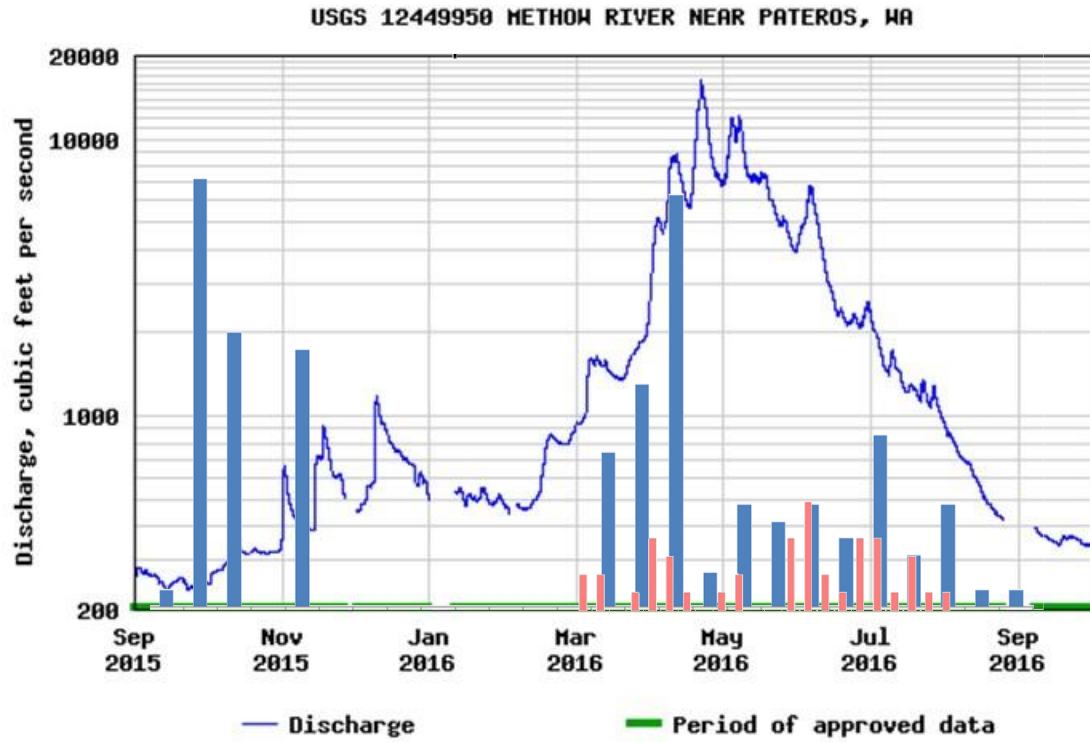


Figure 5. Frequency of upstream (blue bars) and downstream (red bars) movement by Pacific Lamprey from the Fall 2015 release in the Methow Subbasin, displayed together with the discharge data from Figure 1.

Appendix: PIT Tag Information

#	Full PIT Tag ID	Release					#	Full PIT Tag ID	Release				
		Release Date	Release River	Release KM	Release Latitude	Release Longitude			Release Date	Release River	Release KM	Release Latitude	Release Longitude
1	3D9.1C2C60E0D8D	9/17/2015	Methow	46.3	48.246182	-120.117719	81	384.1B79770D3B	9/17/2015	Methow	46.3	48.246182	-120.117719
2	3D9.1C2C60F2F8	9/17/2015	Methow	46.3	48.246182	-120.117719	82	384.1B79770E5F	9/17/2015	Methow	46.3	48.246182	-120.117719
3	3D9.1C2C9C71B7	9/17/2015	Methow	46.3	48.246182	-120.117719	83	384.1B79770FFB	9/17/2015	Methow	46.3	48.246182	-120.117719
4	384.1B79770B3E	9/17/2015	Methow	46.3	48.246182	-120.117719	84	384.1B7977100D	9/17/2015	Methow	46.3	48.246182	-120.117719
5	384.1B79771B4A	9/17/2015	Methow	46.3	48.246182	-120.117719	85	384.1B79771078	9/17/2015	Methow	46.3	48.246182	-120.117719
6	3DA.1A19B337C9	9/17/2015	Methow	46.3	48.246182	-120.117719	86	384.1B7977109B	9/17/2015	Methow	46.3	48.246182	-120.117719
7	384.1B79736160	9/17/2015	Methow	46.3	48.246182	-120.117719	87	384.1B79771573	9/17/2015	Methow	46.3	48.246182	-120.117719
8	3DA.1A19B304BC	9/17/2015	Methow	46.3	48.246182	-120.117719	88	3D9.1C2C52A7FB	9/17/2015	Methow	46.3	48.246182	-120.117719
9	384.1B797703F1	9/17/2015	Methow	46.3	48.246182	-120.117719	89	3D9.1C2C52F035	9/17/2015	Methow	46.3	48.246182	-120.117719
10	3DA.1A19B3112ED	9/17/2015	Methow	46.3	48.246182	-120.117719	90	3D9.1C2C53D8CF	9/17/2015	Methow	46.3	48.246182	-120.117719
11	384.1B79770518	9/17/2015	Methow	46.3	48.246182	-120.117719	91	3D9.1C2C562338	9/17/2015	Methow	46.3	48.246182	-120.117719
12	3D9.1C2C60EEA2	9/17/2015	Methow	46.3	48.246182	-120.117719	92	3D9.1C2C5E90D8	9/17/2015	Methow	46.3	48.246182	-120.117719
13	3D9.1C2C53D6E7	9/17/2015	Methow	46.3	48.246182	-120.117719	93	3D9.1C2C5E9459	9/17/2015	Methow	46.3	48.246182	-120.117719
14	384.1B79734E84	9/17/2015	Methow	46.3	48.246182	-120.117719	94	3D9.1C2C60F594	9/17/2015	Methow	46.3	48.246182	-120.117719
15	384.1B79770296	9/17/2015	Methow	46.3	48.246182	-120.117719	95	3D9.1C2CD27872	9/17/2015	Methow	46.3	48.246182	-120.117719
16	3DA.1A19B306B0	9/17/2015	Methow	46.3	48.246182	-120.117719	96	3DA.1A19B303D9	9/17/2015	Methow	46.3	48.246182	-120.117719
