



Translocation of Adult Pacific Lamprey within the Wenatchee Subbasin, 2017-2018 Broodstock



[Cover Photo: Releasing adult lamprey with the general public in Wenatchee River at Jolanda Lake (river km 50.4) on August 31, 2017; Tyler Beals in the background demonstrating electrofishing methods for larval lamprey surveys]

Project No. 2008-470-00

Report was completed under BPA Contract No. 56662 REL 153

Report covers work performed from: May, 2017 – December, 2018

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**

Report Created: March, 2018

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

Highlights

- A total of 275 adult 2017-2018 broodstock Pacific Lamprey from Lower Columbia River were translocated to Wenatchee Subbasin between August 31, 2017, and April 23, 2018.
- From the PITAGIS regional data base (<http://www.ptagis.org/>), using Query Builder2 Reports, the interrogation data of PIT tagged lamprey were summarized.
- Based on detections at Tumwater Dam from all releases, potential dam passage (i.e. detection at “Weir 18”) was estimated to be 12.8% during the summer season and 6.5% during the spring season. Of these last detected at Weir 18, two lamprey were also detected in the Lower Nason Creek instream array.

Abstract

This report is composed of two parts: 1) summary of all 2017-2018 broodstock adult Pacific Lamprey releases within the Wenatchee Subbasin and 2) analysis of migration data from PIT tagged adults. From the Lower Columbia 2017-2018 broodstock (adults collected in summer 2017 that primarily mature in 2018), a total of 275 adult Pacific Lamprey were released at six locations within the Wenatchee Subbasin between August 31, 2017, and April 23, 2018. This is the third year that adult Pacific Lamprey were translocated into the Wenatchee Subbasin. Translocation was implemented beginning in 2016 out of concern for the species extinction observed upstream of Tumwater Dam and also to enhance the larval pheromone signal from Upper Wenatchee River to improve adult lamprey attraction. 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 275 PIT tagged lamprey, 143 lamprey (52.0%) were detected in at least one PIT array site within the Columbia Basin. The highlights from the 2017-2018 broodstock Pacific Lamprey translocation monitoring in the Wenatchee Subbasin are the following:

- Sites that detected lamprey the most were TUF (Tumwater Dam Adult Fishway; river km 49.6) at 25.5%, UWE (Upper Wenatchee River; river km 80.9) at 15.6%, NAL (Lower Nason Creek; river km 0.8) at 11.6%, and LWE (Lower Wenatchee River; river km 2.7) at 10.9%.
- Based on detections at Tumwater Dam from all releases, the estimated number of lamprey that potentially achieved dam passage (i.e. detection at “Weir 18”) was estimated to be 12.8% during the summer season and 6.5% during the spring season, which is similar to the estimate provided the previous year (6.0%). Of these last detected at Weir 18, two lamprey were also detected in the Lower Nason Creek instream array.
- We estimated that 398-602 adult lamprey may have approached Tumwater Dam between 2017 and 2018 based on window count detection efficiency through PIT tagged lamprey and total observed lamprey that passed the dam.

Part I: Release Summary

From the 2017-2018 broodstock (adults collected in summer 2017, most of which mature in spring/summer 2018), a total of 275 adult Pacific Lamprey were released in the lower to upper reaches of the Wenatchee River on August 31, 2017 (n=207), and April 23, 2018 (n=68) (Fig. 1 and Table 1). Overall female ratio was estimated to be 29.9%, PIT tag ratio was 100.0% (61.5% 9 mm tags and 39.5% 12 mm tags), and genetic tag ratio was 100.0% (Table 2). Lamprey were originally captured from John Day Dam (20.0%), The Dalles Dam (16.7%), and Bonneville Dam (38.2%) or a mix of the aforementioned sources (25.1%) in the Lower Columbia River during the summer of 2017. Total length averaged 666 mm (min. 509 mm and max. 782 mm), weight averaged 469.9 g (min. 274.6 g and max. 721.5 g), and interdorsal distance averaged 32.9 mm (min. 8 mm and max. 49 mm) during the PIT tagging operations between Summer 2017 and Spring 2018.

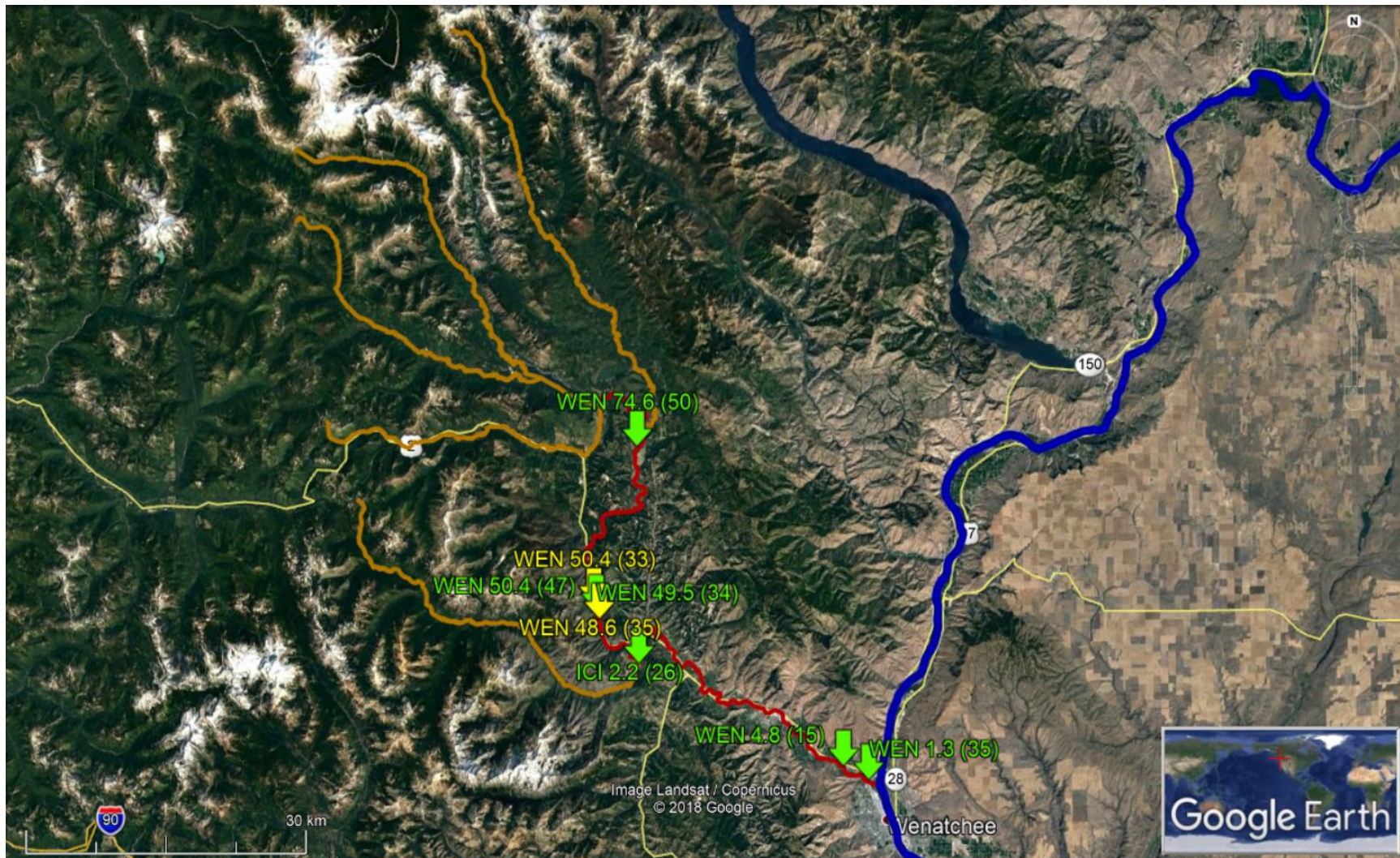


Figure 1. Overall aerial map of 2016-2017 broodstock Pacific Lamprey translocation release sites in the Wenatchee Subbasin. “WEN” stands for Wenatchee, the number next to the stream name is the river km, and the number in parenthesis is the total number of lamprey released (green label indicates summer 2017 releases and yellow label indicates spring 2018 releases). The red line represents mainstem Wenatchee River, the orange lines represent key tributaries, and the blue line represents the Columbia River.

Table 1. Summary of 2017-2018 broodstock Pacific Lamprey translocation release information in the Wenatchee Subbasin.

| Subbasin | River | RKM | Date | Location | Season | Time | Water Temp (C°) | # |
|------------------|------------------|----------|-----------|-------------------------------|----------|----------|-----------------|------------|
| Wenatchee | Wenatchee | 1.3 | 8/31/2017 | Downstream of Lower PIT Array | Fall | 15:30 | 21.7 | 35 |
| Wenatchee | Wenatchee | 4.8 | 8/31/2017 | Upstream of Lower PIT Array | Fall | 16:00 | 21.0 | 15 |
| Wenatchee | Wenatchee | 49.5 | 8/31/2017 | Downstream of Tumwater Dam | Fall | 11:05 | 17.6 | 34 |
| Wenatchee | Wenatchee | 50.4 | 8/31/2017 | Jolanda Lake | Fall | 14:00 | 18.0 | 47 |
| Wenatchee | Wenatchee | 74.6 | 8/31/2017 | Upper Release | Fall | 11:00 | 17.8 | 50 |
| Wenatchee | Icicle | 2.2 | 8/31/2017 | Lower Icicle Creek | Fall | 11:10 | 14.2 | 26 |
| Wenatchee | Wenatchee | 48.6 | 4/23/2018 | Downstream Tumwater Dam | Spring | 15:10 | 7.9 | 35 |
| Wenatchee | Wenatchee | 50.4 | 4/23/2018 | Jolanda Lake | Spring | 13:40 | 7.9 | 33 |
| Wenatchee | Wenatchee | - | - | - | - | - | - | 275 |

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 includes “# F (?)” and “# M (?)” in the estimation. The source of the lamprey is also shown (BON=Bonneville Dam, TDA=The Dalles Dam, JDA=John Day Dam, PRO=Prosser Dam, Mix=mixed source).

| River | RKM | Date | # | # F | # M | # (?) | # (?) | # UN | # BON | # TDA | # JDA | # PRO | # Mix | # w/ 9mm PIT | # w/ 12mm PIT | # w/ Genetic Tags | Female Ratio | PIT Ratio | Tag Ratio | Genetic Tag Ratio |
|------------------|----------|-----------|------------|-----------|------------|-----------|-----------|----------|------------|-----------|-----------|----------|-----------|--------------|---------------|-------------------|--------------|---------------|---------------|-------------------|
| Wenatchee | 1.3 | 8/31/2017 | 35 | 10 | 23 | 1 | 1 | 0 | 15 | 8 | 0 | 0 | 12 | 17 | 18 | 35 | 31% | 100% | 100% | |
| Wenatchee | 4.8 | 8/31/2017 | 15 | 3 | 11 | 1 | 0 | 0 | 9 | 5 | 0 | 0 | 1 | 7 | 8 | 15 | 27% | 100% | 100% | |
| Wenatchee | 49.5 | 8/31/2017 | 34 | 8 | 21 | 2 | 3 | 0 | 13 | 7 | 0 | 0 | 14 | 17 | 17 | 34 | 29% | 100% | 100% | |
| Wenatchee | 50.4 | 8/31/2017 | 47 | 7 | 34 | 3 | 2 | 1 | 21 | 9 | 0 | 0 | 17 | 24 | 23 | 47 | 22% | 100% | 100% | |
| Wenatchee | 74.6 | 8/31/2017 | 50 | 10 | 28 | 7 | 5 | 0 | 27 | 11 | 0 | 0 | 12 | 25 | 25 | 50 | 34% | 100% | 100% | |
| Wenatchee | 2.2 | 8/31/2017 | 26 | 4 | 22 | 0 | 0 | 0 | 10 | 5 | 0 | 0 | 11 | 12 | 14 | 26 | 15% | 100% | 100% | |
| Wenatchee | 49.6 | 4/23/2018 | 35 | 11 | 19 | 3 | 2 | 0 | 6 | 0 | 28 | 0 | 1 | 34 | 1 | 35 | 40% | 100% | 100% | |
| Wenatchee | 50.4 | 4/23/2018 | 33 | 9 | 19 | 3 | 2 | 0 | 4 | 1 | 27 | 0 | 1 | 33 | 0 | 33 | 36% | 100% | 100% | |
| Wenatchee | - | - | 275 | 62 | 177 | 20 | 15 | 1 | 105 | 46 | 55 | 0 | 69 | 169 | 106 | 275 | 29.9% | 100.0% | 100.0% | |

Lower Wenatchee Release

A total of 35 lamprey were released at river km 1.3 in Lower Wenatchee River immediately downstream of the North Wenatchee Avenue (Highway 285) bridge on August 31, 2017 (Fig. 2). An additional 15 lamprey were released upstream of the LWE PIT array on the same day at river km 4.8. Water temperature was 21.0-21.7°C during the release. For summer release, we target our releases to take place between 15-20°C.

The primary goal of the two lower releases was two-fold: 1) to assess the number of lamprey that will move upstream to Tumwater Dam; and 2) to characterize the detection efficiency of the instream PIT array located at river km 2.7 (LWE arrays) and lamprey behavior above and below this array.

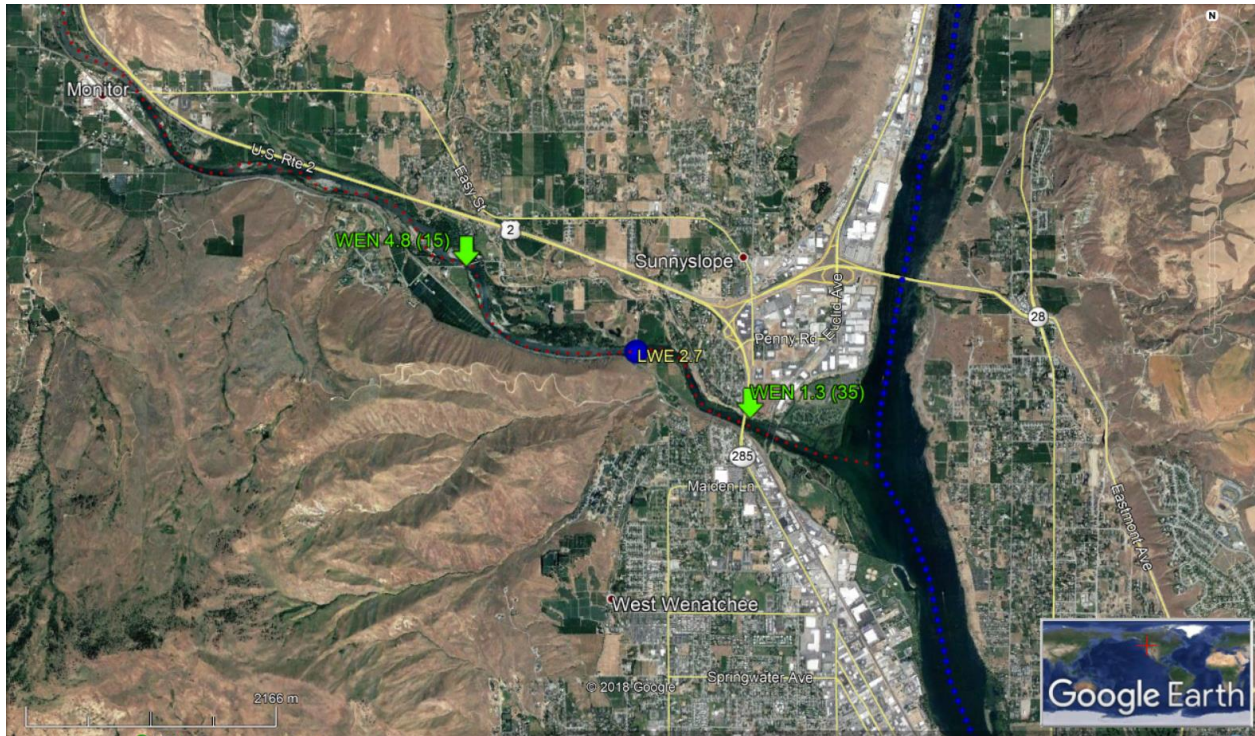


Figure 2. Aerial map of Pacific Lamprey translocation lower release site at Wenatchee river km 1.3 and 4.8 (green arrows). The number next to the stream abbreviation is the river km and the number in parenthesis is the total number of lamprey released. Shown with the blue circle is the PIT tag array location (LWE). Also, 0.1 km points along the Wenatchee River (small red dots) and mainstem Columbia River (blue dots) are displayed.

Mid Wenatchee Release

A total of 34 lamprey were released at river km 49.5 on August 31, 2017, and 35 lamprey at river km 48.6 on April 23, 2018, both downstream of Tumwater Dam in slow water habitat (Fig. 3). The water at river km 49.5 release site during the spring was much more turbulent with less places for lamprey to seek refuge, so we found a slow water habitat further downstream at river km 48.6. For summer release, we target our releases to take place between 15-20°C, and for early spring release, we target our releases to take place when streams/ivers reach 7-12°C.

The primary goal of this release was to understand what portion of the adults would interact and pass the entrance to Tumwater Dam fish ladder and potentially pass through the PIT arrays within the ladder. There are currently five arrays within the fish ladder (Fig. 4): 1) high flow fish ladder entrance, 2) low flow fish ladder entrance, 3) between Weir Pool #2 and #3, 4) between Weir Pool #13 and #14 (in PTAGIS, it is still labeled as “Weir 15”, however), 5) between Weir Pool #17 and #18. Under different dam operating conditions, fish exiting the top of the Tumwater ladder are either directed to the forebay or into a trapping route (Fig.5). Lamprey passage efficiency from Weir 18 through the forebay exit or the trapping route is unknown. For the purposes of this report,

lampreys last detected moving upstream at Weir 18 were considered to have “potentially passed” the dam.

