

Translocation of Adult Pacific Lamprey within the Yakima Subbasin, 2016-2017 Broodstock



[Cover Photo: Adult Pacific Lamprey being released above Prosser Dam on Yakima River (river km 76.1) by the general public during an open house release event on April 8, 2017]

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Abstract

This report is composed of two parts: 1) summary of all 2016-2017 broodstock adult Pacific Lamprey releases during the spring 2017 migration season within the Yakima Subbasin and 2) analysis of migration data from those adults that were PIT tagged (all adults were PIT tagged). From the 2016-2017 broodstock (adults collected in summer 2016 that primarily mature in 2017), a total of 429 adult Pacific Lamprey were released within the Yakima Subbasin between October 13, 2016, and May 18, 2017. Overall female ratio was estimated to be 47.8%, PIT tag ratio was 96.5% (9 and 12 mm tags 48.0% and 48.5%, respectively), and genetic tag ratio was 98.8%. This is the sixth year that adult Pacific Lamprey were translocated into the Yakima Subbasin. This was the first year we incorporated wild natural run Pacific Lamprey from the Yakima River (Prosser Dam) into the translocation. Larval Pacific Lamprey have not been documented upstream of Roza Diversion Dam (river km 210.5) until recently in 2016 (adult translocation in Upper Yakima occurred in 2015).

From the PITAGIS regional data base (<http://www.ptagis.org/>), using Query Builder2 Reports, the interrogation data of PIT tagged lamprey were summarized. A total of 158 lamprey (38.2%) out of 414 total PIT tagged lamprey released were detected in at least one PIT array site. The highlights from the 2016-2017 broodstock adult Pacific Lamprey translocation monitoring in the Yakima Subbasin are the following:

- The site with the most detection was at PRO (Prosser Dam; 60.4%), SAT (Lower Satus Creek; 21.9%), AHT (Lower Ahtanum Creek; 7.1%), and SIM (Simcoe Creek; 4.7%). There were some detections from ROZ (Roza Dam; 4.1%) and SUN (Sunnyside Instream Array; 1.8%) as well.
- Detection of movement was the highest during the month of May and attenuated in June and July, with the last detection in mid July. One movement was detected in late November, likely associated with an increase in discharge.
- Detection from the three releases downstream of Prosser Dam resulted in an overall 64.9% detection. For some of these (22.1% overall), the last detection was at a lower array, indicating potential fallback within the ladder. However, 1 of the 6 lamprey (16.7%) that entered Satus Creek from these releases was not detected at Prosser Dam, indicating some level of passage without detection.
- From the 151 adults released downstream of Prosser Dam, six lamprey (4.0%) were detected at Satus Creek. Ten of the 155 adults (6.5%) released immediately upstream of Prosser Dam were detected at Satus Creek; providing an estimate of 61.6% Prosser Dam passage.
- From the 151 adults released downstream of Prosser Dam, three lamprey (2.0%) were detected at Roza Dam (one of which were last detected at the upper array, potentially indicating fish ladder passage). Four of the 155 lamprey (2.6%) released immediately

upstream of Prosser Dam were detected at Roza Dam; providing an estimate of 77% Prosser Dam passage.

- Lamprey used the left and right ladder the most (44.8% each), while only several used center ladder (10.4%). However, the average time spent in left ladder ranged from 0.91 to 3.35 days, whereas the time spent in the right and center ladders ranged from 0.00 to 0.39 days, indicating that lamprey consistently spent more time in passing the left ladder.
- There was a seasonal tendency - more lamprey approached the right ladder during the early spring high flow season, whereas during the late spring lower flow conditions, more lamprey approached the left ladder.
- The fastest upstream traveling lamprey detected was 48.3 and 41.8 km/day (lamprey detected at Lower Satus Array), which may be the fastest migration speed ever recorded for Pacific Lamprey upstream migration.
- Downstream post spawn drifting was observed primarily between mid-June and mid-July.
- Lamprey continuous holding by PIT arrays were detected at Prosser and Roza diversion dams and will be closely examined in future years (focusing on issues and potential solutions).

Part I: Release Summary

From the 2016-2017 broodstock (adults collected in summer 2016, most of which mature in spring/summer 2017), a total of 429 adult Pacific Lamprey were released in three lower Yakima tributaries (Satus, Toppenish, and Ahtanum) and mainstem Yakima River between October 13, 2016, and May 18, 2017 (Fig. 1 and Table 1). Overall female ratio was estimated to be 47.8%, PIT tag ratio was 96.5% (9 and 12 mm tags 48.0% and 48.5%, respectively), and genetic tag ratio was 98.8%. All lamprey were originally captured from Bonneville Dam (27.4%), The Dalles Dam (18.4%), and John Day Dam (25.5%) in Lower Columbia River during the summer of 2015 or from Prosser Dam in Lower Yakima River during the spring of 2016 (22.2%). Lamprey from Prosser Dam were either captured from the new lamprey passage structure (n=44) or from the dewatered fish ladder on May 1, 2017 (n=39). Total length averaged 606 mm (minimum 364 mm and maximum 767 mm), weight averaged 373.8 g (minimum 223.9 g and maximum 589.6 g), and interdorsal distance averaged 22.2 mm (minimum -3 mm and maximum 45 mm) during the PIT tagging operations in summer 2015 through spring 2016. Lamprey from Prosser Dam were slightly smaller than the Lower Columbia River lamprey in late spring (average of 573.4 mm and 614.7 mm for length and 348.5 g and 360.4 g for weight, respectively) and interdorsal distance was also smaller (average of 15.4 mm and 22.3 mm, respectively). Interestingly, the female ratio for the lamprey that were captured in the dewatered ladder on May 1, 2017 (N=42), was 83.3%; the likely explanation is that female lamprey in spring typically have much larger girth compared to male counterparts and they were unable to pass through the small gap in the picketed lead behind the fish counting station, where they were found during dewatering. Similarly, the female ratio for the lamprey that were captured in the vertical wetted wall lamprey structures was also relatively high (66.1% on average and higher during the early run); this higher ration of female may be due to 1) male lamprey being more prone to pass through the fish ladder and/or 2) female lamprey being more adept at climbing the vertical wetted wall structure.

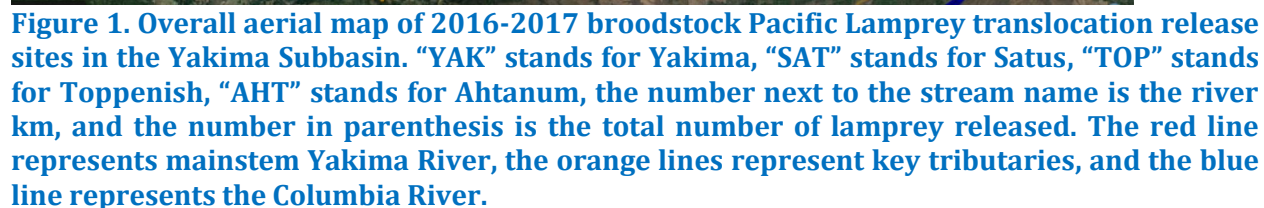
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Table 2. Summary of 2016-2017 broodstock Pacific Lamprey translocation release data in the Wenatchee Subbasin. “# F” is “# of female lamprey”, and “# M” is “# of male lamprey.” “(?)” denotes lower certainty with the sex ID, and “# UN” is “# of unknown sex.” Female Ratio (Est. 1) is based solely on “# F” and “# M”, whereas “Female Ratio (Est. 2)” includes “# F (?)” and “# M (?)” in the estimation.

River	RKM	Date	#	# F	# M	# (?)	# UN	# with 9mm PIT	# with 12mm PIT	# with Genetic Tags	Female Ratio (Est. 1)	Female Ratio (Est. 2)	9mm PIT Tag Ratio	12mm PIT Tag Ratio	Genetic Tag Ratio
Yakima	75.4	4/27/2017	50	21	26	0	0	3	25	25	50	45%	45%	50%	100%
Yakima	75.4	5/4/2017	50	17	24	2	1	6	24	26	50	41%	43%	48%	100%
Yakima	75.4	5/11/2017	51	12	31	4	0	4	16	35	49	28%	34%	31%	96%
Yakima	75.6	4/18/2017	9	2	6	0	0	1	9	0	9	25%	25%	100%	0%
Yakima	76.1	4/8/2017	50	20	22	2	2	4	26	24	50	48%	48%	52%	100%
Yakima	76.1	4/27/2017	8	8	0	0	0	0	8	0	8	100%	100%	100%	0%
Yakima	76.1	5/2/2017	41	37	2	1	1	0	22	19	41	95%	93%	54%	100%
Yakima	76.1	5/5/2017	18	11	6	0	1	0	9	9	18	65%	61%	50%	100%
Yakima	76.1	5/9/2017	16	9	5	0	2	0	8	8	16	64%	56%	50%	100%
Yakima	76.1	5/11/2017	17	7	10	0	0	0	1	16	17	41%	41%	6%	94%
Yakima	76.1	5/12/2017	1	0	1	0	0	0	1	0	1	0%	0%	100%	0%
Yakima	134.7	5/18/2017	4	0	2	0	2	0	3	1	4	0%	0%	75%	25%
Yakima	172.6	4/27/2017	15	8	7	0	0	0	0	0	15	53%	53%	0%	100%
Ahtanum	1.7	3/29/2017	29	8	12	2	2	5	29	0	27	40%	42%	100%	93%
Satus	3.0	3/24/2017	15	3	12	0	0	0	0	15	15	20%	20%	0%	100%
Satus	3.0	3/30/2017	15	4	11	0	0	0	0	15	15	27%	27%	0%	100%
Toppenish	54.4	5/9/2017	30	12	14	0	0	4	15	15	29	46%	46%	50%	97%
Toppenish	61.6	10/13/2016	10	1	7	0	0	2	10	0	10	13%	13%	100%	0%
-	-	-	429	180	198	11	11	29	206	208	424	47.6%	47.8%	48.0%	98.8%

The number of translocated lamprey has steadily increased over the years since 2012, which started with only 15 lamprey (Table 3). The total accumulated number of translocated adult Pacific Lamprey in the Yakima Subbasin from 2012 (fall) - 2017 (spring) is 2045. The number of adult lamprey released in the last two years were slightly lower compared to 2014-2015 due to the increase in adult translocation numbers going outside the Yakima Subbasin in recent years (e.g. Methow and Wenatchee subbasins). The female ratio has fluctuated between 20-48% with an average of 37.6%, resulting in slightly higher numbers of males than females over the years, except for the 2011-2012 broodstock (with only 15 lamprey). Approximately 71% of all lamprey have been PIT tagged over the six years to improve the assessment of distribution and final destination of the released lamprey. Genetic tagging ratios have stayed close to 100% for all release years to track the success of translocation (via larval/juvenile sampling using parentage based genetics) with a current running average of 97.3%. In 2017 spring, a 38 fold increase in adult counts (compared to the previous 20-year average) was observed at Prosser Dam, indicating that adult returns can increase substantially in a relatively short period of time through adult translocation programs. Adult translocation began in 2012 with only 15 lamprey (Satus Creek only), and increased to 138 lamprey in 2013 (in three Yakima tributary streams), indicating that the increase in adult returns occurred only after effectively five years of translocation.

Table 3. Summary of all Yakama Nation Fisheries Pacific Lamprey translocation (broodstock 2011-2012 through 2016-2017). *Number of lamprey with genetic tags from 2012-2013 and 2013-2014 are approximate numbers.

Broodstock Year	# Total	# of Female	# of Male	# of Unknown	# with Pit Tags	# with Genetic Tags	Female Ratio	Pit Tag Ratio	Genetic Tag Ratio
2011-2012	15	9	6	-	14	15	60.0%	93.3%	100.0%
2012-2013	138	27	110	1	121	*135	19.7%	87.7%	95.7%
2013-2014	264	111	144	9	213	*250	43.5%	80.7%	94.7%
2014-2015	752	201	492	59	546	735	29.0%	72.6%	97.7%
2015-2016	447	191	249	7	151	427	43.4%	33.8%	95.5%
2016-2017	429	191	209	29	414	424	47.8%	96.5%	98.8%
Total	2045	730	1210	105	1459	1986	37.6%	71.3%	97.1%

Satus Creek

In Satus Creek, there were two release events: 1) 15 lamprey were released at river km 3.0 on March 24, 2017, and 2) 15 lamprey were released at the same site on March 30, 2017 (Fig. 2). Water temperature were 7.0 and 7.6°C, respectively, during the two releases. For early spring release, we target our releases to take place when the rivers/streams reach 7-12°C.

The primary goal was two-fold: 1) to continue to increase the population abundance of Pacific Lamprey in Satus Creek and 2) to assess upstream movement through the lower PIT array at river km 4.3 (SAT).

