

**Walker Creek PIT Antenna Project, 2<sup>nd</sup> Year (2021-2022)**  
**February Update**

February saw a significant downturn in the number of detections compared to the first three months of the monitoring season. High turbidity persisted throughout the month, but the first adult of the season was seen (a steelhead) and five new coho redds were detected. Additionally, the first adult that was part of the Salmon Creek release group was detected on BRZ on 2/04 (3DD.003DF92778, F), which makes it the first adult from the upstream release group to be detected in the two years of the study.

The WCR antenna was not operational from 02/06-02/25, because multiple sets of batteries had failed on top of the Memory Reader Error that has still not been fixed. It was determined that the battery chargers were the cause of the battery failures at the MCL antennas, and new chargers were purchased halfway through the month and this has rectified the issue.

No adult coho have been sighted as part of this monitoring effort in Walker Creek to date this season. Because so few redds identified have characterized as made by coho salmon, we reached out to Eric Ettlinger at Marin Water to see if their Fisheries Team had conducted any monitoring in Walker Creek this season. Marin Water has access to Salmon Creek, and through surveying identified six steelhead redds, but no coho redds there. In Arroyo Sausal, MMWD surveyors saw no fish sightings nor redds during surveys in (XX month or week). At this late point in the season, we have passed the peak of coho spawning migrations and expect to see zero coho adults for the sampling season, even with the addition of the tagged adults released as part of the study.

Spawner Survey Protocols used for this monitoring are the same as those developed and currently used by Eric Ettlinger in Lagunitas Creek at Marin Water. Marin Water also conducts spawner surveys in Walker Creek at invariable intervals, in separate sections of the creek. They are able to survey Arroyo Sausal between Soulajule Dam and Salmon Creek, as well as up into Salmon Creek. Through their monitoring, they were able to identify six steelhead redds, but did not observe any adult coho or coho redds in the 2021-22 season. Additionally, Eric Ettlinger reached out to Marin Water's Water Quality Manager about Soulajule's turbidity, and this was the response:

"I haven't been out to Soulajule or seen any turbidity data for Soulajule recently but we have seen the turbidity stay higher than expected in Nicasio compared to the reservoirs in the Mt. Tam watershed. Both Nicasio and Soulajule were drawn down very low last fall and filled quickly mostly with rainwater/runoff. I suspect the difference is the amount of rainwater/runoff now in the Soulajule/Nicasio reservoirs compared to Kent, the low alkalinity of that rainwater, and the type of contributing runoff to the Soulajule/Nicasio watersheds compared to Mt. Tam. Hopefully both Nicasio and Soulajule start to settle out soon." It is believed that the heavy rains in December brought an influx of sediment into the reservoir, and with continuous stirring of the waters due to high wind activity, the silt has not settled and is responsible for the unusual turbidity of the season.

One of the goals of this program is to create a more robust life-cycle monitoring coalition for Walker Creek by increasing the coverage and consistency of surveying, so the sharing of resources and data between agencies is and will continue to be incredibly important for the recovery of coho in Walker Creek. We are incredibly thankful for the help and guidance given by Marin Water staff during the adult

monitoring season, and are hopeful that the partnership will continue for the benefit of the stakeholders and the fish.

### **Detections**

To date, there have been 242 adult coho salmon detections as part of this monitoring, totaling 58 individual adults, and 124 total juvenile detections, with 49 individuals detected. In February, there were 27 total adult coho detections on the antennas. Thirteen individual adults were detected, nine of which were detected for the first time. Of the 13 individuals detected, only one showed up on MCL. The rest were observed at the BRZ and MCL antennas.

In February, there were 35 total juvenile detections, with 19 individuals detected, 16 of which were detected for the first time. All juveniles detected in February were seen on the MCL antenna. One unknown individual (3E7.0006054AB5), was detected on 2/26 on the BRZ antenna. We have reached out to NPS, CA Sea Grant, and MMWD to determine the source of this unknown juvenile fish, but are waiting on confirmation. Both adult and juvenile detections peaked in the first week of the month with nine adults and 24 juveniles detected. In terms of migration patterns, no adults or juveniles detected in February were detected on more than one antenna suggesting they were remaining in the area.