Until the recent adult translocation began in 2016 spring, no lamprey have been detected in the Wenatchee River upstream of Tumwater Dam despite intensive monitoring efforts conducting larval lamprey electrofishing surveys by Yakama Nation Fisheries and USFWS. Since translocation began in 2016, 22 adult lamprey have been detected passing the window count station (n=10 and 12 in 2017 and 2018, respectively), and a few of these have been through the steep pass and fish hopper trap (Alex Repp, Washington Department of Fish and Wildlife, personal communication, March 19, 2019). For more information about the overall passage numbers, see Table 25 at the end of this report.

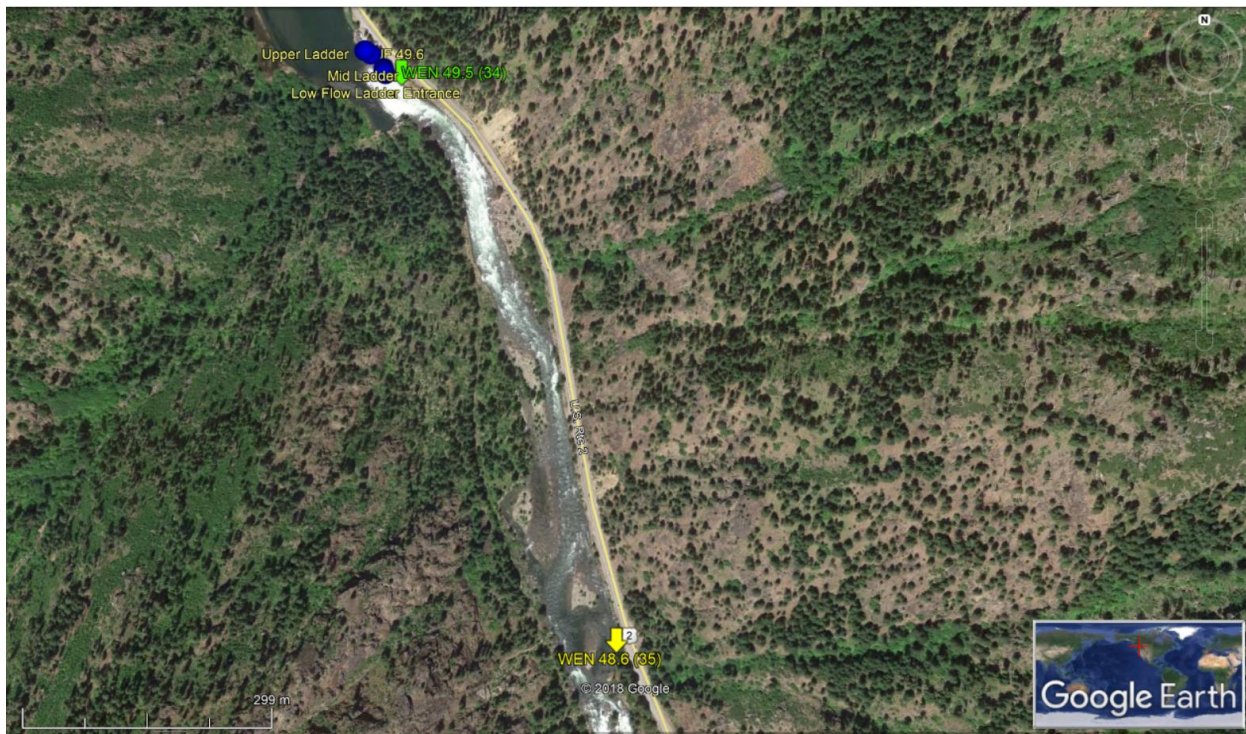


Figure 3. Aerial map of Pacific Lamprey translocation middle release site at Wenatchee river km 49.5 and 48.6. The number next to the stream abbreviation is the river km and the number in parenthesis is the total number of lamprey released. Shown with the blue circles are the PIT tag array locations (TUF). Also, 0.1 km points along the Wenatchee River are displayed as red dots.

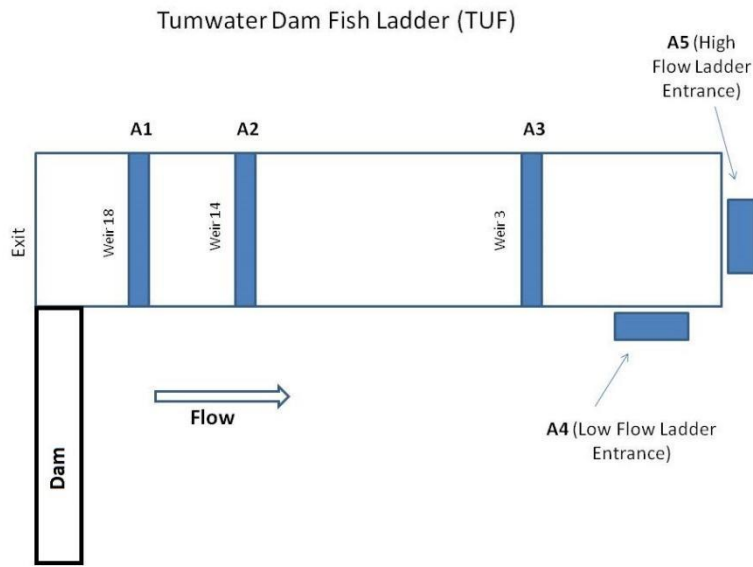


Figure 4. Array locations (5 total) within Tumwater Dam Fish Ladder (from PTAGIS website).

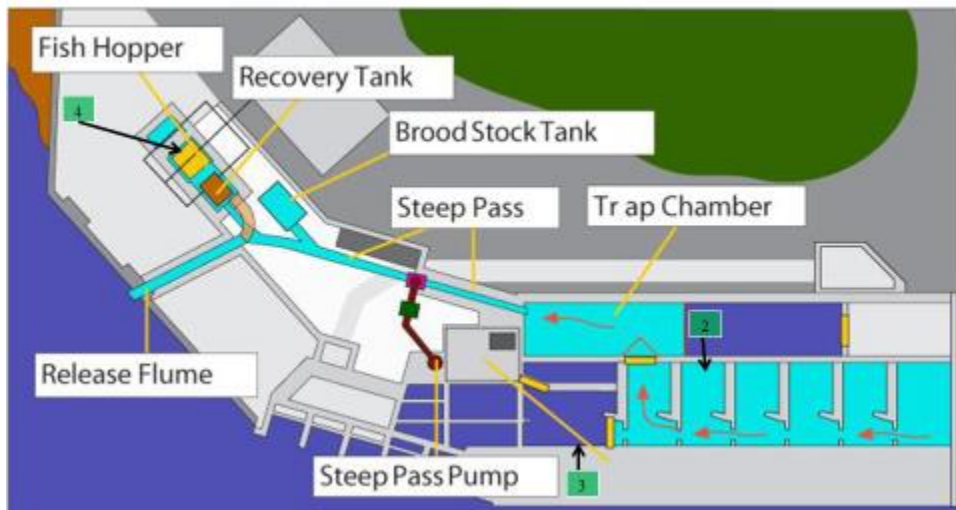


Figure 5. Diagram of the Upper portion of the Tumwater Dam Ladder showing the fish ladder as well as the trapping route.

Upper Wenatchee Release #1

A total of 47 lamprey were released at river km 50.4 in the middle reach of the Wenatchee River in Jolanda Lake just upstream of Tumwater Dam on August 23, 2016 (Fig. 6). An additional 33 overwintered lamprey were released at this same location on April 23, 2018. Water temperature was 18.0°C during the summer release and 7.9°C during the spring release. For summer release, we target our releases to take place between 15-20°C, and for early spring release, we target our releases to take place when streams/rivers reach 7-12°C.

The primary goal was to understand where Pacific Lamprey will distribute themselves within the Upper Wenatchee River or any of the tributary streams, taking advantage of the existing instream PIT array sites in Upper Wenatchee as well as Chiwawa, Nason, White, and Little Wenatchee watersheds (UWE, CHL, CHU, NAL, NAU, WTL, LMN arrays).



Figure 6. Aerial map of Pacific Lamprey translocation upper release site #1 at Wenatchee river km 50.4. 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 circle are the PIT tag array locations (TUF and WEN). PIT array at WEN (river km 50.4), however, was not in operation during the release. Also, 0.1 km points along the Wenatchee River are displayed as red dots.

Upper Wenatchee Release #2

A total of 50 lamprey were released at river km 74.6 in the middle reach of the Wenatchee River at the Highway 209 (Chumstick Highway) bridge crossing in Plain, WA, on August 31, 2017 (Fig. 7). Water temperature was 17.8°C. For summer release, we target our releases to take place between 15-20°C.

The primary goal was to understand where Pacific Lamprey would migrate to on their own within the Upper Wenatchee River or any of the tributary streams, taking advantage of the existing instream PIT array sites in Upper Wenatchee as well as Chiwawa, Nason, White, and Little Wenatchee watersheds (UWE, CHL, CHU, NAL, NAU, WTL, LMN arrays).

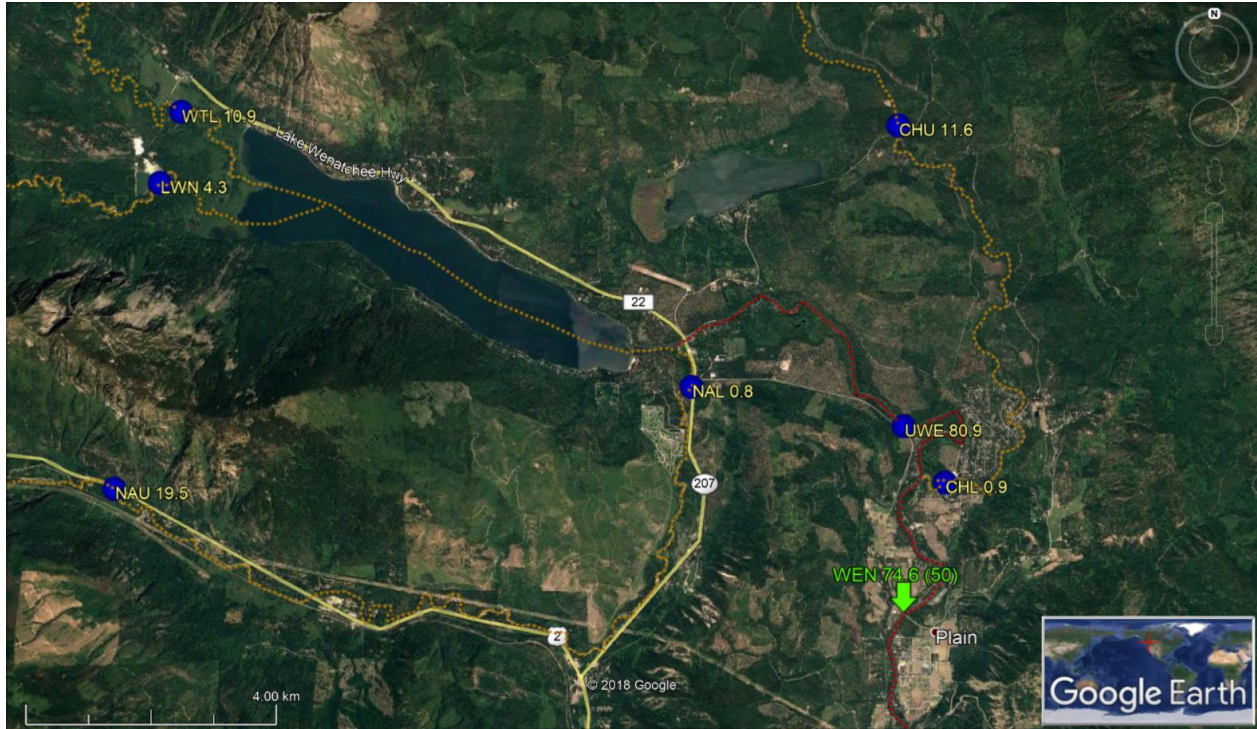


Figure 7. Aerial map of Pacific Lamprey translocation upper release site at Wenatchee river km 74.6. The number next to the stream abbreviation is the river km and the number in parenthesis is the total number of lamprey released. Shown with the blue circles are the PIT tag array locations (UWE, CHL, CHU, NAL, NAU, WTL, and LWN). Also, 0.1 km points along the Wenatchee River (red dots) and tributaries (orange dots; Chiwawa, Nason, White, and Little Wenatchee from downstream to upstream) are displayed.

Icicle Creek Release (River KM 2.2)

A total of 26 lamprey were released at river km 2.2 in Lower Icicle Creek along East Leavenworth Road south of Leavenworth, WA, on August 31, 2017 (Fig. 8). Water temperature was 14.2°C. For summer release, we target our releases to take place between 15-20°C.

The primary goal was 1) to reintroduce Pacific Lamprey to Icicle Creek, a stream where the species was once historically present, and 2) to understand where lamprey would migrate to on their own within Icicle Creek, taking advantage of the existing instream PIT array sites in this stream (ICL, LNF, ICM, ICU PIT arrays).

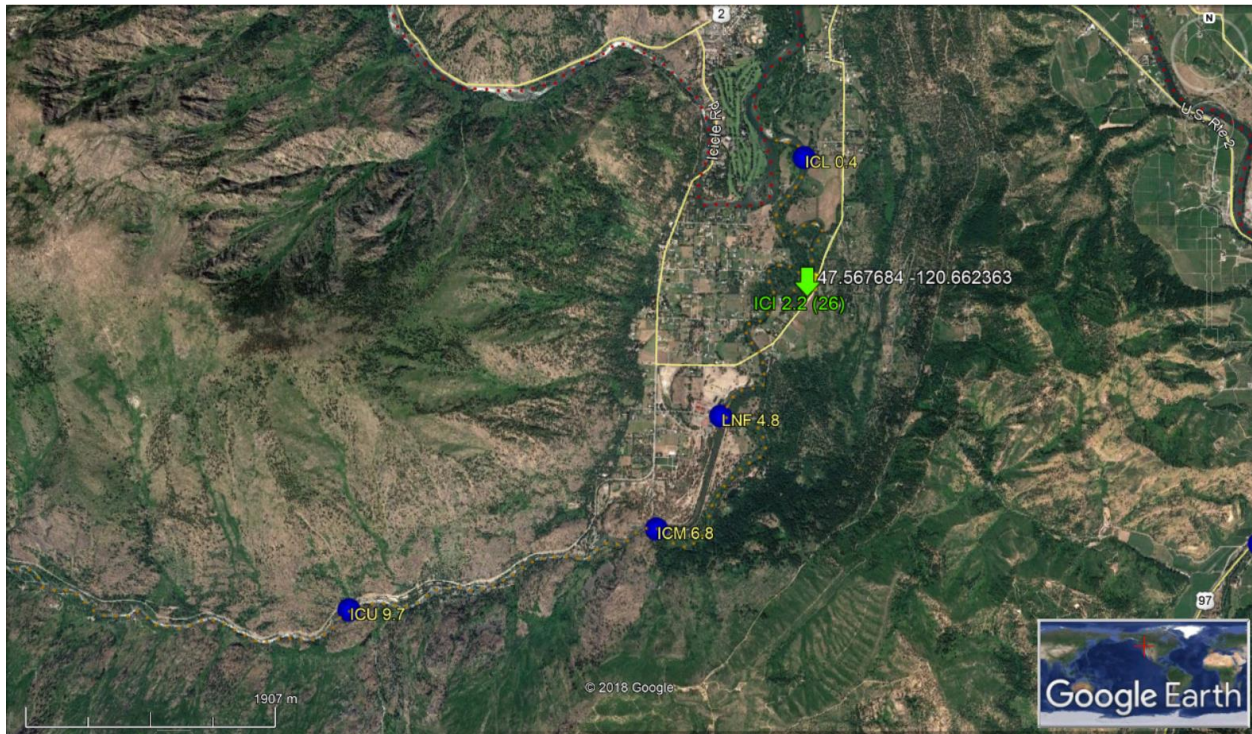


Figure 8. Aerial map of Pacific Lamprey translocation Icicle release site at river km 2.2. The number next to the stream abbreviation is the river km and the number in parenthesis is the total number of lamprey released. Shown with the blue circles are the PIT tag array locations (ICL, LNF, ICM, and ICU). Also, 0.1 km points along the Icicle Creek (orange dots) and Wenatchee River (red dots) are displayed.

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. Out of 275 total PIT tagged lamprey released, 143 lamprey (52.0%) were detected in at least one PIT array site and 38 lamprey (13.8%) were detected at more than one site. Approximately half (98 / 207 = 47.3%) were detected from the summer release, whereas a higher portion was detected from the spring release (45 / 68 = 66.2%). First detection was on August 31, 2017 (0 days after first release) and last detection was on August 9, 2018 (343 days after first release).

There are a total of four instream PIT array sites located on the mainstem Wenatchee River (river km 2.7, 49.6, 50.4, and 80.9), four sites on Icicle Creek (river km 0.4, 4.8, 6.8, and 9.7), three sites on Chiwawa Creek (river km 0.9, 11.6, 29.9), three sites on Nason Creek (river km 0.8, 19.5, and 25.9), and one site each on Mission, Preshastin, Chumstick, Chiwaukum, Little Wenatchee (river km 4.3), and White (river km 10.9) rivers/streams (Fig. 9). The PIT array site just above Tumwater Dam at river km 50.4 (MWE) has not been in operation in recent years. Most sites have a pair of arrays, consisting of lower (downstream) and an upper (upstream) arrays.

At the flow monitoring station in Monitor, WA (river km 10.5), Wenatchee River water level was ~650 cfs during the first release event on August 31, 2017, and was ~4,000 cfs during the second release event on April 23, 2018 (Fig. 10). The last detection was on August 9, 2018, corresponding to the lowest level of water flow period (~850 cfs).