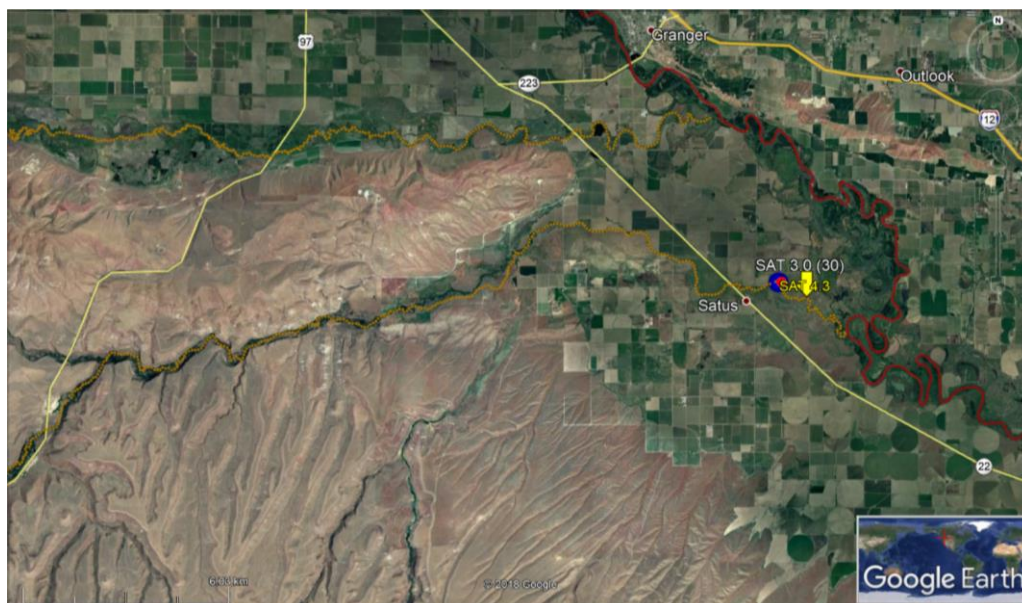


Figure 2. Aerial map of Pacific Lamprey translocation release site (yellow arrow) in Satus Creek (bottom orange line). "SAT" stands for Satus, the number next to the stream abbreviation is the river km, and the number in parenthesis is the total number of lamprey released. Also shown with the large blue circle is the PIT tag array location [one in lower Satus (river km 4.3)], and the red circle is the location of a screw trap. Yakima River is the red line.

Toppenish Creek

In Toppenish Creek, there were two release events: 1) 10 lamprey were released at river km 61.6 on October 13, 2016; and 2) 30 lamprey were released at river km 54.4 on May 9, 2017 (Fig. 3). Water temperature were 12.2 and 12.0°C, respectively, during the two releases. For early spring release, we target our releases to take place when the rivers/streams reach 7-12°C. For summer/fall release, we target our releases to take place between 15-20°C.

The primary goal was to continue to increase the population abundance of Pacific Lamprey in Toppenish Creek through these two releases. The first release in the fall was conducted in the upper reach (after extreme water temperature conditions have attenuated) to monitor and document production in the upper reaches of Toppenish Creek. The second release occurred in late spring (May 9, 2017), so they were released further upstream closer to the potential spawning ground reaches. The lower reach PIT array was not operating during the spring season, hence monitoring of upstream migration from the lower reach was not possible this year. Both upper arrays in upper Toppenish (river km 55.5) and Simcoe Creek (river km 8.9) only operated for a limited part of the spring season (between February 10 and 21, 2017, and between April 17 and June 1, 2017, respectively).

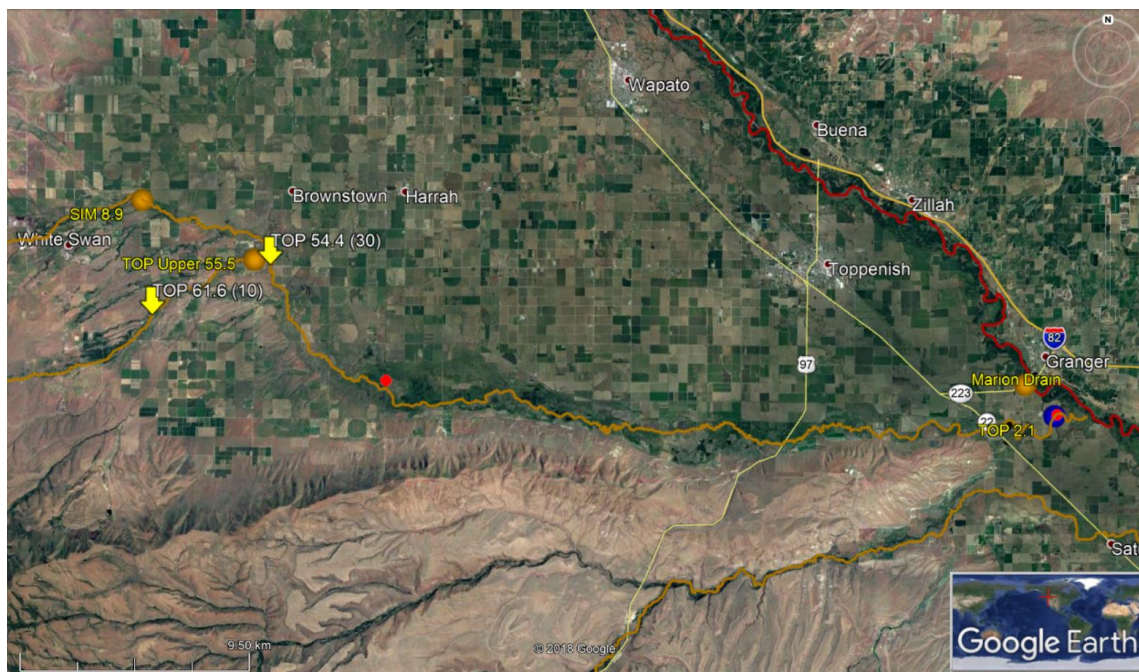


Figure 3. Aerial map of Pacific Lamprey translocation release sites (yellow arrows) in Toppenish Creek (upper orange line). “TOP” stands for Toppenish, the number next to the stream abbreviation is the river km, and the number in parenthesis is the total number of lamprey released. Also shown with the large blue and orange circles are the PIT tag array locations [one in lower Toppenish (river km 2.1), one in upper Toppenish (river km 55.5), and one in Simcoe Creek (river km 8.9)], and the red circles are the locations of screw traps for juvenile monitoring. Yakima River is the red line.

Ahtanum Creek

In Ahtanum Creek, there was one release event: 29 lamprey were released at river km 1.7 on March 29, 2017 (Fig. 4). Water temperature was 7.1 during the release. For early spring release, we target our releases to take place when the rivers/streams reach 7-12°C.

The primary goal was two-fold: 1) to continue to increase the population abundance of Pacific Lamprey in Satus Creek and 2) to assess upstream movement through the lower PIT array at river km 4.0 (AHT).

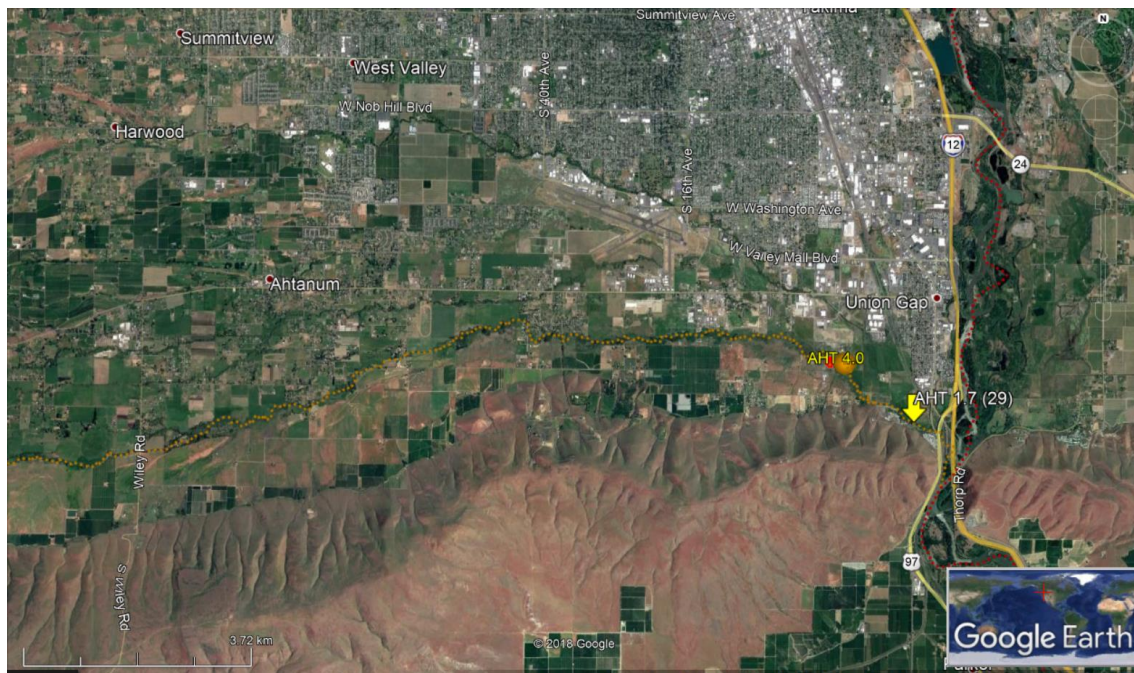


Figure 4. Aerial map of Pacific Lamprey translocation release site (yellow arrow) in Ahtanum Creek (orange dots / line). “AHT” stands for Ahtanum, the number next to the stream abbreviation is the river km, and the number in parenthesis is the total number of lamprey released. Also shown with the large orange circle is the PIT tag array location [one in lower Ahtanum (river km 4.0)], and the red circle is the location of a screw trap for juvenile monitoring. Yakima River is the red line.

Lower Yakima River #1

In the Lower Yakima River, there were three release sites: 1) 75 lamprey were released at river km 75.4 downstream of Prosser Dam (left bank looking downstream) on April 27, May 4, and May 11, 2017 (25 lamprey each); 2) 76 lamprey were released at river km 75.4 downstream of Prosser Dam (right bank looking downstream) on April 27, May 4, and May 11, 2017 (25 lamprey each for first two releases, and 26 lamprey for last release); and 3) 150 lamprey were released at river km 76.1 upstream of Prosser Dam on April 8 and 27, May 2, 5, 9, 11, and 12, 2017) (Fig. 5).

Water temperature was 10.5, 15.9, and 14.0°C at the river km 75.4 site on April 27, May 4, and May 11, 2017, respectively, and ranged from 9.6 to 16.0 at the river km 76.1 site between April 8 and May 12, 2017 (highest temperature was recorded on May 5, 2017, and then it attenuated). For early spring release, we target our releases to take place when the rivers/streams reach 7-12°C. Some of the releases should have been scheduled earlier (perhaps starting in late March and early April) to reduce the warm water conditions experienced in this reach.

The primary goal for the releases downstream of Prosser Dam was to evaluate dam passage through the fish ladders and lamprey passage structures. The primary goal for the releases upstream of Prosser Dam was two-fold: 1) to evaluate the destination of lamprey upstream of Prosser Dam and the migration behavior into tributary streams, including translocation streams; and 2) to release the more sexually mature adults into the rivers/streams in a timely fashion so they can find spawning grounds on their own (prior to over ripening). Lamprey for the release upstream of the dam were predominantly sexually mature lamprey from Prosser Hatchery (many lamprey matured simultaneously around this time) that could not be held much longer in the tanks (due to their advanced sexual maturation stage).



Figure 5. Aerial map of Pacific Lamprey translocation release sites (yellow arrows) in the Lower Yakima River. “YAK” stands for Yakima, the number next to the stream abbreviation is the river km, and the number in parenthesis is the total number of lamprey released. Also shown with the blue circles are the PIT tag array locations, including the location of Chandler Juvenile Monitoring Facility (PIT arrays are located on each of the three fish ladders at the dam). The red dots indicate 0.1 km segments of the Yakima River.

Lower Yakima River #2

There were two additional release sites in the mid and upper portion of the Lower Yakima River: 1) four lamprey were released at river km 134.7 on May 18, 2017; and 2) 15 lamprey were released at river km 172.6 on April 27, 2017 (Fig. 6). Lamprey released at river km 172.6 were untagged (too ripe to PIT tag).

Water temperature was 14.0°C at the river km 134.7 site on May 18, 2017, and 9.5°C at the river km 172.6 site on April 27, 2017. For early spring release, we target our releases to take place when the rivers/streams reach 7-12°C. Ideally, the releases would take place earlier than May 18 (perhaps starting in late March and early April) to reduce the warm water conditions experienced in this reach; however, these lamprey were released as an emergency measure (rather than scheduled releases) to prevent mortality at the hatchery and to increase the chances that lamprey survive to reach their spawning grounds successfully.

The primary goal for the releases upstream of Prosser Dam was to release the more sexually mature adults into the rivers/streams in a timely fashion so they can find spawning grounds on their own (prior to over ripening). Lamprey for the release upstream of the dam were predominantly sexually mature lamprey from Prosser Hatchery (many lamprey matured simultaneously around this time) that could not be held much longer in the tanks (due to their advanced sexual maturation stage). To ensure some can reach upstream of the Sunnyside and Wapato diversion dams, we released one group upstream of these two dams.



Figure 6. Aerial map of Pacific Lamprey translocation release sites (yellow arrows) in the upper part of the Lower Yakima River. “YAK” stands for Yakima, the number next to the stream abbreviation is the river km, and the number in parenthesis is the total number of lamprey released. Shown with the blue circles are the PIT tag array locations. Yakima River is the red line.

Lower Yakima River #3

There were nine additional PIT tagged lamprey that escaped the lamprey passage structure at Prosser Dam right ladder (river km 75.6) approximately on April 18, 2017, and were later detected at Prosser Dam fish ladder.

These lamprey were in the passage structure traps to experiment with attraction resulting from other adult lamprey pheromone signal, but due to small opening available in the entrance device, they were able to escape the trap and move downstream. As a result, they were not intentionally released, but nevertheless have begun migrating on their own, and were detected by some of the PIT arrays.

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 are summarized. A total of 158 lamprey (38.2%) out of 414 total PIT tagged lamprey released were detected in at least one PIT array site.

There are a total of three instream PIT array sites on the mainstem Yakima River (river km 75.7, 171.2, and 210.5) and many more within the tributaries (Fig. 7). Within the Lower Yakima, there are two sites in Toppenish Creek (river km 2.1 and 55.5), and one site each in Simcoe (river km 8.9), Satus (river km 4.3), and Ahtanum (river km 4.0) creeks. Within the Upper Yakima, there are three sites within Teanaway River (river km 0.4, 19.8, and North Fork Teanaway river km 0.2), two sites within Menastash (river km 2.2 and 9.3) and Taneum (river km 0.1 and 3.6), and one site each within Swaulk (river km 0.3). Additional sites are being established in other tributaries (e.g. Naches, Cowiche, Tieton, Wenas, Reecer, and Cle Elum) and side channels / canals (Marion Drain, Holmes Acclimation channel) as well. Some of these arrays are temporary and are not running year around. Most sites have a pair of arrays, consisting of lower (downstream) and an upper (upstream) array.

