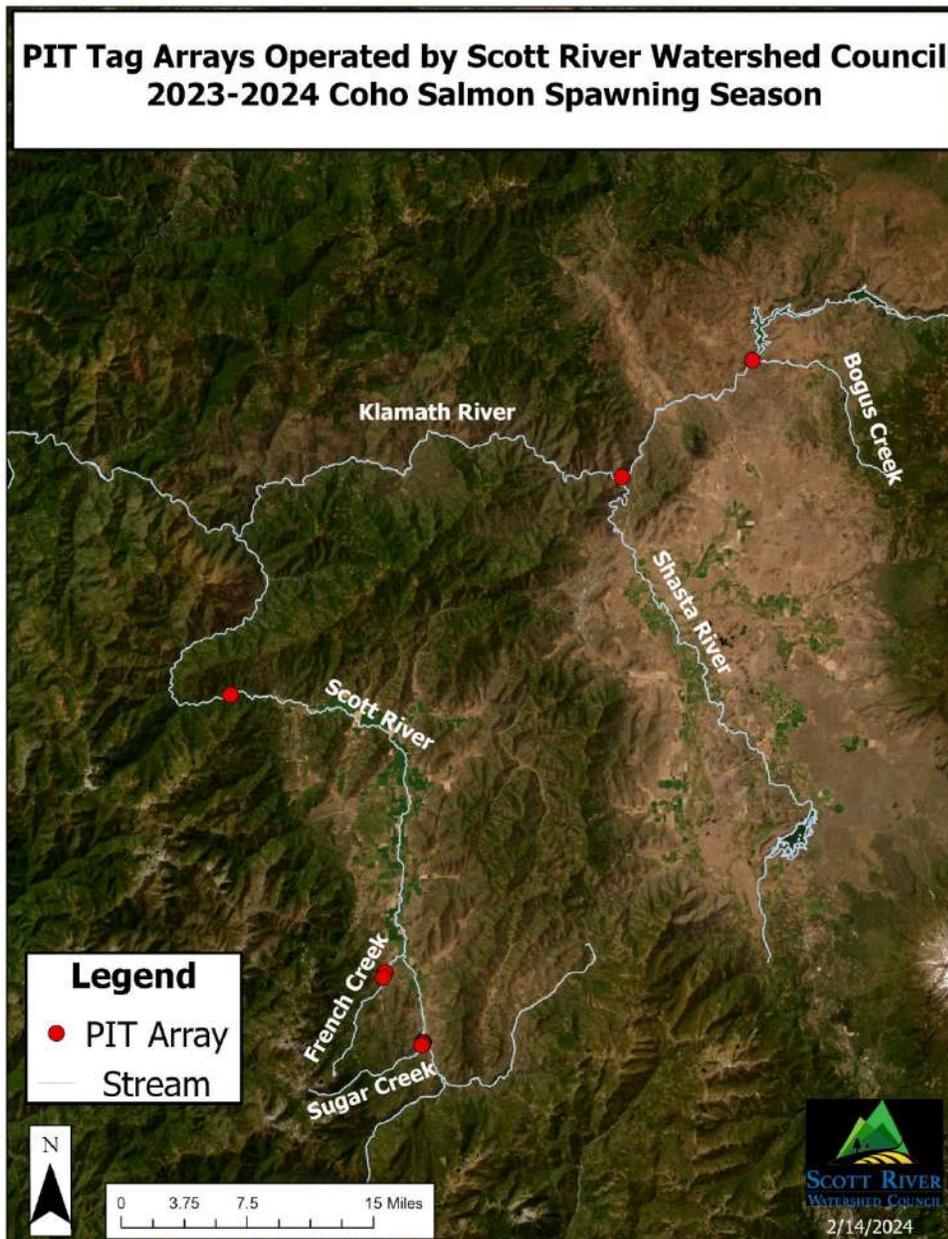




Scott River Watershed Council's
Passive Integrated Transponder (PIT) Program
2023/2024