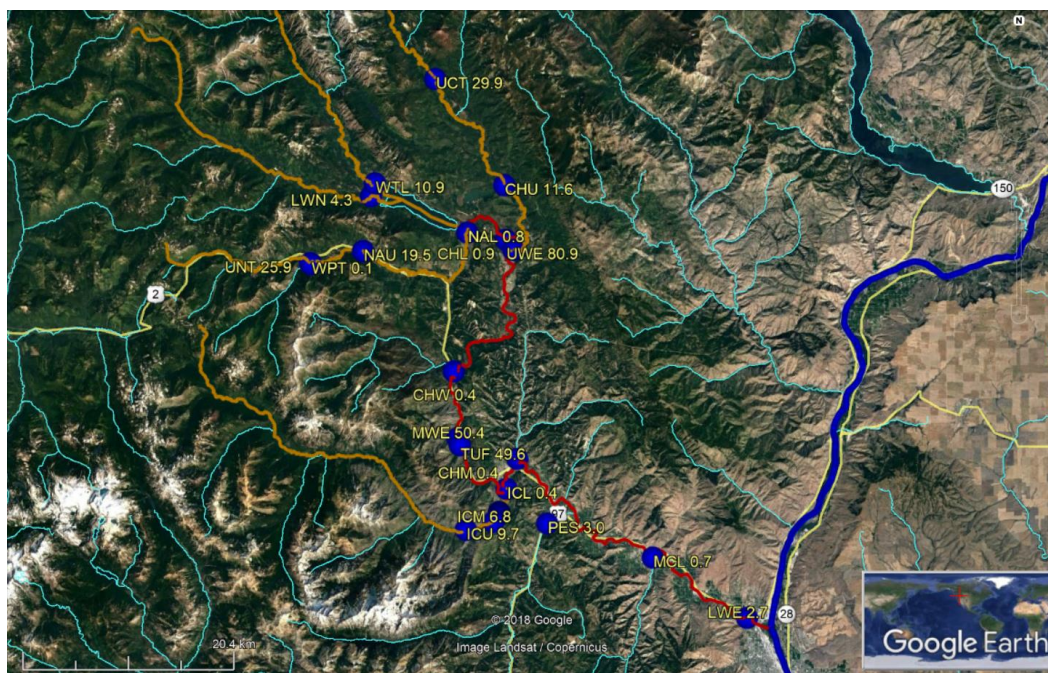


Figure 9. Overall aerial map of PIT tag arrays within the Wenatchee Subbasin (blue circles). The three letter abbreviation and its associated river km is labeled in yellow font. The red line represents mainstem Wenatchee River, the orange lines represent its tributaries, and the blue line represents the Columbia River.

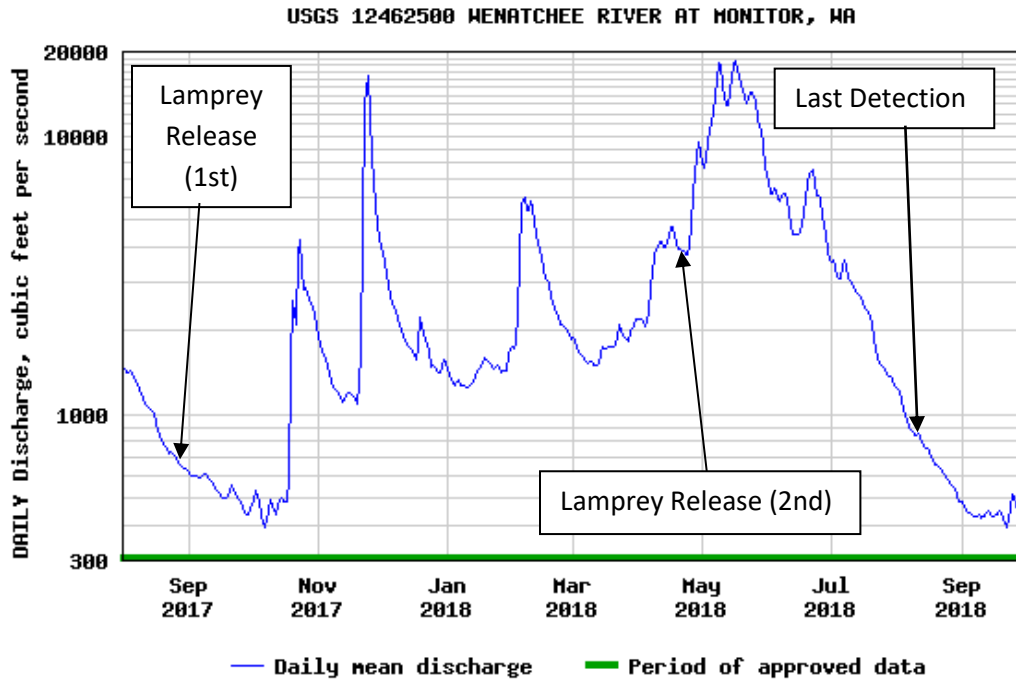


Figure 10. Discharge (cubic feet per second) data of the Wenatchee River at Monitor, WA (river km 10.5) between August 1, 2017, and September 30, 2018 (US Geological Survey National Water Information System: Web Interface). First and second lamprey releases as well as last PIT array detection are also displayed.

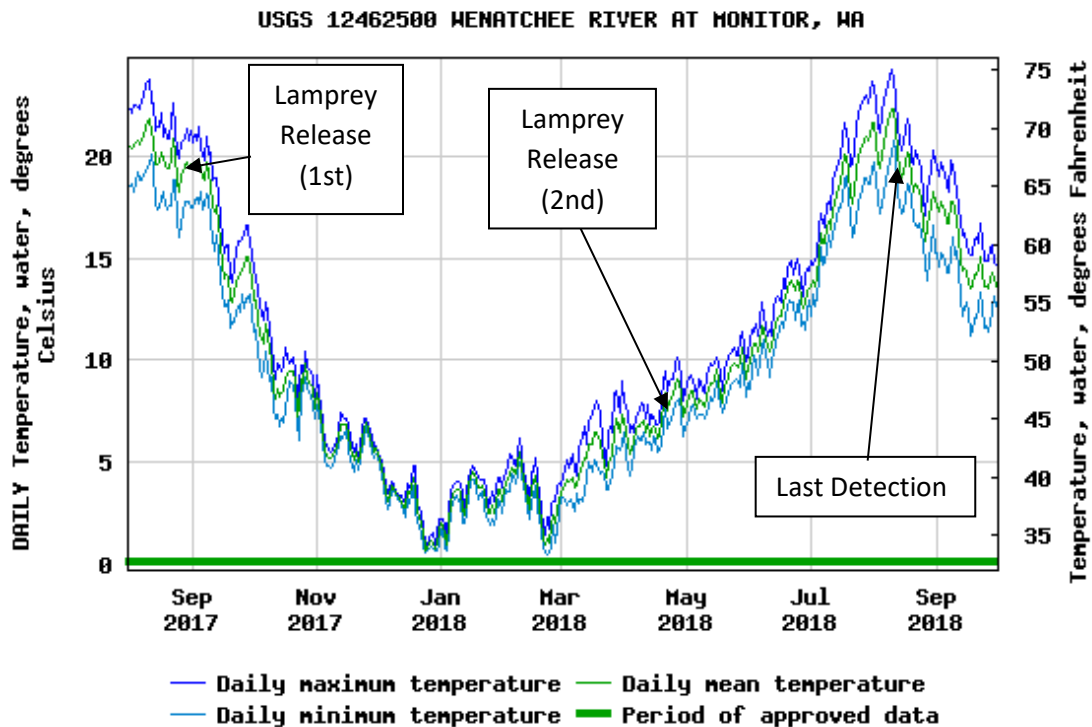


Figure 11. Water temperature data of the Wenatchee River at Monitor, WA (river km 10.5) between August 1, 2017, and September 30, 2018 (US Geological Survey National Water Information System: Web Interface).

The detection summary from each release groups are described below. The first bullet point summarizes the overall detection percentages, the second bullet point summarizes the location of first detections, and if there were any lamprey with multiple detections, the following bullet point summarizes those additional detection locations, and finally the last bullet point summarizes the overall detection from all detections, including multiple detections.

A table is also attached to provide summary data on first detection of all detected lamprey (ordered by detection site longitude primarily and by detection date secondarily), including the site name, first and last detection date/time, days since release (or days since last detection for second or third detections), distance traveled, migration speed, duration of detection, movement direction, first and last antenna, and total number of detections. Some of the columns are color coded to emphasize the high and low values (high values are blue and low values are red hued colors). If there were multiple detections by any individual lamprey, additional tables were provided. The primary purpose of these tables is to provide more information and data for readers that are interested in more than the simple overview of the detections, including specific antenna detections, movement speed, and temporal timing of the detections.

Summer - Lower Wenatchee Release #1 (River KM 1.3; 8/31/2017; n=35)

- Twenty-three of 35 (66%) were detected, and five (14%) were detected at more than 1 site.
- Of the 23 first detections, all detections were from lamprey moving upstream initially, including 22 detections (96%) at LWE (Lower Wenatchee River; river km 2.7) and one detection (4%) at TUF (Tumwater Dam Adult Fishway; river km 49.6) (Table 3).

Table 3. Summary of first detections from Lower Wenatchee River (river km 1.3) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site | | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Directio n? | First | Last | # |
|----|------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|-------------|---------|---------|----|
| | Code | Site # | | | | | | | | | | | Ant. ID | Ant. ID | |
| 1 | LWE | 1 | Wenatchee | 2.7 | 8/31/17 21:01 | 0.3 | 1.4 | 5.1 | 8/31/17 21:01 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 2 | LWE | 2 | Wenatchee | 2.7 | 8/31/17 21:04 | 0.3 | 1.4 | 5.1 | 8/31/17 21:05 | 0.0 | 0.2 | Up | 0A | 4 | 6 |
| 3 | LWE | 3 | Wenatchee | 2.7 | 8/31/17 21:08 | 0.3 | 1.4 | 5.1 | 8/31/17 21:08 | 0.0 | 0.0 | Up | 7 | 7 | 3 |
| 4 | LWE | 4 | Wenatchee | 2.7 | 8/31/17 21:09 | 0.3 | 1.4 | 5.0 | 8/31/17 21:09 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 5 | LWE | 5 | Wenatchee | 2.7 | 8/31/17 21:46 | 0.3 | 1.4 | 4.6 | 8/31/17 21:46 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 6 | LWE | 6 | Wenatchee | 2.7 | 8/31/17 21:50 | 0.3 | 1.4 | 4.6 | 8/31/17 21:50 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 7 | LWE | 7 | Wenatchee | 2.7 | 8/31/17 21:52 | 0.3 | 1.4 | 4.6 | 8/31/17 21:52 | 0.0 | 0.2 | Up | 0A | 3 | 6 |
| 8 | LWE | 8 | Wenatchee | 2.7 | 8/31/17 21:53 | 0.3 | 1.4 | 4.5 | 8/31/17 21:54 | 0.0 | 0.3 | Up | 0B | 5 | 6 |
| 9 | LWE | 9 | Wenatchee | 2.7 | 8/31/17 22:01 | 0.3 | 1.4 | 4.5 | 8/31/17 22:01 | 0.0 | 0.0 | Up | 0A | 0A | 3 |
| 10 | LWE | 10 | Wenatchee | 2.7 | 8/31/17 22:03 | 0.3 | 1.4 | 4.4 | 8/31/17 22:03 | 0.0 | 0.2 | Up | 0B | 4 | 9 |
| 11 | LWE | 11 | Wenatchee | 2.7 | 8/31/17 22:07 | 0.3 | 1.4 | 4.4 | 8/31/17 22:08 | 0.0 | 0.3 | Up | 0A | 4 | 6 |
| 12 | LWE | 12 | Wenatchee | 2.7 | 8/31/17 22:41 | 0.3 | 1.4 | 4.1 | 8/31/17 22:41 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 13 | LWE | 13 | Wenatchee | 2.7 | 8/31/17 23:01 | 0.4 | 1.4 | 3.9 | 8/31/17 23:01 | 0.0 | 0.2 | Up | 0A | 4 | 6 |
| 14 | LWE | 14 | Wenatchee | 2.7 | 8/31/17 23:18 | 0.4 | 1.4 | 3.8 | 8/31/17 23:18 | 0.0 | 0.2 | Up | 0A | 4 | 6 |
| 15 | LWE | 15 | Wenatchee | 2.7 | 8/31/17 23:49 | 0.4 | 1.4 | 3.6 | 8/31/17 23:49 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 16 | LWE | 16 | Wenatchee | 2.7 | 9/1/17 0:51 | 0.4 | 1.4 | 3.2 | 9/1/17 0:51 | 0.0 | 0.0 | Up | 3 | 3 | 3 |
| 17 | LWE | 17 | Wenatchee | 2.7 | 9/1/17 0:52 | 0.4 | 1.4 | 3.2 | 9/1/17 0:52 | 0.0 | 0.2 | Up | 0A | 3 | 6 |
| 18 | LWE | 18 | Wenatchee | 2.7 | 9/1/17 19:59 | 1.2 | 1.4 | 1.1 | 9/1/17 20:00 | 0.0 | 0.2 | Up | 0B | 4 | 6 |
| 19 | LWE | 19 | Wenatchee | 2.7 | 9/1/17 20:42 | 1.3 | 1.4 | 1.1 | 9/1/17 20:42 | 0.0 | 0.0 | Up | 0B | 0B | 3 |
| 20 | LWE | 20 | Wenatchee | 2.7 | 9/4/17 20:23 | 4.2 | 1.4 | 0.3 | 9/4/17 20:23 | 0.0 | 0.2 | Up | 0A | 4 | 6 |
| 21 | LWE | 21 | Wenatchee | 2.7 | 9/8/17 20:52 | 8.3 | 1.4 | 0.2 | 9/8/17 20:52 | 0.0 | 0.2 | Up | 9 | 3 | 4 |
| 22 | LWE | 22 | Wenatchee | 2.7 | 9/9/17 20:38 | 9.3 | 1.4 | 0.2 | 7/28/18 22:41 | 322.1 | 463802.5 | Up | 0A | 0B | 7 |
| 23 | TUF | 1 | Wenatchee | 49.6 | 7/10/18 0:54 | 312.4 | 48.3 | 0.2 | 7/12/18 0:19 | 2.0 | 2845.0 | Up | A5 | A5 | 50 |

- The first detection at TUF occurred on July 10, 2018 (322 days post release). Duration of detection was 2.0 days, with a total of 50 detections. Based on complete tag history, this lamprey appeared to have entered the fishway through the “High Flow Ladder Entrance” and repeatedly ascended and descended the fishway until it was last detected at the “High Flow Ladder Entrance,” and never detected again (“Weir 15” was its upper most detection within the fishway).
- Five of 22 (23%) that were first detected at LWE were detected later at TUF, which occurred between May 27 and July 17, 2018 (269 to 319 days since first detection) (Table 4). Duration of detection ranged from 0.00 seconds to 61 days (others were 6.2, 24.9, 42.2 days). The number of detections ranged from 1 to 40. Three of the five lamprey were only detected at the entrance (two were detected at both “High Flow Ladder Entrance” and “Low Flow Ladder Entrance”), while one lamprey only moved as far upstream as “Weir 3”, and the other lamprey was last detected at “Weir 18” on July 23, 2018 at 6:08, potentially indicating passage.

Table 4. Summary of second detections from Lower Wenatchee River (river km 1.3) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|----|-----------------|--------|-----------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 2 | TUF | 1 | Wenatchee | 49.6 | 7/8/18 1:14 | 310.2 | 46.9 | 0.2 | 8/1/18 22:11 | 24.9 | 35817.6 | Up | A5 | A4 | 40 |
| 3 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 4 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 5 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 6 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 7 | TUF | 2 | Wenatchee | 49.6 | 7/17/18 1:23 | 319.1 | 46.9 | 0.1 | 7/23/18 6:08 | 6.2 | 8924.9 | Up | A5 | A1 | 7 |
| 8 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 9 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 10 | TUF | 3 | Wenatchee | 49.6 | 7/15/18 20:58 | 318.0 | 46.9 | 0.1 | 7/15/18 20:58 | 0.0 | 0.0 | Up | A5 | A5 | 1 |
| 11 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 12 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 13 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 14 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 15 | TUF | 4 | Wenatchee | 49.6 | 5/27/18 22:14 | 268.9 | 46.9 | 0.2 | 7/27/18 23:20 | 61.0 | 87905.4 | Up | A5 | A4 | 9 |
| 16 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 17 | TUF | 5 | Wenatchee | 49.6 | 6/17/18 22:07 | 289.9 | 46.9 | 0.2 | 7/30/18 2:15 | 42.2 | 60727.6 | Up | A4 | A4 | 6 |
| 18 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 19 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 20 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 21 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 22 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 23 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |

- In the end, of the 35 lamprey, 22 (63%) were detected at LWE and six (17%) were detected at TUF.

Summer - Lower Wenatchee Release #2 (River KM 4.8; 8/31/2017; n=15)

- Five of 15 (33.3%) were detected, and none were detected at more than 1 site.
- Of the five first detections, two detections (40%) were from lamprey moving upstream to TUF (Tumwater Dam Adult Fishway; river km 49.6), and three detections (60%) were from lamprey moving downstream to LWE (Lower Wenatchee River; river km 2.7) (Table 5).