Based on data provided by the flow monitoring stations within Satus Creek (river km 4.3), Toppenish Creek (river km 72.9), Ahtanum Creek (river km 1.0), and Yakima River (river km 177.7), the release events occurred primarily during the peak and tail end of the snow melt peak flow (Fig. 8, 9, 10, and 11). Discharge ranged between 6,000-17,000 cfs within the Yakima River, 100-350 cfs in Upper Toppenish Creek, 450 cfs in Lower Ahtanum, and 1,000 cfs in Satus Creek during the adult release period. The tail end of the detection was on July 15, 2017, which corresponds to the tail end of the rapid decline in water flow in all of these streams/ rivers, and the very last detection was on November 24, 2017 (Satus Creek), which corresponds to a high discharge point (potential movement of lamprey during the high flow event).

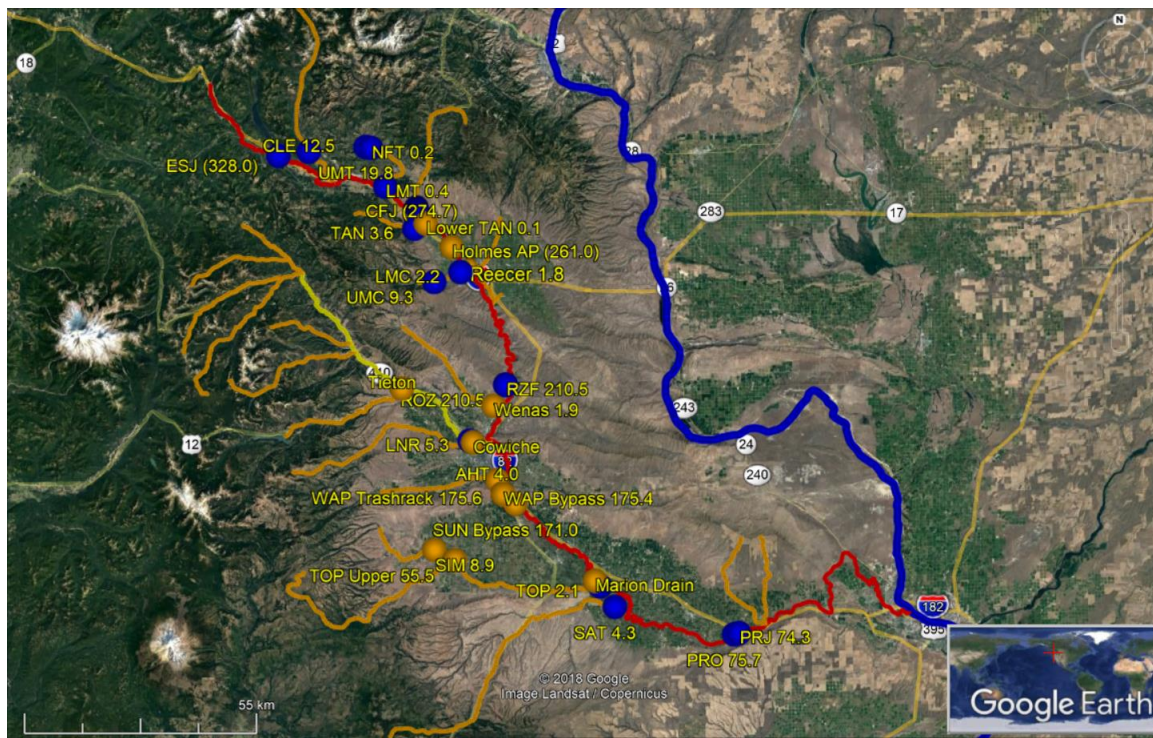


Figure 7. Overall aerial map of PIT tag arrays within the Yakima Subbasin. The two- to three-letter abbreviation or name and its associated river km is labeled in yellow font. The red line represents mainstem Yakima River, the orange lines represent its tributaries, and the blue line represents the Columbia River.

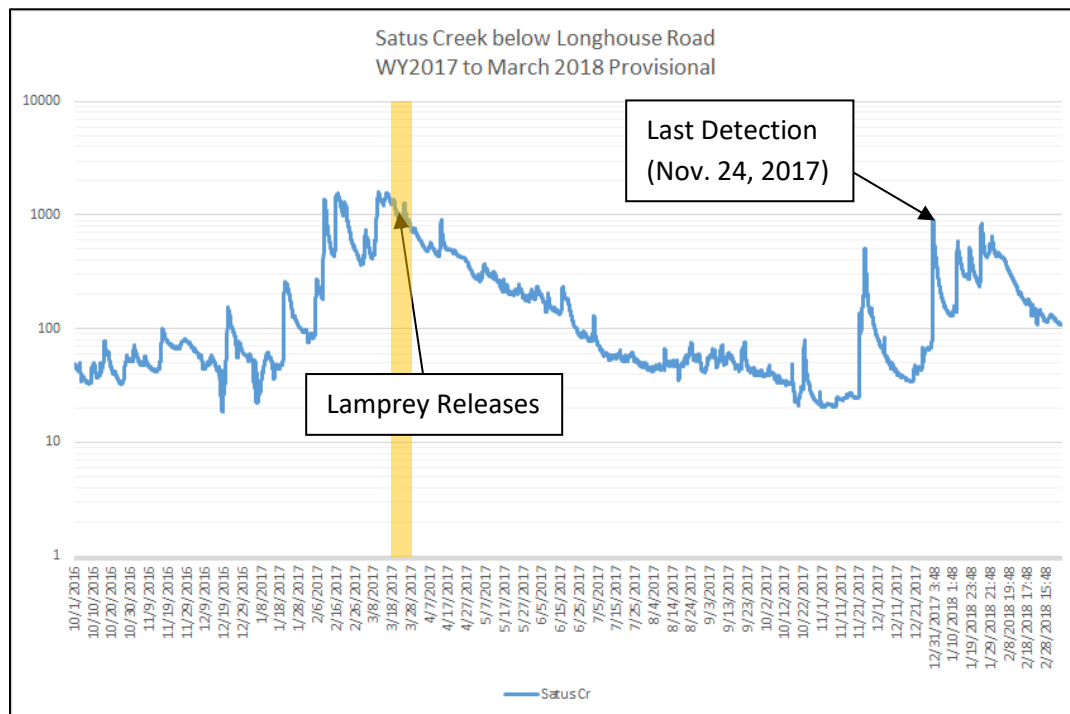


Figure 8. Discharge (cubic feet per second) data of Satus Creek in Satus, WA, below Satus Longhouse Road (river km 5.1) between October 1, 2016, and February 28, 2018 (Yakama Nation Water Resources Program), and associated lamprey releases and detection information.

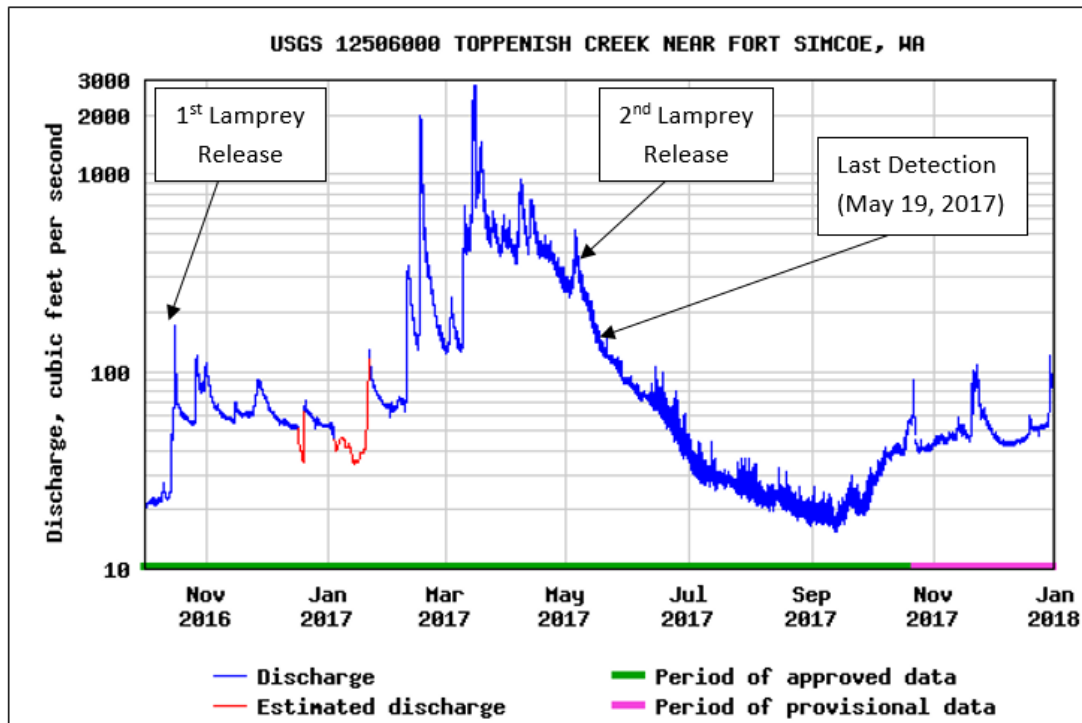


Figure 9. Discharge (cubic feet per second) data of Toppenish Creek near Fort Simcoe, WA (river km 72.9) between October 1, 2016, and December 31, 2017 (US Geological Survey National Water Information System: Web Interface), and associated lamprey release and detection information.

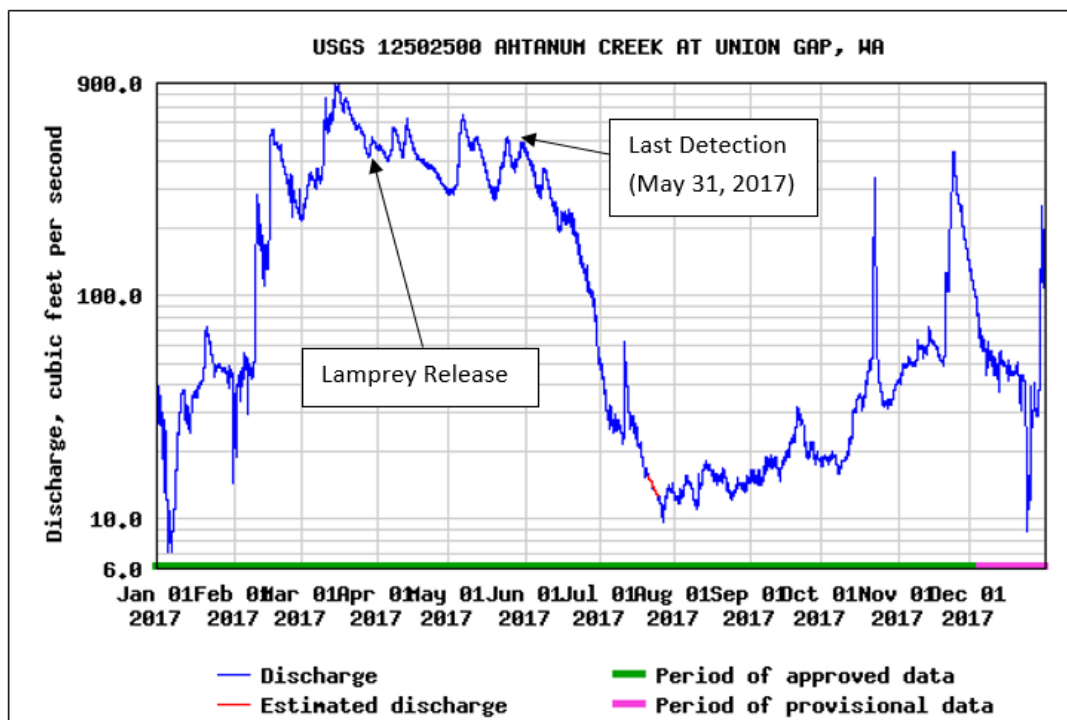


Figure 10. Discharge (cubic feet per second) data of the Ahtanum Creek at Union Gap, WA (river km 1.0) between January 1, 2017, and December 31, 2017 (US Geological Survey National Water Information System: Web Interface), and associated lamprey release and detection information.

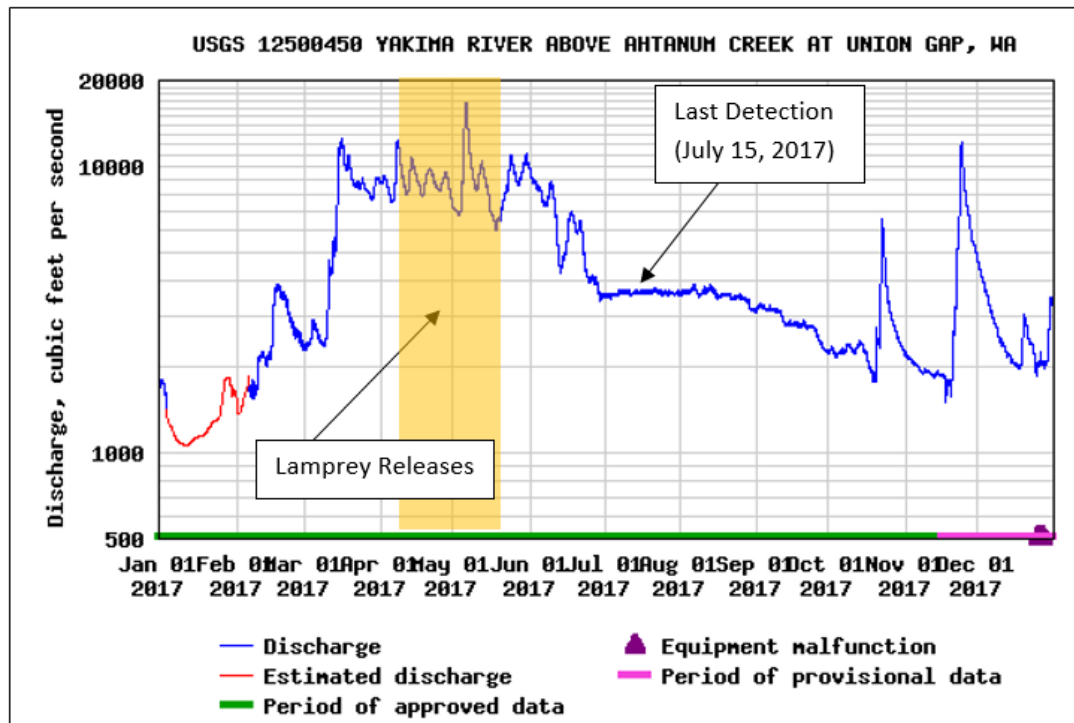


Figure 11. Discharge (cubic feet per second) data of the Yakima River at Union Gap, WA (river km 177.7) between January 1, 2017, and December 31, 2017 (US Geological Survey National Water Information System: Web Interface), and associated lamprey release and detection information.