Introduction

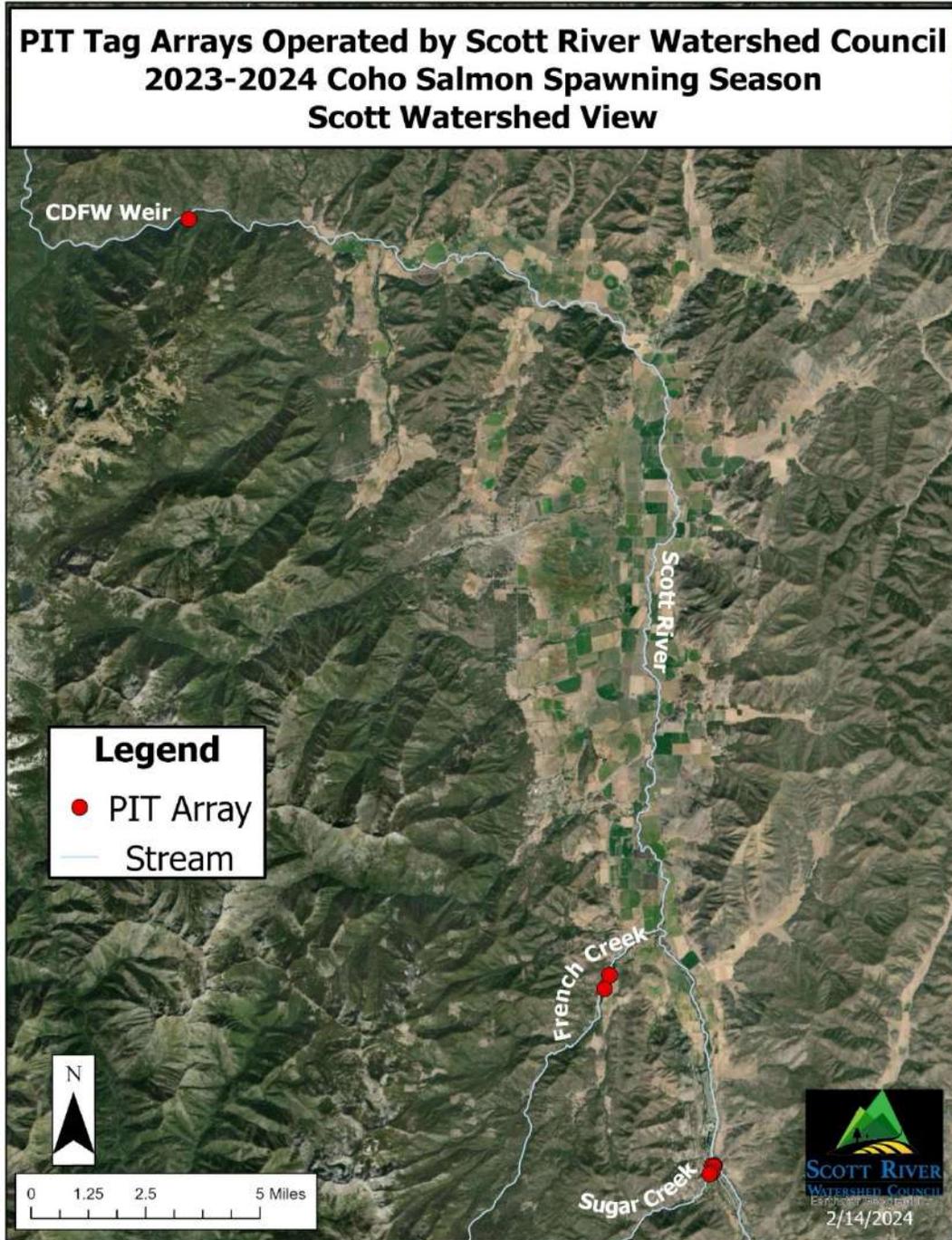
During the 2023/2024 Coho Salmon (*Oncorhynchus kisutch*) spawning season, the Scott River Watershed Council (SRWC) operated eleven passive integrated transponder (PIT) tag arrays in the Klamath River watershed. These arrays, consisting of an instream antenna, a data logger and a power station, record detection data as previously PIT-tagged fish pass over or through the antenna. On the mainstem Scott River and the Shasta River, SRWC operated antennas at the California Department of Fish and Wildlife (CDFW) adult salmonid counting facilities. In addition to these weir antennas, SRWC operated nine arrays: two at French Creek, five at Sugar Creek and two at Bogus Creek (Map 1).



Map 1. Locations of all PIT arrays operated by the Scott River Watershed Council between October 2023 and January 2024.

Scott River, French Creek and Sugar Creek

The CDFW weir on the Scott River and its associated PIT antenna are operated at river kilometer (RKM) 29.2. The furthest downstream array on French Creek is located at RKM 2.85, while the furthest downstream array on Sugar Creek is located at RKM 0.05 (Map 2).



Map 2. PIT arrays operated in the Scott River watershed between October 2023 and January 2024.

The Scott River weir array operated from October 25th to December 27th, 2023. This array consists of an HDPE antenna that is oriented around the weir opening, meaning that all adult Coho Salmon migrating past this point must pass through this antenna. The antenna connects to an IS1001 reader in an enclosure on the weir and then to a power station and data logger on the bank (Picture 1-4).



Picture 1. Scott River CDFW weir.



Picture 2. HDPE antenna operated at Scott River weir.



Picture 3. Fishway enclosure housing IS1001 reader and capacitance board.



Picture 4. Data logger and power station at Scott River weir array.

The French and Sugar Creek PIT Arrays are operated continuously throughout the year. The downstream array at French Creek consists of two 20-foot flexible cord antennas lying flat on the streambed. These antennas connect to “J-boxes” (connection point between antennas and readers) and then on to IS1001 readers housed in a Pelican box on the bank. The power for this system comes from a battery bank being charged by solar panels (Picture 5-9).