Table 5. Summary of first detections from Lower Wenatchee River (river km 4.8) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|---|-----------------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | LWE | 1 | Wenatchee | 2.7 | 6/11/18 2:50 | 283.5 | -2.1 | 0.0 | 6/11/18 23:50 | 0.9 | 1260.0 | Down | 5 | 5 | 35 |
| 2 | LWE | 2 | Wenatchee | 2.7 | 7/1/18 17:53 | 304.1 | -2.1 | 0.0 | 7/1/18 17:54 | 0.0 | 1.0 | Down | 6 | 0B | 3 |
| 3 | LWE | 3 | Wenatchee | 2.7 | 7/8/18 9:00 | 310.8 | -2.1 | 0.0 | 7/11/18 23:18 | 3.6 | 5178.0 | Down | 3 | 5 | 6 |
| 4 | TUF | 1 | Wenatchee | 49.6 | 9/27/17 2:20 | 26.5 | 44.8 | 1.7 | 9/28/17 22:25 | 1.8 | 2645.1 | Up | A4 | A4 | 11 |
| 5 | TUF | 2 | Wenatchee | 49.6 | 6/21/18 22:13 | 294.3 | 44.8 | 0.2 | 8/3/18 20:22 | 42.9 | 61808.6 | Up | A5 | A4 | 13 |

- First detections at TUF (n=2) occurred on September 27, 2017, and June 21, 2018 (26 and 294 days post release, respectively). Duration of detection was 1.8 and 42.9 days, with a total of 11 and 13 detections, respectively. Based on complete tag history, the former lamprey was only detected at the “Low Flow Ladder Entrance” during the summer season. The latter lamprey was detected at both the “High Flow Ladder Entrance” and “Low Flow Ladder Entrance” and ascended and descended the fishway repeatedly, only to be detected last at the “Low Flow Ladder Entrance”; its upper most detection was at “Weir 3” and appeared to have remained within the fishway for an extended period of time.
- First detections at LWE (n=3) occurred on June 11, July 1, and July 8, 2018 (283, 304, and 311 days post release, respectively). Time of day of detection was 2:50, 9:00, and 17:53, respectively. Duration of detection was 0.9 days, 0.98 seconds, and 3.6 days, respectively.
- In the end, of the 15 lamprey, two (13%) were detected at TUF and three (20%) were detected at LWE.

Summer - Mid Wenatchee Release below Tumwater Dam (River KM 49.5; 8/31/2017; n=34)

- Twenty-five of 34 (74%) were detected, two (6%) were detected at two sites, and one (3%) was detected at three sites.
- Of the 25 first detections, 24 (96%) were detected moving upstream to TUF (Tumwater Dam Adult Fishway; river km 49.6) and one (4%) was detected moving downstream to LWE (Lower Wenatchee River; river km 2.7) (Table 6).

Table 6. Summary of first detections from Mid Wenatchee River (river km 49.5) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code | Site # | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Directio n? | First Ant. ID | Last Ant. ID | # Reads |
|----|-----------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|-------------|---------------|--------------|---------|
| 1 | LWE | 1 | Wenatchee | 2.7 | 5/4/18 3:36 | 245.7 | -46.8 | -0.2 | 7/16/18 13:48 | 73.4 | 105731.4 | Down | 0C | 0B | 66 |
| 2 | TUF | 1 | Wenatchee | 49.6 | 8/31/17 19:35 | 0.4 | 0.1 | 0.3 | 6/21/18 0:33 | 293.2 | 422218.7 | Up | A4 | A5 | 9 |
| 3 | TUF | 2 | Wenatchee | 49.6 | 8/31/17 19:36 | 0.4 | 0.1 | 0.3 | 8/31/17 19:41 | 0.0 | 5.4 | Up | A5 | A5 | 5 |
| 4 | TUF | 3 | Wenatchee | 49.6 | 8/31/17 19:50 | 0.4 | 0.1 | 0.2 | 6/21/18 22:33 | 294.1 | 423522.9 | Up | A5 | A4 | 5 |
| 5 | TUF | 4 | Wenatchee | 49.6 | 8/31/17 20:04 | 0.4 | 0.1 | 0.2 | 8/31/17 20:10 | 0.0 | 5.5 | Up | A4 | A4 | 6 |
| 6 | TUF | 5 | Wenatchee | 49.6 | 8/31/17 20:06 | 0.4 | 0.1 | 0.2 | 6/20/18 23:04 | 293.1 | 422098.1 | Up | A5 | A5 | 2 |
| 7 | TUF | 6 | Wenatchee | 49.6 | 8/31/17 20:20 | 0.4 | 0.1 | 0.2 | 6/19/18 21:37 | 292.1 | 420556.8 | Up | A5 | A5 | 4 |
| 8 | TUF | 7 | Wenatchee | 49.6 | 8/31/17 20:28 | 0.4 | 0.1 | 0.2 | 9/13/17 20:38 | 13.0 | 18729.5 | Up | A4 | A4 | 8 |
| 9 | TUF | 8 | Wenatchee | 49.6 | 8/31/17 20:34 | 0.4 | 0.1 | 0.2 | 8/31/17 20:54 | 0.0 | 20.2 | Up | A5 | A4 | 8 |
| 10 | TUF | 9 | Wenatchee | 49.6 | 8/31/17 20:54 | 0.5 | 0.1 | 0.2 | 9/2/17 22:32 | 2.1 | 2977.5 | Up | A5 | A4 | 13 |
| 11 | TUF | 10 | Wenatchee | 49.6 | 8/31/17 21:49 | 0.5 | 0.1 | 0.2 | 9/1/17 23:13 | 1.1 | 1523.5 | Up | A4 | A1 | 47 |
| 12 | TUF | 11 | Wenatchee | 49.6 | 9/1/17 19:51 | 1.4 | 0.1 | 0.1 | 9/1/17 20:11 | 0.0 | 19.6 | Up | A5 | A4 | 2 |
| 13 | TUF | 12 | Wenatchee | 49.6 | 9/1/17 20:39 | 1.4 | 0.1 | 0.1 | 7/14/18 23:13 | 316.1 | 455193.8 | Up | A5 | A1 | 17 |
| 14 | TUF | 13 | Wenatchee | 49.6 | 9/2/17 19:28 | 2.4 | 0.1 | 0.0 | 9/2/17 19:28 | 0.0 | 0.0 | Up | A5 | A5 | 1 |
| 15 | TUF | 14 | Wenatchee | 49.6 | 9/2/17 21:41 | 2.5 | 0.1 | 0.0 | 9/5/17 23:18 | 3.1 | 4416.6 | Up | A4 | A1 | 103 |
| 16 | TUF | 15 | Wenatchee | 49.6 | 9/3/17 20:12 | 3.4 | 0.1 | 0.0 | 10/26/17 18:30 | 52.9 | 76217.8 | Up | A4 | A4 | 4 |
| 17 | TUF | 16 | Wenatchee | 49.6 | 9/28/17 3:38 | 27.7 | 0.1 | 0.0 | 9/28/17 22:55 | 0.8 | 1156.9 | Up | A4 | A5 | 9 |
| 18 | TUF | 17 | Wenatchee | 49.6 | 10/23/17 17:38 | 53.3 | 0.1 | 0.0 | 6/28/18 21:32 | 248.2 | 357354.8 | Up | A4 | A5 | 5 |
| 19 | TUF | 18 | Wenatchee | 49.6 | 6/16/18 0:01 | 288.6 | 0.1 | 0.0 | 7/5/18 21:44 | 19.9 | 28663.0 | Up | A4 | A5 | 7 |
| 20 | TUF | 19 | Wenatchee | 49.6 | 6/16/18 21:59 | 289.5 | 0.1 | 0.0 | 7/1/18 21:50 | 15.0 | 21591.5 | Up | A4 | A5 | 5 |
| 21 | TUF | 20 | Wenatchee | 49.6 | 6/18/18 23:25 | 291.6 | 0.1 | 0.0 | 6/20/18 21:40 | 1.9 | 2775.2 | Up | A5 | A5 | 8 |
| 22 | TUF | 21 | Wenatchee | 49.6 | 6/19/18 23:59 | 292.6 | 0.1 | 0.0 | 7/7/18 22:17 | 17.9 | 25817.4 | Up | A5 | A1 | 99 |
| 23 | TUF | 22 | Wenatchee | 49.6 | 6/20/18 13:07 | 293.1 | 0.1 | 0.0 | 6/20/18 13:08 | 0.0 | 1.1 | Up | A4 | A4 | 2 |
| 24 | TUF | 23 | Wenatchee | 49.6 | 6/21/18 12:10 | 294.1 | 0.1 | 0.0 | 8/1/18 1:59 | 40.6 | 58429.7 | Up | A5 | A2 | 46 |
| 25 | TUF | 24 | Wenatchee | 49.6 | 7/11/18 23:36 | 314.6 | 0.1 | 0.0 | 7/14/18 0:17 | 2.0 | 2921.3 | Up | A5 | A5 | 2 |

- First detections at TUF (n=24) occurred between August 31, 2017, and July 11, 2018 (0.4 and 315 days post release). Time of first detection ranged between 19:35 and 3:38. Duration of detection were between 0.00 seconds to 316 days (median of 8.0 days), with the number of detections ranging between 1 and 103. Seventeen of the 24 lamprey (71%) were detected approaching the dam during the first summer, whereas the remainder (29%) were detected approaching the dam after overwintering. Six of the 24 lamprey (25%) have attempted to pass during both migration periods (first summer and second spring/summer) extending over 248 days.
- Of the 24 detected at TUF, 13 were first detected at the “High Flow Ladder Entrance,” while 11 were first detected at the “Low Flow Ladder Entrance.” Four lamprey (17%) were last detected at “Weir 18” (July 4 and 14 and September 1 and 5, 2018) indicating those may potentially have passed the dam; the remainder (except one last detected at “Weir 15”) were all last detected at either of the two ladder entrances.
- First detections at LWE (n=1) occurred on May 4, 2018 (246 days post release). Time of first detections was 3:36, and duration of detection was 73 days, with 66 total detections.
- Of the 24 first detected at TUF, one was detected moving upstream 27 days later to UWE (Upper Wenatchee River; river km 80.9) and one was detected moving downstream 339 days later to LWE (Table 7).

Table 7. Summary of second detections from Mid Wenatchee River (river km 49.5) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| Site Code # | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads | |
|-------------|--------|-------|-----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|---|
| 16 | LWE | 1 | Wenatchee | 2.7 | 8/9/18 2:57 | 339.3 | -46.9 | -0.1 | 8/9/18 2:57 | 0.0 | 0.0 | Down | 0B | 0B | 1 |
| 22 | UWE | 1 | Wenatchee | 80.9 | 7/16/18 22:21 | 26.9 | 31.3 | 1.2 | 7/16/18 22:21 | 0.0 | 0.0 | Up | B5 | B5 | 1 |

- The second detection at LWE occurred on August 9, 2018, at 2:57, and lasted for 0.00 seconds (1 detection).
- The second detection at UWE occurred on July 16, 2018, at 22:21, and lasted for 0.00 seconds (1 detection) (Table 8). This lamprey was detected 1.0 day later at NAL (Lower Nason Creek; river km 0.8) on July 17, 2018, at 23:16 (1 detection).

Table 8. Summary of third detections from Mid Wenatchee River (river km 49.5) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| Site Code # | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads | |
|-------------|--------|-------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|---|
| 22 | NAL | 1 | Nason | 0.8 | 7/17/18 23:16 | 1.0 | 6.6 | 6.4 | 7/17/18 23:16 | 0.0 | 0.00 | Up | 66 | 66 | 1 |

- In the end, of the 34 lamprey, 24 (71%) were detected at TUF, two (6%) were detected at LWE, one (3%) was detected at UWE, and one (3%) was detected at NAL.

Summer - Upper Wenatchee Release #1 (River KM 50.4; 8/31/2017; n=47)

- Twelve of 47 (26%) were detected, and six (13%) were detected at two sites.
- Of the 12 first detections, 10 detections (83%) were from lamprey moving upstream initially, including eight (67%) at UWE (Upper Wenatchee River; river km 80.9) and two (17%) at NAL (Lower Nason Creek; river km 0.8) (Table 9). Two of the first detections (17%) were from lamprey moving downstream initially to TUF (Tumwater Dam Adult Fishway; river km 49.6).

Table 9. Summary of first detections from Upper Wenatchee River (river km 50.4) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site | | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Directio n? | First | Last | # |
|----|------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|-------------|---------|---------|----|
| | Code | Site # | | | | | | | | | | | Ant. ID | Ant. ID | |
| 1 | TUF | 1 | Wenatchee | 49.6 | 8/31/17 20:58 | 0.4 | -0.8 | -2.2 | 8/31/17 21:20 | 0.0 | 22.0 | Down / Up | A4 | A4 | 6 |
| 2 | TUF | 2 | Wenatchee | 49.6 | 10/25/17 19:54 | 55.3 | -0.8 | 0.0 | 7/28/18 22:28 | 276.1 | 397594.3 | Down / Up | A4 | A4 | 16 |
| 3 | UWE | 1 | Wenatchee | 80.9 | 9/3/17 22:43 | 3.4 | 30.5 | 8.9 | 9/3/17 22:43 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 4 | UWE | 2 | Wenatchee | 80.9 | 9/3/17 22:45 | 3.4 | 30.5 | 8.9 | 9/3/17 22:45 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 5 | UWE | 3 | Wenatchee | 80.9 | 9/4/17 2:39 | 3.6 | 30.5 | 8.5 | 6/28/18 2:46 | 297.0 | 427686.9 | Up | B4 | B4 | 2 |
| 6 | UWE | 4 | Wenatchee | 80.9 | 9/4/17 20:18 | 4.3 | 30.5 | 7.0 | 9/4/17 20:18 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 7 | UWE | 5 | Wenatchee | 80.9 | 9/6/17 22:32 | 6.4 | 30.5 | 4.7 | 9/6/17 22:32 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 8 | UWE | 6 | Wenatchee | 80.9 | 9/14/17 20:23 | 14.3 | 30.5 | 2.1 | 9/14/17 20:23 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 9 | UWE | 7 | Wenatchee | 80.9 | 10/19/17 22:15 | 49.4 | 30.5 | 0.6 | 10/19/17 22:15 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 10 | UWE | 8 | Wenatchee | 80.9 | 5/31/18 21:25 | 273.4 | 30.5 | 0.1 | 6/1/18 0:08 | 0.1 | 163.0 | Up | B4 | B6 | 3 |
| 11 | NAL | 1 | Nason | 0.8 | 9/5/17 4:17 | 4.7 | 37.1 | 8.0 | 9/5/17 4:17 | 0.0 | 0.0 | Up | 62 | 62 | 1 |
| 12 | NAL | 2 | Nason | 0.8 | 7/1/18 21:38 | 304.4 | 37.1 | 0.1 | 7/1/18 21:38 | 0.0 | 0.0 | Up | 66 | 66 | 1 |

- First detections at UWE (n=8) occurred between September 3, 2017, and May 31, 2018 (3.4 and 273 days post release). Seven lamprey (88%) were detected in the first summer, whereas 1 lamprey (12%) was detected only after overwintering.
- First detections at NAL (n=2) occurred on September 5, 2017, and July 1, 2018 (4.7 and 304 days post release, respectively).
- First detections at TUF (n=2) occurred on August 31, 2017, and October 25, 2017 (0.4 and 55 days post release, respectively). Both lamprey approached Tumwater Dam from the downstream end (ladder entrance) and one was detected as far upstream as “Weir 3.”
- Of the eight first detected at UWE, five (63%) were detected moving upstream to NAL (Lower Nason Creek). The detection ranged between September 5, 2017 and June 20, 2018 (0.2 to 277 days since last detection at UWE).
- Of the two first detected at NAL, one (50%) was detected moving downstream to UWE (Upper Wenatchee River) (Table 10). The detection was 23 days after last detection at NAL on July 24, 2018, at 20:59. It lasted for 0.00 seconds (1 detection).

Table 10. Summary of second detections from Upper Wenatchee River (river km 50.4) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site | | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First | Last | # |
|----|------|--------|-----------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------|---------|------|
| | Code | Site # | | | | | | | | | | | Ant. ID | Ant. ID | |
| 1 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 2 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 3 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 4 | NAL | 1 | Nason | 0.8 | 5/28/18 0:26 | 266.1 | 6.6 | 0.0 | 6/16/18 22:58 | 19.9 | 28712.1 | Up | 61 | 61 | 4 |
| 5 | NAL | 2 | Nason | 0.8 | 6/8/18 0:30 | 276.9 | 6.6 | 0.0 | 6/8/18 0:30 | 0.0 | 0.0 | Up | 63 | 63 | 1 |
| 6 | NAL | 3 | Nason | 0.8 | 9/5/17 23:03 | 1.1 | 6.6 | 5.9 | 9/5/17 23:04 | 0.0 | 0.3 | Up | 66 | 62 | 2 |
| 7 | NAL | 4 | Nason | 0.8 | 9/7/17 3:55 | 0.2 | 6.6 | 29.4 | 9/7/17 3:55 | 0.0 | 0.0 | Up | 63 | 63 | 1 |
| 8 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 9 | NAL | 5 | Nason | 0.8 | 6/20/18 0:08 | 243.1 | 6.6 | 0.0 | 7/14/18 23:41 | 25.0 | 35972.8 | Up | 63 | 66 | 2 |
| 10 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 11 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 12 | UWE | 1 | Wenatchee | 80.9 | 7/24/18 20:59 | 23.0 | -6.6 | -0.3 | 7/24/18 20:59 | 0.0 | 0.0 | Down | B2 | B2 | 1 |

- In the end, of the 47 lamprey, nine (19%) were detected at UWE, seven (15%) were detected at NAL, and two (4%) were detected at TUF.

Summer - Upper Wenatchee Release #2 (River KM 74.6; 8/31/2017; n=50)

- Thirty-three of 50 (66%) were detected, 20 (40%) were detected at two sites, and five (10%) were detected at three sites.
- Of the 33 first detections, all were detected moving upstream initially, including 31 (94%) at UWE (Upper Wenatchee River; river km 80.9) and two (6%) at NAL (Lower Nason Creek; river km 0.8) (Table 11).