Satus Creek #1 (River KM 3.0; 3/24/2017; n=15)

- 8 of 15 detected (53.3%), and none were detected at more than 1 site.
- All detections were from lamprey moving upstream to SAT (Lower Satus Creek; river km 4.3).
- Detection at SAT all occurred on 3/24/2017 (release date) between the hour of 15:28 and 21:37 (migration speed of 2.8-12.5 km/day).
- All detections were less than 1 min long in duration, and no downstream post-spawn drifting movements were detected.

Satus Creek #2 (River KM 3.0; 3/30/2017; n=15)

- 12 of 15 detected (80.0%), and none were detected at more than 1 site.
- All detections were from lamprey moving upstream to SAT (Lower Satus Creek; river km 4.3).

- All first detections at SAT occurred on 3/30/2017 (release date) between 11:35 and 22:13 (migration speed of 2.6-6.5 km/day), except one lamprey was first detected on April 4, 2017, at 21:57.
- All detections were less than 2 min long in duration, except one lamprey was detected for 7 min and another one was detected several months later on November 24, 2017.

Toppenish Creek #1 (River KM 54.4; 5/9/2017; n=30)

- 8 of 30 detected (26.7%), and none were detected at more than 1 site.
- All detections were from lamprey moving upstream to SIM (Simcoe Creek; river km 8.9).
- All first detections at Simcoe occurred by 2:47 on May 11, 2017 (1.5 days post release date) between the hour of 21:26 and 2:47 (migration speed of 0.8-2.3 km/day), except one lamprey was first detected on May 19, 2017 (9.5 days post release) at 3:51.
- All detections were less than 2 min long in duration, except one lamprey was detected for 24 min on May 19, 2017, with a total of 724 detections. The highest detection number was 1,486, but it only lasted for 2 min in duration.

Toppenish Creek #2 (River KM 61.6; 10/13/2016; n=10)

- None of the 10 PIT tagged lamprey were detected during the study period.

Ahtanum Creek (River KM 1.7; 3/29/2017; n=29)

- 12 of 29 detected (41.4%), and none were detected at more than 1 site.
- All detections were from lamprey moving upstream to the Lower Ahtanum array (river km 4.0).
- All first detections at Lower Ahtanum array occurred between March 29 and May 17, 2017 (0.4 – 49.4 days after release) between the hours of 19:58 and 2:45 (migration speed of 0.0-2.5 km/day). Many of the lamprey released in Ahtanum Creek did not move upstream right away; only two lamprey moved upstream during the first two nights.
- Most detections were less than 3 min long in duration, except three lamprey were detected 6.1, 29.1, and 51.0 days later on May 23, 2017, April 29, 2017, and May 31, 2017, respectively.

Lower Yakima River #1 (River KM 75.4; 4/27/2017; n=50)

- 35 of 50 detected (70.0%), and 3 were detected at more than 1 site. 17 out of 35 (48.6%) were from the left bank release.
- All first detections (35) were from lamprey moving upstream to PRO (Prosser Diversion Dam Combined; river km 75.7; Fig. 12).
- Of the 35 lamprey detected at PRO, two lamprey were later detected at SAT (Lower Satus Creek; river km 4.3) and one lamprey was later detected at ROZ (Roza Diversion Dam Combined; river km 210.5; Fig. 13).
- Two lamprey that entered SAT was between May 4 and May 5, 2017, and the migration speed was 10.4 and 24.9 km/day.
- For the one lamprey that entered ROZ, it occurred on May 23, 2017, and the migration speed was 6.5 km/day (only detected at downstream weir), so likely no passage at Roza Dam.
- Detection at PRO all occurred between April 29, 2017, and June 19, 2017 (1.6 - 53.6 days after release). Time of day was between 20:14 and 10:42.
- For 7 of 35 lamprey (20.0%) at PRO, the last detection was at a lower array at PRO, indicating they may not have successfully passed the dam (at least there is some uncertainty).
- On the other hand, it is possible that some tagged lamprey could pass the dam completely undetected (if they use the picketed lead areas) – from radio telemetry, the count efficiency at Prosser Dam was only about 50% (1 out of 2 lamprey passed the dam undetected).
- At PRO, 22 of 35 lamprey (62.9%) were last detected at the right ladder counting window, 10 of 35 lamprey (28.6%) were last detected at the left ladder counting window, and 3 of 35 lamprey (8.6%) were last detected at the center ladder counting window.
- At PRO, one lamprey was first detected in the left ladder, but was later detected in the right ladder (4.8 days later). Another lamprey was first detected in the left ladder, but was later detected in the center ladder (0.5 days later).
- At PRO, the average detection duration on the right, center, and left ladders were 0.39, 0.00, and 1.06 days, respectively, indicating the left ladder taking longer to pass lamprey.

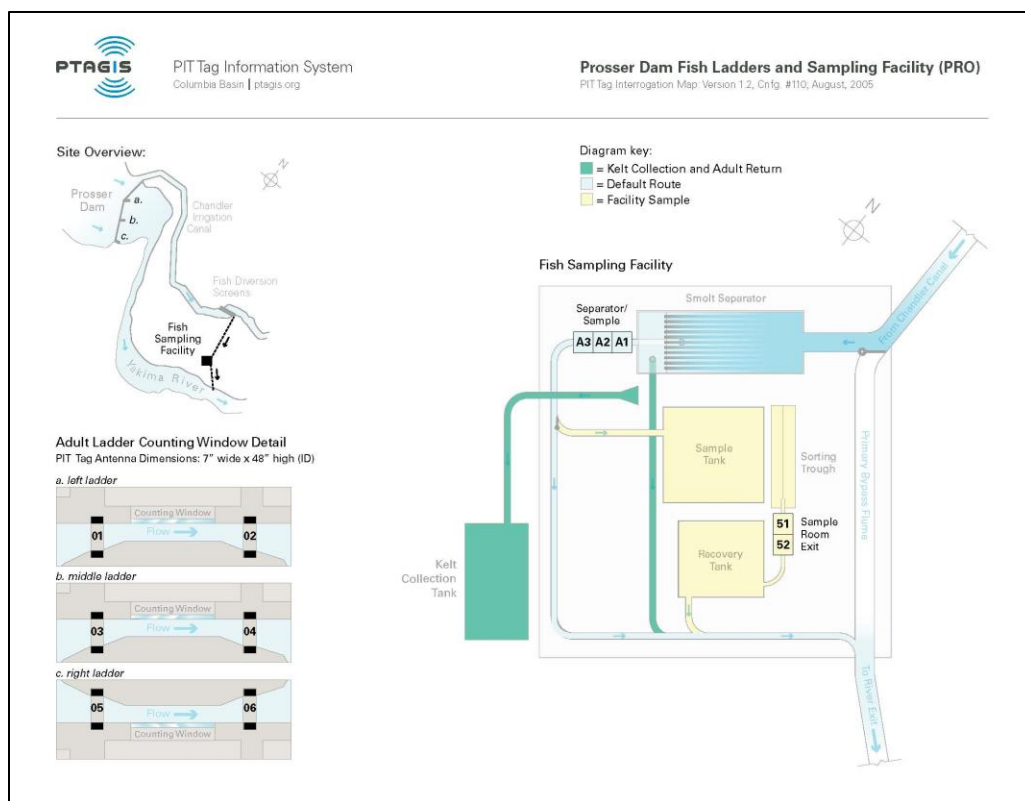


Figure 12. PIT array configuration at Prosser Diversion Dam.

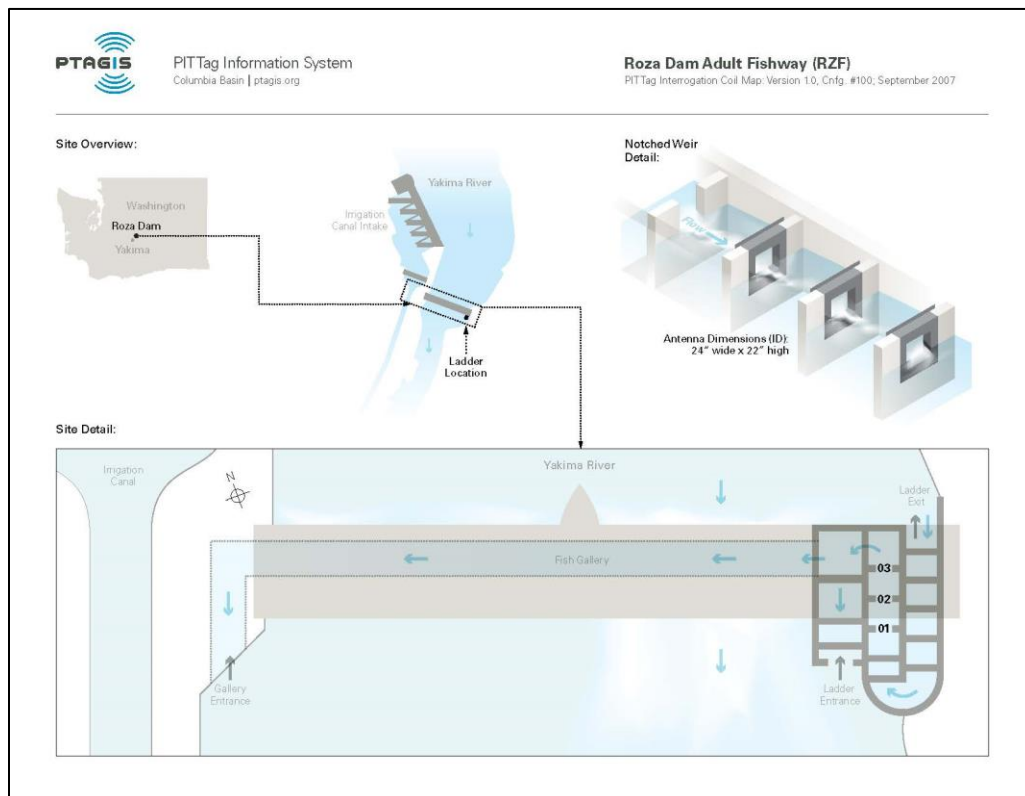


Figure 13. PIT array configuration at Prosser Diversion Dam.

Lower Yakima River #2 (River KM 75.4; 5/4/2017; n=50)

- 27 of 50 detected (54.0%), and 2 were detected at more than 1 site. 20 of 27 (74.1%) were from the left bank release.
- All first detections, except from one lamprey, were from lamprey moving upstream to PRO (Prosser Diversion Dam Combined; river km 75.7). One lamprey was only detected at SAT (Lower Satus Creek), indicating that it passed Prosser Dam undetected.
- Of the 26 lamprey detected at PRO, two lamprey were later detected at SAT (Lower Satus Creek; river km 4.3).
- Three lamprey that entered SAT did so between May 5 and May 6, 2017, and the migration speed was 17.7, 41.8, and 48.3 km/day (potentially the fastest speed ever recorded for Pacific Lamprey).
- Detection at PRO all occurred between May 4, 2017, and July 4, 2017 (0.3 – 61.3 days after release). Time of day was between 21:00 and 14:24.
- For 3 of 34 lamprey (8.8%) at PRO, the last detection was at a lower array at PRO, indicating they may not have successfully passed the dam (at least there is some uncertainty). In addition, one lamprey was detected on July 13, 2017, at the “Smolt Bypass Separator/Sample,” which was 69.7 days after the first detection at Prosser Dam, likely indicating post spawn drifting.
- At PRO, 14 of 26 lamprey (53.8%) were last detected at the right ladder counting window, 9 of 26 lamprey (34.6%) were last detected at the left ladder counting window, and 3 of 26 lamprey (11.5%) were last detected at the center ladder counting window. No lamprey appeared to switch from one ladder to another.
- At PRO, the average detection duration on the right, center, and left ladders were 0.00, 0.00, and 0.91 days, respectively, indicating the left ladder taking longer to pass lamprey.

Lower Yakima River #3 (River KM 75.4; 5/11/2017; n=51)

- 36 of 51 detected (70.6%), and 3 were detected at more than 1 site.
- All first detections, except from one lamprey, were from lamprey moving upstream to PRO (Prosser Diversion Dam Combined; river km 75.7). One lamprey was only detected at SAT (Lower Satus Creek), indicating that it passed Prosser Dam undetected.
- Of the 35 lamprey detected at PRO, one lamprey were later detected at SAT (Lower Satus Creek; river km 4.3) and two lamprey were later detected at ROZ (Roza Diversion Dam Combined; river km 210.5).
- Two lamprey that entered SAT did so between May 21 and June 15, 2017, and the migration speed was 4.0 and 18.8 km/day.