17	3DA.1A19B303A0	9/17/2015	Methow	46.3	48.246182	-120.117719	97	3DA.1A19B306C8	9/17/2015	Methow	46.3	48.246182	-120.117719
18	384.1B797712B1	9/17/2015	Methow	46.3	48.246182	-120.117719	98	3DA.1A19B30E58	9/17/2015	Methow	46.3	48.246182	-120.117719
19	384.1B797714D8	9/17/2015	Methow	46.3	48.246182	-120.117719	99	3DA.1A19B31555	9/17/2015	Methow	46.3	48.246182	-120.117719
20	384.1B79733AF7	9/17/2015	Methow	46.3	48.246182	-120.117719	100	3DA.1A19B33473	9/17/2015	Methow	46.3	48.246182	-120.117719
21	384.1B79770AA8	9/17/2015	Methow	46.3	48.246182	-120.117719	101	3D9.1C2C533EE8	9/17/2015	Methow	66.4	48.359375	-120.114346
22	384.1B797706B8	9/17/2015	Methow	46.3	48.246182	-120.117719	102	384.1B79770651	9/17/2015	Methow	66.4	48.359375	-120.114346
23	384.1B79732EA1	9/17/2015	Methow	46.3	48.246182	-120.117719	103	384.1B79770458	9/17/2015	Methow	66.4	48.359375	-120.114346
24	3D9.1C2C98EF77	9/17/2015	Methow	46.3	48.246182	-120.117719	104	384.1B79770DD0	9/17/2015	Methow	66.4	48.359375	-120.114346
25	3D9.1C2C53EECE	9/17/2015	Methow	46.3	48.246182	-120.117719	105	3D9.1BF240B973	9/17/2015	Methow	66.4	48.359375	-120.114346
26	384.1B797361A2	9/17/2015	Methow	46.3	48.246182	-120.117719	106	3DA.1A19B337AB	9/17/2015	Methow	66.4	48.359375	-120.114346
27	384.1B79771532	9/17/2015	Methow	46.3	48.246182	-120.117719	107	3D9.1BF24489FD	9/17/2015	Methow	66.4	48.359375	-120.114346
28	3DA.1A19B3301F	9/17/2015	Methow	46.3	48.246182	-120.117719	108	384.1B79770EE0	9/17/2015	Methow	66.4	48.359375	-120.114346
29	384.1B79770C70	9/17/2015	Methow	46.3	48.246182	-120.117719	109	384.1B79770936	9/17/2015	Methow	66.4	48.359375	-120.114346
30	384.1B797714D1	9/17/2015	Methow	46.3	48.246182	-120.117719	110	384.1B79770703	9/17/2015	Methow	66.4	48.359375	-120.114346
31	384.1B79771665	9/17/2015	Methow	46.3	48.246182	-120.117719	111	3D9.1C2C560778	9/17/2015	Methow	66.4	48.359375	-120.114346
32	3DA.1A19B305EC	9/17/2015	Methow	46.3	48.246182	-120.117719	112	3D9.1C2C5E9667	9/17/2015	Methow	66.4	48.359375	-120.114346
33	384.1B79735E09	9/17/2015	Methow	46.3	48.246182	-120.117719	113	384.1B79771048	9/17/2015	Methow	66.4	48.359375	-120.114346
34	3DA.1A19B331E9	9/17/2015	Methow	46.3	48.246182	-120.117719	114	3D9.1C2C527098	9/17/2015	Methow	66.4	48.359375	-120.114346
35	3DA.1A19B30491	9/17/2015	Methow	46.3	48.246182	-120.117719	115	384.1B797713F3	9/17/2015	Methow	66.4	48.359375	-120.114346
36	384.1B79734527	9/17/2015	Methow	46.3	48.246182	-120.117719	116	384.1B79770CFD	9/17/2015	Methow	66.4	48.359375	-120.114346