Table 11. Summary of first detections from Upper Wenatchee River (river km 74.6) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|----|-----------------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | UWE | 1 | Wenatchee | 80.9 | 8/31/17 22:42 | 0.5 | 6.3 | 11.9 | 8/31/17 22:42 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 2 | UWE | 2 | Wenatchee | 80.9 | 8/31/17 23:41 | 0.6 | 6.3 | 11.0 | 8/31/17 23:41 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 3 | UWE | 3 | Wenatchee | 80.9 | 8/31/17 23:43 | 0.6 | 6.3 | 11.0 | 8/31/17 23:43 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 4 | UWE | 4 | Wenatchee | 80.9 | 8/31/17 23:46 | 0.6 | 6.3 | 11.0 | 6/2/18 0:19 | 274.0 | 394592.2 | Up | B5 | B2 | 2 |
| 5 | UWE | 5 | Wenatchee | 80.9 | 8/31/17 23:49 | 0.6 | 6.3 | 10.9 | 8/31/17 23:49 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 6 | UWE | 6 | Wenatchee | 80.9 | 8/31/17 23:55 | 0.6 | 6.3 | 10.9 | 8/31/17 23:55 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 7 | UWE | 7 | Wenatchee | 80.9 | 9/1/17 0:04 | 0.6 | 6.3 | 10.7 | 9/1/17 0:04 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 8 | UWE | 8 | Wenatchee | 80.9 | 9/1/17 0:06 | 0.6 | 6.3 | 10.7 | 9/1/17 0:06 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 9 | UWE | 9 | Wenatchee | 80.9 | 9/1/17 0:21 | 0.6 | 6.3 | 10.5 | 9/1/17 0:21 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 10 | UWE | 10 | Wenatchee | 80.9 | 9/1/17 0:47 | 0.6 | 6.3 | 10.2 | 9/1/17 0:48 | 0.0 | 0.1 | Up | B5 | B4 | 2 |
| 11 | UWE | 11 | Wenatchee | 80.9 | 9/1/17 0:48 | 0.6 | 6.3 | 10.2 | 9/1/17 0:48 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 12 | UWE | 12 | Wenatchee | 80.9 | 9/1/17 0:58 | 0.6 | 6.3 | 10.1 | 9/1/17 0:58 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 13 | UWE | 13 | Wenatchee | 80.9 | 9/1/17 1:08 | 0.6 | 6.3 | 10.0 | 9/1/17 1:08 | 0.0 | 0.0 | Up | B2 | B2 | 1 |
| 14 | UWE | 14 | Wenatchee | 80.9 | 9/1/17 1:11 | 0.6 | 6.3 | 10.0 | 9/1/17 1:11 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 15 | UWE | 15 | Wenatchee | 80.9 | 9/1/17 1:14 | 0.6 | 6.3 | 9.9 | 9/1/17 1:14 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 16 | UWE | 16 | Wenatchee | 80.9 | 9/1/17 2:26 | 0.7 | 6.3 | 9.2 | 9/1/17 2:26 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 17 | UWE | 17 | Wenatchee | 80.9 | 9/1/17 2:29 | 0.7 | 6.3 | 9.2 | 9/1/17 2:29 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 18 | UWE | 18 | Wenatchee | 80.9 | 9/1/17 20:49 | 1.5 | 6.3 | 4.3 | 9/1/17 20:49 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 19 | UWE | 19 | Wenatchee | 80.9 | 9/1/17 23:25 | 1.6 | 6.3 | 4.0 | 5/31/18 21:08 | 271.9 | 391542.6 | Up | B4 | B3 | 4 |
| 20 | UWE | 20 | Wenatchee | 80.9 | 9/1/17 23:38 | 1.6 | 6.3 | 4.0 | 9/1/17 23:38 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 21 | UWE | 21 | Wenatchee | 80.9 | 9/2/17 0:09 | 1.6 | 6.3 | 4.0 | 9/2/17 0:09 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 22 | UWE | 22 | Wenatchee | 80.9 | 9/2/17 3:11 | 1.7 | 6.3 | 3.7 | 9/2/17 3:11 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 23 | UWE | 23 | Wenatchee | 80.9 | 9/2/17 3:28 | 1.7 | 6.3 | 3.6 | 9/2/17 3:28 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 24 | UWE | 24 | Wenatchee | 80.9 | 9/3/17 21:50 | 3.5 | 6.3 | 1.8 | 5/29/18 20:41 | 268.0 | 385851.4 | Up | B3 | B1 | 2 |
| 25 | UWE | 25 | Wenatchee | 80.9 | 9/12/17 3:10 | 11.7 | 6.3 | 0.5 | 9/12/17 3:10 | 0.0 | 0.0 | Up | B3 | B3 | 1 |
| 26 | UWE | 26 | Wenatchee | 80.9 | 9/15/17 21:16 | 15.5 | 6.3 | 0.4 | 9/15/17 21:16 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 27 | UWE | 27 | Wenatchee | 80.9 | 10/19/17 22:43 | 49.5 | 6.3 | 0.1 | 7/13/18 4:00 | 266.2 | 383356.6 | Up | B5 | B4 | 5 |
| 28 | UWE | 28 | Wenatchee | 80.9 | 3/6/18 23:00 | 187.5 | 6.3 | 0.0 | 3/6/18 23:00 | 0.0 | 0.0 | Up | B5 | B5 | 1 |
| 29 | UWE | 29 | Wenatchee | 80.9 | 5/5/18 21:07 | 247.5 | 6.3 | 0.0 | 5/18/18 21:29 | 13.0 | 18742.7 | Up | B3 | B4 | 2 |
| 30 | UWE | 30 | Wenatchee | 80.9 | 6/6/18 21:58 | 279.5 | 6.3 | 0.0 | 6/6/18 21:58 | 0.0 | 0.0 | Up | B3 | B4 | 2 |
| 31 | UWE | 31 | Wenatchee | 80.9 | 6/22/18 0:26 | 294.6 | 6.3 | 0.0 | 6/22/18 0:26 | 0.0 | 0.0 | Up | B1 | B1 | 1 |
| 32 | NAL | 1 | Nason | 0.8 | 9/1/17 3:27 | 0.7 | 12.9 | 17.7 | 9/1/17 3:27 | 0.0 | 0.2 | Up | 66 | 62 | 2 |
| 33 | NAL | 2 | Nason | 0.8 | 7/10/18 2:34 | 312.7 | 12.9 | 0.0 | 7/10/18 2:34 | 0.0 | 0.7 | Up | 66 | 61 | 2 |

- First detections at UWE (n=31) occurred between August 31, 2017, and June 22, 2018 (0.5 and 295 days post release). Twenty-seven lamprey (87%) were detected in the first summer, whereas four lamprey (13%) were detected only after overwintering.

- First detections at NAL (n=2) occurred on September 1, 2017, and July 10, 2018 (0.7 and 313 days post release, respectively).
- Of the 31 first detected at UWE, 18 (58%) were detected moving upstream to NAL (Lower Nason Creek). The detection ranged between September 1, 2017 and July 25, 2018 (0.1 to 328 days since last detection at UWE). Time of first detections at NAL were between 21:18 and 5:03, and total detections ranged from 1 to 6. Duration of detection ranged from 0.00 seconds to 327 days; two of the 18 (11%) were detected moving downstream (likely indicating post spawn drifting) between June 26 and July 26, 2018.
- Of the two first detected at NAL, one (50%) was detected moving upstream to NAU (Upper Nason Creek; river km 19.5) (Table 12). The detection was 1.9 days after last detection at NAL on September 3, 2018, at 0:32. It lasted for 0.32 seconds (2 detection).

Table 12. Summary of second detections from Upper Wenatchee River (river km 74.6) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant ID | Last Ant ID | # Reads |
|----|-----------|--------|-----------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|--------------|-------------|---------|
| 1 | NAL | 1 | Nason | 0.8 | 9/1/17 1:50 | 0.1 | 6.6 | 50.4 | 9/1/17 1:51 | 0.0 | 0.5 | Up | 66 | 62 | 2 |
| 2 | NAL | 2 | Nason | 0.8 | 9/1/17 22:27 | 0.9 | 6.6 | 7.0 | 7/26/18 5:07 | 327.3 | 471279.8 | Up | 66 | 63 | 3 |
| 3 | LWE | 1 | Wenatchee | 2.7 | 7/25/18 17:42 | 327.7 | -78.2 | -0.2 | 7/25/18 17:42 | 0.0 | 0.0 | Down | 4 | 4 | 1 |
| 4 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 5 | NAL | 3 | Nason | 0.8 | 9/1/17 3:13 | 0.1 | 6.6 | 46.5 | 9/1/17 3:13 | 0.0 | 0.2 | Up | 66 | 62 | 2 |
| 6 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 7 | NAL | 4 | Nason | 0.8 | 9/1/17 21:18 | 0.9 | 6.6 | 7.5 | 9/1/17 21:18 | 0.0 | 0.2 | Up | 66 | 62 | 2 |
| 8 | NAL | 5 | Nason | 0.8 | 9/1/17 23:01 | 1.0 | 6.6 | 6.9 | 9/1/17 23:01 | 0.0 | 0.2 | Up | 66 | 62 | 2 |
| 9 | NAL | 6 | Nason | 0.8 | 9/1/17 21:55 | 0.9 | 6.6 | 7.3 | 9/1/17 21:55 | 0.0 | 0.3 | Up | 66 | 62 | 2 |
| 10 | NAL | 7 | Nason | 0.8 | 9/1/17 3:52 | 0.1 | 6.6 | 51.6 | 9/1/17 3:52 | 0.0 | 0.2 | Up | 66 | 63 | 2 |
| 11 | NAL | 8 | Nason | 0.8 | 9/2/17 0:35 | 1.0 | 6.6 | 6.7 | 9/2/17 0:35 | 0.0 | 0.0 | Up | 63 | 63 | 1 |
| 12 | NAL | 9 | Nason | 0.8 | 9/2/17 0:16 | 1.0 | 6.6 | 6.8 | 9/2/17 0:17 | 0.0 | 0.1 | Up | 66 | 63 | 2 |
| 13 | NAL | 10 | Nason | 0.8 | 9/1/17 22:17 | 0.9 | 6.6 | 7.5 | 9/1/17 22:17 | 0.0 | 0.3 | Up | 66 | 62 | 2 |
| 14 | NAL | 11 | Nason | 0.8 | 9/1/17 21:24 | 0.8 | 6.6 | 7.8 | 9/8/17 21:24 | 7.0 | 10079.9 | Up | 66 | 66 | 4 |
| 15 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 16 | NAL | 12 | Nason | 0.8 | 9/2/17 1:27 | 1.0 | 6.6 | 6.9 | 9/2/17 1:27 | 0.0 | 0.0 | Up | 66 | 66 | 1 |
| 17 | NAL | 13 | Nason | 0.8 | 9/1/17 23:24 | 0.9 | 6.6 | 7.6 | 9/1/17 23:25 | 0.0 | 1.0 | Up | 65 | 62 | 2 |
| 18 | NAL | 14 | Nason | 0.8 | 6/18/18 17:54 | 289.9 | 6.6 | 0.0 | 6/18/18 17:55 | 0.0 | 1.5 | Up | 66 | 61 | 3 |
| 19 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 20 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 21 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 22 | NAL | 15 | Nason | 0.8 | 9/2/17 22:01 | 0.8 | 6.6 | 8.4 | 9/2/17 22:01 | 0.0 | 0.0 | Up | 63 | 63 | 1 |
| 23 | NAL | 16 | Nason | 0.8 | 9/2/17 21:59 | 0.8 | 6.6 | 8.6 | 9/2/17 22:00 | 0.0 | 0.2 | Up | 66 | 62 | 2 |
| 24 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 25 | NAL | 17 | Nason | 0.8 | 5/24/18 5:03 | 254.1 | 6.6 | 0.0 | 5/24/18 5:12 | 0.0 | 9.1 | Up | 64 | 61 | 2 |
| 26 | NAL | 18 | Nason | 0.8 | 6/6/18 23:06 | 264.1 | 6.6 | 0.0 | 6/26/18 14:58 | 19.7 | 28312.2 | Up | 65 | 63 | 6 |
| 27 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 28 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 29 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 30 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 31 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 32 | NAU | 1 | Nason | 19.5 | 9/3/17 0:32 | 1.9 | 18.7 | 10.0 | 9/3/17 0:32 | 0.0 | 0.3 | Up | 44 | 42 | 2 |
| 33 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |

- Of the 18 detected moving upstream to NAL after UWE detection, five (28%) were detected moving upstream to NAU (Table 13). Four of the five (80%) detected at NAL moved during the first summer, and one (20%) moved after dewatering. The detection

ranged between September 2, 2017 and July 6, 2018 (1.8 to 308 days since last detection at NAL). Duration of detection ranged from 0.23 seconds to 292 days.

Table 13. Summary of third detections from Upper Wenatchee River (river km 74.6) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site | | River | River KM | First Time | Days | River | Migration | Last Time | Duration | Duration | Directio | First | Last | # |
|---|-------|------|-------|----------|--------------|-----------|--------|-----------|---------------|----------|-----------|-----------|-------|------|-------|
| | Code | Site | | | Value | Since | KM | Speed | Value | (Days) | (Sec) | n? | Ant. | Ant. | |
| # | Value | # | River | River KM | Value | Detection | Travel | (km/day) | Value | (Days) | (Sec) | n? | ID | ID | Reads |
| 1 | NAU | 1 | Nason | 19.5 | 9/2/17 21:05 | 1.8 | 18.7 | 10.4 | 9/2/17 21:05 | 0.0 | 0.23 | Up | 46 | 42 | 3 |
| 2 | NAU | 2 | Nason | 19.5 | 7/6/18 17:16 | 307.8 | 18.7 | 0.1 | 7/20/18 4:33 | 13.5 | 19397.48 | Up / Down | 44 | 45 | 6 |
| 5 | NAU | 3 | Nason | 19.5 | 9/2/17 23:43 | 1.9 | 18.7 | 10.1 | 6/21/18 23:05 | 292.0 | 420441.98 | Up / Down | 44 | 46 | 4 |
| 8 | NAU | 4 | Nason | 19.5 | 9/3/17 22:10 | 2.0 | 18.7 | 9.5 | 6/14/18 23:09 | 284.0 | 409019.20 | Up / Down | 45 | 44 | 5 |
| 9 | NAU | 5 | Nason | 19.5 | 9/13/17 2:00 | 11.2 | 18.7 | 1.7 | 6/18/18 22:54 | 278.9 | 401574.35 | Up / Down | 44 | 46 | 4 |

- In the end, of the 50 lamprey, 31 (62%) were detected at UWE, 20 (40%) were detected at NAL, six (12%) were detected at NAU, and one (2%) was detected at LWE.

Summer - Icicle Release (River KM 2.2; 8/31/2017; n=26)

- Ten of 26 (38%) were detected, and three (12%) were detected at two sites.
- Of the 10 first detections, two detections (20%) were from lamprey moving upstream initially to ICM (Middle Icicle Instream Array; river km 6.8) (Table 14). Eight first detections (80%) were from lamprey moving downstream initially, including four (40%) at ICL (Lower Icicle Instream Array; river km 0.4), two (20%) at LWE (Lower Wenatchee River; river km 2.7), and two (20%) at TUF (Tumwater Dam Adult Fishway; river km 49.6), indicating it moved downstream to Wenatchee River and then swam upstream.

Table 14. Summary of first detections from Icicle Creek (river km 2.2) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site | | River | River KM | First Time | Days | River | Migration | Last Time | Duration | Duration | Directio | First | Last | # |
|----|-------|------|-----------|----------|---------------|---------|--------|-----------|---------------|----------|----------|-----------|-------|------|-------|
| | Code | Site | | | Value | Since | KM | Speed | Value | (Days) | (Sec) | n? | Ant. | Ant. | |
| # | Value | # | River | River KM | Value | Release | Travel | (km/day) | Value | (Days) | (Sec) | n? | ID | ID | Reads |
| 1 | LWE | 1 | Wenatchee | 2.7 | 5/26/18 21:22 | 268.5 | -40.5 | -0.2 | 5/26/18 21:22 | 0.0 | 0.0 | Down | 6 | 6 | 1 |
| 2 | LWE | 2 | Wenatchee | 2.7 | 8/9/18 13:45 | 343.1 | -40.5 | -0.1 | 8/9/18 23:01 | 0.4 | 556.3 | Down | 6 | 6 | 92 |
| 3 | ICM | 1 | Icicle | 6.8 | 9/1/17 21:07 | 1.5 | 4.6 | 3.2 | 9/1/17 21:13 | 0.0 | 5.9 | Up | 5 | 2 | 3 |
| 4 | ICM | 2 | Icicle | 6.8 | 9/3/17 2:25 | 2.7 | 4.6 | 1.7 | 9/3/17 2:25 | 0.0 | 0.0 | Up | 5 | 5 | 1 |
| 5 | ICL | 1 | Icicle | 0.4 | 8/31/17 20:37 | 0.4 | -1.8 | -4.1 | 8/31/17 20:37 | 0.0 | 0.2 | Down | 4 | 0A | 2 |
| 6 | ICL | 2 | Icicle | 0.4 | 8/31/17 20:49 | 0.4 | -1.8 | -4.1 | 8/31/17 20:49 | 0.0 | 0.0 | Down | 4 | 4 | 1 |
| 7 | ICL | 3 | Icicle | 0.4 | 8/31/17 21:04 | 0.5 | -1.8 | -4.0 | 8/31/17 21:04 | 0.0 | 0.0 | Down | 0A | 0A | 1 |
| 8 | ICL | 4 | Icicle | 0.4 | 9/6/17 20:16 | 6.4 | -1.8 | -0.3 | 9/6/17 20:16 | 0.0 | 0.0 | Down | 0A | 0A | 1 |
| 9 | TUF | 1 | Wenatchee | 49.6 | 9/6/17 3:41 | 5.7 | 8.6 | 1.5 | 9/6/17 3:41 | 0.0 | 0.0 | Down / Up | A4 | A4 | 1 |
| 10 | TUF | 2 | Wenatchee | 49.6 | 9/22/17 3:37 | 21.7 | 8.6 | 0.4 | 9/22/17 3:58 | 0.0 | 20.0 | Down / Up | A4 | A4 | 11 |

- First detections at ICM (n=2) occurred on September 1 and 3, 2017 (1.5 and 2.7 days post release). The number of detections were two and five.