- Two lamprey that entered ROZ did so between June 13 and June 19, 2017, and the migration speed was 5.4 and 6.2 km/day (one lamprey was last detected at upstream array indicating potential passage through the ladder section).
- Detection at PRO all occurred between May 11, 2017, and June 12, 2017 (0.2 – 32.4 days after release). Time of day was between 16:21 and 12:28.
- For 13 of 35 lamprey (37.1%) at PRO, the last detection was at a lower array at PRO, indicating they may not have successfully passed the dam (at least there is some uncertainty). In addition, one lamprey was detected on July 15, 2017, at the “Smolt Bypass Separator/Sample,” which was 57.4 days after the first detection at Prosser Dam, likely indicating post spawn drifting.
- At PRO, 24 of 35 lamprey (68.6%) were detected at the left ladder counting window, 7 of 35 lamprey (20.0%) were detected at the right ladder counting window, and 4 of 35 lamprey (11.4%) were last detected at the center ladder counting window. No lamprey appeared to transfer from one ladder to another.
- At PRO, the average detection duration on the right, center, and left ladders were 0.01, 0.00, and 3.35 days, respectively, indicating the left ladder taking longer to pass lamprey.

Lower Yakima River #4 (River KM 76.1; 4/8/2017-5/12/2017; n=151)

- 19 of 151 detected (12.6%), and none were detected at more than 1 site.
- 10 of 19 detections (52.6%) were from lamprey moving upstream to SAT (Lower Satus Creek; river km 4.3), 3 of 19 detections (15.8%) were from lamprey moving upstream to SUN (Sunnyside Instream Array; river km 171.1), 4 of 19 detections (21.1%) were from lamprey moving upstream to ROZ (Roza Diversion Dam Combined; river km 210.5), and 2 of 19 detections (10.5%) were from lamprey moving downstream to PRO (Prosser Diversion Dam Combined; river km 75.7).
- None of the four lamprey detected at ROZ was detected at SUN, indicating 20% or less detection efficiency at SUN.
- Ten lamprey that entered SAT did so between April 9 and May 22, 2017 (1.3-10.4 days after release), and the migration speed was 3.9 and 32.2 km/day.
- Three lamprey that entered SUN did so between April 27 and 30, 2017 (19.5 – 22.4 days after release), and the migration speed was 4.2 and 4.9 km/day.
- Four lamprey that entered ROZ did so between May 21 and June 19, 2017 (42.6-72.5 days after release), and the migration speed was 1.9 and 3.2 km/day.
- Two lamprey that moved downstream to enter PRO did so between June 14 and June 23, 2017 (40.2-43.3 days after release) and were only detected at the “Smolt Bypass Separator / Sample” arrays, indicating entrainment into Chandler Diversion / Canal. Time of day was 20:37 and 22:31, respectively.

Lower Yakima River #5 (River KM 134.7 & 172.6; 5/18/2017 & 4/27/2017; n=4 & 15)

- None of the four lamprey released at river km 134.7 on May 18, 2017, were detected.
- None of the 15 lamprey released at river km 172.6 on April 27, 2017, were PIT tagged.

Lower Yakima River #6 (River KM 75.6; 4/18/2017~; n=9)

- Nine lamprey that escaped the lamprey passage structure trap on the right ladder were detected at PRO (Prosser Diversion Dam Combined; river km 75.7).
- 8 of 9 lamprey (88.9%) were detected at the right ladder, while one was detected at the left ladder.
- For 7 of 9 lamprey (77.7%) at PRO, the last detection was at a lower array at PRO, indicating they may not have successfully passed the dam (at least there is some uncertainty).
- Dates of first detection ranged from 4/18/2017 to 5/20/2017.
- Three lamprey that escaped the new lamprey structure trap box were detected inside Prosser Dam right ladder starting on April 18, April 20, and April 23, 2017, triggering a total of 44,704, 9,358, and 272,467 detections, respectively, until they were found inside the right ladder behind the picketed lead area during dewatering maintenance on May 1, 2017.
- In fact, 4 of 9 lamprey (44.4%) had more than 40,000 PIT tag detections at PRO, which led to the examination of the question below.

Holding of PIT Tagged Lamprey by Dam PIT Arrays

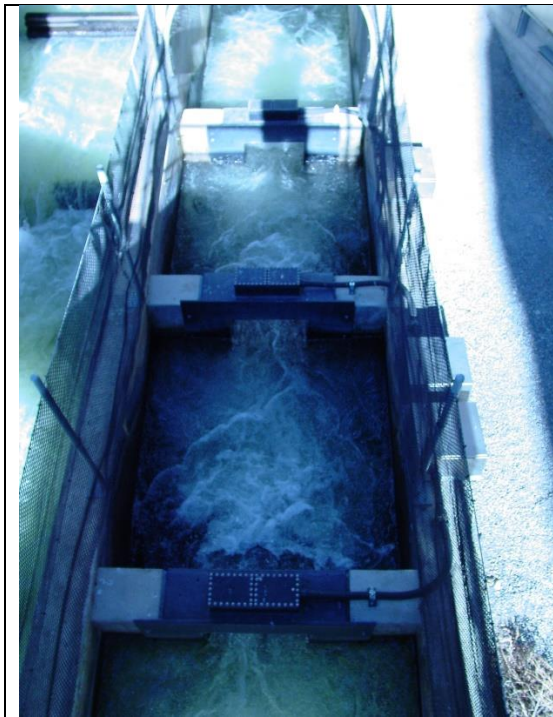
- At Prosser and Roza diversion dams, there were several PIT tagged lamprey that appeared to hold in front of the PIT array detection zones, thereby likely causing interference in the detection of other PIT tagged fish.
- To add some context, one lamprey (3DD.0077963918) that was detected a total of 11,483 times (380 records under PTAGIS “Complete Tag History”) held in front of the PIT array continuously for 8 min. A total of 25,000 detections would be approximately 17.5 min of continuous holding (if condensed). The majority of these lamprey detections (95-100%) were during evening hours (typically 8pm-3am).
- At Prosser Dam, there were 11 individual lamprey that were detected more than 25,000 times (63.6% were 12 mm PIT tags and 36.4% were 9 mm PIT tags). The highest number of detections from an individual lamprey from PRO was 603,157 (approximately 7 hours of holding; 12 mm PIT tag).

- At Roza Dam, there were four individual lamprey that were detected more than 25,000 times (75% were 9 mm PIT tags and 25% were 12 mm PIT tags). The highest number of detections from an individual lamprey from PRO was 64,032 (approximately 44 min of holding; 12 mm PIT tag).
- A solution was implemented on June 21, 2017 at Prosser Dam – vexar sheeting (3/8” mesh) was attached to the PIT array metal containers that were on the back side of the fish counting station at all three fish ladders. No holding in front of the PIT arrays were detected at Prosser Dam since this solution was implemented, and vexar sheeting was confirmed to be holding up during the assessment several months after the placement. See photos below.





- Unlike the Prosser Dam holding issue, which occurred on the back side of the PIT arrays, the Roza Dam holding occurs within the fish ladder weir. Prevention of holding in the fish ladder weir will likely negatively impact lamprey passage (unless an alternate passage route is provided). As a result, solutions at Roza Dam is best if it could accommodate passage needs of lamprey as well as the prevention of PIT tag interference. A few solutions will be implemented during the dewatering period in 2017-2019. Shown below are some potential solutions being discussed.



Roza Dam fish ladder weir PIT arrays (3 total).

<p>PSMFC - Rosa Dam PIT Tag Antenna Concept Drawing</p> <p>Concrete to be added for antenna installation. Required additional reinforcement not shown.</p> <p>Concrete to be added for antenna installation. Required additional reinforcement not shown.</p> <p>Concrete to be removed for antenna installation.</p> <p>Existing weir wall.</p> <p>12.00</p> <p>41.00</p> <p>20.50</p> <p>8.50 - 2 pics</p> <p>"Detail A"</p> <p>Top of new weir wall concrete to be 3" below sides of ladder.</p> <p>3.00</p> <p>NOTES: All dimensions in inches. Concrete to be removed in areas indicated. Concrete to be added in areas indicated. Antenna will be bolted to the weir wall through the flange.</p> <p>6/25/2007 - Page 1 of 2</p>	<p>Design drawing of the Roza Dam fish ladder weir PIT arrays.</p>
<p>Fill the 13/16" gap with 45" x 16" x 3/4" PVC board underneath on both sides</p> <p>12" PVC Pipe (half moon) sealed to PVC board using marine epoxy & stainless screws (*no direct attachment to array)</p> <p>Also, use epoxy b/w two boards and concrete wall</p> <p>stainless steel bolts</p> <p>8.00</p> <p>12.625 PVC</p>	<p>Conceptual drawing of one potential solution (a combination of half-moon PVCs and PVC boards to prevent lamprey from holding within the detection zone but also helping lamprey gain their continuous attachment surface needed to pass through the high velocity area).</p>
<p>8.00</p> <p>8.00</p> <p>6.00</p> <p>15.00</p> <p>24.00</p> <p>12.625 PVC</p> <p>Lamprey Holding Areas (Downstream Side)</p>	<p>Conceptual drawing of the PIT tag detection zone at the array (large red circle) and the proposed new half-moon PVCs (orange areas). Suspected lamprey holding occurs on the downstream side (as well as potentially on the upstream side).</p>

Summary

The highlights from the 2016-2017 broodstock adult Pacific Lamprey translocation monitoring are the following (Table 4 and Fig. 14 and 15):

- The site with the most detection was at PRO (Prosser Dam; 60.4%), SAT (Lower Satus Creek; 21.9%), AHT (Lower Ahtanum Creek; 7.1%), and SIM (Simcoe Creek; 4.7%) (Table 4 and Fig. 14). There were some detections from ROZ (Roza Dam; 4.1%) and SUN (Sunnyside Instream Array; 1.8%) as well.
- Detection of movement was the highest during the month of May and attenuated in June and July, with the last detection in mid-July (Fig. 15). One movement was detected in late November, likely associated with an increase in discharge.
- Majority of the lamprey released in Satus Creek were detected moving upstream (66.7%).
- Almost half of the lamprey (41.4%) released in Ahtanum Creek were detected moving upstream, although upstream movement occurred at various times over a 50 day period, unlike most other tributary releases.
- About a quarter of the lamprey (26.7%) released in Upper Toppenish Creek were detected moving into Simcoe Creek.
- Detection from the three releases downstream of Prosser Dam resulted in an overall 64.9% detection. For some of these (22.1% overall), the last detection was at a lower array, indicating potential fallback within the ladder. However, 1 of the 6 lamprey (16.7%) that entered Satus Creek from these releases was not detected at Prosser Dam, indicating some level of passage without detection.
- From the 151 adults released downstream of Prosser Dam, six lamprey (4.0%) were detected at Satus Creek. Ten of the 155 adults (6.5%) released immediately upstream of Prosser Dam were detected at Satus Creek; providing an estimate of 61.6% Prosser Dam passage.
- From the 151 adults released downstream of Prosser Dam, three lamprey (2.0%) were detected at Roza Dam (one of which were last detected at the upper array, potentially indicating fish ladder passage). Four of the 155 lamprey (2.6%) released immediately upstream of Prosser Dam were detected at Roza Dam; providing an estimate of 77% Prosser Dam passage.
- Lamprey used the left and right ladder the most (44.8% each), while only several used center ladder (10.4%). However, the average time spent in left ladder ranged from 0.91 to 3.35 days, whereas the time spent in the right and center ladders ranged from 0.00 to 0.39 days, indicating that lamprey seem to struggle more in passing the left ladder.
- There was a seasonal tendency - more lamprey approached the right ladder during the early spring high flow season, whereas during the late spring lower flow conditions, more lamprey approached the left ladder.
- The fastest upstream traveling lamprey detected was 48.3 and 41.8 km/day (lamprey detected at Lower Satus Array), which may be the fastest migration speed ever recorded for Pacific Lamprey upstream migration.
- Downstream post spawn drifting was observed primarily between mid-June and mid-July.
- Lamprey continuous holding by PIT arrays were detected at Prosser and Roza diversion dams and will be closely examined in future years (focusing on issues and potential solutions).

Table 4. Summary of 2016-2017 broodstock Pacific Lamprey translocation detection sites from the Yakima Subbasin releases.

River	River KM	Site ID	Site Name	# of	
				Lamprey Detected	% Detected
Yakima	75.7	PRO	Prosser Diversion Dam Combined	107	61.5%
Yakima	171.1	SUN	Sunnyside Instream Array	3	1.7%
Yakima	210.5	ROZ	Roza Diversion Dam (Combined)	7	4.0%
Satus	4.3	SAT	Lower Satus Creek	37	21.3%
Simcoe	8.9	SIM	Simcoe Creek	8	4.6%
Ahtanum	4.0	AHT	Ahtanum	12	6.9%

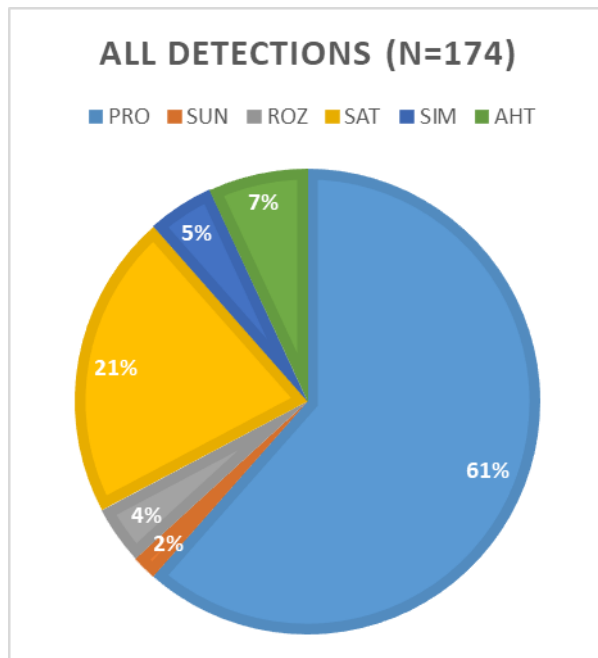


Figure 14. A pie chart summarizing all the site detections (N=169) from the 133 lamprey that were detected at least once from the 2017 spring translocation release in the Yakima Subbasin (none were detected from the 2016 fall release).