37	384.1B79770E7A	9/17/2015	Methow	46.3	48.246182	-120.117719	117	3DA.1A19B3054B	9/17/2015	Methow	66.4	48.359375	-120.114346
38	384.1B79772224	9/17/2015	Methow	46.3	48.246182	-120.117719	118	3D9.1BF240D0C5	9/17/2015	Methow	66.4	48.359375	-120.114346
39	384.1B79770AC9	9/17/2015	Methow	46.3	48.246182	-120.117719	119	384.1B797336AD	9/17/2015	Methow	66.4	48.359375	-120.114346
40	384.1B79770AC3	9/17/2015	Methow	46.3	48.246182	-120.117719	120	384.1B79770989	9/17/2015	Methow	66.4	48.359375	-120.114346
41	384.1B79771E2C	9/17/2015	Methow	46.3	48.246182	-120.117719	121	384.1B797363AC	9/17/2015	Methow	66.4	48.359375	-120.114346
42	384.1B79771102	9/17/2015	Methow	46.3	48.246182	-120.117719	122	3DA.1A19B33463	9/17/2015	Methow	66.4	48.359375	-120.114346
43	3D9.1C2C5391C8	9/17/2015	Methow	46.3	48.246182	-120.117719	123	3D9.1C2C52C088	9/17/2015	Methow	66.4	48.359375	-120.114346
44	384.1B7977077B	9/17/2015	Methow	46.3	48.246182	-120.117719	124	384.1B79771B87	9/17/2015	Methow	66.4	48.359375	-120.114346
45	3DA.1A19B3012A	9/17/2015	Methow	46.3	48.246182	-120.117719	125	384.1B797707C0	9/17/2015	Methow	66.4	48.359375	-120.114346
46	384.1B79771F0F	9/17/2015	Methow	46.3	48.246182	-120.117719	126	384.1B79770B72	9/17/2015	Methow	66.4	48.359375	-120.114346
47	384.1B79770DB0	9/17/2015	Methow	46.3	48.246182	-120.117719	127	3D9.1C2C52C389	9/17/2015	Methow	66.4	48.359375	-120.114346
48	384.1B7977073F	9/17/2015	Methow	46.3	48.246182	-120.117719	128	384.1B79770538	9/17/2015	Methow	66.4	48.359375	-120.114346
49	384.1B79770424	9/17/2015	Methow	46.3	48.246182	-120.117719	129	3D9.1C2C53E6C6	9/17/2015	Methow	66.4	48.359375	-120.114346
50	384.1B79772024	9/17/2015	Methow	46.3	48.246182	-120.117719	130	3DA.1A19B30301	9/17/2015	Methow	66.4	48.359375	-120.114346
51	3D9.1C2C98B3A2	9/17/2015	Methow	46.3	48.246182	-120.117719	131	384.1B79735169	9/17/2015	Methow	66.4	48.359375	-120.114346
52	384.1B7977075F	9/17/2015	Methow	46.3	48.246182	-120.117719	132	3DA.1A19B337A6	9/17/2015	Methow	66.4	48.359375	-120.114346
53	384.1B79734FF3	9/17/2015	Methow	46.3	48.246182	-120.117719	133	384.1B79770A47	9/17/2015	Methow	66.4	48.359375	-120.114346
54	384.1B79771578	9/17/2015	Methow	46.3	48.246182	-120.117719	134	384.1B79736262	9/17/2015	Methow	66.4	48.359375	-120.114346
55	384.1B79770D95	9/17/2015	Methow	46.3	48.246182	-120.117719	135	384.1B79771B54	9/17/2015	Methow	66.4	48.359375	-120.114346
56	384.1B797713AA	9/17/2015	Methow	46.3	48.246182	-120.117719	136	384.1B7977137D	9/17/2015	Methow	66.4	48.359375	-120.114346