- First detections at ICL (n=4) occurred between August 31 and September 6, 2017 (0.4 and 6.4 days post release, respectively).
- First detections at LWE (n=2) occurred on May 26, 2018 and August 9, 2018 (269 and 343 days post release).
- First detections at TUF (n=2) occurred on September 6 and 22, 2018 (5.7 and 22 days post release). Both were last detected at the “Low Flow Ladder Entrance;” indicating they likely moved downstream after interacting with the dam.
- Of the four lamprey first detected at ICL, 3 (75%) were detected moving upstream to TUF (Table 15). The detection ranged between September 6 and October 24, 2017 (5.2 to 53.9 days since last detection at ICL). Duration of detection ranged from 200 to 290 days, indicating that all three made attempts to move upstream during both first summer and pre-spawning spring/summer migration. Their last detection were all from the ladder entrances, indicating no dam passage.

Table 15. Summary of second detections from Icicle Creek (river km 2.2) release on August 31, 2017. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|----|-----------------|--------|-----------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 2 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 3 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 4 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 5 | TUF | 1 | Wenatchee | 49.6 | 9/6/17 1:48 | 5.2 | 8.6 | 1.6 | 6/19/18 21:21 | 286.8 | 413012.1 | Up | A4 | A5 | 3 |
| 6 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 7 | TUF | 2 | Wenatchee | 49.6 | 10/24/17 19:09 | 53.9 | 8.6 | 0.2 | 5/12/18 13:09 | 199.8 | 287640.1 | Up | A4 | A4 | 18 |
| 8 | TUF | 3 | Wenatchee | 49.6 | 9/16/17 0:23 | 9.2 | 8.6 | 0.9 | 7/3/18 0:29 | 290.0 | 417605.7 | Up | A4 | A5 | 10 |
| 9 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |
| 10 | #N/A | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | #N/A | #N/A | #N/A |

- In the end, of the 26 lamprey, two (8%) were detected at ICM, four (15%) were detected at ICL, five (19%) were detected at TUF, and two (8%) were detected at LWE.

Spring - Mid Wenatchee Release below Tumwater Dam (River KM 48.6; 4/23/2018; n=35)

- Twenty-nine of 35 (83%) were detected, and one (3%) was detected at two sites.
- Of the 29 first detections, all detections were from lamprey moving upstream initially to TUF (Tumwater Dam Adult Fishway; river km 49.6) (Table 16).

Table 16. Summary of first detections from Mid Wenatchee River (river km 48.6) release on April 23, 2018. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|----|-----------------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | TUF | 1 | Wenatchee | 49.6 | 6/1/18 22:24 | 39.3 | 1.0 | 0.0 | 6/7/18 17:41 | 5.8 | 8357.2 | Up | A4 | A5 | 2 |
| 2 | TUF | 2 | Wenatchee | 49.6 | 6/2/18 2:51 | 39.5 | 1.0 | 0.0 | 6/2/18 2:57 | 0.0 | 5.8 | Up | A4 | A4 | 3 |
| 3 | TUF | 3 | Wenatchee | 49.6 | 6/3/18 0:49 | 40.4 | 1.0 | 0.0 | 6/21/18 16:25 | 18.7 | 26856.4 | Up | A5 | A5 | 7 |
| 4 | TUF | 4 | Wenatchee | 49.6 | 6/3/18 1:40 | 40.5 | 1.0 | 0.0 | 6/14/18 21:31 | 11.8 | 17030.7 | Up | A4 | A4 | 4 |
| 5 | TUF | 5 | Wenatchee | 49.6 | 6/3/18 2:52 | 40.5 | 1.0 | 0.0 | 6/20/18 23:32 | 17.9 | 25720.5 | Up | A5 | A4 | 8 |
| 6 | TUF | 6 | Wenatchee | 49.6 | 6/5/18 23:52 | 43.4 | 1.0 | 0.0 | 6/21/18 13:12 | 15.6 | 22399.9 | Up | A5 | A4 | 4 |
| 7 | TUF | 7 | Wenatchee | 49.6 | 6/7/18 21:10 | 45.3 | 1.0 | 0.0 | 7/7/18 20:31 | 30.0 | 43160.7 | Up | A4 | A1 | 109 |
| 8 | TUF | 8 | Wenatchee | 49.6 | 6/7/18 21:59 | 45.3 | 1.0 | 0.0 | 6/7/18 21:59 | 0.0 | 0.0 | Up | A4 | A4 | 1 |
| 9 | TUF | 9 | Wenatchee | 49.6 | 6/7/18 22:40 | 45.4 | 1.0 | 0.0 | 7/27/18 2:20 | 49.2 | 70780.8 | Up | A4 | A4 | 21 |
| 10 | TUF | 10 | Wenatchee | 49.6 | 6/7/18 23:26 | 45.4 | 1.0 | 0.0 | 7/9/18 0:54 | 31.1 | 44727.6 | Up | A4 | A5 | 14 |
| 11 | TUF | 11 | Wenatchee | 49.6 | 6/8/18 1:08 | 45.5 | 1.0 | 0.0 | 7/11/18 20:23 | 33.8 | 48674.6 | Up | A4 | A5 | 91 |
| 12 | TUF | 12 | Wenatchee | 49.6 | 6/8/18 1:54 | 45.5 | 1.0 | 0.0 | 7/9/18 0:09 | 30.9 | 44534.5 | Up | A4 | A1 | 89 |
| 13 | TUF | 13 | Wenatchee | 49.6 | 6/10/18 0:32 | 47.4 | 1.0 | 0.0 | 6/20/18 21:01 | 10.9 | 15628.3 | Up | A5 | A4 | 6 |
| 14 | TUF | 14 | Wenatchee | 49.6 | 6/13/18 21:56 | 51.3 | 1.0 | 0.0 | 7/10/18 22:11 | 27.0 | 38894.4 | Up | A4 | A5 | 1017 |
| 15 | TUF | 15 | Wenatchee | 49.6 | 6/13/18 23:32 | 51.4 | 1.0 | 0.0 | 7/31/18 21:28 | 47.9 | 68996.7 | Up | A5 | A4 | 7 |
| 16 | TUF | 16 | Wenatchee | 49.6 | 6/14/18 0:26 | 51.4 | 1.0 | 0.0 | 6/14/18 0:26 | 0.0 | 0.0 | Up | A4 | A4 | 1 |
| 17 | TUF | 17 | Wenatchee | 49.6 | 6/14/18 22:23 | 52.3 | 1.0 | 0.0 | 6/21/18 21:17 | 7.0 | 10013.5 | Up | A4 | A4 | 3 |
| 18 | TUF | 18 | Wenatchee | 49.6 | 6/14/18 23:29 | 52.4 | 1.0 | 0.0 | 6/21/18 23:03 | 7.0 | 10054.7 | Up | A4 | A4 | 4 |
| 19 | TUF | 19 | Wenatchee | 49.6 | 6/14/18 23:54 | 52.4 | 1.0 | 0.0 | 6/24/18 22:35 | 9.9 | 14321.1 | Up | A5 | A4 | 8 |
| 20 | TUF | 20 | Wenatchee | 49.6 | 6/15/18 0:02 | 52.4 | 1.0 | 0.0 | 7/27/18 21:03 | 42.9 | 61741.3 | Up | A4 | A4 | 18 |
| 21 | TUF | 21 | Wenatchee | 49.6 | 6/15/18 0:17 | 52.4 | 1.0 | 0.0 | 8/6/18 23:55 | 53.0 | 76297.9 | Up | A4 | A4 | 10 |
| 22 | TUF | 22 | Wenatchee | 49.6 | 6/15/18 0:36 | 52.4 | 1.0 | 0.0 | 7/15/18 20:09 | 30.8 | 44373.8 | Up | A5 | A5 | 10 |
| 23 | TUF | 23 | Wenatchee | 49.6 | 6/15/18 1:41 | 52.5 | 1.0 | 0.0 | 6/21/18 21:35 | 6.8 | 9833.6 | Up | A5 | A4 | 12 |
| 24 | TUF | 24 | Wenatchee | 49.6 | 6/15/18 21:11 | 53.3 | 1.0 | 0.0 | 7/15/18 0:59 | 29.2 | 41988.5 | Up | A4 | A5 | 28 |
| 25 | TUF | 25 | Wenatchee | 49.6 | 6/18/18 0:27 | 55.4 | 1.0 | 0.0 | 6/18/18 0:43 | 0.0 | 16.1 | Up | A4 | A4 | 5 |
| 26 | TUF | 26 | Wenatchee | 49.6 | 6/18/18 21:33 | 56.3 | 1.0 | 0.0 | 6/24/18 19:56 | 5.9 | 8542.6 | Up | A5 | A4 | 10 |
| 27 | TUF | 27 | Wenatchee | 49.6 | 6/19/18 22:48 | 57.4 | 1.0 | 0.0 | 6/21/18 22:32 | 2.0 | 2863.9 | Up | A4 | A4 | 7 |
| 28 | TUF | 28 | Wenatchee | 49.6 | 7/6/18 1:25 | 73.5 | 1.0 | 0.0 | 7/6/18 1:31 | 0.0 | 6.4 | Up | A5 | A5 | 5 |
| 29 | TUF | 29 | Wenatchee | 49.6 | 7/10/18 0:50 | 77.4 | 1.0 | 0.0 | 8/1/18 0:44 | 22.0 | 31673.8 | Up | A5 | A4 | 8 |

- First detections at TUF (n=29) occurred between June 1 and July 10, 2018 (39 and 77 days post release). Duration of detection were between 0.00 seconds to 53 days (median of 15.6 days), with the number of detections ranging between 1 and 1017.
- Of the 29 detected at TUF, 18 were first detected at the “Low Flow Ladder Entrance,” while 11 were first detected at the “High Flow Ladder Entrance.” Two lamprey (7%) were last detected at “Weir 18,” indicating those may potentially passed the dam (on July; the remainder were all last detected at either of the two ladder entrances.
- Of the two last detected at “Weir 18” at TUF, one (50%) was detected moving upstream 40 days later to NAL (Lower Nason Creek; river km 0.8) (Table 17). This lamprey was detected on July 18, 2018, at 0:20, and was only detected once at this site.). Of the 29 total detected at TUF, the ratio of one lamprey is only 3%.

Table 17. Summary of second detections from Mid Wenatchee River (river km 48.6) release on April 23, 2018. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|---|-----------------|--------|-------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 7 | NAL | 1 | Nason | 0.8 | 7/18/18 0:20 | 40.1 | 37.9 | 0.9 | 7/18/18 0:20 | 0.0 | 0.0 | Up | 66 | 66 | 1 |

- In the end, of the 35 lamprey, 29 (83%) were detected at TUF and one (3%) was detected at NAL.

Spring - Upper Wenatchee Release #1 (River KM 50.4; 4/23/2018; n=33)

- Six of 33 (18%) were detected, and one (3%) was detected at two sites.
- Of the six first detections, four detections (67%) were from lamprey moving upstream initially, including two (33%) at UWE (Upper Wenatchee River; river km 80.9) and two (33%) at NAL (Lower Nason Creek; river km 0.8) (Table 18). Two (33%) of the first detections were from lamprey moving downstream initially to TUF (Tumwater Dam Adult Fishway; river km 49.6).

Table 18. Summary of first detections from Upper Wenatchee River (river km 50.4) release on April 23, 2018. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| # | Site Code Value | Site # | River | River KM | First Time Value | Days Since Release | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant. ID | Last Ant. ID | # Reads |
|---|-----------------|--------|-----------|----------|------------------|--------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|---------------|--------------|---------|
| 1 | TUF | 1 | Wenatchee | 49.6 | 4/23/18 20:04 | 0.3 | -0.8 | -2.6 | 5/16/18 21:06 | 23.0 | 33181.3 | Down / Up | A4 | A3 | 5 |
| 2 | TUF | 2 | Wenatchee | 49.6 | 6/11/18 21:46 | 49.4 | -0.8 | 0.0 | 7/2/18 5:57 | 20.3 | 29291.5 | Down / Up | A5 | A5 | 14 |
| 3 | UWE | 1 | Wenatchee | 80.9 | 6/24/18 21:22 | 62.4 | 30.5 | 0.5 | 6/24/18 21:22 | 0.0 | 0.0 | Up | B2 | B2 | 1 |
| 4 | UWE | 2 | Wenatchee | 80.9 | 7/22/18 2:14 | 89.6 | 30.5 | 0.3 | 7/22/18 2:14 | 0.0 | 0.0 | Up | B4 | B4 | 1 |
| 5 | NAL | 1 | Nason | 0.8 | 7/20/18 0:18 | 87.5 | 37.1 | 0.4 | 7/20/18 0:18 | 0.0 | 0.4 | Up | 66 | 62 | 2 |
| 6 | NAL | 2 | Nason | 0.8 | 7/22/18 21:56 | 90.4 | 37.1 | 0.4 | 7/22/18 21:57 | 0.0 | 0.6 | Up | 66 | 62 | 2 |

- First detections at UWE (n=2) occurred on June 24 and July 22, 2018 (62 and 90 days post release, respectively).
- First detections at NAL (n=2) occurred on July 20 and 22, 2018 (88 and 90 days post release, respectively).
- First detections at TUF (n=2) occurred on April 23 and June 11, 2018 (0.3 and 49 days post release, respectively). Duration of detections were 23.0 and 20.3 days, with a total detections of 5 and 14, respectively. It appears that they fell back downstream of the dam and attempted to climb the fishway; one was only detected at the ladder entrance and the other was detected as far upstream as “Weir 3.”

- Of the two first detected at UWE, one (50%) was detected moving upstream to NAL (Lower Nason Creek) (Table 19). The detection was on June 25, 2018 (0.2 days since last detection at UWE). Time of detection at NAL was 2:58, and duration of detection was 0.37 seconds (2 total detections).

Table 19. Summary of second detections from Upper Wenatchee River (river km 50.4) release on April 23, 2018. See page 10 for the definition of the column headings. The number displayed in the first “#” column is the unique identifier for all individual lamprey detected at least once and remains the same for all the tables listed for this particular release.

| Site Code # | Site # | River | River KM | First Time Value | Days Since Detection | River KM Travel | Migration Speed (km/day) | Last Time Value | Duration (Days) | Duration (Sec) | Direction? | First Ant ID | Last Ant ID | # Reads | |
|-------------|--------|-------|----------|------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|----------------|------------|--------------|-------------|---------|---|
| 3 | NAL | 1 | Nason | 0.8 | 6/25/18 2:58 | 0.2 | 6.6 | 28.2 | 6/25/18 2:59 | 0.0 | 0.4 | Up | 66 | 63 | 2 |

- In the end, of the 33 lamprey, two (6%) were detected at UWE, three (9%) were detected at NAL, and two (6%) were detected at TUF.

Summary

The highlights from the 2017-2018 broodstock Pacific Lamprey translocation monitoring are the following (Table 20 and 21 and Figure 12):

Overall

- The overall detection percentage of PIT tagged lamprey was 52%, which was more than twice as the detection percentage observed in previous year (23%).
- Sites that detected lamprey the most were TUF (Tumwater Dam Adult Fishway; river km 49.6) at 25.5%, UWE (Upper Wenatchee River; river km 80.9) at 15.6%, NAL (Lower Nason Creek; river km 0.8) at 11.6%, and LWE (Lower Wenatchee River; river km 2.7) at 10.9%.
- The majority of lamprey were detected moving upstream initially, except the summer releases at Wenatchee River (river km 4.8) and Icicle Creek (river km 2.2) displayed a high proportion of downstream movement (60 and 82%, respectively). Because there is a lack of larval lamprey in Icicle Creek, it is possible that a large portion of lamprey are simply not attracted to remain in Icicle Creek.
- The proportions of lamprey from Upper Wenatchee release (river km 74.6) that reached UWE and NAL increased by 3.4 and 2.7 times, respectively, compared to those from the Lake Jolanda release (river km 50.4), indicating that those closer to the UWE (~6 km) and NAL (~13 km) are more likely to reach these destinations compared to those further away (~30 km and ~37 km, respectively). However, in previous year, none of the lamprey released in Jolanda Lake made it to Nason Creek, so the attraction appears to be increasing gradually each year.

- Although summer migration is the primary migration timing observed at major hydro dams, many lamprey migrate considerable distances (30-40 km) during the spring final migration within this type of tributary environments.
- For downstream movement (i.e. post spawn drifting), most lampreys are being detected between late June and late July (2018).
- The fastest upstream traveling lamprey detected was 50.4 km/day. This lamprey swam 6.6 km in 3 hours from UWE to NAL. There were a few others that traveled at 30-50 km/day speed for short distances (requiring less than a day). The fastest migration speed for multiple days of travel was 10.4 km/day.
- Unlike releases in other subbasins (Yakima and Methow), no lamprey from the Wenatchee releases were detected outside of the Wenatchee Subbasin.