Picture 5. French Creek downstream array. J-boxes in foreground attached to t-post and tree.



Picture 6. Flexible antenna lying flat on streambed at French Creek downstream array.



Picture 7. IS001 readers at French Creek downstream array.



Picture 8. Example of solar panel setup at array site.



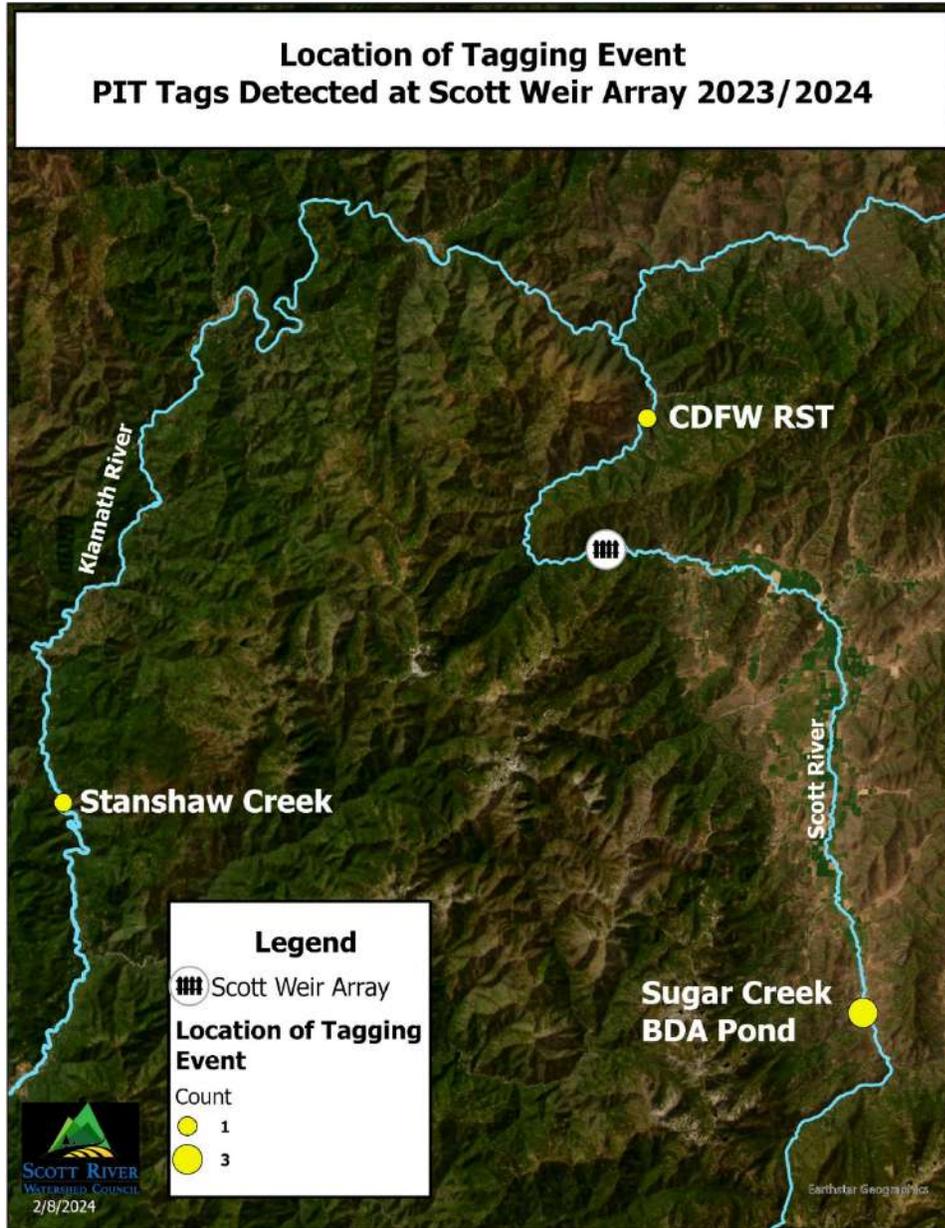
Picture 9. Example of battery bank setup at array site.

The Sugar Creek downstream array site is very similar to its counterpart at French Creek, the main difference being the use of two HDPE antennas standing up in the channel (Picture 10).



Picture 10. Paired antennas at the Sugar Creek downstream array site.

During the 2023/2024 season, five PIT-tagged Coho Salmon were detected passing through the weir antenna at RKM 29.2. Three of these fish had been tagged by SRWC in Sugar Creek beaver dam analog (BDA) habitats, one by the Karuk Tribe at a Stanshaw Creek restoration site and one by CDFW at the Scott River rotary screw trap (RST) at RKM 7.8 (Map 3).



Map 3. Location of tagging event for all PIT-tagged adult Coho Salmon detected in the Scott River watershed between October 2023 and January 2024.