### **Spawner Surveys**

In February, the water quality and visibility remained poor, but six new redds were identified, four coho, one steelhead, and one that could possibly be categorized as a coho redd (WC-08, Figure 10). It was classified as CS/UNK because the pit could be seen and had coho qualities. This data is presented in **Table. 5**. To date, no adult coho have been visually observed due to high turbidity, and in February, only one steelhead (sex unknown) was seen.

**Table 1. Total Detections in February.** This table shows all detections that occurred each day in February, and does not distinguish between adults, juveniles, or individuals.

Date	BRZ	MCL	Total Detected
1-Feb	1	6	7
2-Feb	1	6	7
3-Feb	3	2	5
4-Feb	1	0	1
5-Feb	0	4	4
6-Feb	2	5	7
7-Feb	1	3	4
8-Feb	1	0	1
11-Feb	1	0	1
12-Feb	1	0	1
13-Feb	2	0	2
14-Feb	2	0	2
15-Feb	1	0	1
17-Feb	2	0	2
21-Feb	3	0	3
22-Feb	2	0	2
26-Feb	2	4	6
27-Feb	0	3	3
28-Feb	2	2	4

**Table 2. Detections By Week.** This table shows the total number of detections that occurred each week, separated into adults and juveniles. This data is represented as bar graphs in Figures 2 and 3.

Adults			Juveniles		
Week	BRZ	MCL	Week	BRZ	MCL
2/1-2/7	9	2	2/1-2/7	0	24
2/8-2/14	7	0	2/8-2/14	1	0
2/15-2/21	4	0	2/15-2/21	1	0
2/22-2/28	5	0	2/22-2/28	0	9
<b>Total</b>	<b>25</b>	<b>2</b>	<b>Total</b>	<b>2</b>	<b>33</b>

**Table 3. Individual Adults Detected in February 2022.** This table shows individual adult coho salmon detected in the month of February, on which antenna they were seen, and detection month(s). Added this month was the total number of detections to date and the number of days between first and last detection. No adults that were detected in February, regardless of their first detection date, were seen on more than one antenna.

Antenna	Detection Month	Tag ID	Sex	Release Location	# Detections in February	Date Ranges	Days Between Detections
BRZ	FEB	3DD.003D792778	F	Salmon	1	2/4/2022	1
BRZ	FEB	3DD.003D792957	M	Walker	1	2/12/2022	1
BRZ	FEB	3DD.003D792325	F	Walker	1	2/13/2022	1
BRZ	FEB	3DD.003D78EF67	F	Walker	1	2/17/2022	1
BRZ	FEB	3DD.003D7929BA	F	Walker	2	2/21/2022	1
BRZ	FEB	3DD.003D792667	M	Walker	2	2/22/2022	1
BRZ	FEB	3DD.003D79268E	M	Walker	2	2/28/2022	1
BRZ	FEB	3DD.003D7929D2	M	Walker	6	2/7-2/14	8
BRZ	FEB	3DD.003D792850	M	Walker	6	2/2-2/26	25
MCL	JAN-FEB	3DD.003D792380	M	Walker	4	1/19-2/1	13
BRZ	JAN-FEB	3DD.003D79293A	M	Walker	6	1/7-2/1	25
BRZ	JAN-FEB	3DD.003D792815	M	Walker	11	1/3-2/3	31
BRZ	JAN-FEB	3DD.003D792916	M	Walker	20	1/11-2/3	24