57	384.1B79770B56	9/17/2015	Methow	46.3	48.246182	-120.117719	137	3DA.1A19B315B1	9/17/2015	Methow	66.4	48.359375	-120.114346
58	3DA.1A19B3036A	9/17/2015	Methow	46.3	48.246182	-120.117719	138	3D9.1C2C52A300	9/17/2015	Methow	66.4	48.359375	-120.114346
59	3DA.1A19B33012	9/17/2015	Methow	46.3	48.246182	-120.117719	139	384.1B79770567	9/17/2015	Methow	66.4	48.359375	-120.114346
60	384.1B7977056F	9/17/2015	Methow	46.3	48.246182	-120.117719	140	384.1B797363EC	9/17/2015	Methow	66.4	48.359375	-120.114346
61	384.1B79770DBE	9/17/2015	Methow	46.3	48.246182	-120.117719	141	384.1B797714A9	9/17/2015	Methow	66.4	48.359375	-120.114346
62	3DA.1A19B30027	9/17/2015	Methow	46.3	48.246182	-120.117719	142	384.1B79736026	9/17/2015	Methow	66.4	48.359375	-120.114346
63	3D9.1C2C52D1CA	9/17/2015	Methow	46.3	48.246182	-120.117719	143	384.1B79733D58	9/17/2015	Methow	66.4	48.359375	-120.114346
64	384.1B797711A2	9/17/2015	Methow	46.3	48.246182	-120.117719	144	384.1B79734366	9/17/2015	Methow	66.4	48.359375	-120.114346
65	3D9.1C2C5611D1	9/17/2015	Methow	46.3	48.246182	-120.117719	145	384.1B79736563	9/17/2015	Methow	66.4	48.359375	-120.114346
66	3DA.1A19B316AD	9/17/2015	Methow	46.3	48.246182	-120.117719	146	384.1B79770357	9/17/2015	Methow	66.4	48.359375	-120.114346
67	384.1B79733C6C	9/17/2015	Methow	46.3	48.246182	-120.117719	147	384.1B79770451	9/17/2015	Methow	66.4	48.359375	-120.114346
68	384.1B79734582	9/17/2015	Methow	46.3	48.246182	-120.117719	148	384.1B79770594	9/17/2015	Methow	66.4	48.359375	-120.114346
69	384.1B79734F2B	9/17/2015	Methow	46.3	48.246182	-120.117719	149	384.1B79770648	9/17/2015	Methow	66.4	4	

#	Full PIT Tag ID	Release				
		Release Date	Release River	River KM	Release Latitude	Release Longitude
161	384.1B79771824	9/17/2015	Methow	66.4	48.359375	-120.114346
162	384.1B7977182F	9/17/2015	Methow	66.4	48.359375	-120.114346
163	384.1B797718BF	9/17/2015	Methow	66.4	48.359375	-120.114346
164	384.1B79771C08	9/17/2015	Methow	66.4	48.359375	-120.114346
165	3D9.1BF245D3A3	9/17/2015	Methow	66.4	48.359375	-120.114346
166	3D9.1C2C52A85A	9/17/2015	Methow	66.4	48.359375	-120.114346
167	3D9.1C2C52B7A7	9/17/2015	Methow	66.4	48.359375	-120.114346
168	3D9.1C2C530A7A	9/17/2015	Methow	66.4	48.359375	-120.114346
169	3D9.1C2C5E9470	9/17/2015	Methow	66.4	48.359375	-120.114346
170	3D9.1C2C805B30	9/17/2015	Methow	66.4	48.359375	-120.114346
171	3DA.1A19B300D3	9/17/2015	Methow	66.4	48.359375	-120.114346
172	3DA.1A19B30C6B	9/17/2015	Methow	66.4	48.359375	-120.114346