Tag #989001044294998 was detected passing through the weir antenna and then was detected one month later in French Creek. Interestingly, this fish had been tagged as a juvenile in Sugar Creek, and it appears to have exhibited a two-year life cycle, rather than the more common three-year cycle. Tag #989001044294998 was the only tag detected higher up in the watershed after being detected at the weir antenna.

Tag #989001028144543 was implanted by the Karuk Tribe in Stanshaw Creek near its confluence with the Klamath River on July 1st, 2021 (Table 1). The detection of this tag 29 months later at the Scott weir antenna indicates that this fish originated in the Scott River and took refuge in a restored Stanshaw Creek habitat after making an early outmigration from the Scott watershed.

| Tag #989001041193497 | | | | | |
|-----------------------------|----------------|---|--------------|-------------------------|-------------------|
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 1/19/2022 | Sugar Creek | BDA Pond 1 (RKM 0.1) | Minnow Traps | 100 | 11.4 |
| 3/10/2022 | Sugar Creek | BDA Pond 1 (RKM 0.1) | Minnow Traps | 105 | 12.6 |
| 4/24/2022 | Sugar Creek | Array 1A/1B (RKM 0.05) | PIT Antenna | | |
| 11/6/2023 | Scott River | Scott Weir Array 93 (RKM 29.2) | PIT Antenna | | |
| Tag #989001003466505 | | | | | |
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 5/19/2022 | Scott River | Scott River Rotary Screw Trap (RKM 6.9) | RST | 136 | |
| 11/5/2023 | Scott River | Scott Weir Array 93 (RKM 29.2) | PIT Antenna | | |
| Tag #989001044294998 | | | | | |
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 10/27/2022 | Sugar Creek | BDA Pond 1 (RKM 0.1) | Seine | 80 | 6.0 |
| 12/29/2022 | Sugar Creek | Array 2D (RKM 0.18) | PIT Antenna | | |
| 5/8/2023 | Sugar Creek | Array 2D (RKM 0.18) | PIT Antenna | | |
| 5/14/2023 | Sugar Creek | Array 2A (RKM 0.1) | PIT Antenna | | |
| 5/14/2023 | Sugar Creek | Array 1A/1B (RKM 0.05) | PIT Antenna | | |
| 11/3/2023 | Scott River | Scott Weir Array 93 (RKM 29.2) | PIT Antenna | | |
| 12/3/2023 | French Creek | Array F1/F2 (RKM 2.85) | PIT Antenna | | |
| Tag #989001028144543 | | | | | |
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 7/1/2021 | Stanshaw Creek | Stanshaw Pool (Karuk Tribe Sampling) | Seine | 69 | 4.1 |
| 9/9/2021 | Stanshaw Creek | Stanshaw Pool (Karuk Tribe Sampling) | Seine | 77 | 5.6 |
| 1/21/2022 | Stanshaw Creek | Stanshaw Pool (Karuk Tribe Sampling) | Seine | 95 | 9.9 |
| 12/2/2023 | Scott River | Scott Weir Array 93 (RKM 29.2) | PIT Antenna | | |