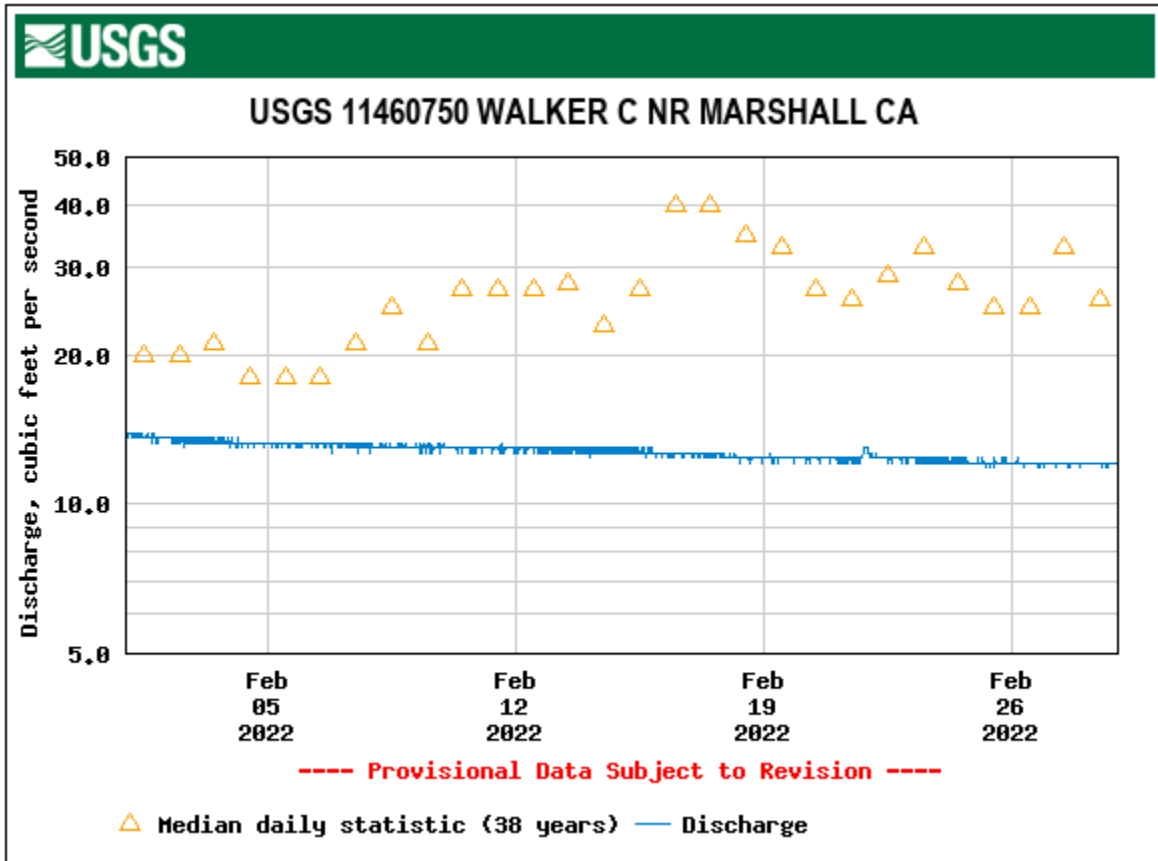
**Table 4. Individual Juveniles Detected in February 2022.** This table shows individual juveniles detected, on which antenna they were detected, number of detections, and duration of time in the creek. Like the adults, no juveniles were detected on more than one antenna. 17 juveniles were detected for the first time in February, and two had previously been detected in November.

Antenna	Detection Month	Tag ID	# Detections in February	Date Ranges	Days Between Detections
MCL	FEB	3DD.003DEEFA94	2	2/1/2022	1
MCL	FEB	3DD.003DEF0519	2	2/2/2022	1
MCL	FEB	3DD.003DEF0825	6	2/1-2/2	2
MCL	FEB	3DD.003DEF07D8	2	2/3/2022	1
MCL	FEB	3DD.003DEF04F6	4	2/5/2022	1
MCL	FEB	3DD.003DEEF9F8	2	2/6/2022	1
MCL	FEB	3DD.003DEF052A	1	2/6/2022	1
MCL	FEB	3DD.003DEF0601	2	2/6-2/7	2
MCL	FEB	3DD.003DEF0865	1	2/6/2022	1
MCL	NOV-FEB	3DD.003DEEFA0C	3	11/20-2/7	79
MCL	FEB	3DD.003DEF04F4	1	2/7/2022	1
BRZ	NOV-FEB	3DD.003DEF0805	4	11/20-2/15	89
MCL	FEB	3DD.003DEEFA25	1	2/26/2022	1
MCL	FEB	3DD.003DEF0568	1	2/26/2022	1
MCL	FEB	3DD.003DEF0835	2	2/26/2022	1
MCL	FEB	3DD.003DEF05AE	1	2/26/2022	1
MCL	FEB	3DD.003DEF06CC	1	2/27/2022	1
MCL	FEB	3DD.003DEF0728	1	2/27/2022	1
MCL	FEB	3DD.003DEF07FC	2	2/28/2022	1