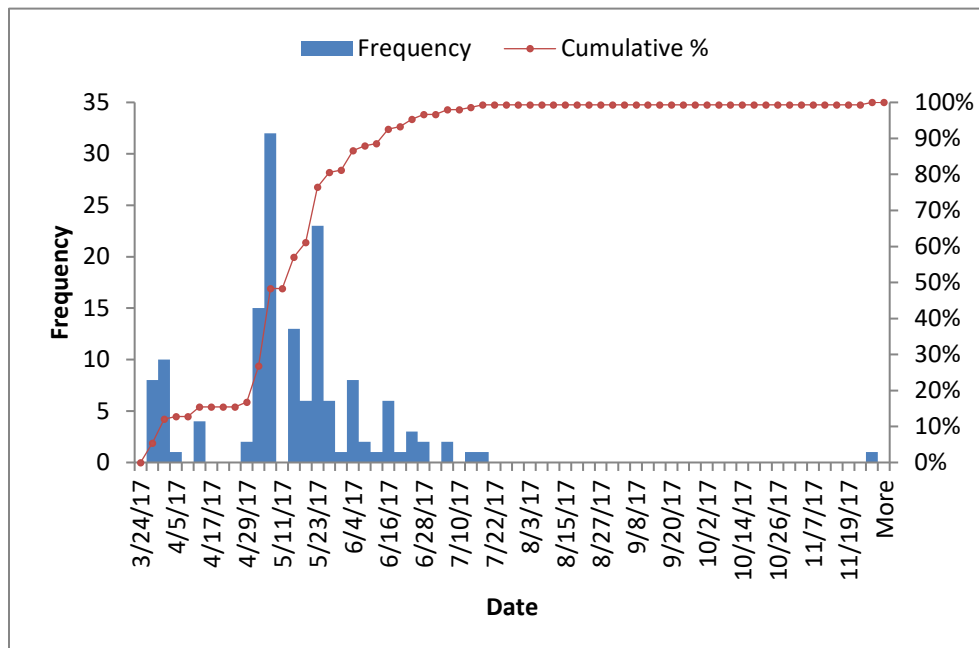


Figure 15. Frequency of movement displayed by Pacific Lamprey from the 2017 Spring release in the Yakima Subbasin based on PIT tag detection data.

Appendix: PIT Tag Information

#	PIT Tag ID	Date	River	KM	Latitude	Longitude	#	PIT Tag ID	Date	River	KM	Latitude	Longitude
1	3DA.1A19B33CC5	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	71	3DA.1A19B2FD91	5/9/2017	Toppenish	54.4	46.37571	-120.61888
2	3DA.1A19B2FB13	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	72	3DA.1A19B30797	5/9/2017	Toppenish	54.4	46.37571	-120.61888
3	3DA.1A19B3258A	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	73	3DD.00779663A9	5/9/2017	Toppenish	54.4	46.37571	-120.61888
4	3DA.1A19B3181A	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	74	3DA.1A19B32794	5/9/2017	Toppenish	54.4	46.37571	-120.61888
5	3DA.1A19B31E19	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	75	3DD.00779720AF	5/9/2017	Toppenish	54.4	46.37571	-120.61888
6	3DA.1A19B31AE8	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	76	3DD.0077971C63	5/9/2017	Toppenish	54.4	46.37571	-120.61888
7	3DA.1A19B2FA70	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	77	3DA.1A19B31CA1	5/9/2017	Toppenish	54.4	46.37571	-120.61888
8	3D9.1C2C52AC3B	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	78	3DD.0077949ED3	5/9/2017	Toppenish	54.4	46.37571	-120.61888
9	384.1B797708F0	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	79	3DD.007796561B	5/9/2017	Toppenish	54.4	46.37571	-120.61888
10	3DA.1A19B31383	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	80	3DD.0077969ABD	5/9/2017	Toppenish	54.4	46.37571	-120.61888
11	3DA.1A19B31B31	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	81	3DD.007795EFAA	5/9/2017	Toppenish	54.4	46.37571	-120.61888
12	3DA.1A19B3228F	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	82	3DD.007796C883	5/9/2017	Toppenish	54.4	46.37571	-120.61888
13	3DA.1A19B3279E	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	83	3DD.0077962C48	5/9/2017	Toppenish	54.4	46.37571	-120.61888
14	3DA.1A19B333FC	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	84	3DA.1A19B326AB	5/9/2017	Toppenish	54.4	46.37571	-120.61888
15	3DA.1A19B32D9D	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	85	3DA.1A19B32379	5/9/2017	Toppenish	54.4	46.37571	-120.61888
16	3DA.1A19B339FC	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	86	3DD.007796C401	5/9/2017	Toppenish	54.4	46.37571	-120.61888
17	3DA.1A19B33BB9	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	87	3DD.007796DC32	5/9/2017	Toppenish	54.4	46.37571	-120.61888
18	3DA.1A19B33AFA	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	88	3DD.007796486C	5/9/2017	Toppenish	54.4	46.37571	-120.61888
19	3DA.1A19B32C2C	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	89	3DD.00779698B5	5/9/2017	Toppenish	54.4	46.37571	-120.61888
20	3DA.1A19B2F72E	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	90	3DA.1A19B33A79	10/13/2016	Toppenish	61.6	46.35595	-120.68443
21	3DA.1A19B31B13	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	91	3DA.1A19B33D4D	10/13/2016	Toppenish	61.6	46.35595	-120.68443
22	3DA.1A19B33C84	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	92	3DA.1A19B31501	10/13/2016	Toppenish	61.6	46.35595	-120.68443
23	3DA.1A19B3101F	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	93	3DA.1A19B32A32	10/13/2016	Toppenish	61.6	46.35595	-120.68443
24	3DA.1A19B31728	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	94	3DA.1A19B32A3C	10/13/2016	Toppenish	61.6	46.35595	-120.68443
25	3DA.1A19B32F54	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	95	3DA.1A19B32BAA	10/13/2016	Toppenish	61.6	46.35595	-120.68443
26	3DA.1A19B339AF	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	96	3DA.1A19B323B5	10/13/2016	Toppenish	61.6	46.35595	-120.68443
27	3DA.1A19B32C05	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	97	3DA.1A19B319D9	10/13/2016	Toppenish	61.6	46.35595	-120.68443
28	3DA.1A19B32AE7	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	98	3DA.1A19B32EFE	10/13/2016	Toppenish	61.6	46.35595	-120.68443
29	3DA.1A19B32E1F	3/29/2017	Ahtanum	1.7	46.53839	-120.47989	99	3DA.1A19B2F77C	10/13/2016	Toppenish	61.6	46.35595	-120.68443
30	3DD.0077969C31	3/24/2017	Satus	3.0	46.27085	-120.12667	100	3DD.0077970A24	4/27/2017	Yakima	75.4	46.21358	-119.76892
31	3DD.0077966F47	3/24/2017	Satus	3.0	46.27085	-120.12667	101	3DD.0077971888	4/27/2017	Yakima	75.4	46.21358	-119.76892
32	3DD.007795EFC2	3/24/2017	Satus	3.0	46.27085	-120.12667	102	3DD.007796521B	4/27/2017	Yakima	75.4	46.21358	-119.76892
33	3DD.00779720FF	3/24/2017	Satus	3.0	46.27085	-120.12667	103	3DD.0077966499	4/27/2017	Yakima	75.4	46.21358	-119.76892
34	3DD.007795C1FB	3/24/2017	Satus	3.0	46.27085	-120.12667	104	3DD.007796646D	4/27/2017	Yakima	75.4	46.21358	-119.76892
35	3DD.007796541A	3/24/2017	Satus	3.0	46.27085	-120.12667	105	3DD.007795F6CD	4/27/2017	Yakima	75.4	46.21358	-119.76892
36	3DD.0077969CCB	3/24/2017	Satus	3.0	46.27085	-120.12667	106	3DD.007797062B	4/27/2017	Yakima	75.4	46.21358	-119.76892
37	3DD.0077971B3C	3/24/2017	Satus	3.0	46.27085	-120.12667	107	3DD.0077968528	4/27/2017	Yakima	75.4	46.21358	-119.76892
38	3DD.00779705BE	3/24/2017	Satus	3.0	46.27085	-120.12667	108	3DD.00779681DC	4/27/2017	Yakima	75.4	46.21358	-119.76892
39	3DD.00779635A5	3/24/2017	Satus	3.0	46.27085	-120.12667	109	3DD.0077968379	4/27/2017	Yakima	75.4	46.21358	-119.76892
40	3DD.00779602C0	3/24/2017	Satus	3.0	46.27085	-120.12667	110	3DD.007795F0F6	4/27/2017	Yakima	75.4	46.21358	-119.76892
41	3DD.0077961297	3/24/2017	Satus	3.0	46.27085	-120.12667	111	3DD.007797062D	4/27/2017	Yakima	75.4	46.21358	-119.76892
42	3DD.0077961CDE	3/24/2017	Satus	3.0	46.27085	-120.12667	112	3DA.1A19B2FA4E	4/27/2017	Yakima	75.4	46.21358	-119.76892
43	3DD.0077960E4E	3/24/2017	Satus	3.0	46.27085	-120.12667	113	3DA.1A19B322E1	4/27/2017	Yakima	75.4	46.21358	-119.76892
44	3DD.007795F806	3/24/2017	Satus	3.0	46.27085	-120.12667	114	3DA.1A19B323FC	4/27/2017	Yakima	75.4	46.21358	-119.76892
45	3DD.007796C980	3/30/2017	Satus	3.0	46.27085	-120.12667	115	3DA.1A19B311CC	4/27/2017	Yakima	75.4	46.21358	-119.76892
46	3DD.0077968EBA	3/30/2017	Satus	3.0	46.27085	-120.12667	116	3DA.1A19B335F7	4/27/2017	Yakima	75.4	46.21358	-119.76892
47	3DD.0077962A3C	3/30/2017	Satus	3.0	46.27085	-120.12667	117	3DA.1A19B31A6A	4/27/2017	Yakima	75.4	46.21358	-119.76892
48	3DD.00779718C2	3/30/2017	Satus	3.0	46.27085	-120.12667	118	3DA.1A19B33BFB	4/27/2017	Yakima	75.4	46.21358	-119.76892
49	3DD.007796CF4C	3/30/2017	Satus	3.0	46.27085	-120.12667	119	3DA.1A19B39B19	4/27/2017	Yakima	75.4	46.21358	-119.76892
50	3DD.007796F7E1	3/30/2017	Satus	3.0	46.27085	-120.12667	120	3DA.1A19B322DE	4/27/2017	Yakima	75.4	46.21358	-119.76892
51	3DD.0077960FD8	3/30/2017	Satus	3.0	46.27085	-120.12667	121	3DA.1A19B31DE2	4/27/2017	Yakima	75.4	46.21358	-119.76892
52	3DD.00779644AB	3/30/2017	Satus	3.0	46.27085	-120.12667	122	3DA.1A19B31DF6	4/27/2017	Yakima	75.4	46.21358	-119.76892
53	3DD.0077960EDC	3/30/2017	Satus	3.0	46.27085	-120.12667	123	3DA.1A19B3280C	4/27/2017	Yakima	75.4	46.21358	-119.76892
54	3DD.007796F232	3/30/2017	Satus	3.0	46.27085	-120.12667	124	3DA.1A19B33C27	4/27/2017	Yakima	75.4	46.21358	-119.76892
55	3DD.00779726F6	3/30/2017	Satus	3.0	46.27085	-120.12667	125	3DA.1A19B32713	5/4/2017	Yakima	75.4	46.21358	-119.76892
56	3DD.007796FF95	3/30/2017	Satus	3.0	46.27085	-120.12667	126	3DA.1A19B31B1E	5/4/2017	Yakima	75.4	46.21358	-119.76892
57	3DD.00779629EA	3/30/2017	Satus	3.0	46.27085	-120.12667	127	3DA.1A19B3252C	5/4/2017	Yakima	75.4	46.21358	-119.76892
58	3DD.00779701D0	3/30/2017	Satus	3.0	46.27085	-120.12667	128	3DA.1A19B32387	5/4/2017	Yakima	75.4	46.21358	-119.76892
59	3DD.007797077F	3/30/2017	Satus	3.0	46.27085	-120.12667	129	3DD.0077969E7A	5/4/2017	Yakima	75.4	46.21358	-119.76892
60	3DA.1A19B2F82B	5/9/2017	Toppenish	54.4	46.37571	-120.61888	130	3DA.1A19B318F2	5/4/2017	Yakima	75.4	46.21358	-119.76892
61	3DA.1A19B316A7	5/9/2017	Toppenish	54.4	46.37571	-120.61888	131	3DA.1A19B32BA7	5/4/2017	Yakima	75.4	46.21358	-119.76892
62	3DD.007794E333	5/9/2017	Toppenish	54.4	46.37571	-120.61888	132	3DA.1A19B2F7FB	5/4/2017	Yakima	75.4	46.21358	-119.76892
63	3DA.1A19B30FA4	5/9/2017	Toppenish	54.4	46.37571	-120.61888	133	3DA.1A19B31B64	5/4/2017	Yakima	75.4	46.21358	-119.76892
64	3DA.1A19B2F8DF	5/9/2017	Toppenish	54.4	46.37571	-120.61888	134	3DA.1A19B31DDE	5/4/2017	Yakima	75.4	46.21358	-119.76892
65	3DD.007796D03E	5/9/2017	Toppenish	54.4	46.37571	-120.61888	135	3DA.1A19B33AB7	5/4/2017	Yakima	75.4	46.21358	-119.76892
66	3DA.1A19B2F756	5/9/2017	Toppenish	54.4	46.37571	-120.61888	136	3DA.1A19B33A55	5/4/2017	Yakima	75.4	46.21358	-119.76892
67	3DA.1A19B33D63	5/9/2017	Toppenish	54.4	46.37571	-120.61888	137	3DA.1A19B32344	5/4/2017	Yakima	75.4	46.21358	-119.76892
68	3DA.1A19B391D0	5/9/2017	Toppenish	54.4	46.37571	-120.61888	138	3DD.0077978E76	5/4/2017	Yakima	75.4	46.21358	-119.76892
69	3DA.1A19B31295	5/9/2017	Toppenish	54.4	46.37571	-120.61888	139	3DD.007794A22D	5/4/2017	Yakima	75.4	46.21358	-119.76892
70	3DA.1A19B3245E	5/9/2017	Toppenish	54.4	46.37571	-120.61888	140	3DD.0077977370	5/4/2017	Yakima	75.4	46.21358	-119.76892