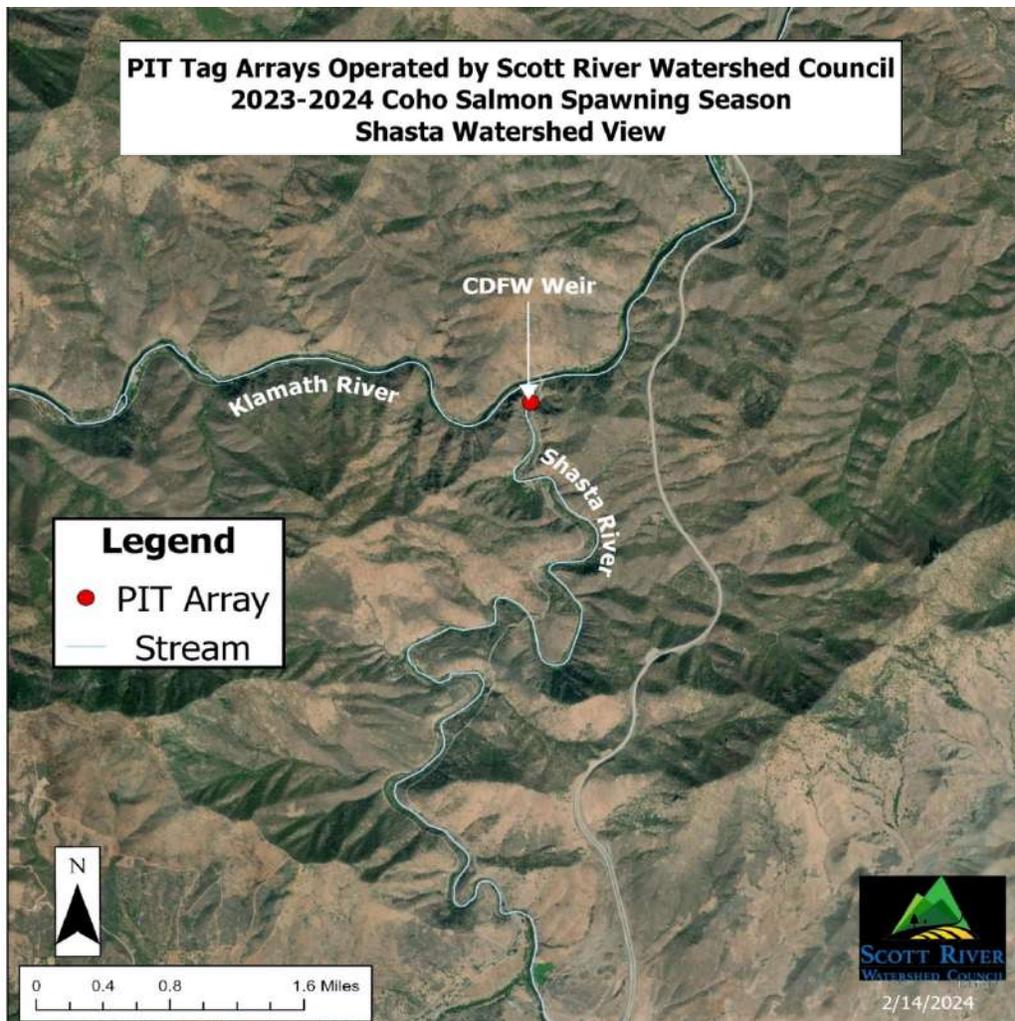
Table 1. Detection histories of all adult PIT-tagged Coho Salmon detected in the Scott River watershed in the 2023-2024 season.

| Tag #989001039966194 | | | | | |
|----------------------|-------------|--------------------------------|--------------|------------------|------------|
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 7/21/2021 | Sugar Creek | BDA Pond 1 (RKM 0.1) | Minnow Traps | 76 | 4.8 |
| 1/12/2022 | Sugar Creek | Array 2C (RKM 0.18) | PIT Antenna | | |
| 1/14/2022 | Sugar Creek | Array 2C (RKM 0.18) | PIT Antenna | | |
| 5/31/2022 | Sugar Creek | Array 1A/1B (RKM 0.05) | PIT Antenna | | |
| 12/2/2023 | Scott River | Scott Weir Array 93 (RKM 29.2) | PIT Antenna | | |

Table 2 (continued). Detection histories of all adult PIT-tagged Coho Salmon detected in the Scott River watershed in the 2023-2024 season.

Shasta River

The PIT array operated on the CDFW Shasta River weir is located at RKM 0.2 (Map 3). This array was operated from September 15th to December 28th, 2023.