173	3DA.1A19B30C7A	9/17/2015	Methow	66.4	48.359375	-120.114346
174	3DA.1A19B30FF7	9/17/2015	Methow	66.4	48.359375	-120.114346
175	3DA.1A19B33538	9/17/2015	Methow	66.4	48.359375	-120.114346
176	384.1B79771048	9/23/2015	Methow	83.8	48.473631	-120.177307
177	384.1B797705CE	9/23/2015	Methow	83.8	48.473631	-120.177307
178	384.1B79733EA4	9/23/2015	Methow	83.8	48.473631	-120.177307
179	3D9.1C2C5E9A07	9/23/2015	Methow	83.8	48.473631	-120.177307
180	3DA.1A19B30A41	9/23/2015	Methow	83.8	48.473631	-120.177307
181	384.1B79771641	9/23/2015	Methow	83.8	48.473631	-120.177307
182	384.1B797330DD	9/23/2015	Methow	83.8	48.473631	-120.177307
183	3D9.1C2CAEEB5C	9/23/2015	Methow	83.8	48.473631	-120.177307
184	3DA.1A19B301E5	9/23/2015	Methow	83.8	48.473631	-120.177307
185	384.1B797703C5	9/23/2015	Methow	83.8	48.473631	-120.177307
186	384.1B79733EF6	9/23/2015	Methow	83.8	48.473631	-120.177307
187	384.1B79735992	9/23/2015	Methow	83.8	48.473631	-120.177307
188	384.1B79770810	9/23/2015	Methow	83.8	48.473631	-120.177307
189	384.1B79734AC0	9/23/2015	Methow	83.8	48.473631	-120.177307
190	3DA.1A19B3164F	9/23/2015	Methow	83.8	48.473631	-120.177307
191	384.1B797704FF	9/23/2015	Methow	83.8	48.473631	-120.177307
192	384.1B7977124C	9/23/2015	Methow	83.8	48.473631	-120.177307
193	384.1B797706AE	9/23/2015	Methow	83.8	48.473631	-120.177307
194	3D9.1C2C3FF1E0	9/23/2015	Methow	83.8	48.473631	-120.177307
195	384.1B79734B80	9/23/2015	Methow	83.8	48.473631	-120.177307
196	384.1B79770929	9/23/2015	Methow	83.8	48.473631	-120.177307
197	3D9.1C2C3B9B9C	9/23/2015	Methow	83.8	48.473631	-120.177307
198	384.1B79735D47	9/23/2015	Methow	83.8	48.473631	-120.177307
199	384.1B797706AC	9/23/2015	Methow	83.8	48.473631	-120.177307
200	384.1B79770D65	9/23/2015	Methow	83.8	48.473631	-120.177307
201	384.1B79770669	9/23/2015	Methow	83.8	48.473631	-120.177307
202	384.1B79734840	9/23/2015	Methow	83.8	48.473631	-120.177307
203	384.1B797708A6	9/23/2015	Methow	83.8	48.473631	-120.177307
204	384.1B79770AF6	9/23/2015	Methow	83.8	48.473631	-120.177307
205	3D9.1C2CA3A582	9/23/2015	Methow	83.8	48.473631	-120.177307
206	3DA.1A19B30399	9/23/2015	Methow	83.8	48.473631	-120.177307
207	384.1B79771192	9/23/2015	Methow	83.8	48.473631	-120.177307
208	384.1B79733819	9/23/2015	Methow	83.8	48.473631	-120.177307
209	3DA.1A19B332C2	9/23/2015	Methow	83.8	48.473631	-120.177307
210	384.1B797706E5	9/23/2015	Methow	83.8	48.473631	-120.177307
211	384.1B7973454C	9/23/2015	Methow	83.8	48.473631	-120.177307