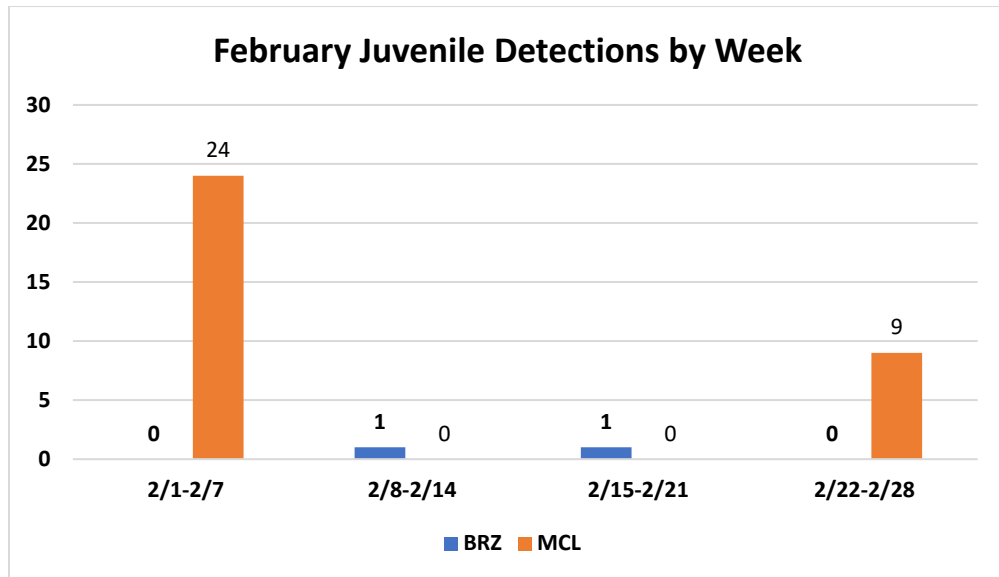
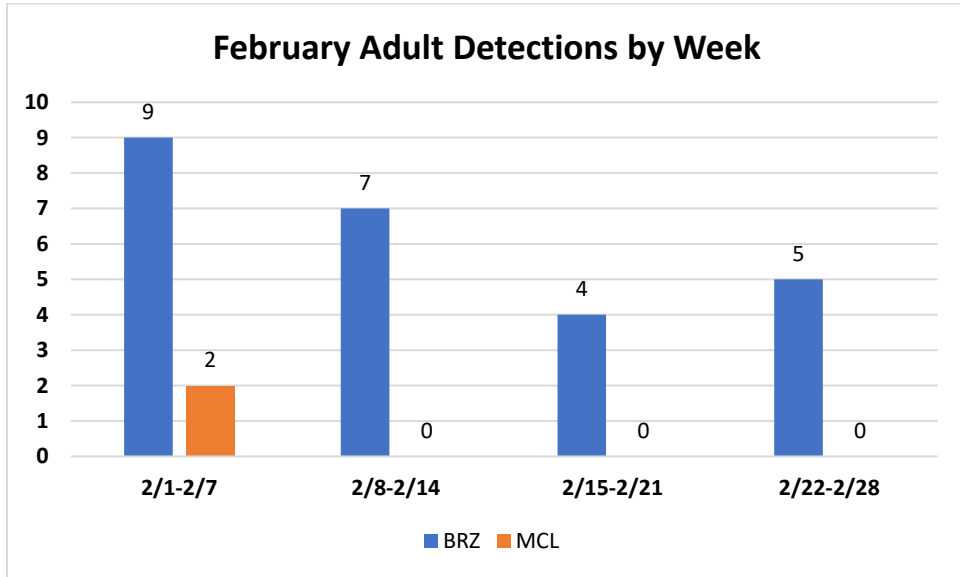
**Table 5. Redd Data.** This table shows the dimensions of the redds detected in January and February. Redd Height and Riffle Crest measurements are taken from protocols designed by David Hines at CDFW using the surface of the stream water as a surrogate for horizontal reference. The riffle crest thalweg is determined as the intersection of the highest point longitudinally along a riffle and the lowest cross-sectional point at the location of the redd, and the redd height is measured at the tallest point of the redd's mound.