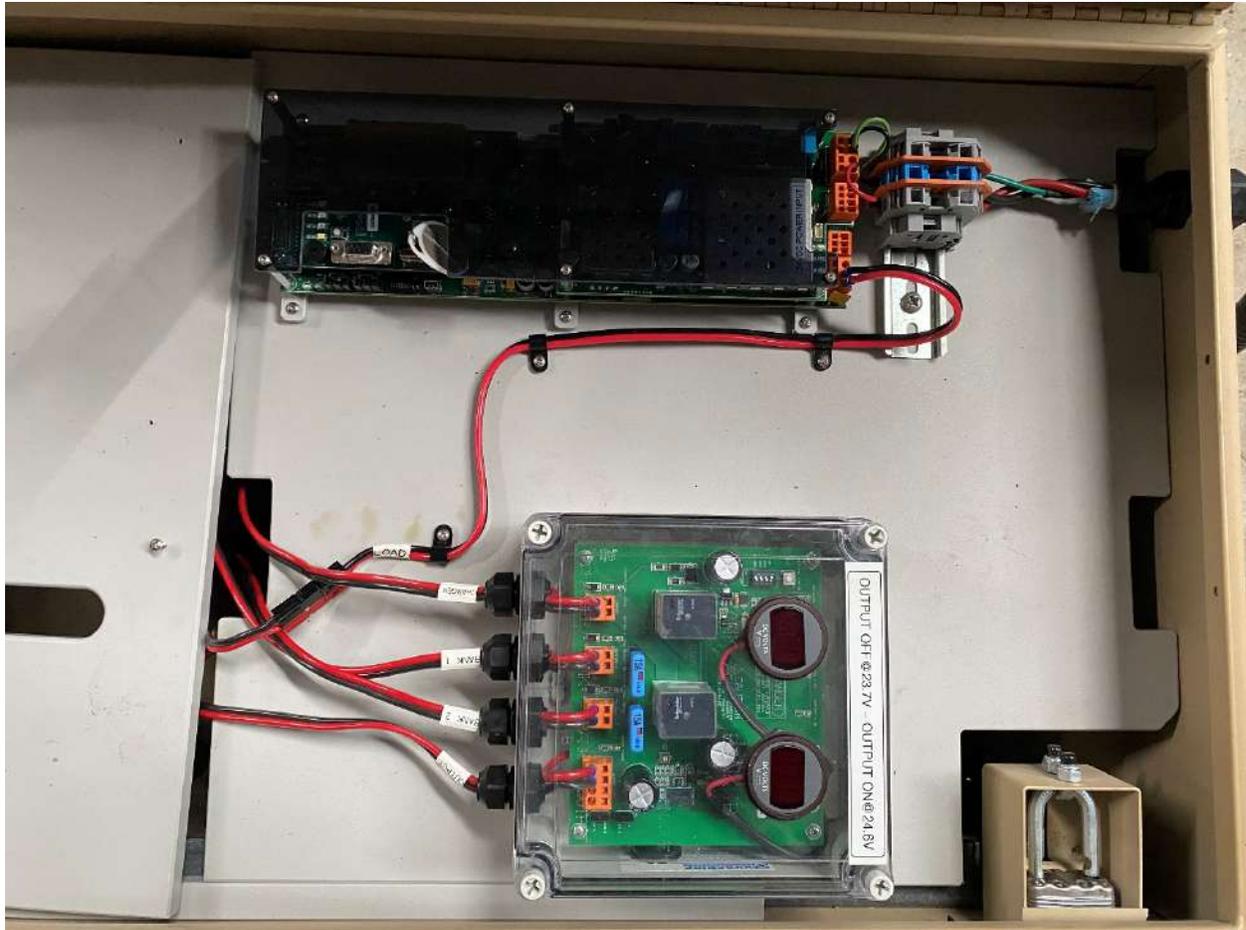


Map 4. PIT arrays operated in the Shasta River watershed between October 2023 and January 2024.

Like the Scott weir array, Shasta weir array consists of an HDPE antenna designed to encompass the weir opening where the migrating adult Coho must pass through. The distance from the antenna to the bank is much less than at the Scott River, so the IS1001 reader is able to be housed in the same enclosure as the data logger and battery bank. This array also differs from the Scott weir system in that it is adjacent to an AC power source, allowing for batteries to be continuously charged (Picture 11-12).