#	PIT Tag ID	Date	River	KM	Latitude	Longitude	#	PIT Tag ID	Date	River	KM	Latitude	Longitude
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142	3DD.00779712D1	5/4/2017	Yakima	75.4	46.21358	-119.76892	212	3DD.0077973D54	5/4/2017	Yakima	75.4	46.21340	-119.76914
143	3DD.007796019A	5/4/2017	Yakima	75.4	46.21358	-119.76892	213	3DD.0077961F4E	5/4/2017	Yakima	75.4	46.21340	-119.76914
144	3DD.0077968240	5/4/2017	Yakima	75.4	46.21358	-119.76892	214	3DD.0077966D04	5/4/2017	Yakima	75.4	46.21340	-119.76914
145	3DD.0077968E00	5/4/2017	Yakima	75.4	46.21358	-119.76892	215	3DD.00779638B1	5/4/2017	Yakima	75.4	46.21340	-119.76914
146	3DD.0077950AD8	5/4/2017	Yakima	75.4	46.21358	-119.76892	216	3DD.0077962950	5/4/2017	Yakima	75.4	46.21340	-119.76914
147	3DD.007796D031	5/4/2017	Yakima	75.4	46.21358	-119.76892	217	3DA.1A19B31C77	5/4/2017	Yakima	75.4	46.21340	-119.76914
148	3DD.00779678C3	5/4/2017	Yakima	75.4	46.21358	-119.76892	218	3DD.0077965729	5/4/2017	Yakima	75.4	46.21340	-119.76914
149	3DD.00779660B9	5/4/2017	Yakima	75.4	46.21358	-119.76892	219	3DD.00779636EF	5/4/2017	Yakima	75.4	46.21340	-119.76914
150	3DD.007796967E	5/11/2017	Yakima	75.4	46.21358	-119.76892	220	3DD.00779637D6	5/4/2017	Yakima	75.4	46.21340	-119.76914
151	3DD.0077962AC9	5/11/2017	Yakima	75.4	46.21358	-119.76892	221	3DD.0077961B1E	5/4/2017	Yakima	75.4	46.21340	-119.76914
152	3DD.0077962BAF	5/11/2017	Yakima	75.4	46.21358	-119.76892	222	3DD.0077960F4C	5/4/2017	Yakima	75.4	46.21340	-119.76914
153	3DD.0077966270	5/11/2017	Yakima	75.4	46.21358	-119.76892	223	3DD.007796C6A2	5/4/2017	Yakima	75.4	46.21340	-119.76914
154	3DD.0077962C31	5/11/2017	Yakima	75.4	46.21358	-119.76892	224	3DD.00779695AD	5/4/2017	Yakima	75.4	46.21340	-119.76914
155	3DD.0077968214	5/11/2017	Yakima	75.4	46.21358	-119.76892	225	3DD.0077970B48	5/11/2017	Yakima	75.4	46.21340	-119.76914
156	3DD.0077970897	5/11/2017	Yakima	75.4	46.21358	-119.76892	226	3DD.0077968137	5/11/2017	Yakima	75.4	46.21340	-119.76914
157	3DD.0077969DB0	5/11/2017	Yakima	75.4	46.21358	-119.76892	227	3DD.00779656F2	5/11/2017	Yakima	75.4	46.21340	-119.76914
158	3DD.007797A88E	5/11/2017	Yakima	75.4	46.21358	-119.76892	228	3DD.0077961E58	5/11/2017	Yakima	75.4	46.21340	-119.76914
159	3DD.007795F6F6	5/11/2017	Yakima	75.4	46.21358	-119.76892	229	384.3515DF65D3	5/11/2017	Yakima	75.4	46.21340	-119.76914
160	3DD.0077972089	5/11/2017	Yakima	75.4	46.21358	-119.76892	230	3DD.00779639A2	5/11/2017	Yakima	75.4	46.21340	-119.76914
161	3DD.00779662DA	5/11/2017	Yakima	75.4	46.21358	-119.76892	231	3DD.00779718A9	5/11/2017	Yakima	75.4	46.21340	-119.76914
162	3DA.1A19B31E25	5/11/2017	Yakima	75.4	46.21358	-119.76892	232	3DD.007796DE2C	5/11/2017	Yakima	75.4	46.21340	-119.76914
163	3DA.1A19B339CD	5/11/2017	Yakima	75.4	46.21358	-119.76892	233	3DD.007795EFEB	5/11/2017	Yakima	75.4	46.21340	-119.76914
164	3DA.1A19B33A76	5/11/2017	Yakima	75.4	46.21358	-119.76892	234	3DD.0077971736	5/11/2017	Yakima	75.4	46.21340	-119.76914
165	3DA.1A19B3398C	5/11/2017	Yakima	75.4	46.21358	-119.76892	235	3DD.007797654F	5/11/2017	Yakima	75.4	46.21340	-119.76914
166	3DA.1A19B2F885	5/11/2017	Yakima	75.4	46.21358	-119.76892	236	3DD.007796DD22	5/11/2017	Yakima	75.4	46.21340	-119.76914
167	3DA.1A19B33813	5/11/2017	Yakima	75.4	46.21358	-119.76892	237	3DD.0077961D95	5/11/2017	Yakima	75.4	46.21340	-119.76914
168	3DA.1A19B2F965	5/11/2017	Yakima	75.4	46.21358	-119.76892	238	3DD.0077970B99	5/11/2017	Yakima	75.4	46.21340	-119.76914
169	3DA.1A19B31DC5	5/11/2017	Yakima	75.4	46.21358	-119.76892	239	3DA.1A19B3929B	5/11/2017	Yakima	75.4	46.21340	-119.76914
170	3DD.0077966D8A	5/11/2017	Yakima	75.4	46.21358	-119.76892	240	3DA.1A19B392EC	5/11/2017	Yakima	75.4	46.21340	-119.76914
171	3DD.0077963918	5/11/2017	Yakima	75.4	46.21358	-119.76892	241	3DA.1A19B31DC8	5/11/2017	Yakima	75.4	46.21340	-119.76914
172	3DD.00779681FD	5/11/2017	Yakima	75.4	46.21358	-119.76892	242	3DA.1A19B3DB8F	5/11/2017	Yakima	75.4	46.21340	-119.76914
173	3DD.0077966C9C	5/11/2017	Yakima	75.4	46.21358	-119.76892	243	3DA.1A19B31AAB	5/11/2017	Yakima	75.4	46.21340	-119.76914
174	3DD.007796C12B	5/11/2017	Yakima	75.4	46.21358	-119.76892	244	3DA.1A19B2F924	5/11/2017	Yakima	75.4	46.21340	-119.76914
175	3DD.0077961D55	4/27/2017	Yakima	75.4	46.21340	-119.76914	245	3DA.1A19B391AB	5/11/2017	Yakima	75.4	46.21340	-119.76914
176	3DD.00779689A3	4/27/2017	Yakima	75.4	46.21340	-119.76914	246	3DD.007796BFDC	5/11/2017	Yakima	75.4	46.21340	-119.76914
177	3DD.0077964664	4/27/2017	Yakima	75.4	46.21340	-119.76914	247	3DD.0077967ADE	5/11/2017	Yakima	75.4	46.21340	-119.76914
178	3DD.0077965441	4/27/2017	Yakima	75.4	46.21340	-119.76914	248	3DD.007796F0ED	5/11/2017	Yakima	75.4	46.21340	-119.76914
179	3DD.0077972728	4/27/2017	Yakima	75.4	46.21340	-119.76914	249	3DD.0077950EA7	5/11/2017	Yakima	75.4	46.21340	-119.76914
180	3DD.0077962ACD	4/27/2017	Yakima	75.4	46.21340	-119.76914	250	3DD.0077962AC5	5/11/2017	Yakima	75.4	46.21340	-119.76914
181	3DD.0077965541	4/27/2017	Yakima	75.4	46.21340	-119.76914	251	3DD.0077966C19	4/8/2017	Yakima	76.1	46.21017	-119.77798
182	3DD.00779700FB	4/27/2017	Yakima	75.4	46.21340	-119.76914	252	3DD.007796546F	4/8/2017	Yakima	76.1	46.21017	-119.77798
183	3DD.007796D28D	4/27/2017	Yakima	75.4	46.21340	-119.76914	253	3DD.0077966EBB	4/8/2017	Yakima	76.1	46.21017	-119.77798
184	3DD.007796F0D5	4/27/2017	Yakima	75.4	46.21340	-119.76914	254	3DD.007796F19C	4/8/2017	Yakima	76.1	46.21017	-119.77798
185	3DD.0077962C0D	4/27/2017	Yakima	75.4	46.21340	-119.76914	255	3DA.1A19B328EA	4/8/2017	Yakima	76.1	46.21017	-119.77798
186	3DD.0077968F53	4/27/2017	Yakima	75.4	46.21340	-119.76914	256	3DD.0077977F4C	4/8/2017	Yakima	76.1	46.21017	-119.77798
187	3DA.1A19B38FDC	4/27/2017	Yakima	75.4	46.21340	-119.76914	257	3DD.007796AD39	4/8/2017	Yakima	76.1	46.21017	-119.77798
188	3DA.1A19B32B02	4/27/2017	Yakima	75.4	46.21340	-119.76914	258	3DD.007795F087	4/8/2017	Yakima	76.1	46.21017	-119.77798
189	3DA.1A19B317C3	4/27/2017	Yakima	75.4	46.21340	-119.76914	259	3DD.00779749BF	4/8/2017	Yakima	76.1	46.21017	-119.77798
190	3DA.1A19B325DC	4/27/2017	Yakima	75.4	46.21340	-119.76914	260	3DD.0077952A56	4/8/2017	Yakima	76.1	46.21017	-119.77798
191	3DA.1A19B31B2D	4/27/2017	Yakima	75.4	46.21340	-119.76914	261	3DD.0077971793	4/8/2017	Yakima	76.1	46.21017	-119.77798
192	3DA.1A19B32731	4/27/2017	Yakima	75.4	46.21340	-119.76914	262	3DD.0077964900	4/8/2017	Yakima	76.1	46.21017	-119.77798
193	3DA.1A19B32B3A	4/27/2017	Yakima	75.4	46.21340	-119.76914	263	3DD.0077964495	4/8/2017	Yakima	76.1	46.21017	-119.77798
194	3DA.1A19B31C01	4/27/2017	Yakima	75.4	46.21340	-119.76914	264	3DD.0077961D39	4/8/2017	Yakima	76.1	46.21017	-119.77798
195	3DA.1A19B3281E	4/27/2017	Yakima	75.4	46.21340	-119.76914	265	3DD.0077965449	4/8/2017	Yakima	76.1	46.21017	-119.77798
196	3DA.1A19B3195F	4/27/2017	Yakima	75.4	46.21340	-119.76914	266	3DD.0077969282	4/8/2017	Yakima	76.1	46.21017	-119.77798
197	3DA.1A19B31D7F	4/27/2017	Yakima	75.4	46.21340	-119.76914	267	3DD.0077971808	4/8/2017	Yakima	76.1	46.21017	-119.77798
198	3DA.1A19B31A5C	4/27/2017	Yakima	75.4	46.21340	-119.76914	268	3DD.007796A2DC	4/8/2017	Yakima	76.1	46.21017	-119.77798
199	3DD.007796E267	4/27/2017	Yakima	75.4	46.21340	-119.76914	269	3DD.007796F6FE	4/8/2017	Yakima	76.1	46.21017	-119.77798
200	3DA.1A19B33C87	5/4/2017	Yakima	75.4	46.21340	-119.76914	270	3DD.0077978ECD	4/8/2017	Yakima	76.1	46.21017	-119.77798
201	3DA.1A19B2F89B	5/4/2017	Yakima	75.4	46.21340	-119.76914	271	3DD.0077972140	4/8/2017	Yakima	76.1	46.21017	-119.77798
202	3DA.1A19B31AD0	5/4/2017	Yakima	75.4	46.21340	-119.76914	272	3DD.0077970E47	4/8/2017	Yakima	76.1	46.21017	-119.77798
203	3DA.1A19B33B21	5/4/2017	Yakima	75.4	46.21340	-119.76914	273	3DD.007796CE70	4/8/2017	Yakima	76.1	46.21017	-119.77798
204	3DA.1A19B2F9C0	5/4/2017	Yakima	75.4	46.21340	-119.76914	274	3DD.007796F415	4/8/2017	Yakima	76.1	46.21017	-119.77798
205	3DA.1A19B2FEC6	5/4/2017	Yakima	75.4	46.21340	-119.76914	275	3DD.007796B161	4/8/2017	Yakima	76.1	46.21017	-119.77798
206	3DA.1A19B2FCAD	5/4/2017	Yakima	75.4	46.21340	-119.76914	276	3DA.1A19B2F801	4/8/2017	Yakima	76.1	46.21017	-119.77798
207	3DA.1A19B31D3E	5/4/2017	Yakima	75.4	46.21340	-119.76914	277	3DA.1A19B322AF	4/8/2017	Yakima	76.1	46.21017	-119.77798
208	3DA.1A19B323FA	5/4/2017	Yakima	75.4	46.21340	-119.76914	278	3DA.1A19B322BD	4/8/2017	Yakima	76.1	46.21017	-119.77798
209	3DA.1A19B32ADB	5/4/2017	Yakima	75.4	46.21340	-119.76914	279	3DA.1A19B39A69	4/8/2017	Yakima	76.1	46.21017	-119.77798
210	3DA.1A19B3189D	5/4/2017	Yakima	75.4	46.21340	-119.76914	280	3DA.1A19B33B65	4/8/2017	Yakima	76.1	46.21017	-119.77798