212	384.1B79772054	9/23/2015	Methow	83.8	48.473631	-120.177307
213	384.1B79771123	9/23/2015	Methow	83.8	48.473631	-120.177307
214	384.1B79733D39	9/23/2015	Methow	83.8	48.473631	-120.177307
215	384.1B79734126	9/23/2015	Methow	83.8	48.473631	-120.177307
216	384.1B79735C8C	9/23/2015	Methow	83.8	48.473631	-120.177307
217	384.1B79735E7C	9/23/2015	Methow	83.8	48.473631	-120.177307
218	384.1B79735F12	9/23/2015	Methow	83.8	48.473631	-120.177307
219	384.1B79770319	9/23/2015	Methow	83.8	48.473631	-120.177307
220	384.1B79770631	9/23/2015	Methow	83.8	48.473631	-120.177307
221	384.1B7977065D	9/23/2015	Methow	83.8	48.473631	-120.177307
222	384.1B797707A4	9/23/2015	Methow	83.8	48.473631	-120.177307
223	384.1B7977095D	9/23/2015	Methow	83.8	48.473631	-120.177307
224	384.1B79770AB5	9/23/2015	Methow	83.8	48.473631	-120.177307
225	384.1B79770C1F	9/23/2015	Methow	83.8	48.473631	-120.177307
226	384.1B79771083	9/23/2015	Methow	83.8	48.473631	-120.177307
227	384.1B7977127D	9/23/2015	Methow	83.8	48.473631	-120.177307
228	384.1B79771403	9/23/2015	Methow	83.8	48.473631	-120.177307
229	384.1B79771729	9/23/2015	Methow	83.8	48.473631	-120.177307
230	384.1B79771747	9/23/2015	Methow	83.8	48.473631	-120.177307
231	384.1B797718AF	9/23/2015	Methow	83.8	48.473631	-120.177307
232	384.1B79771901	9/23/2015	Methow	83.8	48.473631	-120.177307
233	384.1B797719B6	9/23/2015	Methow	83.8	48.473631	-120.177307
234	384.1B79771EA8	9/23/2015	Methow	83.8	48.473631	-120.177307
235	384.1B79772064	9/23/2015	Methow	83.8	48.473631	-120.177307
236	3D9.1C2C41F16D	9/23/2015	Methow	83.8	48.473631	-120.177307
237	3D9.1C2C539C61	9/23/2015	Methow	83.8	48.473631	-120.177307
238	3D9.1C2C53F208	9/23/2015	Methow	83.8	48.473631	-120.177307
239	3D9.1C2C601D4A	9/23/2015	Methow	83.8	48.473631	-120.177307
240	3D9.1C2C87CDF8	9/23/2015	Methow	83.8	48.473631	-120.177307

#	Full PIT Tag ID	Release				
		Release Date	Release River	River KM	Release Latitude	Release Longitude
241	3D9.1C2C9C3F44	9/23/2015	Methow	83.8	48.473631	-120.177307
242	3DA.1A19B306D0	9/23/2015	Methow	83.8	48.473631	-120.177307
243	3DA.1A19B306F4	9/23/2015	Methow	83.8	48.473631	-120.177307
244	3DA.1A19B30929	9/23/2015	Methow	83.8	48.473631	-120.177307
245	3DA.1A19B30CAC	9/23/2015	Methow	83.8	48.473631	-120.177307
246	3DA.1A19B30CD1	9/23/2015	Methow	83.8	48.473631	-120.177307
247	3DA.1A19B30DFF	9/23/2015	Methow	83.8	48.473631	-120.177307
248	3DA.1A19B3354C	9/23/2015	Methow	83.8	48.473631	-120.177307
249	3DA.1A19B33871	9/23/2015	Methow	83.8	48.473631	-120.177307