Table 20. Summary of 2017-2018 broodstock Pacific Lamprey translocation detection sites from the Wenatchee Subbasin releases.

| Site Subbasin Name | Site Code Value | Site Name | River | River KM | # of Lamprey Detected | % of Lamprey Detected |
|---------------------------|-----------------|------------------------------------|-----------|----------|-----------------------|-----------------------|
| Wenatchee | LWE | LWE - Lower Wenatchee River | Wenatchee | 2.7 | 30 | 10.9% |
| Wenatchee | TUF | TUF - Tumwater Dam Adult Fishway | Wenatchee | 49.6 | 70 | 25.5% |
| Wenatchee | UWE | UWE - Upper Wenatchee River | Wenatchee | 80.9 | 43 | 15.6% |
| Wenatchee | ICL | ICL - Lower Icicle Instream Array | Icicle | 0.4 | 4 | 1.5% |
| Wenatchee | ICM | ICM - Middle Icicle Instream Array | Icicle | 6.8 | 2 | 0.7% |
| Wenatchee | NAL | NAL - Lower Nason Creek | Nason | 0.8 | 32 | 11.6% |
| Wenatchee | NAU | NAU - Upper Nason Creek | Nason | 19.5 | 6 | 2.2% |
| Total Detections | - | - | - | - | 187 | - |
| Total # of Lamprey | - | - | - | - | 143 | 52.0% |

Table 21. Summary of PIT array detections from each release events within the Wenatchee Subbasin for the 2017-2018 broodstock Pacific Lamprey translocation.

| Release \ Site | # Tagged | % Initially Upstream | TUF | | | | | | | | Undetected |
|-----------------|----------|----------------------|-----|-------------|-----|-----|-----|-----|-----|----|------------|
| | | | LWE | TUF (Upper) | UWE | NAL | NAU | ICL | ICM | | |
| WEN 1.3 Fall | 35 | 100% | 63% | 17% | 3% | 0% | 0% | 0% | 0% | 0% | 34% |
| WEN 4.8 Fall | 15 | 40% | 20% | 13% | 0% | 0% | 0% | 0% | 0% | 0% | 67% |
| WEN 49.5 Fall | 34 | 94% | 6% | 71% | 12% | 3% | 0% | 0% | 0% | 0% | 26% |
| WEN 48.6 Spring | 35 | 100% | 0% | 83% | 6% | 0% | 3% | 0% | 0% | 0% | 17% |
| WEN 50.4 Fall | 47 | 89% | 0% | 4% | 0% | 19% | 15% | 0% | 0% | 0% | 74% |
| WEN 50.4 Spring | 33 | 71% | 0% | 6% | 0% | 6% | 9% | 0% | 0% | 0% | 82% |
| WEN 74.6 Fall | 50 | 100% | 0% | 0% | 0% | 66% | 40% | 12% | 0% | 0% | 34% |
| ICI 2.2 Fall | 26 | 18% | 0% | 19% | 0% | 0% | 0% | 0% | 15% | 8% | 62% |

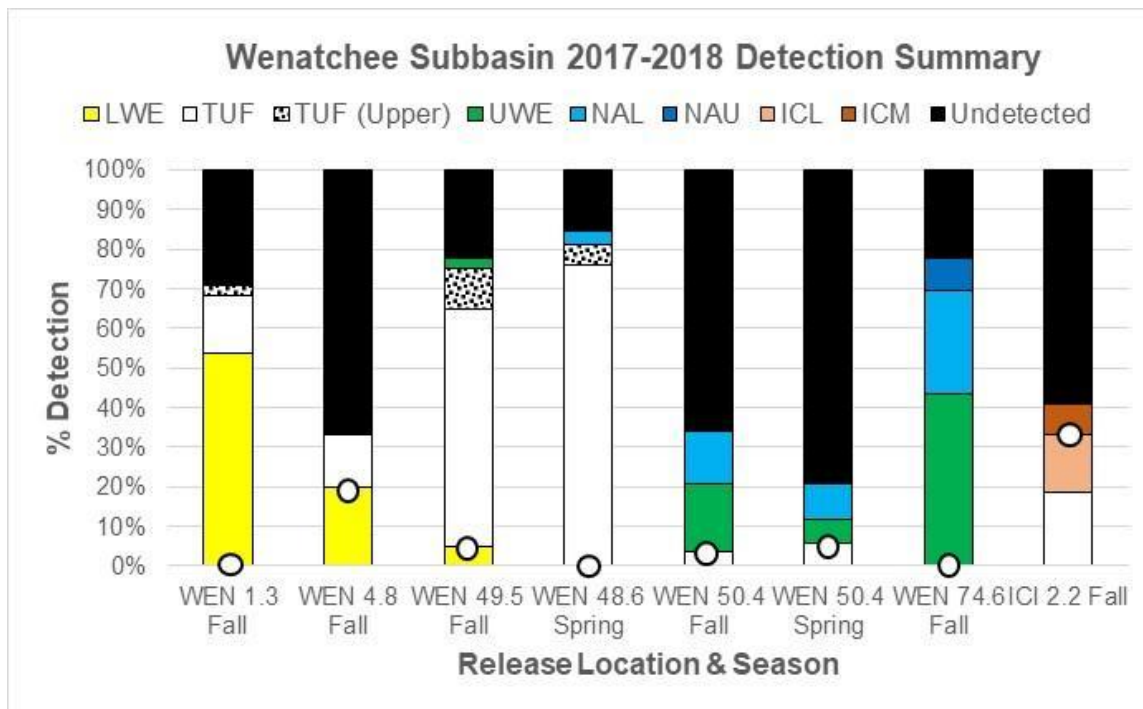


Figure 12. Summary of PIT array detections from each release events within the Wenatchee Subbasin for the 2017-2018 broodstock Pacific Lamprey translocation. The white circle indicates the relative location of the release in relation to the respective detection sites (sites above are upstream of the release sites, whereas those below are downstream).

Tumwater Dam and Detection Efficiency of PIT Arrays

Wenatchee river km 1.3 release (summer)

- One lamprey was detected at TUF site without any detection at LWE site, whereas five other lamprey were detected at both LWE and TUF. This indicates that the estimated LWE tag detection efficiency rate is approximately 83% (during summer relatively low flow conditions).
- While LWE detections occurred soon after the release event in the first summer, all of the detections at TUF occurred the following spring/summer in May through July, indicating many of them overwintered somewhere between these two array sites and they used the pre-spawn migration period to migrate past Tumwater Dam.
- Of the six lamprey that were detected at TUF, the majority spent an extended number of days at the dam ascending and descending the fishway; of those only 1 (17%) was able to approach “Weir 18” and possibly pass the dam (on July 23, 2018).
- It is also likely that some lamprey are approaching Tumwater Dam tailrace without being detected at either of the fishway entrance PIT arrays.

Wenatchee river km 4.8 release (summer)

- None of the lamprey were detected moving downstream at Lower Wenatchee River PIT array site immediately after release; because three were detected moving downstream during the higher flow conditions in spring (which is likely an indicator for post spawn drifting), it is safe to assume that very few, if any, migrated downstream immediately after the release.
- Two lamprey were detected at TUF from this release. One lamprey was detected during summer, indicating that a small portion of the released lamprey (13% from pooling all the Lower Wenatchee releases) may migrate to Tumwater Dam during the first migration season in summer, while others migrate during the following spring.
- If we pool all the Lower Wenatchee releases, only one of the eight (13%) lamprey that were detected at TUF appears to have potentially passed the dam (last detection being at “Weir 18”).
- While 76.8% of the lamprey released immediately below Tumwater Dam were detected at Tumwater Dam PIT arrays, only 16.0% of the lamprey released in the lower reaches (river km 1.3 and 4.8 combined) were detected at Tumwater Dam. This indicates that those starting from Lower Wenatchee River are 4.8 times less likely to approach Tumwater Dam compared to those that start their migration just downstream of Tumwater Dam.

Wenatchee river km 49.5 release (summer)

- Of the 34 released immediately downstream of Tumwater Dam, 24 were detected at TUF and four lamprey (12%) were last detected at “Weir 18,” indicating those may have potentially passed the dam. Dates of last detection were the following: July 7, 2018, July 14, 2018, September 1, 2018, and September 5, 2018. If we exclude the 10 lamprey that were not detected at Tumwater Dam (which may potentially exclude those that have attempted to approach the dam but nevertheless did not come in close enough proximity to the fish ladder entrances to be detected), 17% were last detected at “Weir 18.”

Wenatchee river km 50.4 (summer)

- Of the 47 lamprey released, eight (17%) were detected at Upper Wenatchee River and five (11%) were detected at Lower Nason Creek. One lamprey was detected at Lower Nason Creek without any detection at Upper Wenatchee River site, whereas five other lamprey were detected at both Upper Wenatchee River and Lower Nason Creek. This indicates that the estimated tag detection efficiency rate for Upper Wenatchee River is approximately 83% (mostly during the relatively low flow conditions).

Wenatchee river km 74.6 (summer)

- Of the 50 lamprey released, 31 (62%) were detected at Upper Wenatchee River, twenty (40%) were detected at Lower Nason Creek, and six (12%) were detected at Upper Nason Creek.
- Two lamprey were detected at Lower Nason Creek without any detection at Upper Wenatchee River site, whereas 18 other lamprey were detected at both Upper Wenatchee River and Lower Nason Creek. This indicates that the estimated tag detection efficiency rate for Upper Wenatchee River is approximately 90% (mostly during the relatively low flow conditions). Pooled together with the detection from other releases, the detection efficiency is estimated to be 88%.
- One lamprey was detected at Upper Nason Creek without any detection at Lower Nason Creek, whereas 5 other lamprey were detected at both Lower and Upper Nason Creek. This indicates that the estimated tag detection efficiency rate for Lower Nason Creek is approximately 83% (mostly during summer season).

Wenatchee river km 48.6 (spring)

- Of the 35 released immediately downstream of Tumwater Dam, two lamprey (6%) were last detected at “Weir 18,” indicating those may have potentially passed the dam (July 7 and July 14, 2017, were the last dates of detection). If we exclude the six lamprey that were not detected directly at Tumwater Dam (which may potentially exclude those that have attempted to approach the dam but nevertheless did not come in close enough proximity to the fish ladder entrances to be detected), 7% were last detected at “Weir 18.”

Wenatchee river km 50.4 (spring)

- Of the 33 lamprey released, two (20%) were detected at Upper Wenatchee River, two (20%) were detected at Lower Nason Creek, and two (20%) were detected moving downstream to Tumwater Dam. Both lamprey detected at Lower Nason Creek were never detected at Upper Wenatchee River, indicating the PIT array detection efficiency at Upper Wenatchee River may be low during spring high flow conditions.

Based on detections from all releases at Tumwater Dam, the estimated number of lamprey that potentially achieved dam passage was estimated to be 12.8% during the summer season and 6.5% during the spring season (Table 22). This dam passage, however, is based on the following two assumptions: 1) that those that were detected at “Weir 18” have successfully passed the dam to move upriver and 2) that no additional lamprey have interacted with the dam besides those that were detected by the Tumwater Dam PIT array antennae (e.g. if any lamprey approached Tumwater Dam tailrace but never moved close enough to be detected at the fish ladder entrance, those were excluded from these estimates). Due to these assumptions, this estimate is more likely to be a liberal estimate. The estimate provided this year is similar to the estimate provided the

previous year from the 2016-2017 adult releases (6.0%). Of the seven lamprey last detected at “Weir 18,” two lamprey were also detected at Lower Nason Creek instream array.

Table 22. Summary of PIT array detections at Tumwater Dam (“TUF”) and those that had their last detection at “Weir 18” within Tumwater Dam (“TUF TOP”) from all release events within the Wenatchee Subbasin for the 2017-2018 broodstock Pacific Lamprey translocation.

| Release \ Site | # | # TUF | | % |
|-----------------------|------------|-----------|----------|--------------|
| | Tagged | # TUF | TOP | |
| WEN 1.3 Fall | 35 | 6 | 1 | 16.7% |
| WEN 4.8 Fall | 15 | 2 | 0 | 0.0% |
| WEN 49.5 Fall | 34 | 24 | 4 | 16.7% |
| WEN 50.4 Fall | 47 | 2 | 0 | 0.0% |
| WEN 74.6 Fall | 50 | - | - | 0.0% |
| ICI 2.2 Fall | 26 | 5 | 0 | 0.0% |
| Overall Fall | 207 | 39 | 5 | 12.8% |
| WEN 48.6 Spring | 35 | 29 | 0 | 0.0% |
| WEN 50.4 Spring | 33 | 2 | 2 | 100.0% |
| Overall Spring | 68 | 31 | 2 | 6.5% |

At Tumwater Dam, adult salmonids including steelhead, spring/summer Chinook, Sockeye, and Coho salmon, are collected from the steep pass trap at various times of the year. During 24 hour and 7 days a week trapping operations, the upper ladder is completely closed (with a gate) above “Weir 18” ladder PIT array and most adult sized fishes are not able to pass the dam through the upper ladder. Adult Pacific Lamprey could possibly pass the ladder undetected during trapping operations if they could 1) find any lamprey size gap in the shut gate to continue to move upstream or 2) swim into the upper ladder by migrating through the ladder bottom gratings (1-inch spacing) from just downstream of steep pass entrance. During partial trapping operations, the trap would run part of the day (usually day time) and week (usually week days), and for the rest of the time the ladder will remain open with video monitoring to account for the number of fishes that pass. There are also times when no trapping operations occur at all. Although lamprey could potentially be trapped at the steep pass fish hopper trap (one was indeed trapped in 2018), lamprey are certainly able to escape the trap through the 1-inch grate spacing within the trap, which carries them back downstream towards the fish ladder entrance; all ten lamprey released in the fish hopper trap at night all escaped the trap by the following morning in 2016.

A summary of the trapping operation schedule between 2017 and 2018 is listed in Table 23. A variety of trapping operation was in place when the seven lamprey that potentially passed the dam were last detected at “Weir 18” (Table 24). A few (n=3) were last detected when the trapping was occurring 24 hours and 7 days a week, another few (n=2) were last detected when the trapping operation was not occurring at all, and one was last detected when trapping was occurring only part of the week. Two of those last detected during the 100% trapping season were later detected in Nason Creek, indicating that they conclusively passed the dam. However, it is also possible that those two may have held in the ladder for a few days just downstream of the upper gate till the

gate finally opened. Finally, the associated trapping operation schedule during the date and time when the 22 lamprey that were observed and counted at Tumwater Dam is listed in Table 25. The majority (86%) were detected during the partial trapping operation days, while the remainder (14%) were detected during no trapping days. Two lamprey from this overall group shared the same dates as the potential passage date for our PIT tagged lamprey, indicating that the observed lamprey may have been a PIT tagged lamprey, and one lamprey was just off by one day, suggesting a potential match. Because they are able to slide under or through the 1-inch picketed lead spacing, lamprey can also potentially pass the dam undetected by the video counting system. If we make the assumption that all seven PIT tagged lamprey last detected at “Weir 18” indeed passed the dam, and two to three of the seven lamprey were detected to pass the dam, the detection rate of the video counting system is estimated to be 29-43%. If we assume this detection rate is representative of the entire period between 2017 and 2018, the extrapolated number of lamprey that passed the dam between this period is estimated to be 51-77 adult lamprey. If we take this calculation one step further, we can make a conservative estimate that 398-602 adult lamprey may have approached Tumwater Dam during this same period based on the estimated “potential” passage rates for the summer season. There are many assumptions embedded in these calculation steps and these numbers cannot be confirmed or verified, but they provide some crude estimates for the total number of lamprey that may be approaching Tumwater Dam.

Table 23. Summary of steep pass trapping operation schedule at Tumwater Dam between March, 2017, and December, 2018. Green highlight indicates 24 hours and 7 days a week trapping schedule whereas the orange highlight indicates partial day/week trapping. No trapping was conducted during white highlighted dates.

| Start Date/Time | End Date/Time | Trapping Operations | Trapping Schedule Details | Notes |
|-----------------|-----------------|---------------------|---------------------------------|---|
| 3/6/17 12:30 | 3/22/20167 9:45 | Ladder Shut Down | Closed for array installments | Closed for pit tag array installation at ladder entrance |
| 4/3/17 0:00 | 4/30/17 0:00 | Trapping | 24 hr | Hopper check 1x/daily |
| 5/1/17 0:00 | 5/2/17 0:00 | Video | Video monitoring | Video on Weekend |
| 5/3/17 0:00 | 5/23/17 0:00 | Trapping | 24 hr | Hopper check 1x/daily |
| 5/23/17 0:00 | 6/1/17 0:00 | Ladder Dewatered | No trapping | shut down high flow gates |
| 6/1/17 0:00 | 7/13/17 11:25 | Trapping | 24 hr | Hopper check 1x/daily |
| 7/13/17 11:25 | 7/19/17 3:00 | Trapping & Video | Trapping 2 shifts | 11 pm-5:30am video only: trapping day and evening |
| 7/19/17 3:00 | 8/23/17 7:00 | Trapping & Video | Trapping 1 shift | 6am-4pm MON thru FRI (5) /video nights and weekends |
| 8/23/17 7:00 | 8/31/17 12:45 | Trapping | 24 hr | Hopper check 1x/daily |
| 8/31/17 12:45 | 9/8/2017 | Video | No trapping | Ladder opened for lamprey releases and passage |
| 9/8/2017 | 11/3/2017 | Trapping | 24 hr | Hopper check 1x/daily |
| 11/3/2017 | 11/7/2017 | Trapping & Video | Trapping 3x/WK | Tribe Trapping - Days may vary |
| 11/7/2017 | 12/31/2017 | Video | No trapping | Winter video |
| 12/31/17 0:00 | 2/28/17 9:00 | Video | No trapping | Winter video |
| 2/28/17 9:00 | 2/28/17 11:30 | Ladder Shut Down | No trapping | Ladder Maintainance |
| 2/28/17 11:30 | 3/19/18 15:30 | Video | No trapping | Winter video |
| 3/19/18 15:30 | 5/7/18 15:00 | Trapping & Video | 24/7 x3/WK | MON thru WED, video remaining time |
| 5/7/18 15:00 | 5/29/18 8:00 | Ladder Shut Down | No trapping | Ladder closed due to high water |
| 5/29/18 8:00 | 5/29/18 12:00 | Video | ladder opened prior to trap set | - |
| 5/29/18 12:00 | 7/11/18 23:26 | Trapping | 24 hr SPCH | Hopper check 1x/daily |
| 7/11/18 23:26 | 11/19/18 19:25 | Broodstock Trapping | Trapping x4/WK | 6am-4pm MON thru THU (4): video nights and weekends |
| 11/19/18 19:25 | 12/31/18 2400 | Video | Ladder open all winter | 1 day shutdown on 11/19/18, Ladder open until the end of the year |