#	PIT Tag ID	Date	River	KM	Latitude	Longitude	#	PIT Tag ID	Date	River	KM	Latitude	Longitude
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282	3DA.1A19B32C46	4/8/2017	Yakima	76.1	46.21017	-119.77798	352	3DA.1A19B31C9F	5/5/2017	Yakima	76.1	46.21003	-119.77797
283	3DA.1A19B32931	4/8/2017	Yakima	76.1	46.21017	-119.77798	353	3DA.1A19B2FED7	5/5/2017	Yakima	76.1	46.21003	-119.77797
284	3DA.1A19B391D5	4/8/2017	Yakima	76.1	46.21017	-119.77798	354	3DD.0077966F5F	5/5/2017	Yakima	76.1	46.21003	-119.77797
285	3DA.1A19B32DA2	4/8/2017	Yakima	76.1	46.21017	-119.77798	355	3DD.00779611FE	5/5/2017	Yakima	76.1	46.21003	-119.77797
286	3DA.1A19B2F9A1	4/8/2017	Yakima	76.1	46.21017	-119.77798	356	3DA.1A19B32456	5/5/2017	Yakima	76.1	46.21003	-119.77797
287	3DA.1A19B39288	4/8/2017	Yakima	76.1	46.21017	-119.77798	357	3DA.1A19B32CC7	5/5/2017	Yakima	76.1	46.21003	-119.77797
288	3DA.1A19B31DD5	4/8/2017	Yakima	76.1	46.21017	-119.77798	358	3DD.00779700DC	5/5/2017	Yakima	76.1	46.21003	-119.77797
289	3DA.1A19B316AC	4/8/2017	Yakima	76.1	46.21017	-119.77798	359	3DD.007796FD79	5/5/2017	Yakima	76.1	46.21003	-119.77797
290	3DA.1A19B31BC1	4/8/2017	Yakima	76.1	46.21017	-119.77798	360	3DA.1A19B3282F	5/5/2017	Yakima	76.1	46.21003	-119.77797
291	3DA.1A19B325C6	4/8/2017	Yakima	76.1	46.21017	-119.77798	361	3DD.0077968EE5	5/5/2017	Yakima	76.1	46.21003	-119.77797
292	3DA.1A19B3A460	4/8/2017	Yakima	76.1	46.21017	-119.77798	362	3DA.1A19B339C3	5/5/2017	Yakima	76.1	46.21003	-119.77797
293	3DA.1A19B39312	4/8/2017	Yakima	76.1	46.21017	-119.77798	363	3DD.007796B6DA	5/5/2017	Yakima	76.1	46.21003	-119.77797
294	3DA.1A19B32D34	4/8/2017	Yakima	76.1	46.21017	-119.77798	364	3DD.00779654D6	5/5/2017	Yakima	76.1	46.21003	-119.77797
295	3DA.1A19B390E9	4/8/2017	Yakima	76.1	46.21017	-119.77798	365	3DA.1A19B2F7CB	5/5/2017	Yakima	76.1	46.21003	-119.77797
296	3DA.1A19B390D7	4/8/2017	Yakima	76.1	46.21017	-119.77798	366	3DA.1A19B32C16	5/5/2017	Yakima	76.1	46.21003	-119.77797
297	3DA.1A19B33809	4/8/2017	Yakima	76.1	46.21017	-119.77798	367	3DA.1A19B2F9F0	5/5/2017	Yakima	76.1	46.21003	-119.77797
298	3DA.1A19B324CB	4/8/2017	Yakima	76.1	46.21017	-119.77798	368	3DD.0077966EA6	5/9/2017	Yakima	76.1	46.21003	-119.77797
299	3DA.1A19B325C6	4/8/2017	Yakima	76.1	46.21017	-119.77798	369	3DD.0077970C3A	5/9/2017	Yakima	76.1	46.21003	-119.77797
300	3DA.1A19B39179	4/8/2017	Yakima	76.1	46.21017	-119.77798	370	3DD.00779653D3	5/9/2017	Yakima	76.1	46.21003	-119.77797
301	3DA.1A19B321B7	4/27/2017	Yakima	76.1	46.21003	-119.77797	371	3DA.1A19B3298A	5/9/2017	Yakima	76.1	46.21003	-119.77797
302	3DA.1A19B31C2F	4/27/2017	Yakima	76.1	46.21003	-119.77797	372	3DD.0077961E16	5/9/2017	Yakima	76.1	46.21003	-119.77797
303	3DA.1A19B3257F	4/27/2017	Yakima	76.1	46.21003	-119.77797	373	3DA.1A19B326C3	5/9/2017	Yakima	76.1	46.21003	-119.77797
304	3DA.1A19B33BEE	4/27/2017	Yakima	76.1	46.21003	-119.77797	374	3DD.0077977202	5/9/2017	Yakima	76.1	46.21003	-119.77797
305	3DA.1A19B32E70	4/27/2017	Yakima	76.1	46.21003	-119.77797	375	3DA.1A19B32860	5/9/2017	Yakima	76.1	46.21003	-119.77797
306	3DA.1A19B2F97C	4/27/2017	Yakima	76.1	46.21003	-119.77797	376	3DD.0077965635	5/9/2017	Yakima	76.1	46.21003	-119.77797
307	3DA.1A19B31CE4	4/27/2017	Yakima	76.1	46.21003	-119.77797	377	3DD.007797A7EA	5/9/2017	Yakima	76.1	46.21003	-119.77797
308	3DA.1A19B33B0B	4/27/2017	Yakima	76.1	46.21003	-119.77797	378	3DA.1A19B32514	5/9/2017	Yakima	76.1	46.21003	-119.77797
309	3DD.007796B3C5	5/2/2017	Yakima	76.1	46.21003	-119.77797	379	3DA.1A19B2FAFA	5/9/2017	Yakima	76.1	46.21003	-119.77797
310	3DD.007795F0B1	5/2/2017	Yakima	76.1	46.21003	-119.77797	380	3DA.1A19B31C32	5/9/2017	Yakima	76.1	46.21003	-119.77797
311	3DD.00779629C5	5/2/2017	Yakima	76.1	46.21003	-119.77797	381	3DD.0077963997	5/9/2017	Yakima	76.1	46.21003	-119.77797
312	3DD.0077966404	5/2/2017	Yakima	76.1	46.21003	-119.77797	382	3DA.1A19B2F8A8	5/9/2017	Yakima	76.1	46.21003	-119.77797
313	3DD.0077960FBE	5/2/2017	Yakima	76.1	46.21003	-119.77797	383	3DA.1A19B325DE	5/9/2017	Yakima	76.1	46.21003	-119.77797
314	3DD.007797178E	5/2/2017	Yakima	76.1	46.21003	-119.77797	384	3DD.0077978CD0	5/11/2017	Yakima	76.1	46.21003	-119.77797
315	3DD.00779723DF	5/2/2017	Yakima	76.1	46.21003	-119.77797	385	3DD.0077966D35	5/11/2017	Yakima	76.1	46.21003	-119.77797
316	3DD.007796DF3F	5/2/2017	Yakima	76.1	46.21003	-119.77797	386	3DD.0077961088	5/11/2017	Yakima	76.1	46.21003	-119.77797
317	3DD.0077961CD6	5/2/2017	Yakima	76.1	46.21003	-119.77797	387	3DD.00779610DD	5/11/2017	Yakima	76.1	46.21003	-119.77797
318	3DD.007796FF92	5/2/2017	Yakima	76.1	46.21003	-119.77797	388	3DD.007796922A	5/11/2017	Yakima	76.1	46.21003	-119.77797
319	3DD.0077967863	5/2/2017	Yakima	76.1	46.21003	-119.77797	389	3DD.0077975738	5/11/2017	Yakima	76.1	46.21003	-119.77797
320	3DD.00779422BA	5/2/2017	Yakima	76.1	46.21003	-119.77797	390	3DD.00779628E5	5/11/2017	Yakima	76.1	46.21003	-119.77797
321	3DD.0077969611	5/2/2017	Yakima	76.1	46.21003	-119.77797	391	3DD.0077972174	5/11/2017	Yakima	76.1	46.21003	-119.77797
322	3DD.0077967AB7	5/2/2017	Yakima	76.1	46.21003	-119.77797	392	3DD.00779645F2	5/11/2017	Yakima	76.1	46.21003	-119.77797
323	3DD.00779679FE	5/2/2017	Yakima	76.1	46.21003	-119.77797	393	3DD.0077963900	5/11/2017	Yakima	76.1	46.21003	-119.77797
324	3DD.007796BFE25	5/2/2017	Yakima	76.1	46.21003	-119.77797	394	3DD.007795EC58	5/11/2017	Yakima	76.1	46.21003	-119.77797
325	3DD.007796FBEB	5/2/2017	Yakima	76.1	46.21003	-119.77797	395	3DD.007795F7D0	5/11/2017	Yakima	76.1	46.21003	-119.77797
326	3DD.007796B703	5/2/2017	Yakima	76.1	46.21003	-119.77797	396	3DD.0077961C08	5/11/2017	Yakima	76.1	46.21003	-119.77797
327	3DD.007796F0C5	5/2/2017	Yakima	76.1	46.21003	-119.77797	397	3DD.00779678D6	5/11/2017	Yakima	76.1	46.21003	-119.77797
328	3DA.1A19B32CA30	5/2/2017	Yakima	76.1	46.21003	-119.77797	398	3DD.007796C99F	5/11/2017	Yakima	76.1	46.21003	-119.77797
329	3DA.1A19B33A81	5/2/2017	Yakima	76.1	46.21003	-119.77797	399	3DD.0077968D07	5/11/2017	Yakima	76.1	46.21003	-119.77797
330	3DA.1A19B31C45	5/2/2017	Yakima	76.1	46.21003	-119.77797	400	3DA.1A19B339C4	5/11/2017	Yakima	76.1	46.21003	-119.77797
331	3DA.1A19B32336	5/2/2017	Yakima	76.1	46.21003	-119.77797	401	3DA.1A19B31B20	5/12/2017	Yakima	76.1	46.21003	-119.77797
332	3DA.1A19B3257A	5/2/2017	Yakima	76.1	46.21003	-119.77797	402	3DA.1A19B323B0	5/18/2017	Yakima	135	46.33535	-120.19569
333	3DA.1A19B31COA	5/2/2017	Yakima	76.1	46.21003	-119.77797	403	3DD.007796C865	5/18/2017	Yakima	135	46.33535	-120.19569
334	3DA.1A19B31C47	5/2/2017	Yakima	76.1	46.21003	-119.77797	404	3DA.1A19B32451	5/18/2017	Yakima	135	46.33535	-120.19569
335	3DA.1A19B2FDD1	5/2/2017	Yakima	76.1	46.21003	-119.77797	405	3DA.1A19B31BA2	5/18/2017	Yakima	135	46.33535	-120.19569
336	3DA.1A19B2F74E	5/2/2017	Yakima	76.1	46.21003	-119.77797	406	3DA.1A19B32681	4/18/2017	Yakima	75.6	46.21003	-119.77797
337	3DA.1A19B32D36	5/2/2017	Yakima	76.1	46.21003	-119.77797	407	3DA.1A19B2F85A	4/18/2017	Yakima	75.6	46.21003	-119.77797
338	3DA.1A19B323F6	5/2/2017	Yakima	76.1	46.21003	-119.77797	408	3DA.1A19B31B00	4/18/2017	Yakima	75.6	46.21003	-119.77797
339	3DA.1A19B2FA0C	5/2/2017	Yakima	76.1	46.21003	-119.77797	409	3DA.1A19B32D77	4/18/2017	Yakima	75.6	46.21003	-119.77797
340	3DA.1A19B327A1	5/2/2017	Yakima	76.1	46.21003	-119.77797	410	3DA.1A19B31A44	4/18/2017	Yakima	75.6	46.2124	-119.7715
341	3DA.1A19B339D6	5/2/2017	Yakima	76.1	46.21003	-119.77797	411	3DA.1A19B31CF1	4/18/2017	Yakima	75.6	46.2124	-119.7715
342	3DA.1A19B32B7A	5/2/2017	Yakima	76.1	46.21003	-119.77797	412	3DA.1A19B32972	4/18/2017	Yakima	75.6	46.2124	-119.7715
343	3DA.1A19B31E07	5/2/2017	Yakima	76.1	46.21003	-119.77797	413	3DA.1A19B33A5B	4/18/2017	Yakima	75.6	46.2124	-119.7715
344	3DA.1A19B32515	5/2/2017	Yakima	76.1	46.21003	-119.77797	414	3DA.1A19B38FB8	4/18/2017	Yakima	75.6	46.2124	-119.7715
345	3DA.1A19B2FE9F	5/2/2017	Yakima	76.1	46.21003	-119.77797							
346	3DA.1A19B33CE1	5/2/2017	Yakima	76.1	46.21003	-119.77797							
347	3DA.1A19B339B6	5/2/2017	Yakima	76.1	46.21003	-119.77797							
348	3DA.1A19B31908	5/2/2017	Yakima	76.1	46.21003	-119.77797							
349	3DA.1A19B31C70	5/2/2017	Yakima	76.1	46.21003	-119.77797							
350	3DD.007796552C	5/5/2017	Yakima	76.1	46.21003	-119.77797							