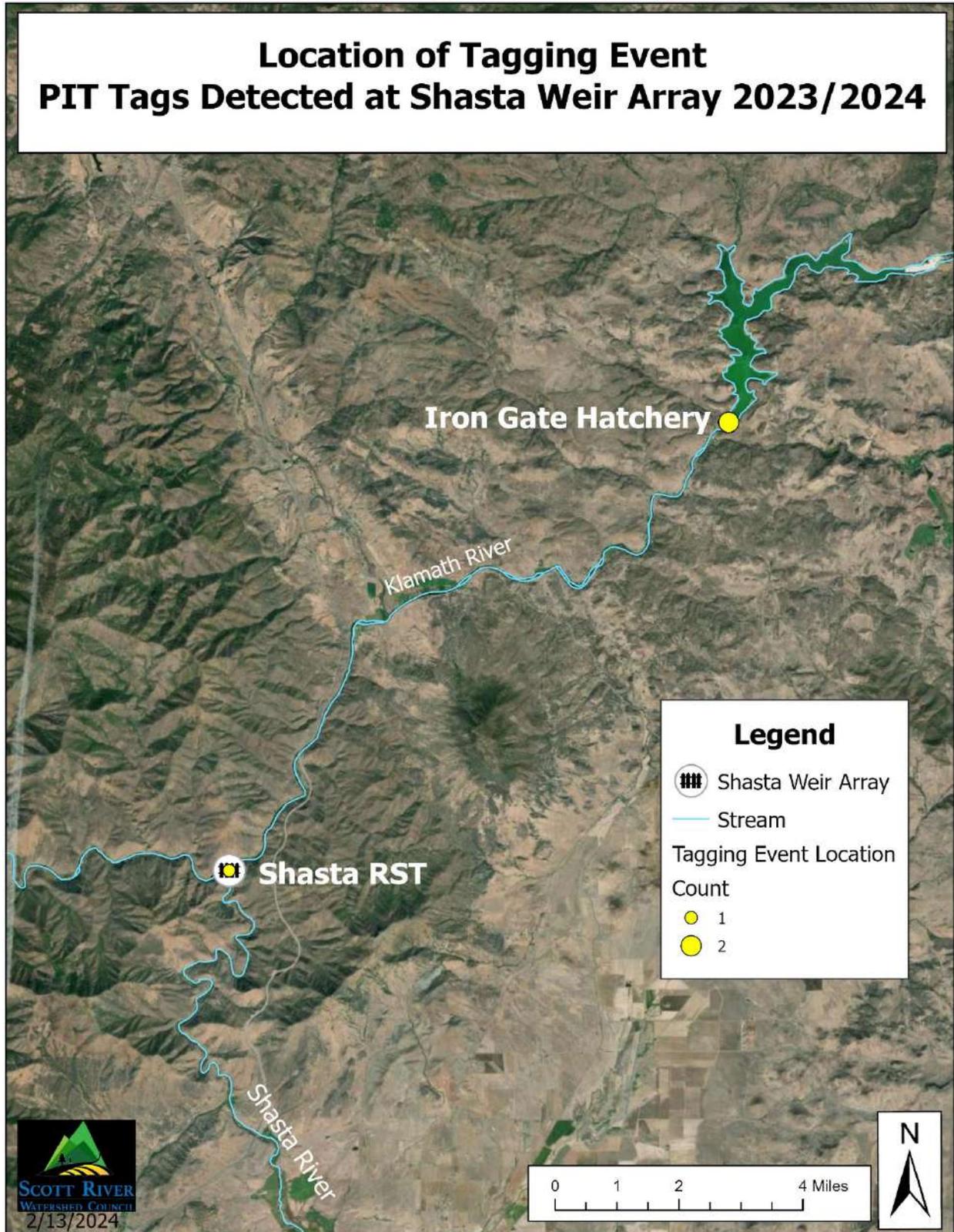


Picture 11. Shasta River weir and PIT array.



Picture 12. Shasta weir array IS001 reader, data logger and battery bank switcher.

Three PIT tags were detected on this antenna during the 2023-2024 season. Two of the three fish received their tags as returning adults at Iron Gate Hatchery (IGH), where CDFW staff implant tags into a sample of Coho Salmon that are not used for broodstock. These fish are then released back into the Klamath River and are able to voluntarily travel to spawning grounds downstream of Iron Gate Dam. The mouth of the Shasta River is approximately 21.6 RKM downstream from IGH. The third was tagged as a juvenile by CDFW at the Shasta River rotary screw trap (Map 5). At the tagging event in spring of 2022, it was determined that this fish originated at IGH after a left maxillary clip was observed. This fish and one of the fish tagged as an adult at IGH were detected on a Bogus Creek antenna before being detected at the Shasta River antenna (Table 2).



Map 5. Location of tagging event for all PIT-tagged adult Coho Salmon detected in the Shasta River watershed between October 2023 and January 2024.

| Tag #989001003466285 (IGH Origin) | | | | | |
|--|---------------|--------------------------------|-------------|-------------------------|-------------------|
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 4/21/2022 | Shasta River | Shasta RST | RST | | |
| 10/31/2023 | Bogus Creek | Bogus Array B1 (RKM 0.1) | PIT Antenna | | |
| 11/2/2023 | Shasta River | Shasta Weir Array 99 (RKM 0.2) | PIT Antenna | | |
| Tag #900254001786793 | | | | | |
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 11/16/2023 | Klamath River | Iron Gate Hatchery | | 650 | |
| 11/27/2023 | Bogus Creek | Bogus Array B1 (RKM 0.1) | PIT Antenna | | |
| 12/2/2023 | Shasta River | Shasta Weir Array 99 (RKM 0.2) | PIT Antenna | | |
| Tag #900254000898038 | | | | | |
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 11/16/2023 | Klamath River | Iron Gate Hatchery | | 660 | |
| 12/2/2023 | Shasta River | Shasta Weir Array 99 (RKM 0.2) | PIT Antenna | | |

Table 3. Detection histories of all adult PIT-tagged Coho Salmon detected at the Shasta River weir array in the 2023-2024 season.

Bogus Creek

The two PIT arrays operated in Bogus Creek are located at RKM 0.1 and RKM 0.15 (Map 6). These arrays are operated continuously.



Map 6. PIT arrays operated in the Bogus Creek watershed between October 2023 and January 2024.

The two PIT arrays at Bogus Creek each consist of one 20-foot flexible cord antenna, a waterproof node housing the IS1001 reader and an onshore enclosure housing the data logger and battery bank. Like the Shasta weir array, these systems at Bogus Creek have access to AC power and use battery chargers (Picture 13-14).



Picture 13. Bogus Creek downstream antenna.



Picture 14. Waterproof node housing IS1001 reader.

16 PIT-tagged adult Coho Salmon were detected on one or both of these antennas during the 2023-2024 season, including the two previously mentioned in the Shasta River section of this report. 14 of these 16 fish were tagged as adults at IGH. These fish varied significantly in the amount of time it took them to enter Bogus Creek after receiving their tag (Table 3).