Table 24. Summary of potential passage timing and steep pass trapping operation for all seven lamprey that were last detected at “Weir 18” at Tumwater Dam by release locations. Detections from further upstream instream array sites are also listed.

| Release Site | Release Date | Passage Date | Weir 18 Last Detection | Trapping Operation | Upstream Detection (1) | Upstream Detection Date (1) | Upstream Detection (2) | Upstream Detection Date (2) |
|--------------|--------------|--------------|------------------------|--------------------|------------------------|-----------------------------|------------------------|-----------------------------|
| WEN 1.3 | 8/31/2017 | 7/23/2018 | 1 | 6am-4pm Mon-Thu | - | - | - | - |
| WEN 49.5 | 8/31/2017 | 9/1/2017 | 1 | No Trapping | - | - | - | - |
| WEN 49.5 | 8/31/2017 | 9/5/2017 | 1 | No Trapping | - | - | - | - |
| WEN 49.5 | 8/31/2017 | 7/7/2018 | 1 | 24 Hour / 7 Days | UWE | 7/16/2018 | NAL | 7/17/2018 |
| WEN 49.5 | 8/31/2017 | 7/14/2018 | 1 | 6am-4pm Mon-Thu | - | - | - | - |
| WEN 48.6 | 4/23/2018 | 7/7/2018 | 1 | 24 Hour / 7 Days | NAL | 7/18/2018 | - | - |
| WEN 48.6 | 4/23/2018 | 7/9/2018 | 1 | 24 Hour / 7 Days | - | - | - | - |
| - | - | Total | 7 | - | - | - | - | - |

Table 25. Summary of all lamprey observations at Tumwater Dam and the corresponding trapping operations since translocation began in 2016 (data from DART Adult Passage Daily Counts for All Species website: http://www.cbr.washington.edu/dart/query/adult_daily). Those that had the same detection date as our PIT tagged lamprey released were noted as “Yes”, whereas those that were detected within a day were noted as “?” in the “PIT Lamprey Passage?” column.

| Passage Date | # | Trapping Operation | PIT Lamprey Passage? |
|--------------|-----------|--------------------|----------------------|
| 8/5/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/10/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/11/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/12/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/13/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/18/2017 | 1 | 6am-4pm Mon-Fri | - |
| 8/22/2017 | 1 | 6am-4pm Mon-Fri | - |
| 9/1/2017 | 1 | No Trapping | Yes |
| 9/2/2017 | 1 | No Trapping | - |
| 9/6/2017 | 1 | No Trapping | ? |
| 7/23/2018 | 1 | 6am-4pm Mon-Thu | Yes |
| 7/26/2018 | 1 | 6am-4pm Mon-Thu | - |
| 7/27/2018 | 1 | 6am-4pm Mon-Thu | - |
| 7/29/2018 | 1 | 6am-4pm Mon-Thu | - |
| 7/30/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/1/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/6/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/7/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/9/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/11/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/14/2018 | 1 | 6am-4pm Mon-Thu | - |
| 8/18/2018 | 1 | 6am-4pm Mon-Thu | - |
| Total | 22 | - | - |

Appendix: PIT Tag Information

“#” column below corresponds to the “#” displayed in the detection summary tables in Part II.

| Total I # | PIT Tag (Full ID) | # | Release Date | Release River | Release | | |
|-----------|-------------------|----|--------------|---------------|---------|-----------|-------------|
| | | | | | River | KM | Latitude |
| 1 | 3DD.007796B36D | 1 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 2 | 3DD.007796C73A | 2 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 3 | 3DA.1A19B39596 | 3 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 4 | 3DD.00779755D8 | 4 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 5 | 3DD.007796C9A5 | 5 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 6 | 3DA.1A19B391F3 | 6 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 7 | 3DD.0077962895 | 7 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 8 | 3DA.1A19B399E0 | 8 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 9 | 3DD.0077965298 | 9 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 10 | 3DD.007796C452 | 10 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 11 | 3DD.007795F0D9 | 11 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 12 | 3DA.1A19B323C5 | 12 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 13 | 3DD.0077962A8A | 13 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 14 | 3DD.007796A394 | 14 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 15 | 3DA.1A19B3904C | 15 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 16 | 3DA.1A19B3C979 | 16 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 17 | 3DA.1A19B3912A | 17 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 18 | 3DD.0077961EAD | 18 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 19 | 3DD.007795F937 | 19 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 20 | 3DA.1A19B39605 | 20 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 21 | 3DA.1A19B3A379 | 21 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 22 | 3DA.1A19B39099 | 22 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 23 | 3DD.007796FED3 | 23 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 24 | 3DA.1A19B38FA0 | 24 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 25 | 3DA.1A19B39276 | 25 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 26 | 3DA.1A19B3C6B4 | 26 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 27 | 3DA.1A19B38FE0 | 27 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 28 | 3DA.1A19B38FBE | 28 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 29 | 3DD.007796D51B | 29 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 30 | 3DD.0077974891 | 30 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 31 | 3DD.007796A9B2 | 31 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 32 | 3DD.007796B9E7 | 32 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 33 | 3DD.00779718D8 | 33 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 34 | 3DA.1A19B397D2 | 34 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 35 | 3DA.1A19B39271 | 35 | 8/31/2017 | Wenatchee | 1.3 | 47.459017 | -120.335811 |
| 36 | 3DD.007796D264 | 1 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 37 | 3DD.0077965682 | 2 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 38 | 3DA.1A19B392A4 | 3 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 39 | 3DD.0077963877 | 4 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 40 | 3DD.00779678C8 | 5 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 41 | 3DA.1A19B39345 | 6 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 42 | 3DA.1A19B39203 | 7 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |

| | | | | | | | |
|----|----------------|----|-----------|-----------|------|-----------|-------------|
| 43 | 3DA.1A19B3931D | 8 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 44 | 3DA.1A19B324A4 | 9 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 45 | 3DA.1A19B392D8 | 10 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 46 | 3DA.1A19B391B1 | 11 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 47 | 3DD.0077972482 | 12 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 48 | 3DD.00779704FE | 13 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 49 | 3DD.0077967AE9 | 14 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 50 | 3DD.007796A975 | 15 | 8/31/2017 | Wenatchee | 4.8 | 47.472059 | -120.371917 |
| 51 | 3DD.0077966121 | 1 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 52 | 3DA.1A19B390C1 | 2 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 53 | 3DD.0077964615 | 3 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 54 | 3DD.0077961E62 | 4 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 55 | 3DA.1A19B39135 | 5 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 56 | 3DA.1A19B392C2 | 6 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 57 | 3DA.1A19B38D0B | 7 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 58 | 3DD.007796FB86 | 8 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 59 | 3DA.1A19B3A6D1 | 9 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 60 | 3DA.1A19B390E6 | 10 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 61 | 3DD.007796F2F7 | 11 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 62 | 3DA.1A19B323CE | 12 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 63 | 3DA.1A19B392FA | 13 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 64 | 3DA.1A19B39026 | 14 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 65 | 3DD.0077970D9B | 15 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 66 | 3DD.007796FF98 | 16 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 67 | 3DD.007796027B | 17 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 68 | 3DA.1A19B390CB | 18 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 69 | 3DA.1A19B390F7 | 19 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 70 | 3DD.0077969E55 | 20 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 71 | 3DD.007796FBC5 | 21 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 72 | 3DA.1A19B394CE | 22 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 73 | 3DA.1A19B39317 | 23 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 74 | 3DD.007795F8E5 | 24 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 75 | 3DD.0077962B20 | 25 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 76 | 3DA.1A19B39172 | 26 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 77 | 3DA.1A19B3963B | 27 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 78 | 3DA.1A19B3A377 | 28 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 79 | 3DA.1A19B3953C | 29 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 80 | 3DD.0077964650 | 30 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 81 | 3DD.0077971F5B | 31 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 82 | 3DD.007796A006 | 32 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 83 | 3DD.007797127F | 33 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 84 | 3DD.007796ED23 | 34 | 8/31/2017 | Wenatchee | 49.5 | 47.616608 | -120.722412 |
| 85 | 3DD.0077960EF5 | 1 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 86 | 3DD.0077971CD2 | 2 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 87 | 3DA.1A19B3915D | 3 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 88 | 3DD.007795F7DE | 4 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 89 | 3DD.007796CE62 | 5 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 90 | 3DA.1A19B391A6 | 6 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 91 | 3DD.0077973D58 | 7 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |

| | | | | | | | |
|-----|----------------|----|-----------|-----------|------|-----------|-------------|
| 92 | 3DD.00779628BE | 8 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 93 | 3DD.0077970C39 | 9 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 94 | 3DD.007797058E | 10 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 95 | 3DA.1A19B3905D | 11 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 96 | 3DD.007796460C | 12 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 97 | 3DA.1A19B3930F | 13 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 98 | 3DA.1A19B39048 | 14 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 99 | 3DA.1A19B3A58C | 15 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 100 | 3DA.1A19B39670 | 16 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 101 | 3DA.1A19B395E1 | 17 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 102 | 3DA.1A19B390C6 | 18 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 103 | 3DA.1A19B3DA3E | 19 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 104 | 3DA.1A19B3948B | 20 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 105 | 3DA.1A19B38FE4 | 21 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 106 | 3DA.1A19B3A68A | 22 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 107 | 3DA.1A19B3933D | 23 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 108 | 3DA.1A19B391E9 | 24 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 109 | 3DA.1A19B39042 | 25 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 110 | 3DA.1A19B38FC7 | 26 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 111 | 3DA.1A19B3A673 | 27 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 112 | 3DA.1A19B391A8 | 28 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 113 | 3DA.1A19B3923F | 29 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 114 | 3DA.1A19B39245 | 30 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 115 | 3DA.1A19B3983D | 31 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 116 | 3DA.1A19B3A679 | 32 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 117 | 3DA.1A19B39210 | 33 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 118 | 3DD.00779660CE | 34 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 119 | 3DD.0077968F66 | 35 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 120 | 3DD.007796EFB8 | 36 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 121 | 3DD.007796EE41 | 37 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 122 | 3DD.007796516C | 38 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 123 | 3DD.0077971974 | 39 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 124 | 3DD.00779661E6 | 40 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 125 | 3DD.007796B732 | 41 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 126 | 3DD.007796A6D3 | 42 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 127 | 3DD.007796B9DF | 43 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 128 | 3DD.00779417FC | 44 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 129 | 3DD.0077972258 | 45 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 130 | 3DD.007796D223 | 46 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 131 | 3DD.00779628B6 | 47 | 8/31/2017 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 132 | 3DD.0077969B2B | 1 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 133 | 3DD.007796ACE1 | 2 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 134 | 3DA.1A19B32304 | 3 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 135 | 3DD.007797343C | 4 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 136 | 3DD.0077967AB4 | 5 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 137 | 3DA.1A19B3A4C5 | 6 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 138 | 3DA.1A19B390DE | 7 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 139 | 3DD.007795F898 | 8 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 140 | 3DD.00779661E2 | 9 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |

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| 141 | 3DD.007796F23A | 10 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 142 | 3DA.1A19B39302 | 11 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 143 | 3DD.007795F7C0 | 12 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 144 | 3DA.1A19B3A6A0 | 13 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 145 | 3DA.1A19B31C97 | 14 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 146 | 3DA.1A19B38F92 | 15 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 147 | 3DA.1A19B3C8D0 | 16 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 148 | 3DD.00779638A0 | 17 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 149 | 3DA.1A19B390C4 | 18 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 150 | 3DA.1A19B39330 | 19 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 151 | 3DD.0077963B36 | 20 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 152 | 3DA.1A19B39350 | 21 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 153 | 3DD.0077961F9F | 22 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 154 | 3DD.007796AD90 | 23 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 155 | 3DD.0077962C68 | 24 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 156 | 3DD.0077969293 | 25 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 157 | 3DA.1A19B38E89 | 26 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 158 | 3DD.007796291F | 27 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 159 | 3DD.0077961BC7 | 28 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 160 | 3DA.1A19B2F757 | 29 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 161 | 3DD.0077961136 | 30 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 162 | 3DA.1A19B39258 | 31 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 163 | 3DD.007795F065 | 32 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 164 | 3DA.1A19B394B2 | 33 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 165 | 3DA.1A19B3A37D | 34 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 166 | 3DA.1A19B390C3 | 35 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 167 | 3DA.1A19B3A5E8 | 36 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 168 | 3DA.1A19B3932A | 37 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 169 | 3DA.1A19B391BD | 38 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 170 | 3DA.1A19B3915E | 39 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 171 | 3DA.1A19B3901E | 40 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 172 | 3DA.1A19B3912F | 41 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 173 | 3DA.1A19B3A4FC | 42 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 174 | 3DA.1A19B3C762 | 43 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 175 | 3DD.0077965447 | 44 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 176 | 3DD.0077979C74 | 45 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 177 | 3DD.007796470E | 46 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 178 | 3DD.007796D620 | 47 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 179 | 3DD.00779655E8 | 48 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
| 180 | 3DD.007797712C | 49 | 8/31/2017 | Wenatchee | 74.6 | 47.766754 | -120.66366 |
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| 183 | 3DA.1A19B3966E | 2 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 184 | 3DA.1A19B39688 | 3 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 185 | 3DA.1A19B3947D | 4 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 186 | 3DA.1A19B394A0 | 5 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 187 | 3DA.1A19B3935C | 6 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 188 | 3DA.1A19B39707 | 7 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |

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| 189 | 3DA.1A19B39401 | 8 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 190 | 3DA.1A19B396F5 | 9 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 191 | 3DA.1A19B38FD1 | 10 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 192 | 3DA.1A19B394E9 | 11 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
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| 196 | 3DA.1A19B39186 | 15 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 197 | 3DA.1A19B39543 | 16 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 198 | 3DA.1A19B39396 | 17 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
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| 200 | 3DA.1A19B39667 | 19 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 201 | 3DA.1A19B39383 | 20 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 202 | 3DA.1A19B3902A | 21 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 203 | 3DA.1A19B39339 | 22 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 204 | 3DA.1A19B39421 | 23 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 205 | 3DA.1A19B395F7 | 24 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 206 | 3DA.1A19B394EC | 25 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 207 | 3DA.1A19B396B5 | 26 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 208 | 3DA.1A19B39472 | 27 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 209 | 3DA.1A19B39676 | 28 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 210 | 3DA.1A19B39706 | 29 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 211 | 3DD.0077961D15 | 30 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 212 | 3DA.1A19B395A9 | 31 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 213 | 3DA.1A19B394CF | 32 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 214 | 3DA.1A19B39529 | 33 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 215 | 3DA.1A19B39402 | 34 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 216 | 3DA.1A19B3A383 | 35 | 4/23/2018 | Wenatchee | 48.6 | 47.608897 | -120.71804 |
| 217 | 3DA.1A19B39629 | 1 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 218 | 3DA.1A19B39444 | 2 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 219 | 3DA.1A19B398B3 | 3 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 220 | 3DA.1A19B39635 | 4 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 221 | 3DA.1A19B39610 | 5 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 222 | 3DA.1A19B395D0 | 6 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 223 | 3DA.1A19B3965E | 7 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 224 | 3DA.1A19B3A453 | 8 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 225 | 3DA.1A19B396EC | 9 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 226 | 3DA.1A19B39574 | 10 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 227 | 3DA.1A19B395E7 | 11 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 228 | 3DA.1A19B39072 | 12 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 229 | 3DA.1A19B3978C | 13 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 230 | 3DA.1A19B3963E | 14 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 231 | 3DA.1A19B39600 | 15 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 232 | 3DA.1A19B39469 | 16 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 233 | 3DA.1A19B39399 | 17 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 234 | 3DA.1A19B393E7 | 18 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 235 | 3DA.1A19B396FA | 19 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 236 | 3DA.1A19B395DF | 20 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 237 | 3DA.1A19B393C0 | 21 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |

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| 238 | 3DA.1A19B39700 | 22 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 239 | 3DA.1A19B396A8 | 23 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 240 | 3DA.1A19B39420 | 24 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 241 | 3DA.1A19B39064 | 25 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 242 | 3DA.1A19B392FB | 26 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 243 | 3DA.1A19B39673 | 27 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 244 | 3DA.1A19B39651 | 28 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 245 | 3DA.1A19B396C0 | 29 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 246 | 3DA.1A19B3930D | 30 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 247 | 3DA.1A19B3A666 | 31 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 248 | 3DA.1A19B393D1 | 32 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 249 | 3DA.1A19B39429 | 33 | 4/23/2018 | Wenatchee | 50.4 | 47.622867 | -120.725768 |
| 250 | 3DD.007797115B | 1 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 251 | 3DD.007795EF9E | 2 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 252 | 3DD.007796F0CA | 3 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 253 | 3DD.007796A47C | 4 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 254 | 3DD.007796A7E5 | 5 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 255 | 3DD.0077970887 | 6 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 256 | 3DA.1A19B391D4 | 7 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 257 | 3DD.0077961C12 | 8 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 258 | 3DD.007797B55B | 9 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 259 | 3DD.0077979A67 | 10 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 260 | 3DA.1A19B390F4 | 11 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 261 | 3DA.1A19B392E5 | 12 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 262 | 3DA.1A19B39057 | 13 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 263 | 3DA.1A19B3A57F | 14 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 264 | 3DA.1A19B39158 | 15 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 265 | 3DA.1A19B3C7E F | 16 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 266 | 3DA.1A19B39293 | 17 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
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| 272 | 3DD.0077970B9D | 23 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 273 | 3DD.00779601D6 | 24 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 274 | 3DA.1A19B39349 | 25 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |
| 275 | 3DD.0077963727 | 26 | 8/31/2017 | Icicle | 2.2 | 47.567684 | -120.662363 |