Redd #	Species	Date ID'd	Length (m)	Width (m)	Redd Height (cm)	Riffle Thalweg (cm)
WC-01	Unk	29-Jan-22	3.7	1.9	21	22
WC-02	Unk	29-Jan-22	4.2	2.4	16	17.5
WC-03	CS	21-Feb-22	7.4	2.5	12	29
WC-04	CS	21-Feb-22	7.9	2.8	8	13.5
WC-05	SH	26-Feb-22	1.9	1.2	12	14
WC-06	CS	26-Feb-22	5.5	1.9	9	11
WC-07	CS	26-Feb-22	7.1	1.9	14	15.5
WC-08	CS/UNK	26-Feb-22	6.3	2.2	16	18

**Figure 1. Flows in February.** This graph shows the flow of Walker Creek in Cubic ft. per second over the course of the month of January. Flows peaked at 13.6 CFS on February 1<sup>st</sup> and 2<sup>nd</sup>.



**Figures 2 and 3. Adult and Juvenile Detection Timelines.** These graphs show the number of detections of adults and juveniles for February. Adult detections peaked on BRZ and MCL in the first week of the month. Juvenile detections peaked on BRZ in the second and third weeks of the month and MCL in the first week of the month. For reference, 4,387 tagged juveniles were released into Walker Creek at the WCR antenna on 11/10/22, and 590 adults were released between 12/28 and 12/30.



**Figures 4 and 5. Redd Maps.** These maps show the location of the 6 redds detected in February, WC-03 to WC-08, and their relative position in the creek compared to the antennas. Red pins represent coho redds, pink pins represent steelhead redds, and yellow pins represent unknown redds. WC-06 and WC-07 are both coho redds but are sharing space in the same riffle.





**Figure 6. WC-03.** This redd was first classified as steelhead but was later revised to coho, because on 3/12 the redd had grown substantially. Redd Note: Pit is deep but short, very defined right side, moderately sorted. Mound is low and oblong. Backs into riffle, very clean. From 3/12: redd is much larger now, with expanded pit. Now classified as CS.



**Figure 7. WC-04.** Similar to WC-03, this redd was first classified as steelhead but was determined to be coho on the same 3/12 survey because the dimensions have increased. Redd Notes: Pit is wide and deep, moderately sorted, no defined edges. Mound is very high and clean, backs into riffle crest. Mound is wide and crescent shaped, new. From 3/12: redd is much larger now, multiple Upstream fingers, defined Left-side edge, multiple mounds.



**Figure 8. WC-05.** This is the first and only steelhead redd identified to date. Redd Notes: Redd is small/teardrop shape. Pit is deep, moderately sorted, some smaller cobbles, hard to see. Mound is high and peaks in riffle crest. Potential super imposition of older redd but hard to see. Mound is clean.



**Figure 9. WC-06 (RS) and WC-07 (LS).** Both coho, these redds share a pit. Redd Notes (WC-06): Very fresh, potentially 2-3 redds on top of each other. WC-06 = very poorly sorted, pit has lots of fines with very defined RS edge. 2 Upstream fingers, series of 3 small mounds, low, with low sorting in first 2 and clean 3rd. 3rd mound backs into riffle crest, with potential 2nd redd in the middle of the 2nd. Redd Notes (WC-07): Touching WC-06, less defined pit, poorly sorted. Fines and gravels, another series of 3 mounds. First two are low, 3rd is in riffle crest.



**Figure 10. WC-08.** This redd is currently classified as Unknown/coho, because the water quality has not cleared up enough to determine the measurements of the redd. Redd Notes: Redd is under fallen tree. Not scour because defined RS edges and clear mound. Tree is above where the water line by a few feet. Pit looks deep but is obscured by tree, poor water quality. Mound is clean, low, long, and tapers into riffle crest.