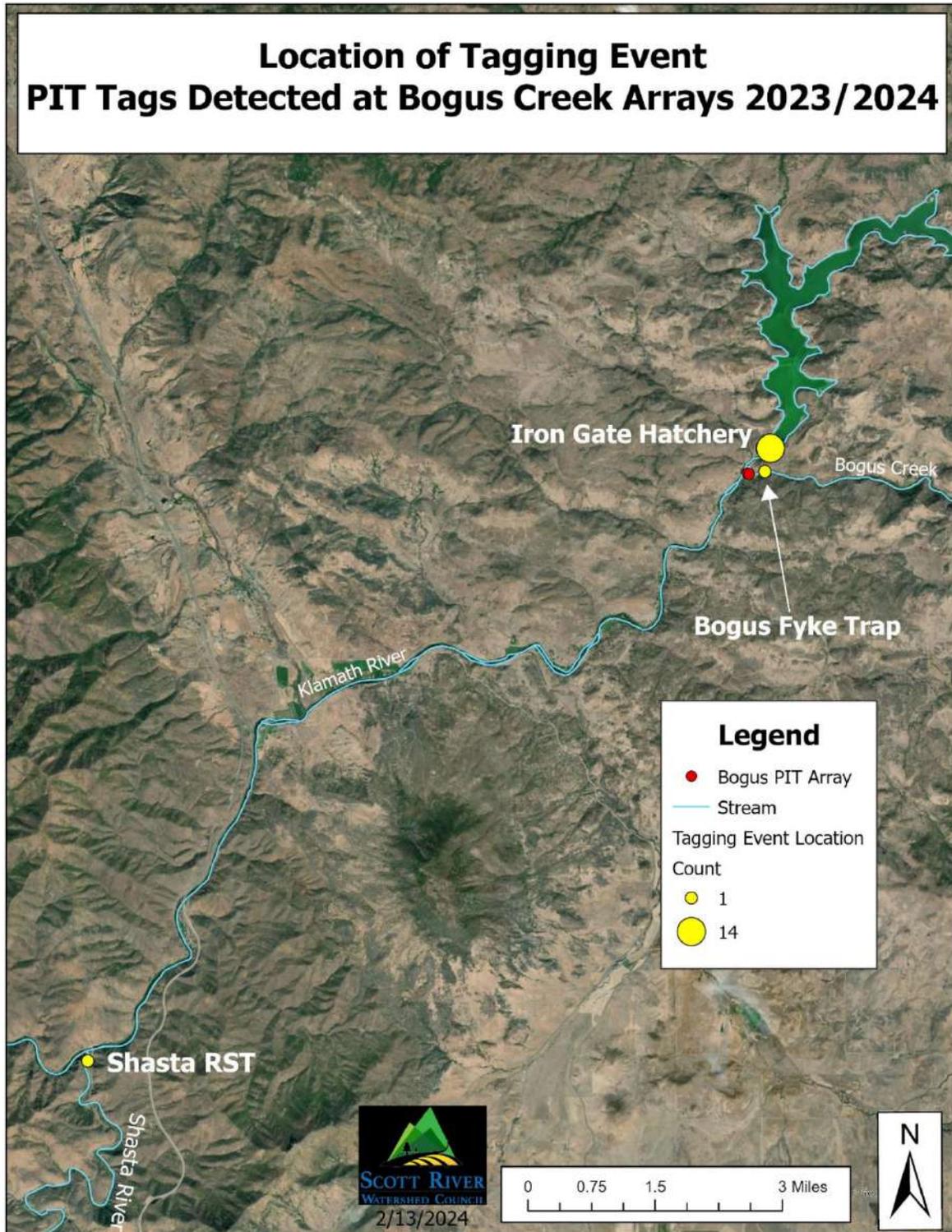
| Coho Salmon PIT-tagged at Iron Gate Hatchery and Detected in Bogus Creek | | | | |
|---|--------------------------------|--|--|--|
| Count | Average Forklength (cm) | Average Days Between Tag at IGH and Bogus Detection | Minimum Days Between Tag at IGH and Bogus Detection | Maximum Days Between Tag at IGH and Bogus Detection |
| 14 | 65.2 | 10 | 0 | 36 |

Table 4. Forklength and movement data from the Coho Salmon tagged at Iron Gate Hatchery and detected in Bogus Creek during the 2023-2024 season.

Only one of the 16 fish was tagged as a juvenile in Bogus Creek. This is the first detection of a natural-origin Coho Salmon returning to spawn in Bogus Creek since the beginning of SRWC’s monitoring in this watershed in 2022 (Table 4, Map 7).

| Tag #900254000445995 | | | | | |
|-----------------------------|---------------|--------------------------|-------------|-------------------------|-------------------|
| Date | Stream | Location | Gear | Fork Length (mm) | Weight (g) |
| 2/19/2022 | Bogus Creek | Bogus Fyke Trap | Fyke | 100 | |
| 11/6/2023 | Bogus Creek | Bogus Array B1 (RKM 0.1) | PIT Antenna | | |

Table 5. Detection history of the one adult Coho Salmon to have received its tag in Bogus Creek as a juvenile.



Map 7. Location of tagging event for all PIT-tagged adult Coho Salmon detected in the Bogus Creek watershed between October 2023 and January 2024.